COMMON NOUNS AND RIGIDITY

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Thesis Abstract

Cem Şişkolar, "Common Nouns and Rigidity"

The principal question addressed is whether there is a division among common nouns which is similar to a familiar division among noun phrases that designate particular-level individuals: the one which is captured in the relevant literature as the difference between *de jure* rigid and not *de jure* rigid singular terms. In relation with the previous philosophical literature relevant to noun rigidity it is argued that the extant positions on the matter are not defended on the basis of well-founded syntactic categories and proper semantic arguments. Proper ways to argue for rigidity ascriptions to nouns are described. Then, such arguments are sought for the case of rigid/non-rigid division among count common nouns. It is shown that there are plausible, albeit inconclusive, reasons to hold that among common nouns (N-bar expressions) only simple common nouns are kind designators, and that if that is the case these simple common nouns will have to be reckoned as *de jure* rigid designators.

Tez Özeti

Cem Şişkolar, “Cins İsimler ve Gönderimsel Direşgenlik”

Ele alınan temel soru cins isimler arasında, tekil terimler arasında olan türden, dile dayalı bir gönderimsel direşgenlik ayrımı olup olmadığı. Yani, tekil terimler arasında dile dayalı gönderimsel direşgenlik gösteren özel isimler gibi cins isimler arasında da özel bir sınıf var mı? Bu soruya ilişkin olarak önce bu konuyla ilgili felsefi literatürde temsil edilen kuramsal konumların uygun sözdizimsel kategoriler kullanılarak ve uygun anlambilimsel temellendirmeler verilerek savunulmadığı iddia ediliyor. Ardından uygun anlambilimsel temellendirmelerin nasıl olması gerektiği tarif ediliyor. Bundan sonra da dile dayalı direşgenlik özelliği gösteren özel bir cins isim sınıfının varlığını gösterecek böyle temellendirmelerin varolup varolmadığı araştırılıyor. İlk olarak cins isimler arasında sadece basit cins isimlerin türlere gönderme yaptığına inanmak için makul ancak kesin olmayan gerekçelerin bulunduğu gösteriliyor, ardından eğer bu doğruysa basit cins isimlerin dile dayalı direşgenliğinin tanınması gerektiği gösteriliyor.

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Framing a question on the basis of one's prior studies and then investigating it at length with the aim of working out a voluminous study which will represent a novel, somewhat significant, contribution is what one is supposed to do in graduate dissertations. To judge from my personal experience, it is a very difficult task in the field of philosophy, and I have to confess that I struggled in pursuing it. I hope that eventually I have been able to come up with a result which can satisfy the academic earnestness which I always felt to be very much alive in our precious Boğaziçi University and our precious Philosophy Department.

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I dare to dedicate this unworthy work to my wife Zeynep, and my parents Nilgün and Münir. Whatever I ever do or say will fail to express my gratitude to them. Thank you.

CONTENTS

CHAPTER I

INTRODUCTION

Very concisely expressed the principal question I will be addressing in the following text will be whether there is a division among common nouns which is similar to a familiar division among noun phrases that designate particular-level individuals: the one which is captured in the relevant literature as the difference between *de jure* rigid and not *de jure* rigid singular terms. I will critically review how this question has been handled in the previous philosophical literature, and then weigh it myself relative to two frameworks derived from the linguistic semantic literature pertaining to the semantics of noun phrases formed by common nouns. I will pursue this objective as much as I can by way of 'a rigorous presentation in terms of possible worlds semantics' as recommended but not pursued in *Naming and Necessity* by Kripke himself.[1]

Kripke's *Naming and Necessity* lies at the origin of the question concerning the rigidity of common nouns (Kripke 1980). In *Naming and Necessity* Kripke famously introduced and defended the view that proper names are *de jure* rigid designators, whereas singular definite noun phrases termed as *definite descriptions* are not. In relation with common nouns, he explicitly claimed that those which are natural kind terms are like proper names. He also explicitly

[1] "Some of the worst misrepresentations of rigidity would have had much less currency if the relevant philosophical discussions had been conducted in the context of a rigorous presentation in terms of 'possible worlds semantics'. I did not do this in the present monograph both because I did not want to rest the argument heavily on a formal model and because I wished the presentation to be philosophical rather than technical. To readers who are thoroughly familiar with intensional semantics the rough outline of a presentation of my views in these terms should be clear enough without an explicit development…" (Kripke 1981, pg15, n16).

attributed rigid designation to some of these. As a result he has been commonly interpreted by its readers to suggest that common nouns that are natural kind terms are *de jure* rigid designators, although he did not provide any explicit justification for this suggestion.

What is it to be a rigid designator? To designate the same thing relative to every possible world. What is it to be a *de jure* rigid designator? To be a rigid designator by virtue of linguistic nature of the term rather than by virtue of how things stand. So, Kripke has claimed that names designate the same thing in all possible worlds by virtue of their linguistic nature. Why what terms denote relative to possible worlds should be of interest at all?[2]

The interest of what a term denotes relative to the actual state of affairs is obvious. The denotation of the term plays a role in the determination of the truth values of the sentences in which that term figures. But very often we also talk about what might or would or cannot happen and such talk too can be true or false. The truth and falsity of such talk in turn depends on what the terms forming it denotes relative to possible state of affairs.

If Alice had not been in France, Bob could borrow her bike.

For sure we are capable of judging the truth or falsity of our talk about possibilities. So, we should be able to determine what our terms denote relative to possible state of affairs. But then what is the big deal about Kripke's claim that proper names are *de jure* rigid designators? We should have known this all

[2] I will use *denote* and its variants as a generic term for reference. I will term different types of denotation as *designation* (e), *application* (<e,t>), and *quantification* (<<e,t>,t>).

along. But apparently, we were like the undergrads who in exams systemically compute the truth values of disjunctions erroneously, although they are competent users of the sentential connective *or*. Prior to Kripke's *Naming and Necessity*, it has been seriously and popularly been claimed that proper names were synonymous with definite descriptions. For example, famously Frege (1893) claimed that the meaning of the name 'Aristotle' will be synonymous with different definite descriptions for different speakers; for instance for one it might mean *the pupil of Plato and the teacher of Alexander the Great* whilst for another it might mean *the teacher of Alexander the Great, who was born in Stagira*. This was a startling suggestion. It has many unlikely consequences noted by Kripke and many other authors after him. For one thing it falsely predicts that for someone for whom *Aristotle* meant the second one of the descriptions mentioned above, the sentence *Aristotle might not have been born in any place other than Stagira* will not have a true reading. Surprisingly however this view about the meaning of proper names has been very popular for almost three quarters of the previous century.

After discussing issues mainly relating to proper names in the first two lectures of *Naming and Necessity*, in the third lecture Kripke turns his attention to the case of general terms. He discusses issues related with such common nouns as *gold*, *tiger*, *cat*, *animal*, *lightning*, *light*, *water*, *heat* etc.[3] He claims that such nouns for natural kinds are similar to proper names. He advances the same

[3] Kripke refer to the nouns just mentioned alternatively as *general terms*, *terms for natural kinds*, *common names*, *predicates*, *general names*, *natural kind terms*, *species names*, *terms for substances*, *terms for natural phenomena*. I will refer to them as common nouns for natural kinds.

claim also for related adjectives such as *hot*. Kripke does not in fact produce any explicit statement to the effect that every such natural kind noun as those mentioned above, besides being proper name like, is also a rigid designator. Among these terms he explicitly ascribes rigid designation only to the terms *heat*, *light* and *gold*.[4] However his overall discussion strongly suggests that he implies the same for the rest of such nouns as well as the corresponding adjectives, and he has been generally interpreted as such.

Kripke's ascription of *de jure* rigid designation to proper names has found almost universal acceptance. Yet his ascription of *de jure* rigid designation to natural kind common nouns and certain related adjectives did not receive that level of acceptance and initiated a controversy.

Kripke often appealed to intuitions for both of these ascriptions, and did not draw on systematic semantic analyses of a wide range of examples. Yet, in comparison with the case of proper names the case of common nouns and adjectives presents difficulties that makes it hard to assess on an intuitive basis the claim that some special class of common nouns and adjectives are *de jure* rigid designators.

Proper names' mode of denotation is pre-theoretically quite clear. However we may prefer to name it what a proper name does in a sentence

[4] Another general term which Kripke explicitly ascribes rigid designation is the term *meter* (55), as highlighted by Inan (2008). I here omitted mentioning it just because, unlike the other terms mentioned in the main text above, the main discussion pertaining to it does not take place in the third lecture of *Naming and Necessity* and it is not a term which one would like to count among the so called *natural kind terms*.

appears to be univocally clear: it purports to pick one single individual –in the present work I will refer to this mode of denotation as *designation*.

Also it seems that proper names' being *de jure* rigid designators can easily be intuitively ascertained by considering how we evaluate talk about possible state of affairs which involves proper names. The sentence *If Alice had not been a mean person*, *Bob would not need therapy* appears to pertain to the same individuals named as *Alice* and *Bob* as the sentence *Alice is a mean person and Bob needs therapy*.

The intuitively compelling nature of the ascription of *de jure* rigid designation to proper names is also heightened by the plain differences that hold between them and definite descriptions, which together with proper names are labelled as *singular terms*, as regards their contributions to the talk about possible states of affairs. Definite descriptions *prima facie* play a similar semantic role as proper names *qua* designators. However they can easily be seen to have the potential to designate different things relative to different. *If Bob's fiancée had not been a mean person Bob would not need therapy* and *Bob's fiancée is a mean person and Bob needs therapy* may not relate to the same person as *Bob's fiancée*.

In contrast, what common nouns' mode of denotation is is not as clear as that of proper names. From an intuitive pre-theoretical standpoint it seems that they may be taken to purport to pick a single kind like names. But on that same standpoint they may as well be seen as picking each member of a multitude of individuals of a certain kind. For example in relation with the common noun *tiger* occurring in *Every tiger has born in captivity*, it can be said that it primarily picks a certain kind of thing, and that it then only derivatively, given the sentential context in which it figures, also picks the possibly many individuals of that kind. But it is also possible to conceive the primary role of *tiger* in that sentence as merely picking tiger tokens. This pre-theoretical duality is reflected in semantic theorizing as well. Common nouns such as *tiger* are usually treated as being primarily appliers that pertain to tokens,[5] but occasionally they are also treated as being primarily designators that pertain to kinds.[6]

The absence of an intuitive pre-theoretical clarity regarding the denotation mode of common nouns makes it harder to intuitively assess ascriptions of rigidity to certain common nouns. Considered as designators, natural kind common nouns appear indeed to be rigid. Both in *If Bob had not kept tigers as pets then Bob would not need emergency treatment* and *Bob has been keeping tigers as pets and Bob needs emergency treatment,* the common noun *tiger* pertain to the same kind of thing. But considered as an applier *tiger* does not pertain to the same tiger tokens in these sentences –in the counterfactual it also pertains to possible tigers. So, *qua* designator *tiger* appears to be rigid, but *qua* an applier *tiger* is not rigid.

For sure, Kripke specifically ascribed rigid *designation* to natural kind common nouns, and not merely rigid denotation. And we have just noted that

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[5] This is the standard procedure instantiated in innumerably many works. It probably originated in Montague's and Lewis's formal semantic work (Lewis D., 1970) and it is also adopted in such a popular formal semantics textbook as Heim and Kratzer (1998).

[6] Krifka et al. (1995), Krifka (1995), Zamparelli (2000), Longobardi (2005).

considered as designators such nouns indeed appear to pertain to the same kind of thing regardless whether they are used to talk about possible states of affairs or about actual states of affairs. The problem is that Kripke appeared to imply that natural kind common nouns are special in being *de jure* rigid designators among general terms, just as names are special among singular terms. However there does not seem to be any general term, which considered as a designator won't be a *de jure* rigid designator. According to a common understanding of the notion of *general term*, general terms comprise expressions that can form syntactic predicates; and these appear to include besides simple adjectives and common nouns, modified common nouns as well. As in the case of semantically and syntactically simple *tiger*, the primary mode of denotation of such a modified common noun as *young tiger born in the wild* too can be considered to be designation. But if indeed *young tiger born in the wild* purports to pick a specific kind, then presumably it purports to pick the same kind in both *If Bob had not kept young tigers born in the wild as pets then Bob would not need emergency treatment* and *Bob has been keeping young tigers born in the wild as pets and Bob needs emergency treatment*.

So, unlike the case of singular terms, when viewed from a pre-theoretical standpoint *de jure* rigid designation does not appear to set a contrast among general terms, *pace* what Kripke appears to imply with his reference to natural kind common nouns. That all general terms may probably be *de jure* rigid designators does not of course indicate that it is wrong to ascribe *de jure* rigid designation to natural kind common nouns. But it reduces the significance of the ascription in comparison with its significance as regards the case of proper names.

Such considerations problematizing Kripke's ascription of *de jure* rigid designation to natural kind common nouns and related adjectives gave rise to a controversy about the relevance of the notion of rigidity with regard to general terms.

Some philosophers who take the primary mode of denotation of general terms to be designation maintain that as designators all common nouns and adjectives are rigid designators. But they hold that the category of general terms is not exhausted by adjectives and common nouns, and that it also includes such definite phrases as *the color of the sky* in so far as such phrases can occasionally form syntactic predicates. Such putative general terms as the definite phrase *the color of the sky* do not appear to be rigid designators. Drawing on this point these philosophers then argue that rigidity interpreted as rigid designation is not after all not a completely idle property that all general terms have.[7]

Another group of philosophers who take the primary mode of denotation of general terms to be application maintain that no general terms, except those applying to necessary existents such as mathematical entities, are rigid appliers in the sense of truly applying to the same individuals relative to all possible

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[7] The classic representative of this approach is Salmon (2005). LaPorte (2000) too is often considered a proponent of this approach, although as a matter of fact he abstains from using the label *general term* to any of the examples he discusses. Linsky (2006)'s account is very close to Salmon, but he inextricably conflates simple general terms –*tiger*- with constituents that play the role of syntactic predicates –*is a tiger*. Inan (2007) follows Salmon (2005) in accepting *the color of the sky* as a non-rigid general term but distinguishes between singular and predicative occurrences of general terms and qualifies his position by arguing that *the color of the sky* is non-rigid in its singular occurrences, whereas he remains non-committal as far as its predicative occurrences are concerned.

circumstances. Yet, they think that we should formulate the notion of rigidity in relation with appliers in some other way than formulating it as applying to the same individuals in all possible circumstances. According to these philosophers rigid application ought rather be understood in the following way (I will henceforth refer to this as *rigid* application*):

Applier α is a rigid*-applier iff every individual x is such that if there is a possible world w relative to which α applies to x then for every possible world w' in which x exists α applies to x.

Equipped with rigid* application, these philosophers appear to be able to claim that most natural kind common nouns are rigid*, in the sense of rigid*-application. For, it seems that tigers cannot fail to be tigers and masses of water cannot fail to be masses of water, so on and so forth. Thereby these philosophers appear to be able to capture and defend the distinctiveness of natural kind common nouns among common nouns as suggested by Kripke himself, albeit in a different way.[8]

And finally a third group of philosophers find fault, for a number of reasons to be studied later, with both of the described ways to defend the extension of the notion of rigidity to the case of general terms. This then constitutes a rough and brief description of the background upon which I will pursue my aim of weighing the question whether there is a linguistically significant rigid/non-rigid division among common nouns.[9]

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[8] Cook (1980), Mondadori (1978), Devitt (2005).

[9] To stave off a probable misunderstanding due to common association of general term rigidity with natural kind terms let me note that I neither intend to examine only the case of so called natural kind nouns, nor do I presuppose in any way that *de jure* rigidity should be co-extensional with natural kind nouns. *De jure* rigidity is a linguistic-semantic notion about the

My way of approaching this question will specifically aim to correct three specific shortcomings which I find both in Kripke's original discussion in *Naming and Necessity* and in the contributions to the controversy on the rigidity of general terms. I find that three points highly relevant for the issue of the extension of the notion of *rigidity* to the case of common nouns are not properly handled, neither by Kripke nor by the other philosophers who contributed to the controversy on the rigidity of general terms.

One point concerns the distinction between common nouns and noun phrases. It appears that neither Kripke nor the other authors pay heed to this distinction although it may have semantic consequences. Kripke explicitly ascribes rigidity only to the mass common nouns such as *heat*, *light* and *gold*. The peculiar thing about these mass common nouns is that unlike count common nouns like *tiger*, they can form noun phrases and figure in argument positions without taking any determiners (i.e. expressions like *a*, *the*, *all*, *some*). Consider the sentences below:

Alice found some gold in the drawer.
Alice found gold in the drawer.
Alice found a tiger in the wardrobe.
*Alice found tiger in the wardrobe.

The pair involving the common noun *gold* are both grammatical and meaningful, but this cannot be said for each member of the pair involving the noun *tiger*. *Gold* can replace *some gold* but *tiger* cannot replace *a tiger*. *Some gold* and *a tiger* are noun phrases. In so far as *gold* too can grammatically and

way expressions refer, and not about what they refer to. So, it may not exactly coincide with natural kind terms.

meaningfully replace a noun phrase it too in the second sentence above should be operating as a noun phrase: a noun phrase which is formed by the common noun *gold* but which should be distinguished from it. In general, common nouns do not have the same meanings and the same mode of denotation as the noun phrases they form. So, even if the noun phrase *gold* is a designator and rigid, one cannot immediately infer from this that the same also holds for the common noun *gold*. The same considerations apply all the more obviously for example in the case of the definite generic noun phrase *the honeybee* which designates a species and the common noun *honeybee*. Yet, in the relevant literature these latter two terms are often treated as if they were syntactically and semantically on a par.[10]

The second point concerns the semantics of the common nouns. Whether common nouns are designators for kinds or appliers for tokens seem to be a question that cannot be settled on intuitive grounds alone. Unlike the case of proper names, our intuitions appear to support both alternatives as regards the denotation mode of common nouns. Another difficulty one faces in determining the denotation mode of common nouns is related with the previous critical point I raised. Common nouns contribute to the determination of the truth conditions of sentences only via forming noun phrases which may have different denotation modes than the common nouns that form them –e.g. *the chinese cook* vs. *chinese cook* (proper names too contribute to the truth-conditions by forming noun phrases, but these noun phrases have the same denotation modes

[10] LaPorte (2000), Schwartz (2002), Devitt (2005).

as the proper names that form them). For this reason it seems that the issue of the denotation mode of common nouns can be settled only through going into wider theoretical considerations pertaining to the semantics of noun phrases formed by common nouns themselves. The authors that contributed to the controversy on the rigidity of general terms do not go beyond assuming that common nouns should be treated as appliers or as designators; and do not dwell at all on the implications of their assumptions regarding the semantics of noun phrases. Yet the question about the denotation mode of common nouns is of great relevance to the question whether the notion of rigidity can play any significant role in relation with common nouns. For example, it may be the case that common nouns are best treated as appliers and that as appliers *de jure* rigidity may be of no relevance to them.

The third point concerns nothing less than the justifications given for ascriptions of *de jure* rigidity to specific common nouns. In fact often no such justifications are ever provided.

For example, almost all contributors appear to agree that the common noun *tiger* should be *de jure* rigid. But no contributor takes the pain of setting an argument to justify this view. In fact, that natural kind common nouns and only them should be *de jure* rigid is often accepted as if it were an axiom, and attempts to formulate a notion of rigidity that will apply to common nouns are assessed according to whether they are consistent with that axiom. But why natural kind common nouns should be *de jure* rigid is not scrutinized at all.

Furthermore, when it is claimed that *tiger* is rigid according to this or that formulation of rigidity, this claim is supported solely on the basis of intuitions and without considering how this ascription will fare in accounting for the truth-conditions assigned to sentences in which the noun *tiger* occurs.

For example, it is generally accepted that if *tiger* is a designator it has to be a *de jure* rigid designator, but why this *has* to be so is not supported by semantic arguments. It may be retorted why should they, given that evidently whether it is used in talk about possible state of affairs or in talk about possible state of affairs *tiger* will pertain to the same kind of thing, and if that kind to which it pertains is taken to be its designatum then the designatum will remain the same in both sorts of talk. Still, it is desirable to go beyond this intuitive evidence and consider the question from a semantic-theoretical point of view: what would go wrong if we treated *tiger* as a non-rigid designator in our endeavor to account for the way the truth-conditions of English statements are determined on the basis of the contributions of their constituents? If *per impossible* nothing would go wrong then we would be free to accept that *tiger* may be a non-rigid designator despite the apparent intuitive evidence to the contrary.

This may appear as a futile exercise to show the intuitively obvious. Yet, it is not. Figuring out the theoretical reasons that would require us to affirm/deny ascriptions *de jure* rigid designation may be of assistance in settling the cases of the common nouns where our intuitions are not as compelling as in the case of *tiger*. For example, consider the case of the modified taxonomic common noun *endangered cat*. Intuitively, this noun will not pertain to the same kind of thing in talk about possible states of affairs as in talk about the actual states of affairs. In fact, it does not seem to pertain to one single kind at all. Of course, it may be thought that there is also a single kind which *endangered cat* pertains to regardless whether it is used in talk about possibilities or in talk about the actuality, something we would more efficiently refer to by using a phrase like *the endangered-cat-kind*. Yet, the very intuitiveness of taking *endangered cat* to primarily pertain to such an abstruse kind rather than to a variety of endangered cat species, and taking this abstruse kind to be the denotation of that modified common noun is questionable. So, it seems that unlike the case of *tiger*, there is no intuitive certainty regarding the question whether if *endangered cat* is a designator it is a rigid designator. For, already in entertaining the possibility that the noun *endangered cat* may be a designator for the endangered-cat-kind we seem to step beyond our intuitions. For this reason I think that the question whether such a noun as *endangered cat* can be treated as a *de jure* rigid designator can only be settled by considering how well the assumption that modified taxonomic nouns too are *de jure* rigid designators fares in accounting for the truth-conditions of the sentences in which such nouns figure.

The present text will strive to improve on the extant philosophical literature pertaining to ascription of rigidity to common nouns in relation with the shortcomings described here.

Rather than simply assuming that common nouns should be treated as designators for kinds or appliers for particulars, I will scrutinize how well these two options fare in accounting for the semantics of the noun phrases formed by common nouns. To this end I will tap on the linguistic semantic literature on the semantics of nouns phrases formed by common nouns.

Carlson (1980) has convincingly argued that certain noun phrase constructions formed out of common nouns should be taken as denoting kinds; and among them he specifically held that bare plural phrases and definite generics operated as names for kinds. For example, he drew attention to noun phrases like the following:

Whales face extinction due to excessive hunting. *(bare plural)*
The whale faces extinction due to excessive hunting.
The Beluga and the Narwhal are whales. *(bare plural predicate)*
The Beluga is not a shark species, it is a whale. *(indefinite singular predicate)*
Alice objects to the classification of a whale under the Phocoenidae family. *(indefinite singular)*
Alice claims that the cladistic analysis shows that the whale should rather be put under an altogether new family. *(taxonomic definite singular)*
The whale is a highly intelligent mammal. *(definite generic)*
Some whales are not endangered species. *(quantified)*[11]

And although Carlson's specific ways of analyzing these constructions have been criticized and rejected, the views that certain noun phrases denote kinds, and among them some designate kinds have been retained in the semantic literature on the noun phrases formed by common nouns. Clearly, however common nouns can also be used to form noun phrases that denote particular level entities.

The stars of the theme park, Alice and Bob, are whales. *(bare plural predicate)*
Whales have torn our nets last night. *(bare plural)*
One of the stars of the theme park, Alice, is a whale. *(indefinite singular predicate)*
Last night a whale should have thorn off the fish nets. *(indefinite singular)*
Surely, the whale should have been disoriented to come into these waters and tore our nets off. *(definite singular)*
The whales escaped by jumping off the pool over the gate into the sea. *(definite plural)*
Two whales tore out nets. *(quantified)*

[11] In thinking up such examples I am mainly indebted to Carlson (1980) and Krifka et al. (1995), among many other linguistic-semantic works written in this tradition.

This variety in the semantics of the noun phrases formed by common nouns can be theoretically accommodated in a number of ways. Having certain noun phrase types that apparently operate as kind designators may motivate the option to take common nouns themselves to be kind designators so as to obtain straightforward derivations of kind level designata for kind designating noun phrases. But one then will have to formulate special functions to account for the particular level denotations of other types of noun phrases. Or one can keep the common nouns as particular level appliers as is the standard course in formal semantics, and formulate special functions that derive kind level designata from their applier level meanings.

Some of these options have been evidenced in the literature. Carlson himself (1980) took common nouns to be particular level appliers and accounted for the noun phrases which he argued to operate as names for kinds by formulating functions that mapped the meanings of the common noun into appropriate kinds. Neo-Carlsonian works such as Chierchia (1998) and Dayal (2004) follow and improve on Carlson.

On the other side we see that the option of taking common nouns to be kind designators has been adopted in such works as Krifka (1995), Longobardi (2006), Zamparelli (2000). Thereby one can straightforwardly derive kind level designation for kind designating noun phrases; but then one has to formulate special functions that map common noun meanings into particular level applier meanings to account for noun phrases which have particular level denotations.

In sum there are different options regarding the semantics of common nouns, which *prima facie* are equally adequate to form a basis for the analysis of the semantic contributions of the various types of noun phrases. Possibly, there is no way to decide between them as they really are equally adequate. Or one of them may prove to be more potent. Either of these outcomes is relevant for the issue of common noun rigidity. Considered as appliers it indeed seems unlikely that any common noun can be *de jure* rigid –i.e. that it be an applier which by linguistic-semantic design has the same extension relative to every index of evaluation. Then, if there are not any theoretical reasons to treat common nouns as designators rather than as appliers the notion of *de jure* rigidity may be judged to be devoid of significance for common nouns. If on the other hand there are reasons to treat some or all common nouns as kind designators rather than as appliers, the notion of *de jure* rigidity may possibly have a footing among common nouns, provided that one can demonstrate that some/all common nouns should be assumed to be *de jure* rigid designators to account for certain sentence level semantic phenomena.

Another shortcoming I attributed to the extant literature pertaining to common noun rigidity was that ascriptions of rigidity or rejections thereof were not properly justified. In the present text, I will strive to construe proper theoretical justifications for such claims that target common nouns rather than appealing to intuitive evidence.

De jure rigidity understood as constancy of denotation relative to evaluation indexes (viz. possible worlds), is a notion that finds its natural home in a specific brand of semantic theorizing: truth-conditional natural language semantics deployed with the help of the notion of possible worlds.[12] The basic goal of this brand of semantics is to give theories that describe in a systematic manner how the truth-conditions we observably assign to the sentences may be related to the meanings of the constituents of these sentences and their manner of syntactic composition. Consequently one basic criteria relative to which such theories and their semantic claims are assessed is their success in predicting and explaining the semantic judgments of competent speakers about to the truth-conditions of different sentence types. Such judgments may directly pertain to the truth conditions or they may be judgments about ambiguity, equivalence, contradiction, contingency, entailment etc.

Ascriptions of *de jure* rigidity or rejections thereof to a certain family of denoting expressions cannot be assessed in isolation but only in relation with such theories in their goal to give systematically correct predictions of the semantic judgments of competent speakers. To justify an ascription of *de jure* rigidity to a family of denoting expressions one should show there are certain semantic judgments the explanation of which requires that ascription in a theoretical framework which otherwise does generally well in correctly predicting and explaining semantic judgments about a large variety of sentence types.

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[12] A brand of linguistic-semantic theorizing that originated in such works as Montague (1970A), (1970B), (1973), Lewis (1970), further connected with the tradition of transformational grammar through such works as Partee (1973), (1975), and that finds a finished textbook level formulation in such texts as Heim and Kratzer (1998) and Heim and Fintel (2011).

I want to highlight two points in relation with the picture of semantic justification sketched here. One is that *de jure* rigidity ascriptions should aim to explain some pre-theoretically ascertainable semantic phenomena –such as playing a role in explaining such properties and relations as ambiguity/non-ambiguity, contingency/non-contingency etc. The second point is that such ascriptions should be assessed in the context of theoretical frameworks which in their explanatory span goes well beyond the semantic phenomena that may motivate the *de jure* rigidity ascriptions.

To illustrate the first point we can consider the case of the commonly accepted ascription of *de jure* rigid designation to proper names. As we will illustrate in due course, that ascription is useful in giving a neat theoretical explanation of a pre-theoretically ascertainable ambiguity/non-ambiguity divergence that obtains between modal sentences that involve only proper name arguments and modal sentences that involve definite description arguments:

Richard Nixon might have been female.
The 37th president of US might have been female.

The ascription of *de jure* rigid designation to proper names can also be used to explain our pre-theoretical semantic intuition that identity sentences with proper name arguments should always be non-contingent, although identity sentences need not always be non-contingent:

Noah is Gılgamesh, but this might not have been so.
The 37th US president is Richard Nixon, but this might not have been so.

Likewise, the justification of ascription of *de jure* rigidity to some class of common nouns too, say semantically simple common nouns, minimally requires that that ascription does some linguistic-semantic explanation of the sort the ascription of *de jure* rigid designation to proper names does.

To explicate the second point according to which ascriptions of *de jure* rigidity should be assessed in the context of wider theoretical frameworks whose explanatory span go beyond cases that may motivate the ascriptions of *de jure* rigidity, we can consider the following probable situation in relation with the ascription of *de jure* rigidity to a certain class of common nouns. It may be the case that ascriptions of *de jure* rigidity have a theoretical significance of the sort illustrated just above only if common nouns are treated as designators. But perhaps theoretical frameworks in which common nouns are treated as appliers have at least the same explanatory range as the theoretical frameworks in which common nouns are taken to operate as designators and furthemore they don't need to ascribe *de jure* rigidity to any sort of common noun. For example, in the English context a theoretical framework which takes common nouns to be designators will have to explain why for example in English a common noun such as *tiger* is not interchangeable in all syntactic contexts with the name *Panthera tigris* or the definite phrase *the tiger* . In comparison, in a framework in which common nouns are treated as appliers the divergent syntactic distribution of *tiger* and *Panthera tigris* can be explained without any cost. Again, in comparison with a framework which treats both adjectives and common nouns as appliers, a framework where all common nouns including modified ones such as *wounded tiger* are treated as kind designators will have to derive in a more roundabout way a kind designatum for *wounded tiger* out of the meanings of the constituents *wounded* and *tiger*, where at least *tiger* will have to be another kind designator. Now, if frameworks in which common nouns are treated as designators do not have advantages that will counterbalance such disadvantages as those mentioned above, and if furthermore the semantic phenomena which motivates ascriptions of *de jure* rigidity in such frameworks can also be explained without recourse to any *de jure* rigidity ascriptions in frameworks which treat common nouns as appliers, then there will be no need to extend of the notion of *de jure* rigidity to the case of common nouns.

In the present text in weighing the question whether the notion of *de jure* rigidity has any significance in the case of common nouns I will examine whether one can raise a case for ascribing *de jure* rigidity to a certain class of common nouns which can be justified along the lines adumbrated above. I will look into whether sentential semantic phenomena like ambiguity/non-ambiguity, contingence/non-contingence which are crucially relevant to justify the ascription of *de jure* rigidity to proper names will also be relevant in the case of common nouns. I will not however consider these phenomena in a way that ignores the general issues concerning the semantics of the common nouns and of the noun phrases they form. As I have previously indicated noun phrases formed by common nouns manifest a great semantic variety. There are different approaches to accommodate that variety, which involves different theoretical options as to the semantic type to be ascribed to the common nouns: will they be appliers, will they be designators, or a mixed approach will be more appropriate? The analysis of the semantic phenomena which is susceptible to give support for the ascription of *de jure* rigidity to some/all common nouns will therefore be handled relative to general approaches which also have the potential to account for the semantic variety of the noun phrases formed by common nouns and some further phenomena that pertains to the general semantics of common nouns.

The game plan for the coming chapters will then be as follows. In the second chapter I will discuss important elements of the extant literature that pertains to issue of the significance of the extension of the notion of *de jure* rigidity to the case of common nouns. I will first give a critical presentation of Kripke's introduction of the view that some common nouns, specifically those for natural kinds are rigid designators. Then I will give a critical general presentation of the controversy on general term rigidity that emerged in reaction to Kripke's ascription of rigid designation to some common nouns. In support of the discussion of this chapter there will be an appendix at the end of the main text. There I will critically discuss in a detailed manner a number of influential texts representative of the different views defended in the controversy on the rigidity of general terms. In these detailed discussions I will futher substantiate some criticisms which will rather be cursorily raised in the general presentation of the controversy on rigidity of the general terms.

In the third chapter I will discuss the objectives and the methodology of the branch of truth-conditional semantics to which the property of *de jure* rigidity naturally belongs and from the point of view of which I will weigh the issue of the extension of the notion of rigidity to the case of common nouns. In the meantime I will have occasion to introduce the formalism I will use in the rest of the present work.

In the fourth chapter I will illustrate how the commonly accepted view that proper names are *de jure* rigid designators can be justified properly. The aim of that illustration will be to lay down a template which can be followed to justify ascriptions of *de jure* rigidity to common nouns. The justification will draw on the analysis of two types of pre-theoretically observable semantic phenomena mentioned above: non-ambiguity of sentences with modal elements and proper name arguments, and the non-contingency of identity sentences involving proper name arguments.

In the fifth chapter I will illustrate the variety in the semantics of the noun phrases formed by common nouns. The interest of considering the semantics of the noun phrases formed by common nouns was indicated above: common nouns contribute to the determination of sentential meanings only by forming noun phrases which may manifest a variety of meanings.

In the sixth chapter I will describe and comparatively assess two frameworks designed to account for the variety in the meanings of the noun phrases formed by common nouns. One of these frameworks, which I will label as the C-framework, will take all common nouns to be appliers. This framework will therefore have to resort to special semantic operations to account for the kind designating meanings of certain types of noun phrases. The other framework, which I will label as the K-framework, take simple (non-modified) non-taxonomic common nouns to be kind designators whereas it will treat modified common nouns and taxonomic common nouns as appliers. That is, the

K-framework will take semantically simple common nouns like *tiger, transistor*, *electron* to be kind designators; but it will treat taxonomic common nouns like *species* to be kind level appliers and modified common nouns such as *wounded tiger* to be particular level appliers. I will bypass the option of taking all common nouns to be kind designators regardless whether they are taxonomic, modified or simple. The theoretical reasons for this will be explained at the end of the sixth chapter.

In the seventh chapter drawing on the template set in the fourth chapter for the justification of *de jure* rigidity claims and drawing on the frameworks described and motivated in the sixth chapter I will seek ways to justify the view that some class of common nouns are *de jure* rigid. To this end I will examine from the standpoints of the two frameworks the semantic phenomena that has the potential to give reasons to hold that some class of common nouns should be *de jure* rigid.

The results to be reached in the seventh chapter be summarized in the following way. Of the two frameworks on the semantics of common nouns that will be formulated, the K-framework, the one in which only the semantically simple non-taxonomic common nouns are kind designators, will be seen to warrant a theoretically significant ascription of *de jure* rigidity to common nouns: the semantically simple non-taxonomic common nouns will have to be assumed to be *de jure* rigid designators from the standpoint of that framework to explain certain modality related semantic phenomena.

For example, of the following pair of sentence the first one has a certain reading for which the second one does not have any counterpart:

1 a To avoid surveillance Alice must use an obsolete Japanese mobile model.
b To avoid surveillance Alice must use a Sharp SH903i.

Namely, 1a has a reading which can be paraphrased as Actual obsolete Japanese models are such that every possible circumstance in which Alice avoids surveillance Alice uses one or another token of one or another of these models – this reading may not be plain to see but in the relevant chapter I will argue that it exists. This reading which will be characterized as non-specific de re exists alongside the ordinary de dicto reading which can be paraphrased as in every possible circumstance in which Alice avoids surveillance Alice uses one or another token of a Japanese mobile which is obsolete. These two readings are not equivalent. According to the de dicto reading of 1a the qualifications of the mobile model which is relevant in relation with circumventing the surveillance are the obsoleteness and to be made in Japan, otherwise any model will do. According the non-specific de re reading of 1a however what is relevant for circumventing the surveillance is that the model used be one or another of the Japanese models that are actually obsolete: obseleteness and to be made in Japan are not relevant to avoid surveillance, they are just markers for the relevant models.

In contrast, 1b does not have a kind level non-specific *de re* reading which can be distinguished from its *de dicto* reading. More precisely, the *de dicto* reading is equivalent to the kind level non-specific *de re* reading. This is reflected in the truth conditional equivalence of the following ways of paraphrasing 1b: *The Sharp SH903i is such that every possible circumstance in which Alice avoids surveillance Alice uses one or another token of that model* and *in every possible circumstance in which Alice avoids surveillance Alice uses one or another token* *of the Sharp SH903i*. Both according to the kind level non-specific *de re* reading and according to the *de dicto* reading of 1b what is relevant to circumvent the surveillance is that Alice uses no other than the model Sharp SH903i, the very model which actually bears that name.

I will argue that under a framework like the K-framework which takes simple non-taxonomic common nouns like *Sharp SH903i* to be kind designators, such a difference as the one that holds between 1a and 1b is explainable only if simple non-taxonomic common nouns are assumed to be rigid kind designators. More specifically, if in 1b *Sharp SH903i* were a kind designator but not a rigid one, then the *de dicto* reading could be taken to relate Alice's circumvention of the surveillance not to a single model but to a variety of different models. But it seems that 1b does not support such a reading.

Another semantic phenomenon which I will show to support ascribing rigid designation to simple non-taxonomic common nouns under the K-framework relates to the contingency/non-contingency divergence observed in identity statements with kind designating noun phrase arguments. For example, the first of the following identity sentences is non-contingent, whereas the second is contingent:

2 a The neutrino is in fact the same particle as the antineutrino.
b The neutrino is in fact the same particle as the particle discovered by Reines and Cowan at 1956.

This divergence can readily be explained in terms of the definite *noun phrase* arguments' rigidity or non-rigidity. However such an explanation does not directly support a rigid/non-rigid distinction among *common nouns*. It will support such distinction among *common nouns* only if rigid designation by some definite phrases directly depended on the rigidity of the common nouns which form them. According to the K-framework the so called *definite generics* like *the neutrino* are exactly such definite noun phrases. I will thus argue that according to the K-framework such divergences as the one that obtains between 2a and 2b supports assigning rigid kind designation to simple non-taxonomic common nouns.

However these results will be compromised by the fact the C-framework which takes all common nouns to be appliers can (i) more or less account for the phenomena that constitute the reasons in favor of viewing semantically simple common nouns as kind designators, (ii) can moreover account for the modality related semantic phenomena illustrated above without ascribing *de jure* rigidity to any common noun.

In the sixth chapter I will cite some reasons to prefer the K-framework, according to which rigid designation plays a role in the semantics of some common nouns, over the C-framework, which need not give rigidity any role in relation with common nouns. But there are counter-reasons supporting the opposite preference as well. It will be much beyond the scope of the present text to conclusively decide between these two frameworks as many of the decisive issues are not related with the rigidity issue at all. So, I will simply indicate the relative advantages and disadvantages of both approaches and leave at that.

This description of the conclusion to be reached gives the impression that not much will be achieved after all. The reason for this feeble conclusion is the contrived semantics of common nouns and the noun phrases formed by them. Even if the conclusion we reach is a feeble one, the achievement of the present work should not be measured by that conclusion. I wish that its achievement be measured relative to its endeavor to discuss the issue of the rigidity of common nouns without glossing over the contrived semantics of common nouns, and to require and give explicit semantic arguments for ascriptions of *de jure* rigidity.

CHAPTER II

THE LITERATURE PERTAINING TO THE COMMON NOUN RIGIDITY

As set in the introductory chapter my principal aim in this work is to study the relevance of the notion of rigidity to common nouns –i.e. terms like *tiger*, *wounded tiger*, *transitor*, *bee species which is typically harmed for honey*. And the motivation for this study lies in the shortcomings I perceive to exist in the philosophy of language literature pertaining to the controversy on general term rigidity. This literature has spawned in response to Kripke's ascribing rigid designation to natural kind common nouns and some related adjectives. The category of common nouns is not much in use in the literature in question. Rather, the literature uses the category of general terms, although there does not seem to be a consensus on the extension of that category. Still, whichever way one delimits the category of general terms, common nouns are always included and the discussion has therefore direct relevance to the case of common nouns, and vice versa.

In the present chapter I will present with a critical outlook the principal views defended in this literature pertaining to the rigidity of common nouns and the arguments through which they are defended. It will have two main parts. In the first part I will give a critical presentation of Kripke's introduction of the view that some common nouns, specifically those for natural kinds are rigid designators. Then I will give a general critical presentation of the controversy on general term rigidity that emerged in reaction to Kripke's ascription of rigid designation to some common nouns. In the second part I will give more detailed critical discussions of a number of much cited papers which represent the different views defended in the controversy on the rigidity of general terms.

The Origin: *Naming and Necessity*

In *Naming and Necessity* Kripke (1981) famously introduced and defended the view that proper names are *de jure* rigid designators, whereas singular definite noun phrases termed as definite descriptions are not. In relation with common nouns, he explicitly claimed that those which are natural kind terms are like proper names. He also explicitly attributed rigid designation to some. As a result he has been commonly interpreted by its readers to suggest that common nouns that are natural kind terms are *de jure* rigid designators, although he did not provide any explicit justification for this suggestion. Below I will first cover threads of discussion in *Naming and Necessity* which is relevant to Kripke's ascription of *de jure* rigidity to proper names, then I will pass to discuss Kripke's handling of the case of common nouns in that same work.

Proper Names, Rigid Designation and Surrounding Issues in *Naming and Necessity*

In *Naming and Necessity* Kripke uses mundane examples to show that when we talked about possibilities we all along have been using and understanding proper names to designate the same thing relative to each of them –that is, that we have been using names as rigid designators. Kripke's discussion is very informal. He simply appeals to our linguistic intuition about what we would say and what we would not say; he makes the reader judge for herself how she in fact uses and understands proper names, by making her reflect on the ways she evaluates talk about possible state of affairs.

Kripke does not give any syntactic and semantic analyses of his examples. Furthermore the relation between his claim that proper names are rigid designators, and his other influential claims such as that names are not synonymous with definite descriptions, that identity sentences involving two proper names are non-contingent, are not clear. That is, it is not clear which is being deduced from which. Now let me briefly present the principal threads of his discussion which are one way or another related with the claim that proper names are *de jure* rigid designators.

I find that the most compelling pieces in Kripke's discussion that show that we have been using names as rigid designators were those in which he contrasted such pairs as the following:

1 a The US president in 1970 might not have been the US president in 1977.
b Nixon might not have been Nixon.

Kripke suggested to use such modal sentential contexts as the one exemplified in the sentences in 1 as a test through which we can intuitively deduce whether a singular term is a rigid designator or not. If the resulting sentence cannot ever be evaluated as true, as in the case of 1b, then that designator should be rigid. How does this test show whether a singular term is a *de jure* rigid designator or not? We will give a more detailed account about this in the coming chapters. For the time being let the following suffice. Unlike 1a, we intuit that it is impossible to evaluate 1b as true. Unless the proper name *Nixon* had the same designation relative to every state of affairs that might have been the case we would not have such an intuition. Certainly we see no problem in evaluating 1a as true, where the syntactic arguments are the two occurrences of the definite description *the US president in 1977*, and clearly this definite description will not have the same designatum relative to every possible states of affairs. Since our linguistic intuition tells us that we would not ever do the same with proper name arguments, proper names should be *de jure* rigid designators.

Another part of Kripke's discussion which is relevant for his claim that proper names are rigid designators was his discussion about the identity sentences. He claimed, contradicting the prevalent opinion of the day, that identity sentences with proper name arguments should be necessarily true, if true. And that we know *a priori* that truth entails necessary truth in the case of such sentences (109). He again argued for this claim by appealing to our intuitions. For example he asks us to consider whether under any circumstances we would judge *Hesperus is Phosphorus* to be false, given that Hesperus is actually Phosphorus. The necessary truth of true identity sentences with proper name arguments further confirm the thesis that proper names are rigid designators. If each of *Hesperus* and *Phosphorus* are rigid designators and what they designate relative to the actual state of affairs is the same, then relative to all possible circumstances they will designate the same thing as one another, and thus *Hesperus is Phosphorus* will be true relative to all possible circumstances. Furthermore our *a priori* knowledge that that truth entails necessary truth in the case of identity sentences with proper name arguments support the qualification of names' rigidity as being of the *de jure* sort –i.e. that proper names' being rigid designators is a feature fixed by linguistic design in so far as competence in the language appears to be sufficient to know such entailments.

A considerable part of Kripke's discussion on names is aimed against the view that each proper name is inhering in a descriptive content which helps us to identify the designatum of the proper name. He has given three distinct types of arguments which purport to show that this view has implausible consequences. Of these we will here only illustrate the so called modal argument.

2 Gödel must have proved the completeness theorem for first order logic.

If all the identifying information I had about who Gödel is is that he is the one who first proved the completeness theorem for first order logic, then apparently according to the descriptive content view, for me *Gödel* could only mean *the person who first proved the completeness theorem for first order logic*. But if this were the case then there would be a reading of 2 under which I would have to evaluate it to be true. That is, I would have to evaluate as true the reading which can be paraphrased as *it is necessary that Gödel proved the completeness theorem for first order logic*. But as things stand 2 does not have such a reading.[13]

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[13] This argument is also named as the unwanted necessity argument. Note that considered by itself this type of argument is effective in refuting only the claim that names' content are contingently satisfied descriptions. This type of argument is for example inffective against the claim *Gödel* has a content which can be expressed by the rigidified description *the person who actually proved the completeness of first order logic*. Besides this type of argument Kripke gives two further types of arguments, commonly labeled as *semantic arguments* and *epistemic arguments* (Salmon 1981, 24-31) . And the claim that *Gödel* has rigidified descriptive content *the person who actually proved the completeness theorem for first order logic* cannot stand arguments of these other types. Nonetheless it seems that it is possible to give better thought

The relation of this discussion with the claim that names are rigid designators is two-fold. On the one hand, if names are indeed rigid then they cannot have contents expressible by definite descriptions which involve descriptions that are satisfied by entities only contingently. Relative to a state of affairs definite descriptions designate the entity which uniquely satisfies relative to that state of affairs the descriptive conditions they express. As what uniquely satisfies a contingent description will change relative to different state of affairs, the designata of contingent definite descriptions will also change when they are being used to talk about different possible scenarios. On the other hand, if indeed names do not have descriptive contents, that is, if the way they designate does not have anything to do with the satisfaction of descriptive conditions then there should be no reason for their designatum to change relative to different possibilities.

Natural Kind Common Nouns, Rigidity and Surrounding Issues in *Naming and Necessity*

In the third lecture of Naming and Necessity Kripke turns his attention to the case of general terms. He discusses issues related with such common nouns as

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out versions of descriptive content theories for names which trump all these three types of theories taken together, and which futhermore can give straightforward explanations of certain phenomena which prove difficult to explain for non-descriptive theories for names –such as explaining how we are able to look out for and investigate the designata of the names we use, the informativeness of identity sentences with proper name arguments, the semantics of doxatic sentential contexts etc. About these latter controversial claims see Searle (1983).

gold, *tiger*, *cat*, *animal*, *lightning*, *light*, *water*, *heat* etc.[14] He claims such nouns for natural kinds are similar to proper names. Besides these common nouns he claims the same also for such adjectives as *hot, loud, red* (p. 134).

Kripke does not produce any explicit statement to the effect that every such natural kind noun as those mentioned above is also a rigid designator. Among these terms he explicitly ascribes rigid designation only to the terms *heat*, *light* and *gold*.[15] However his overall discussion strongly suggests that he implies the same for the rest of such nouns as well as the corresponding adjectives. Since Kripke does not dwell as much on the case of adjectives as he does on the case of common nouns for natural kinds, and since in the present work I will primarily focus on the case of common nouns, I will conduct the following presentation of Kripke's views mainly in reference to common nouns.

Kripke supports his claim that common nouns for natural kinds are like proper names mainly in two ways. First, he argues that, just like names, common nouns for natural kinds cannot be taken to connote a complex descriptive content which putatively determines its denotata. Second, he argues that, just like identity sentences with proper name arguments, theoretical

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[14] Kripke refer to the nouns just mentioned alternatively as general terms (p. 134), terms for natural kinds (p. 127, p.136), common names (p. 127), predicates (p.127), general names (p. 127), natural kind terms (p.127), species names (p. 134), terms for substances (p. 116), terms for natural phenomena (p. 134). I will here simply refer to them as *common nouns for natural kinds*.

[15] Another general term which Kripke explicitly ascribes rigid designation is the term one meter (p. 55). I here omitted mentioning it just because, unlike the other terms mentioned in the main text above, the main discussion pertaining to it does not take place in the third lecture of *Naming and Necessity* and it is not a term which one would like to count among the so called natural kind terms.

identifications such as *a lightning is an electrical discharge*, with noun phrase arguments formed by natural kind nouns are necessarily true, if true.

As for the rigidity claim concerning the common nouns for natural kinds, Kripke does not give any explicit argument in its defense. Moreover, this time unlike his discussion concerning proper names, he does not even suggest an intuitive test using which we can intuitively deduce the rigidity of a common noun. We thus have only Kripke's arguments to the effect that natural kind nouns are like proper names in the mentioned two respects to depend on as an intuitive justification for his claim that nouns for natural kinds are rigid designators.

Kripke argued against the idea that nouns for natural kinds are synonymous with the descriptions which may have been used to introduce these nouns into the language by way of identifying their denotations. According to a simplistic implementation of this idea, for example, *tiger* will be synonymous with a description like *large carnivorous quadripedal feline, tawny yellow in color with blackish transverse stripes and white belly* or *heat* will be synonymous with *whatever gives us sensations of hotness*. Kripke plausibly argues that *tiger* cannot be synonymous with a description like *large carnivorous quadripedal feline, tawny yellow in color with blackish transverse stripes and white belly*, as there might be tigers which may not satisfy the identifying description associated with the term *tiger*, and there might be non-tigers which satisfy the description associated with *tiger*.

Even if we grant Kripke's point that common nouns are not synonymous with descriptions, the connection between the rejection of the description analysis for natural kind common nouns and the view that such nouns are rigid designators is tenuous. If we decide to treat common nouns for natural kinds as designators, we can, perhaps even should, do the same about the descriptions putatively associated with them. For, after all most of the descriptions Kripke envisages are just modified common nouns, and in all sentential contexts in which a simple common noun is semantically interpretable it can be replaced by a convoluted modified common noun without any harm to semantic interpretability. That is, for example, *gold* can be replaced by *yellow ductile metal* in all sentential contexts, and the resulting sentences will still be meaningful –albeit they will have different meanings. So, if the designata of common nouns for natural kinds will be taken to be kinds, then the designata of descriptions considered as designators can as well be taken to be kinds. Now, it is not clear whether descriptions, when they are treated as designators for kinds, will designate different kinds relative to different possible states of affairs. On the contrary, it seems that, for example *yellow ductile metal* will designate relative to all possible circumstances the same kind; more specifically the kind which at any possible world w is instantiated by a token x if and only if x is yellow, ductile and metal at w. So, being a description, *a fortiori* not being a common noun for a natural kind, may not be an impediment to rigid designation. Then, not just natural kind nouns but other common nouns too, even those which themselves are descriptions or are synonymous with descriptions, may be rigid designators. But if rigid designation may arguably be compatible with being synonymous with descriptions then solely arguing that natural kind nouns are not synonymous with descriptions will not lend any support to natural kind nouns' being rigid designators.

Let's now turn to the other respect in which Kripke found natural kind nouns to be similar to proper names. According to Kripke, just as the truth of the identity sentences formed with proper name arguments entail their necessary truth, the truth of theoretical identification sentences with arguments formed from natural kind nouns entails the necessary truth of these identification sentences. Moreover, Kripke claims that as in the case of identity sentences, in the case of such theoretical identification sentences as well this entailment is known *a priori*. Kripke's examples of theoretical identification sentences were the following:

3 Light is an electromagnetic radiation.
Water is H2O.
Gold is the element with atomic number 79.
Cats are animals.
Heat is the motion of molecules.
Ligthning is an electrical discharge.
Whales are mammals.

Kripke defends his claim that in the case of such sentences truth entails necessary truth by resorting as usual to our intuitions as to whether we can conceive any circumstances relative to which we will evaluate as false a theoretical identification sentence which we evaluate as true relative to the actual state of affairs.

However the relation between these claims about theoretical identification sentences with arguments formed out of natural kind common nouns and the claim that such common nouns are rigid designators is again not clear. In the case of proper identity sentences with proper name arguments, proper names' being rigid designators semantically requires that if such identity sentences are true they must be necessarily true. Kripke appears to hold that a similar semantic requirement holds between the rigidity of common nouns for natural kinds and the necessary truth of true theoretical identification sentences. How this latter requirement obtains is however not clear at all. Identification sentences such as *Lightning is an electrical discharge* are not identity sentences. So, the alleged semantic requirement cannot exactly be of the same type as in the case of identity sentences with proper name arguments. Such sentences as *Lightning is an electrical discharge* are often analyzed as universal quantifications. Yet this analysis is of no help either: even if the pair of common nouns that occur in such sentences are taken to be rigid designators for natural kinds, their truth will not entail their necessary truth if such sentences are analyzed as universal quantifications. *Every lightning is an electrical discharge* does not entail *Necessarily every lightning is an electrical discharge*, even if *lightning* and *electrical discharge* are assumed to be rigid designators. That the actual extension of the kind designated by *lightning* is in the actual extension of the kind designated by *electrical discharge* does not entail that the extensions of these two kinds will be related in the same way relative to all possible state of affairs.[16] Perhaps the identification sentences are neither identity sentences nor universal quantifications, but have an altogether

[16] This is a point which belongs to the common lore of the controversy on the rigidity of general terms. I do not know who came with it first or where I myself learned about it first. It is produced for example in Soames (2002), (p. 258).

different analysis.[17] But Kripke does not propose any sort of semantic analysis for his examples of theoretical identification sentences.

Critical Remarks on *Naming and Necessity*'s Ascription of Rigid Designation to Some Common Nouns

The Want of a Proper Semantic Argument

For a semanticist who is in the business of describing how the truth-conditions of sentences are determined on the basis of the meanings of their constituents, the *de jure* rigidity related discussions in *Naming and Necessity* constitute a starting point rather than a finished semantic argument. Kripke appeals to our linguistic intuition as to how we would evaluate his examples if such and such were the case, and very informally suggests that our intuitions showed that we have been using names and common nouns for natural kinds rigidly by virtue of the semantic design features of natural languages. But Kripke did not do what a semanticist would do: considering a range of examples *and* then arguing that our intuition as to how we would evaluate these examples is best explained if we adopt such and such analyses, plus the assumptions that proper names or common nouns for natural kinds are rigid designators.

Far be it from me to belittle Kripke's achievement; often real philosophical achievement comes by way of revealing the obvious that has previously been

[17] I think that they should rather be analyzed as *characterizing sentences*, which have an intrinsic modal operator. For more on the semantics of characterizing sentences see Krifka et al. (1995), Shubert & Pelletier (1987). I will not however be able to follow this thread in the present work.

overlooked. Kripke's claim about names was so plausible that it did not require formal semantic analyses to gain general acceptance. In fact, probably a dry defense of that claim involving formal semantic analyses of examples, would be less effective and more prone to be cursively read and forgotten. Nonetheless a run of the mill defense of the sort a semanticist would give for such a claim, one which involves explicit semantic analyses and assumptions is not pointless, because pending such a defense we may be incapable to state the reasons why we should accept a semantic claim which we intuitively find extremely plausible. Indeed, precisely this seems to be case in relation with Kripke's claim that proper names are rigid designators. For example, two authoritative sources on the matter, Salmon (1981) and Soames (2002) propose two alternative justifications for this claim. According to Salmon names' *de jure* rigidity follows from their non-descriptivity (32-33).[18] According to Soames however *de jure* rigidity of names is a datum which can be used in arguments against claims that names are descriptive (22-24).

It is the same with Kripke's rigidity claim regarding natural kind common nouns. Kripke has not given a proper semantic justification for it. To obtain such a justification one first has to lay down the truth conditions we intuitively assign to identification sentences and to modal sentences involving such common nouns, and also the truth-conditions of similar sentences which involve other types of common nouns, to see whether there are any differences in the ways

[18] According to Salmon (1981) the argument against claims of synonymy with certain descriptions does not use *de jure* rigidity; the so called *modal argument* does not have among its premises the claim that names are *de jure* rigid designators (pp. 24-27).

we tend to evaluate them. If such a difference is discerned, then one will strive to show that the difference in question can best be explained by assuming that common nouns for natural kinds are rigid designators. To this end one has to give plausible semantic analyses for these sentences such that these analyses will yield the intuitively known truth conditions and the differences thereof only if common nouns for natural kinds are distinctively assumed to be rigid designators.[19]

In *Naming and Necessity* Kripke partly accomplishes only the first part of such a semantic justification for the thesis that common nouns for natural kinds are rigid designators; namely illustrating certain aspects of how we tend to evaluate modal sentences or identifications involving such common nouns. But this time, differently than his case for proper names' rigidity, a consideration of how we intuitively evaluate certain relevant sentences falls short of constituting an intuitively compelling case for the rigidity of natural kind nouns.

Are Common Nouns Designators?

I have above mentioned that Kripke explicitly ascribes rigid designation only to the common nouns *heat*, *light*, *gold*. The generalization of this ascription to the other common nouns for natural kinds which he mentions and in general to all

[19] In the coming chapters I will first give an explicit linguistic-semantic argument for the *de jure* rigidity of names. I will do so because the issue of the rigidity of certain types of common nouns turns around the question whether an analogous argument can be given for them as well. Then, in a later chapter I will explore whether similar arguments can be set up for the *de jure* rigidity of certain types of common nouns. As previously indicated in the introduction I however do not presuppose in any way that *de jure* rigidity, if significantly applicable to common nouns at all, should distinguish natural kind common nouns from others.

such common nouns is an implication we, and other more authoritative readers, derive from Kripke's discussion in the third lecture of *Naming and Necessity*.

In the third lecture, alongside the mass common nouns *heat*, *light* and *gold* Kripke dwells on such count nouns as *tiger*, *cat*, *cow* as well. Common nous, mass or count, are often taken to be token level appliers (to have predicative denotations of type <e,t>) rather than being designators like names and pronouns. Not without a reason. Common nouns can form nominal predicates; they can combine with adjectives or relative clauses to form modified common nouns; they can combine with determiners such as *a, the*, *some*, *all*, *three* to form noun phrases.

4 That bit that Alice could not swallow was bootleg liquor.
Mumbo is a tiger.
Mumbo and Jumbo are tigers.
Alice poured hot water into the sink.
Alice noticed a wounded tiger in the clearing.
Alice poured some water into the sink.
Alice noticed three tigers in the clearing.
Alice noticed many tigers in the clearing.

In these positions paradigmatic designators such as proper names, pronouns, and definite phrases even if they designate kinds, are usually not possible:

5 ?That bit that Alice could not swallow was this highly potent transparent spirit
? Simba is a panthera tigris.
?Mumbo and Jumbo are panthera tigris.
*Simba is that striped Asian feline species.
*Alice poured hot that transparent liquid into the sink.
?Alice noticed a wounded panthera tigris.
*Alice noticed (a) wounded that panthera species.
*Alice poured some that transparent liquid into the sink.
*Alice noticed three panthera tigris in the clearing.

* Alice noticed many that striped Asian panthera species in the clearing.[20]

Most importantly, names and pronouns, without combining with any determiners can form noun phrases which in turn function as syntactic arguments, singular count common nouns cannot do the same (mass common nouns such as *water*, *gold* and plural count common nouns such as *tigers* appear to be an exception, but see further below).

6 Panthera tigris used to be common in this region.
This striped Asian panthere species used to be common in this region.
This striped Asian panthera species is termed as 'the tiger'.
The tiger used to be common in this region.
Tigers used to be common in this region.
The tiger is termed as 'Kaplan' in Turkish.
Bootleg liquor is more commonly known under the name 'Moonshine'.
*Tiger used to be common in this region.
*Tiger is a striped Asian panthera species.
*Tiger is termed as 'Kaplan' in Turkish.

These elements of syntactic organization can rather be given a simple semantic explanation. Verb phrases are appliers (have unsaturated denotations of type <e,t>). Names are designators (have saturated denotations of type e). For this reason their semantic composition determines a truth value. Common nouns cannot combine with verb phrases because they too are appliers (i.e. they too have unsaturated predicative denotations of type <e,t>). But as appliers common nouns can form verb phrases (i.e nominal predicates). Common nouns can figure in syntactic arguments that combine with verb phrases only by taking determiners and forming noun phrases (although there are some exceptions to be discussed below). In accordance with this determiners and specifically

[20] The sign '*' is used to indicate certain unacceptability. '?' is used to indicate doubtful acceptability.

quantifiers are usually assigned denotations of type <<e,t>,<<e,t>,t>> that are satiated by denotations of type <e,t> to yield denotations of type <<e,t>,t> for quantified noun phrases. Having denotations of type <<e,t>,t> noun phrases formed by the combination of a common noun with a determiner can then combine with verb phrases to determine a truth value. What we have very briefly described here is in fact the most common way common nouns and other expressions that can combine with them are interpreted.[21]

It is not impossible to take common nouns to be designators and account for the phenomena illustrated above. But such an account will have to bring in additional semantic operators (to account for the common nouns capability to form predicates, to combine with quantifiers and adjectives) and additional syntactic assumptions (to account for singular count common nouns' not being able to form determinerless noun phrases which can function as syntactic arguments, despite their being designators). These extras should be balanced by theoretical gains which are impossible or difficult to obtain under an approach which assigns predicative denotations to common nouns. So, taking common nouns to be designators for kinds is a step that goes against a common wisdom that presents apparent theoretical advantages, and thus is in need of justification.

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[21]Among indefinitely many works that adopt this treatment we can cite Kratzer and Heim (1998), Lewis (1970), Chierchia (1998), Partee (1986). For a support of the view that relates syntactic distribution patterns with semantic properties see Chierchia (1985) pgs. 433-434. Soames (2002)'s discussion on the rigidity of general terms is shaped by the view that common nouns are appliers which he supports on the basis of considerations similar to ours.

Did Kripke Ever Ascribed Rigid Designation to Common Nouns?

Now, let me briefly look at the apparent exception constituted by mass nouns and plural nouns to the generalizations above. This exception is specifically relevant in relation with Kripke's claim about common nouns for natural kinds. One interesting point about the common nouns for natural kinds which Kripke explicitly ascribes rigid designation, namely heat, light and gold, is that each of them is a mass common noun; and to no count nouns he explicitly ascribes rigid designation.[22] The peculiar thing about mass common nouns is that, unlike singular count couns, they can form determinerless noun phrases which then function as syntactic arguments –determinerless noun phrases only involve nouns but no determiners such as a, the, all, some etc.:

7 Alice cannot touch gold due to some rare sort of allergy of hers.
The pranksters served Alice bootleg liquor instead of water.
Alice poured bootleg liquor on the burning paper.

The same peculiarity also holds for plural nouns.

8 Alice cannot touch peaches due to some rare sort of allergy of hers.
The pranksters served Alice peaches instead of nectarins.
Alice threw tomatoes at the umpire.

Such determinerless syntactic arguments as those highlighted in the sentences above are syntactically speaking noun phrases. And there are syntactic reasons to distinguish between the noun phrases and the nouns that form them even if

[22] We noted that Kripke explicitly ascribed rigid designation to *one meter. One meter* is not a count common noun, though the term *meter* is a count common noun. Strictly speaking Kripke does explicitly ascribe rigidity to *meter*. But as we also noted his discussion appears to imply that ascription as well.

this distinction is not morphologically marked. Consider the following pairs of sentences:

9 a The pranksters served Alice water.
b The pranksters served Alice some hot water.

10 a Alice threw tomatoes at the umpire.
b Alice a few big ripe tomatoes at the umpire.

In 9 we see that *water* and *some hot water* fulfill the same syntactic role: they constitute the second object-argument of the verb phrase in 9a and 9b. For this reason *some hot water* can grammatically replace *water* in 9a and vice versa *water* can replace *some hot water* in 9b. Moreover there is nothing special about the sentences in 9, *water* can replace *some hot water* and vice versa in any sentence in which these play the role of syntactic arguments –objects or subjects of verb phrases. However this inter-changeability cannot be generalized to all occurrences of the morphologic form *water*. For example, *some hot water* cannot grammatically replace the word *water* that occurs within the phrase *some hot water* –*some hot some hot water* is not grammatical. Nor can it grammatically replace *water* as it occurs in any of such phrases as *a little water*, *a lot of water, much water* etc. This difference suggests the idea that not all occurences of the morphologic form *water* correspond to the same type of syntactic constitutent. On the one hand there is a *water* which is the same sort of syntactic constituent as *some hot water*, and which like *some hot water* can form function as syntactic arguments of verbs. On the other hand there is another *water* which, unlike *some hot water* can combine with quantificational determiners and adjectives.

The same considerations equally validly apply to *tomatoes*. Occurences of *tomatoes* that function as syntactic arguments are interchangeable with occurences of *a few big ripe tomatoes*. However, *a few ripe tomatoes* cannot replace the *tomatoes* that occurs in the phrase *a few big ripe tomatoes*; nor for that matter can it replace the occurences of *tomatoes* occur within such phrases as *all tomatoes, some tomatoes, most tomatoes* etc. Again, this difference suggests that we have to distinguish between two types of syntactic constituents both of which has the same morphologic form. There is the *tomatoes* which is on a par with such phrases as *a few big ripe tomatoes*, *all tomatoes, some tomatoes, most tomatoes* all of which always function as syntactic arguments of verb phrases and which are grammatically interchangeable. And there is the *tomatoes* which unlike these phrases can combine with adjectives and quantificational determiners.

Owing to such considerations in generative syntactic theories nouns phrases are distinguished from the common nouns that form them; this is so although in some cases the nouns phrases consist only of a common noun. So, the mass common noun *water* has to be distinguished from the bare noun phrase *water* and the plural common noun *tomatoes* has to be distinguished from the bare plural noun phrase *tomatoes*.[23]

Returning now to Kripke's examples, we have to conclude that syntactically speaking the nouns *heat*, *light*, *gold* are not exactly the same syntactic entities as the noun phrases *heat*, *light*, *gold*. Now, could not this

[23] Carnie (2013), (pp. 74-76, 166-169).

difference be ignored as just a syntactic distinction which is devoid of a semantic dimension? I do not think so. This syntactic difference can be given and often has been given a semantic dimension as well.[24] It is arguable that unlike bare noun phrases formed by mass common nouns, mass common nouns themselves are not designators –i.e don't have a denotation of the saturated type e. One piece of evidence for this is already stated. The mass common nouns in question here, and in general all common nouns can form syntactic predicates, combine with quantificational determiners to form quantificational noun phrases and combine with adjectives to form modified common nouns. However such paradigmatic designators such as pronouns or definite phrases (thus of the saturated type e), even if they designate kinds, cannot usually do any of these. So, qua common nouns mass nouns such as *gold*, *heat*, *light* may preferably be assigned predicative denotations of type <e,t>, to align them with singular count common nouns which also can naturally occur in the stated positions, and to differentiate them from proper names, definite phrases and pronouns which cannot.[25]

On the other hand determinerless noun phrases formed by mass common nouns, can stand as syntactic arguments just as definite phrases and pronouns can. Moreover as we will see in subsequent chapters there are compelling reasons to take bare noun phrases to be kind designators. So, qua

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[24]For example in Chierchia (1985) (pp. 433-434).

[25] Under this approach the denotations of mass nouns will apply to sums like plural nouns. The incapability of mass nouns' combining with counting determiners can then be accounted in a number of ways. For a survey of different possible approaches the reader can refer to Pelletier and Schubert (2002).

determinerless noun phrases *gold*, *heat*, *light* and the like may rather be taken to be designators to align them with definite phrases and pronouns in their capacity to operate as syntactic arguments.[26]

As was the case in relation with the general case about common nouns, the semantics of mass common nouns can be, and in fact often is, handled differently than described here, albeit not without extra assumptions which are balanced by other theoretical gains.

Before that background it is all the more interesting that Kripke assigned rigid designation explicitly only to *heat*, *light* and *gold* among common nouns. Thus, Kripke has ascribed rigid designation explicitly only to three terms which *qua* bare noun phrases can and often are plausibly considered to be designators. This may not be an accident, because considered as bare noun phrases that are designators, the rigidity of *heat*, *light* and *gold*, can be compellingly defended on the same intuitive way Kripke had defended the rigidity of proper names. Yet the same is still not true for the mass common nouns *heat*, *light* and *gold* and the other singular count common nouns discussed by Kripke.

Above when we discussed the relation between Kripke's claims that common nouns for natural kinds are rigid designators and that these nouns are not synonymous with descriptions, we indicated that if common nouns for

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[26] The kind level designata of these are derived from the particular level predicative denotations of the underlying common nouns. To this end special implicit operations are postulated. In the fourth chapter of the present work we will see an example of how this is done. The view that determinerless noun phrases formed by plural common nouns and mass nouns are kind designators although the underlying common nouns may not be so is a quite popular view in linguistic semantic literature. It is labeled as the *Neo-Carlsonian* view and we will have occasion to discuss it in the fifth chapter of the present work. Again the reader can refer to Pelletier and Schubert (2002).

natural kinds are taken to be designators then it seems that the same can be argued to be the case for other common nouns, even for those which are descriptions, and that if all common nouns are designators, *prima facie* all of them are rigid. Take the example of *unmarried male*. It is not a natural kind common noun and it is not semantically simple. If it designates a kind relative to the actual state of affairs, that kind is the same kind designated by *bachelor* relative to the actual state of affairs. Now, the question is, assuming that *unmarried male* is a designator, can we describe conditions relative to which *unmarried male* will designate a different kind than it designates relative to the actual state of affairs? That is, can we for example form a counter-factual of the form *If such and such were the case, an unmarried male might do so*, where *such and such* refers to a set of counterfactual conditions such that as a result *unmarried male* in the second clause will intuitively have to be taken to designate a different kind than the one it designates relative to the actual state of affairs? *Prima facie* this does not seem likely.[27] And apparently the same is

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[27] It might be retorted that such a modified noun as *animal with black stripes* can be used as a non-rigid designator. For example relative to a world in which the only species characterized by black stripes were a hawk species of the bird genus *accipiter*, under a certain way of using, *animal with black stripes* will designate that black-striped *accipiter* species; and relative to a word in which the only species with black stripes were a shark species then relative to that world *Animal with black stripes* will designate that shark species. The same considerations can be extended to the case of *unmarried male* in relation with worlds where for example only extrovert males are unmarried and worlds in which introvert males are unmarried; and it can be claimed that *unmarried male* too can designate relative to one world the extrovert male kind and relative to another world the introvert male kind (Inan 2008, 223). This purported non-rigid designator usage is unlikely. To see this consider again our world where only one species of the genus *accipiter* is characterized by having black stripes. Relative to that world it is alleged that *animal with black stripes* might be taken to designate that species. Now suppose also that in that same world the only *accipiter* species happen to be our black striped hawks. Cannot we then say in the same vein relative to that same world *animal with black stripes* designate the genus *accipiter*? But how can a semantically non-plural noun have multiple designata? Similar considerations make it unlikely that *unmarried male* can ever be used to alternatively designate the extrovert male kind or the introvert male kind relative to different worlds. For example relative to a world in which all and only extrovert males are unmarried and all and only the

the case for any common noun. So, it seems, if common nouns are designators, they generally are rigid designators; the common nouns for natural kinds do not constitute an interesting exception in this respect. Then however rigid designation ceases to be a property that marks a difference among common nouns.[28]

Kripke consistently used the verb *designate* both for proper names and examples of common nouns he highlighted in the third lecture. Perhaps, we have been reading too much from this preference. Perhaps, he used *designate* as a generic term for reference, just as we in this text use *denote* as a generic term for all sorts of reference. Then, it is possible that he meant a different referential relation when he used *designate* in relation with proper names than the one he meant when he used it in relation with common nouns. Then perhaps in the latter case he meant by it the predicative mode of denotation, namely application –where the denotata are unsaturated predicative functions of type <e,t>.

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extrovert males are blond, if it is allowed that *unmarried male* designate the extrovert male kind, then by the same token it should be allowed to designate the blonde male kind. I think that the reason why a noun such as *animal with black stripes* can mistakenly be considered to be a non-rigid designator is that it can in fact be used as a non-rigid taxonomic applier, as in *Every animal with black stripes is currently extinct*. We will have occasion to consider many instances of such usage in the 6th chapter. When inadvertently such a taxonomic applier use is also imported to the case of *unmarried male* for which it is not in fact very usual, then it *seems* that *unmarried male* can be used as a non-rigid designator, whereas in fact it used as a taxonomic applier.

[28] Due to such considerations for example Salmon (1981) wrote “every general term that designates at all, whether descriptionally or nondescriptionally is a rigid designator” presumably including among general terms only adjectives and common nouns (p. 69-72). This has been the commonly held view in relation with the general term rigidity, up until again Salmon himself (2005) attempted to tweak the notion of general term so that it included such definite phrases as *the color of the sky* as well.

But things do not look brighter with regard to the theoretical significance of rigidity for common nouns, even if we drop the assumption that natural kind terms are designators, and instead take them to be appliers, as is more commonly done.

If we generalize the property of rigidity to apply to any sort term with any sort of denotation, the natural way to go will be to say that the rigidity of a denoting term α, be it a designator, applier or a quantifying phrase or what not, is α's having the same denotation relative to any evaluation index (i.e. possible world). In the case of designators this amounts to having the same saturated denotation of type e; in the case of appliers to have the same unsaturated denotation of type <e,t>; in the case of quantifying phrases to have the same unsaturated denotation of type <<e,t>,t>.

If common nouns are appliers then they will have unsaturated denotations of type <e,t>. In this case rigidity for common nouns for natural kinds will amount to their denoting the same function that maps individuals into truth values, relative to all evaluation indexes (i.e. to have a constant intension of type <s,<e,t>>). Then, however, it seems that if the common nouns for natural kinds discussed by Kripke are appliers, they are not rigid.[29] Consider the case of *tiger*. Surely, *There might have been a tiger different than every tiger* has a true reading. *Prima facie*, there would not be such a reading if *tiger*'s denotations

[29] Rigid application in question here is different from the property with the same name that has been defended by Devitt to constitute the analogue of what rigid designation is for proper names. Devitt's rigid application is not just constancy of predicative denotation across evaluation index. We will discuss Devitt's rigid-application below. There to distinguish it we will label it as rigid*-application.

were the same relative to all evaluation indexes, and thus its denotation mapped exactly the same individuals to truth relative to every evaluation index.[30] In this vein contrast that sentence with, *There might have been a prime number different than every prime number.* This latter sentence does not have a true reading because the common noun *prime number*'s denotation maps exactly the same individuals to truth relative to every evaluation index.

So, if common nouns for natural kinds are appliers they appear to be non-rigidly so. And apart from common nouns which truly apply to abstract entities, such as those for mathematical entities, there does not seem to be any common noun which will be rigid as an applier. And the rigidity of these appliers for mathematical entities will surely be due to the special nature of what they apply to rather than a semantic design feature fixed by natural language, and thus it will not be *de jure*. Then, rigidity again does not seem to correspond to a theoretically significant difference among common nouns, even when they are generally taken to be appliers.

So the conclusion to draw seems to be that rigidity understood either as rigid application or rigid designation does not correspond to any linguistically significant difference among common nouns and that there will be no reason to

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[30] Actually a true reading can be ensured for this sentence, even if *tiger* is taken to be rigid as an applier. One way to this would be to adapt to English an analogue of Kripke's semantics for first order modal languages. In Kripke's semantics, quantifiers range over different domains relative to different worlds. This idea can be adapted to English, by adopting models of English that specify quantifying domains for every evaluation index and by relativizing the denotations of quantifier terms such as *every, some* to these domains (under the usual extensional treatment for them they are given denotations of type $<<e,t>,<<e,t>,t>>$). For example, relative to an evaluation index s, *some* can be taken to denote the function $\lambda P.\lambda Q.\exists x(d_s x \ \& \ (Px \ \& \ Qx))$ where d_s is a function that maps to truth every individual in D_s, the quantifiying domain of s. As D_s's will be different for different s's, the denotation of *some* will be different relative to different evaluation indexes. Thus under this proposal, interestingly, *some* will not be rigid.

invoke the property of rigidity in relation with common nouns in semantic theory, or so it seems.

In the chapters to come our principal task will be to study the semantics of common nouns and of the noun phrases formed by them in a more detailed way so as to find a way to counter this *prima facie* plausible conclusion to the effect that rigidity does not make any linguistically significant difference among common nouns.

Here I finish my critical presentation of Kripke's discussion in *Naming and Necessity* where the view that some common nouns, namely those for natural kinds, are rigid designators had been introduced. I now turn to a critical presentation of the controversy that resulted in reaction to Kripke's ascription of *de jure* rigidity to natural kind common nouns.

The Controversy on the Rigidity of General Terms

Kripke's ascription of rigid designation to common nouns for natural kinds and to some related adjectives did not find an acceptance as widespread as his ascription of the same property to proper names. And there ensued a controversy which has come to be regarded as a controversy on the rigidity of general terms, as common nouns and adjectives are generally regarded as general terms.

The views defended on this controversy pertained to the generalization of one of the critical points we've made above in relation with Kripke's ascription of the property of rigidity to some common nouns. Namely, common nouns are either appliers or designators. If the former is the case, virtually none is a *de jure* rigid applier and if the latter is the case, then all are rigid designators. Either way rigid denotation, understood either as rigid application or rigid designation, cannot be a property that makes a difference among common nouns.

The Two Pronged Argument against the Theoretical Significance of General Term Rigidity

Above in the section on Kripke we gave an argument to the effect that rigidity either understood as rigid application or understood as rigid designation does not yield a significant division of common nouns. That same argument can be extended to the more general case of general terms.

General terms, that is, adjectives, simple common nouns and modified common nouns are commonly taken as appliers –i.e. assigned unsaturated predicative denotations of type <e,t>. Or they are taken to be designators for kinds or properties and entities like that –i.e. they are assigned saturated denotations of type e. And there does not seem to be an alternative apart from these two choices.[31]

If all general terms are taken to be designators for kinds/properties, then it seems that all general terms will consequently be rigid designators. For, when

[31] One may think that they can alternatively be taken to be designators of sets of tokens. But when the overall shape of the semantic theory to result is considered this alternative is formally equivalent to take them to have predicative denotations of type <e,t>. Under the former option predication relation will have to be understood as set memberhip, under the general semantic framework adopted here predication relation, will be taken to be functional application.

we talk about possible states of affairs the putative kinds/properties that correspond to our general terms do not seem to change.

11 a Alice might have invited some bachelors to her party.
b Alice has invited some bachelors to her party.

12 Alice might have invited to her party some rich handsome helmsmen.
Alice has invited to her party some rich handsome helmsmen.

13 Alice might have painted these walls red.
Alice has painted these walls red.

14 Alice might have bought an unused copy of that book.
Alice have bought an unused copy of that book.

If we take general terms to designate kinds/properties then it seems that the highlighted adjectives, common nouns and modified common nouns in each of the above given pairs of sentences will have to be taken to designate the same kind/property regardless whether they occur in a piece of talk about the actual states of affairs or they figure in a piece talk about possible states of affairs. If any of these highlighted general terms considered as kind/property designators were not rigid designators then the modal sentence in which it figures would have an ambiguity of the sort that is not seen in the non-modal counterpart. If for example *bachelor* were not a rigid designator for a certain kind it would be expected that 11a had two non-equivalent readings which could be paraphrased in the following ways: (i) *Bachelors are such that it was possible that Alice invited some instances of them to her party* and (ii) *it was possible that Alice invited some instances of bachelors to her party*. Here the former reading would correspond to the wide scope interpretation of the noun phrase formed by *bachelor* and would pertain to the kind designated by *bachelor* relative to the actual world; and the latter reading would correspond to the same noun phrase's narrow scope interpretation, and would pertain to the kinds designated by *bachelor* relative to possible states of affairs, which might be different than the kind designated by *bachelor* relative to the actual states of affairs.

On the other hand if general terms were appliers, then none would be *de jure* rigid appliers –understood as having the same predicative denotation of type <e,t> relative to all evaluation indexes by virtue of the semantic design features of the natural language. Almost all common nouns satisfy the following schema:

There might have been (an) α different than all α(s) that there is (are)

This will be possible only if these common nouns had the capacity to truly apply to things which they did not truly apply to relative to the actual states of affairs. The exceptions are mathematical common nouns such as *number*, *triangle*, *even number*. But their exceptionality is not a linguistic-semantic one. Their rigid application is arguably a result of the special metaphysics of the entities they apply to rather than their being common nouns of a special sort as a design feature of natural languages.

Again apparently almost all adjectives will satisfy the following schema:

There might have been (an) α stuff (thing) different than all α stuff (things) that there are.
There might have been frozen stuff different than all frozen stuff that there are.
There might have been a fresh thing different than all the fresh things that there are.

This will be possible only if these adjectives had the capacity to truly apply to things which they did not truly apply to relative to the actual states of affairs. Again the exceptions are certain adjectives that truly apply only to certain abstract entities such as *even*, *prime* etc. But such adjectives have the same denotations relative to all possible worlds not due to the semantic design features of the natural language, but arguably due to the special metaphysical natures of the entities to which they truly apply.

Now, there seems to be no other possibility for general terms than to be all treated as appliers or to be all treated as designators. In the former case virtually no general terms will be rigid appliers –apart from some which apply to metaphysically special entitites. In the latter case, all general terms will be rigid designators. So, in either case there will be no linguistically significant division of general terms relative to having rigid denotation (where denotation is understood either as designation or application). Either virtually all will be non-rigidly denoting terms or else all will be rigidly denoting terms.

From the property rigidity to be adopted in relation with general terms it is expected that it plays a theoretical role analogous to the one rigid designation plays in relation with singular terms.[32] It is also believed that unless the property of rigidity marks a difference among general terms that theoretical role cannot be a significant one. The problem with general terms now appears to be that the most straightforward ways to define a rigidity property for general terms do not seem to give a significant division of general terms.

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[32] There are different views about that role. For example Devitt 2005 holds that that role is to counter certain descriptive analyzes of natural kind common nouns; Schwartz 1980 appears to expect that rigidity should explain the putative distinctness of natural kind nouns; LaPorte (2002) holds that the rigidity of general terms should explain the necessity of certain true identity sentences. I too have one. I have already adumbrated my view in the introduction: ascriptions of *de jure* rigidity should play a role in the explanation of the truth conditions related properties of sentences such as ambiguity/non-ambiguity, contingency/non-contigency. I will contest other views in the second part of the present chapter when I discuss the representative papers; I will further motivate my view in the second chapter and illustrate it in relation with the justification of the ascription of *de jure* rigidity to proper names in the third chapter.

Different Responses to the Two Pronged Argument

The two pronged argument against the theoretical significance of the property of rigid denotation in relation with general terms is what stirred the controversy on the rigidity of general terms. It has been repeated with slight modifications over and over in the opening pages of the most papers that contributed to that controversy. The parties that contributed to this controversy can be divided into three groups with regard to how they react to the two pronged argument.

One group maintains that rigidity, either in the form of rigid designation or in the form of rigid application or in the form of rigid*-application (Devitt (2005)'s notion which will explored below), is not a property which has an important theoretical significance for general terms from a semantic point of view.[33]

A second group maintains that general terms are designators for kinds (that is, that they have denotations of type e just like proper names), and that some general terms are rigid designators, whilst some are not.[34]

And a third group maintains that general terms are not designators, but appliers (that is, semantic predicates with predicative denotations of type <e,t>). In that respect they contradict Kripke who took both names and natural kind common nouns to be designators. Yet they concur with Kripke that some

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[33] Representatives of which include Soames (2002), Schwartz (1980), (2002).

[34] Salmon (2005), Linsky (2006), Inan (2008); LaPorte (2000) is often read in this way although he has not ever used the label *general term*.

special common nouns, including natural kind common nouns, are rigid*, albeit not rigid designators but rigid*-appliers –with a definition of rigid application different than the one described above.[35]

Now I will briefly present the views of these different parties. I will point to the standard criticisms raised against them and some additional problematic aspects. A more thorough critical assessment of the principal representatives of these views will be given in an appendix. There I will give more substance to the criticisms which will often be merely described in the present section.

Some General Terms Are Rigid Designators, Some Are Not

One way to counter the two pronged argument has been to argue that if general terms are taken to be designators, there will be some general terms that are not rigid designators. Representatives of this approach hold that common nouns and adjectives designate kinds/properties. Moreover they admit that as such it is not just natural kind common nouns and related adjectives that are rigid designators, contrary to what Kripke's discussion led people to believe; nominal kind common nouns such as *bachelor* and *hunter* and even modified common nouns such as *wounded tiger*, *handsome hunter* too will be rigid designators. However according to them there are more general terms than just adjectives and common nouns. They count such definite noun phrases as *the color of the sky* and *the insect species typically farmed for honey* too as general terms. Such

[35] Cook (1980), Devitt (2005).

definite noun phrases are arguably not rigid designators. So, if they are general terms then not all general terms will be rigid designators and rigidity will be a property that makes a difference among general terms.

The foremost representative of this approach is Salmon (2005), who at length argues that the definite noun phrase *the color of the sky* should be counted among general terms alongside adjectives and common nouns, because like the latter such definite phrases can form syntactic predicates in sentences such as *The eyes of my beloved are the color of the sky*.

LaPorte (2000) too is commonly cited as a representative of this approach. In fact the definite phrase *the insect species that is typically farmed for honey* is one of his examples. However, LaPorte never claims that such definite phrases are general terms.[36] He does not use the label *general term* even once in that paper. Instead he deploys his discussion using the label *kind designator.* According to his own formulation of his position not every kind designator is a rigid designator; common nouns of all sorts are all rigid kind designators, such definite phrases as *the honeybee, the soda pop* too are rigid kind designators but there are also such definite phrases as *the insect species that is typically farmed for honey* and *the beverage my uncle requests at superbowl parties* which are not rigid kind designators. Despite LaPorte's avoidance of the label general term, he has commonly be taken to argue for a position similar to Salmon (2005). For this reason I too here include LaPorte (2000) among the

[36] Note also that unlike *the color of the sky*, *the insect species that is typically harmed for honey* cannot be predicated of arguments that designate token level objects.

representatives of the position that some general terms are rigid designators and some are not rigid designators.

One standard criticism raised against this approach is that as its own proponents admit the proposed property of rigidity for general terms does not distinguish natural kind nouns from other common nouns.[37] Both such natural kind nouns as *tiger*, *gold* and such nominal kind nouns as *bachelor*, *hunter*, *married woman* are admitted to be rigid designators. This criticism moves from the premise that the rigidity property that is sought should distinguish natural kind nouns from other nouns. This expectation is generated from the fact that Kripke's examples of common nouns which he claimed to be like proper names in the third lecture of *Naming and Necessity* were all natural kind nouns. I will return to this criticism in a special section of the appendix (1980).

Another often repeated criticism against this approach questions whether the definite phrases singled out as examples of non-rigid general terms are indeed non-rigid. This criticism often addresses LaPorte's examples *the honeybee typically farmed for honey* and *the beverage my uncle requests at superbowl parties*. But it can as well be applied to Salmon (2005)'s *the color of the sky*. Very briefly formulated this criticism runs as follows. It is claimed that if there is such a kind as *beverage-my-uncle-requests-at-superbowl-parties* (BMURASP) which is instantiated by a beverage token if and only if the uncle in question requests that token at superbowl parties then the definite phrase *the beverage my uncle requests at superbowl parties* will rigidly designate that

[37] Schwartz (1980), Cordry (2004), Soames (2002).

kind. Then it is argued that someone who holds that *the beverage my uncle requests at superbowl parties* is non-rigid designator can only do so by presupposing that such a kind as BMURASP does not exist. But, it is claimed, this is a controversial metaphysical presupposition, and the rigid/non-rigid division among general terms that is upheld on the basis of it will then not have linguistic-semantic relevance.[38]

Despite its being repeated in a number of different papers this criticism is clearly ineffective. In fact it was LaPorte who first formulated this as a possible criticism against his own position. LaPorte rightly pointed out that even if there were such a kind as BMURASP obviously we often do not use the phrase *the beverage my uncle requests at superbowl parties* to designate BMURASP. This can clearly be seen by considering the following sentences:

15 The beverage my uncle requests at superbowl parties is coffee.
The beverage my uncle requests at superbowl parties changes every two or three years.

In fact it is dubious that *the beverage my uncle requests at superbowl parties* is ever used to designate such a kind as BMURASP, because neither we nor the proponents of this criticism against LaPorte (2000) could use *the beverage my uncle requests at superbowl parties* to designate that kind in order to formulate the criticism in question. Rather, as rightly indicated by Inan (2008) we had to use hyphenation as in *the-beverage-my-uncle-requests-at-superbowl-parties* or we had to use the specially concocted abbreviation *BMURASP* to designate that kind.

[38] Schwartz (2002), Devitt (2005).

Another criticism against this approach questions the attribution of general term status to such definite noun phrases as *the color of the sky*.[39] This criticism mainly addresses Salmon (2005), who explicitly defends the view that *the color of the sky* is a general term. LaPorte (2000) does not characterize his non-rigid specimens, *the insect species that is typically farmed for honey* and *the beverage my uncle requests at superbowl parties* as general terms; but nonetheless he has often been read as if he does. So, provided that we too read him that way this criticism can be extended to LaPorte's examples as well.

Singular terms are terms that can form syntactic arguments of verb phrases and that purport to designate one single entity. A clearcut definition of what a general term is has never been around. But it seems that it has always been required of a general term that they be able to combine with the *is* of predication to form predicates. Common nouns and adjectives clearly satisfy this requirement, and they have commonly be taken to be general terms.

It is unlikely that besides this requirement a further semantic requirement that demanded of general terms to be designators of kinds/properties or that they be appliers was ever in effect. For, such common nouns as *tiger* or adjectives as *hot* have been taken to be general terms both by those who took them to be designators and by those who took them to be appliers.

To my knowledge prior to Salmon (2005) no one has considered explicitly and unequivocally such definite phrases as *the color of the sky* as general

[39] For instance by May (2003) responding to an earlier version of Salmon (2005) presented at Princeton Workshop on Semantics in May 2003.

terms.[40] For, it appears to be a singular term as it can clearly figure in syntactic argument positions and it apparently purports to designate one single entity. In fact, as a definite phrase its syntactic and semantic constitution can be analyzed in the same ways as such a definite phrase as *the violin of Alice*. The only difference between them is that the former purports to designate a universal whilst the latter a particular.

Salmon (2005) defends the view that *the color of the sky* is a general term by making the satisfaction of the mentioned requirement a sufficient condition for being a general term. According to him, if a term can combine with the predicative *is* to form the predicate of a sentence it should count as general term. Thus, *the color of the sky* too should count as a general term no less than the noun *blue* because we have such sentences as the following:

16 a The eyes of my beloved are blue.
b The eyes of my beloved are the color of the sky.

Salmon takes general terms to be designators of kinds/properties, and treats the predicative *is* as an operator that forms appliers out of designators of kinds/properties[41]:

17 [is]([blue])=λx.{x is an instance of [blue]}

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[40] Linsky (2006), whom Salmon (2005) cites, is not unequivocal in this regard. He rather seems to equate with general terms the syntactic predicates themselves (*is blue*, *is the color of the sky*), thus including the predicative *is* into the general term.

[41] We read in p.232, note 22 the following: "I prefer to regard the predicate 'is the color of the sky' as designating its extension (non-rigidly, of course) while expressing the property of having the same color as the sky, as the predicate's semantic content. On this view the copula/operators formalized above may be taken as designating (with respect to a possible world and time) the function that assigns to any universal its metaphysical extension (in that world at that time) – making each copula/operator roughly analogous to the functor 'the metaphysical extension of'."

[is]([the color of the sky])=λx.{x is an instance of [the color of the sky]}[42]

Taking capacity to form predicates by combining with the predicative *is* as a sufficient condition for being a general term and interpreting the predicative *is* as an operator forming appliers out of designators of kinds/properties appear to lead to undesirable consequences when a greater range of examples are considered. Consider the following sentences:

18 a Alice is plump, strong and the mother of Bob's children.
b Alice is the mother of Bob's children.
c To satisfy Bob, Alice has been every kind of woman.
d Alice is some kind of lunatic who lets her children to drive the truck unattended.[43]

Presumably the *is* in 18a is the predicative *is* rather than the *is* of identity. It can combine with the conjunctive phrase *plump, strong and the mother of Bob's children*. This indicates that in 18b too the *is* can be interpreted as the predicative *is*.[44] But first, this contradicts Salmon's analysis of the predicative *is*. Second, notwithstanding that analysis, are we to count *the mother of Bob's*

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[42] Salmon's formalism is a bit different than mine, but not in essentials. Here I use […] to represent the *interpretation* function that maps a term α to its denotation.

[43] The examples here may appear strained, but they are not my inventions. Graff (2002) uses *He is tall, handsome and the love of my life*, and Zamparelli (2000) discusses such an example as *John has been every kind of doctor*. However, it may quite reasonably be objected that such sentences are special, grammatically strained for some literary effect, and that therefore one cannot base generalizations over them. Yet Salmon's *example the eyes of my beloved are the color of the sky* sounds no less strained and no more generalizable than my examples. I brought forward these examples to problematize Salmon's view that combining with the predicative *is* is a defining criterion for being a general term. Salmon's case for the existence of general terms that are non-rigid crucially depends on the availability of such examples as *the eyes of my love are the color of the sky*. If these are not taken into consideration he cannot claim that such terms as *the color of the sky* are general terms. In this case, neither would there be any need to refute his characterization of general terms by using such examples as in question here.

[44] Graff (2001) cites this among evidence that definite descriptions are in fact appliers (have the denotation type <e,t>).

children as a general term? And there is nothing special about 18a and the phrase *the mother of Bob's children*. Many definite descriptions that designate particulars can be used to form such sentences as 18a. Are we to count them as general terms too?

The occurrences of *is* in 18c and 18d too are presumably of the predicative variant. But they combine with the quantified noun phrases *every kind of woman* and *some kind of lunatic*. Again, Salmon's analysis of the predicative *is* is contradicted. These quantified noun phrases are not designators –they don't have denotations of type e. And again are we to count these quantified phrases as general terms too because they can combine with the predicative *is* to form the predicates of 18c and 18d.

So it seems that Salmon's defense of the view that *the color of the sky* should be counted as a general term rather leads to the dissolution of the category of general terms. Salmon (2005) did not take into account such examples as the ones given in 18 (except the possibility of interpreting 18b as a predication which he tentatively addresses in a footnote). And it is not clear how he would deal with them to give us a stable category of general terms that includes *the color of the sky* but excludes such phrases as *the mother of Bob's children*, *every kind of woman* etc. A more detailed discussion of Salmon (2005) in regard to this question is given in the appendix.

An alternative way to define a stable category of general terms to include such definite phrases as *the color of the sky* seems rather unlikely. And remember that as we indicated above it is also unlikely that the category of general terms is defined by by stipulating that they are designators of kinds/properties. Authors who are of a different persuasion regarding the denotation type of common nouns and adjectives often label these as *general terms*.

Assuming that we still want to use the label *general term*, it seems that it is best to keep things the way they have implicitly been before the category of general terms came into scrutiny in relation with the controversy on the rigidity of general terms. Namely, to identify the category of general terms with the unison of the categories of common nouns and adjectives. I think that an even better option would be to completely discard the dichotomy singular term/general term. For such examples as 16 and 18 indicate that there are oddballs that satisfy both the properties traditionally associated with singular terms and also those associated with general terms. If in place of the categories singular term and general term, we simply use the categories of common noun, adjective and noun phrase to mark syntactic distinctions and the categories, designator, applier and quantifier to mark semantic distinctions, nothing will be amiss.[45]

Under both of these proposed options however the two pronged argument formulated above will apparently hold its sway. Salmon (2005) and LaPorte (2000) could counter that argument only by attributing general-termhood to certain definite phrases which hitherto were never considered as general terms. For, they themselves have granted that all adjectives and common nouns are rigid designators. Now, if these definite phrases are not general terms, and only

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[45] Slightly more detailed discussions about the category of general terms is given in the appendix' special section that discuss LaPorte (2000) and Salmon (2005).

adjectives and common nouns are, then the conclusion that rigidity, understood as rigid designation, does not make a difference among general terms will still hold.

Discarding the category of general terms altogether is also not an appropriate response to the two pronged argument. The interest generated by the two-pronged argument in the philosophy of language lies in that its original intent was to question Kripke's attribution of rigidity to *some* common nouns and adjectives. That argument came to be formulated using the label *general term* because common nouns and adjectives have always been regarded as general terms. But the real target has been the claim that a certain property of rigidity is corresponds to a semantic difference among common nouns and among adjectives. And discarding the category of general terms will clearly not vindicate this claim against the two-pronged argument when it is formulated in a way that makes its real intent explicit.

I now leave the standard criticisms raised against the approach represented by Salmon (2005) and attributed to LaPorte (2000) to pass to two critical points which have been rarely raised but which I deem more important than the standard ones. And one of them pertains to the topic of the real intent of the two pronged argument we just have introduced.

Salmon (2005) and LaPorte (2000) counter the two-pronged argument against general term rigidity by including among general terms some kind designating definite phrases. But no one writing on the extension of the notion of rigidity to the case of general terms had hitherto ever considered such definite phrases to be general terms. Even Salmon himself in his earlier work had considered as general terms only adjectives and common nouns and had concluded that they will all be rigid if they are taken to designate kinds.[46] Moreover Kripke's discussion in the third lecture of *Naming and Necessity*, which stands at the origin of the controversy on the rigidity of general terms and which is the main target of the two-pronged argument stated above, appeared to be primarily concerned with common nouns, and to a lesser extent with adjectives. So, it seems to me that the primary question that stirred the controversy on the rigidity of general terms appears to be whether there is a property of rigidity that will make a difference among common nouns and among adjectives, as Kripke appeared to affirm. If this is true, then even if we grant that Salmon's and LaPorte's putative examples of non-rigid general terms are indeed general terms, the principal question that stirred the controversy on the rigidity of general terms will remain unaddressed.

My second critical point is about the way Salmon (2005) and LaPorte (2000) have argued for their semantic claims. Above one of the criticisms I raised in relation with Kripke's discussion on the rigidity of general terms in *Naming and Necessity* was that he did not give proper justifications neither for the claim that common nouns are designators nor for the claim that natural kind common nouns among them are rigid designators. The same criticisms apply to Salmon (2005) and LaPorte (2000) as well. Salmon (2005) and LaPorte (2000) assume that all common nouns and adjectives are rigid designators, and

[46] Salmon (1981) wrote "every general term that designates at all, whether descriptionally or nondescriptionally is a rigid designator" (pp. 69-72).

contrast them with kind designating definite phrases which they deem to be non-rigid general terms but they do not properly justify their assumption.

Why should we believe that all common nouns are designators? Above we have already indicated in the section on Kripke's *Naming and Necessity* that there are plausible reasons to treat common nouns as appliers. Their syntactic distribution is very different than that of kind designating noun phrases such as *the tiger*, *Panthera tigris*, *this civic status*. The latter can be syntactic arguments of verbs whilst the former cannot; and the former can combine with adjectives and quantificational determiners, and form syntactic predicates while the latter usually cannot. If such noun phrases as *the tiger*, *Panthera tigris, this civic status* have the same designation as *tiger* and *bachelor* respectively why can't the former be replaced in by the latter, or vice versa? The syntactic distribution of adjectives too is different than the related nouns that designate properties (compare for example *alert* and *alertness*). Like common nouns, adjectives can form syntactic predicates, but nouns such as *wisdom*, *heat*, *freshness* cannot. Moreover adjectives can combine with common nouns but such nouns as *wisdom*, *heat*, *freshness* cannot. Again if they designate the same entities why are not they interchangeable? Adjectives and common nouns are standardly treated as appliers (assigned predicative denotations of type <e,t>) to partially account for the described difference in their syntactic distribution from kind or property designating noun phrases. Given that treating adjectives and common nouns as appliers is rather the standard approach, Salmon and LaPorte should have given some reasons in favor of treating them as designators.[47] Are there such reasons? In later chapters when we explore the literature on the semantics of common nouns and the noun phrases formed by them we will see that there indeed are some plausible reasons to treat some common nouns at least as designators, notwithstanding the difference in their syntactic distribution from kind designating noun phrases.

Furthermore even if we accept that common nouns and adjectives are all designators why should we believe that they will be rigid designators? This is a presupposition of the two-pronged argument as well. Almost every contributor to the controversy of the rigidity of general term cites the two-pronged argument but no one ever hints at why if a common noun is a designator it will have to be a rigid designator.[48] The reason for this omission may be the intuitive obviousness. But notwithstanding its obviousness an attempt to explicitly and rigorously justify this claim will be beneficial to understand the theoretical role rigidity possibly plays in the semantics of common nouns,

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[47] Salmon does not give reasons to hold that in general adjectives should be held to be designators. But specially in relation with the adjective *blue*, he argues that the most straightforward way to account for the entailment {*the eyes of my beloved are the color of the sky*, *the color of the sky is blue*}⊨*the eyes of my beloved are blue* is to take all occurences of *blue* in these sentence to be designators. I counter this argument in the appendix' special section on Salmon (2005).

[48] LaPorte (2000) contrasts the non-contingecy of such identity sentences as *The honeybee is Apis mellifera* with the contingency of such sentences as *the insect species that is typically farmed for honey is Apis mellifera*. He suggests that this difference can be explained by the rigidity of the noun phrases *the honeybee* and *Apis mellifera*, and the non-rigidity of *the insect species that is typically farmed for honey*. But the rigidity of *the honeybee* does not by itself entail the rigidity of the common noun *honeybee* neither does the non-rigidity of *the insect species that is typically farmed for honey* entail the non-rigidity of the modified common noun *insect species that is typically farmed for honey*. The entailment depends on how kind designating noun phrases have to be analyzed, on whether there is one type of such definite phrases or different types. For more details see the special section on LaPorte (2000) in the appendix.

however insignificant that role may be. That such an understanding is still wanting may be discerned from the fact that many recent papers on the rigidity of general terms disagree about the theoretical role the property of rigidity is to play in relation with general terms and in relation with common nouns in particular. Some expect that it should distinguish natural kind common nouns from others (Schwartz, 1980, 2002), some claim that its role is to refute the theories according to which natural kind common nouns are synonymous with descriptions (Devitt, 2005). As will be further explicated below I believe that the primary theoretical role ascriptions of *de jure* rigidity can play in relation with any class of expressions is to explain the way we tend to evaluate the sentences we produce. And that this is so can be seen as soon as one makes an effort to answer questions of the form *why should we believe that such and such expressions are* de jure *rigid*?

To recapitulate, Salmon's and LaPorte's papers move from the premises that common nouns and adjectives are either all appliers or all designators, and that if adjectives and common nouns are designators then adjectives and common nouns will be rigid designators. They seek to show that even if all adjectives and common nouns are rigid designators, it is not the case that all general terms are rigid designators. To make their point they extend the category of general terms in an arguably untenable way by including kind designating definite phrases among general terms. Thereby they do not say anything interesting about the issue that originally generated the controversy about the rigidity of general terms –viz. whether there is a rigid/non-rigid distinction among common nouns and adjectives. Futhermore, they do not properly justify the premises which they draw on. I believe scrutinizing these premises should have been the starting point in responding to the two pronged argument.

Some General Terms Are Rigid*-appliers, Some Are Not

Some other authors have sought to counter the other horn of the two-pronged argument: if general terms are appliers then virtually all will be non-rigid. This is done by adopting a slightly different definition of rigid application than the one presupposed in the two-pronged argument.

Above we have proposed to define rigidity in such a way that it can pertain to all types of denotation. To this end we have characterized rigid denotation as constancy of denotation relative to all evaluation indexes. Given this characterization rigid application amounts to having the same unsaturated predicative denotation of type <e,t> relative to all evaluation indexes. Then however only nouns and adjectives that exclusively apply to necessary existents such as mathematical entities can be rigid appliers.

Cook (1980) and Devitt (2005) propose the following definition for rigid-application, which from now on I will term as *rigid*-application*:

A general term α is a rigid*-applier iff it is such that if it applies to an object in any possible world, then it applies to that object in every possible world in which the object exists.

Are there rigid*-appliers? Presumably yes. Nouns for living species, nouns for kinds of stuff, nouns for astronomical objects, in short most natural kind nouns appear to be rigid*-appliers. Take the example of *tiger*. We find that the sentence *a tiger might not have been a tiger* is necessarily false. This is possible only if *tiger* considered as an applier is a rigid*-applier. But not all common nouns are rigid*-appliers. It is not the case that *a bachelor might not have been a bachelor* is necessarily false, so *bachelor* is not a rigid*-applier. What about artifact nouns such as *TV set*? It depends on how you evaluate such sentences as *a TV set might not have been a TV set*. Devitt thinks that contrary to appearances these sentences are not necessarily false and that in general artifact nouns should be non-rigid*.

So, it seems that rigid*-application finely divides common nouns into rigid* and non-rigid* classes. Moreover, it seems to do this along the lines Kripke adumbrated that it should happen: natural kind nouns are rigid*-appliers but nominal kind nouns are arguably not.

There are a number of criticisims standardly raised against the consideration of rigid*-application as the property of rigidity for general terms which is the analogue of what rigid designation is relative to singular terms.

One of them is that application cannot distinguish natural kind nouns from other common nouns. In this vein Devitt's claim that artifact nouns such as *TV set* are not rigid*-appliers is questioned. Also, it is indicated that there are such natural kind common nouns as *frog* and *butterfly* which truly apply only to the mature tokens of certain species. *A frog might not have been a frog* is not necessarily false because a token which actually is a frog might not have reached that mature stage. This criticism, as previously indicated in relation with the rigid-designation approach, depends on the premise that rigidity should distinguish natural kind nouns from other nouns. I will critically consider this premise later below when I discuss Schwartz (1980).

Another criticism due to LaPorte (1997) questions the view that nouns for living species are rigid*-appliers. According to the modern taxonomic views whether a token belongs to a certain species depends on the contingent matter of fact whether in the ancestral lineage under consideration there had been an off-shoot that became a new species. According to this view, had there been an offshoot that formed a new species in the lineage that actually forms the species *Panthera Tigris*, then *Panthera tigris* would have been considered as extinguished and the tokens which actually belong to *Panthera tigris* would have been considered to belong to another species. So, if we accept this taxonomic approach and if *tiger* is by definition the common noun that truly applies to tokens of Panthera Tigris, then *tiger* will not be a rigid*-applier. Devitt's response to this criticism is to simply deny the accuracy of these modern taxonomic approaches.

A further criticism raised against the rigid*-application view is that adjectives such as *hot*, *yellow* and measurement unit nouns such as *meter*, *kilogram* are not rigid*-appliers.[49] This criticism presupposes that these should have turned out to be rigid general terms. And the reason for this is simply the fact that in *Naming and Necessity* Kripke held them to be rigid along the natural kind common nouns. But it may well be the case that Kripke was wrong.

[49] Soames (2002), Inan (2008).

Note that the three criticisms so far considered question only the extension of the property of rigid*-application. Some expressions which were expected to turn out as rigid general terms because in *Naming and Necessity* Kripke explicitly or implicitly held them to be rigid, do not appear to be rigid*-appliers. But notwithstanding the accuracy of the points made by these criticisms, it may still be the case that rigid*-application is a property that is responsible for a linguistic-semantically important division of common nouns, albeit one that does not divide common nouns along the lines that were adumbrated by Kripke. The next criticism is different in this respect.

Devitt (2005) acknowledges that claiming that a noun is a rigid*-applier entails 'a fairly robust metaphysical thesis' about the particulars that noun applies to (146).[50] If *tiger* is a rigid*-applier, it follows that tiger tokens are necessarily tiger tokens. If *gold* is a rigid*-applier it follows that tokens of gold are necessarily so. These may be plausible metaphysical theses. But it is claimed that a semantic property should not have metaphysical corollaries,[51] and rigid*-application is criticized because it has.[52]

I do not see why a semantic property should not have metaphysical consequences. From the truth of *Alice is a chimera* , it follows that there is a

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[50] The claim that *tiger* is a rigid applier has robust metaphysical consequences provided that it has a non-vacuous denotation and that denotation is determined by a kind. In principle it is possible that a certain term is a rigid*-applier by stipulation or linguistic design but fails to have a denotation. Just as such a name as *Herlock Sholmes*, as a proper name, should be a rigid designator but fails to pick a designatum.

[51] Salmon (1981).

[52] Inan (2008).

chimera. To take common nouns to be kind designators entail that there are kinds. The claim that *the even prime* is a rigid-designator is a true semantic claim and entails that some entity is necessarily even and prime.

But this criticism is clearly up to something. The cases in which a metaphysical corollary is entailed by the instantiation of a semantic property are not all the same. Because semantic properties can be instantiated in different ways. In some cases the instantiation of a semantic property is dependent on non-linguistic matters of fact. The truth of *Alice is a chimera* is one such property. It is the same with the rigidity of *the even prime*. In some other cases semantic properties are instantiated because that they be instantiated is a design feature of natural languages or solely follows from such design features. The ambiguity of *Everyone knows someone* is one such example. Another such example is thought to be the rigidity of proper names. In the former type of cases the semantic properties are said to be instantiated *de facto*. In the latter types of cases they are said to be instantiated *de jure*.[53]

Now the last criticism against rigid*-application can be understood as making the following plausible point. It is unlikely that rigid*-application is both

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[53] The distinction drawn here between dependence on linguistic design and dependence on matter of fact is unmistakably reminiscent of the problematic analytic/synthetic distinction. And it may be as hard to give a stable characterization. Yet, I think semantic properties following from linguistic design may be characterized as those features which in semantic theorizing we would like to specify as the semantic fixtures of the language under examination (for the empirical constraints on the determination of these fixtures see the discussion of the third chapter below). Among these can be counted the semantic functions of basic lexical elements (e.g. that common nouns are appliers), the semantic function common to the members of a certain category of grammatical constituents (e.g. that indefinite noun phrases are quantifiers). These fixtures are theoretical and therefore subject to revision. Yet, I think that proper names' being rigid designators is one such strongly attested linguistic fixture. Note that the features in question here are very general and fundamental. In this respect they are unlike the special semantic features pertaining to *bachelor* which one would like to cite to account for the necessity of *bachelors are unmarried*.

a property that is instantiated *de jure* by certain nouns and that it has a metaphysical consequence that amounts to essentialism.[54] For then, essentialism with respect to certain classes of things will directly be a corollary of the design features of language. For example, if *tiger* is *de jure* rigid*-applier then it will follow that tiger tokens cannot fail to be tiger tokens. Anyone who contests this about tigers –e.g. Hindus or people who adopt the recent taxonomic views and think that *tiger* applies to instances of Panthera tigris- will be committing a linguistic-semantic blunder.

It seems that Devitt himself does not think that the familiar examples of rigid*-appliers are so *de jure*. Devitt (2005) describes the introduction of a natural kind noun in the following way (the emphasis is mine):

> A kind term covered by the causal theory applies to all objects that are of the same kind as the actual sample in which the term was grounded (allowing perhaps for a few "errors" in the sample). So, wherever being a member of that kind is essential to any member, the term will be a rigid applier. *So the rigid application of a natural kind term like 'gold' is explained partly by the semantic fact that it is covered by a causal theory and partly by the metaphysical fact that each piece of gold is essentially gold*.

This passage from Devitt indicates that a natural kind noun is not stipulated to be rigid* at its introduction. Rigidity* is a parameter that is fixed 'partly by the metaphysical fact that' the target kind is one that is instantiated essentially. In this respect then according to Devitt kind nouns' being rigid*-appliers is like the

[54] Inan (2008) makes these same points but without making explicit that the metaphysical corollaries constitute a problem for ascriptions of *de jure* rigid*-application, rather than ascriptions of *de facto* rigidity. Anyway ascriptions of *de facto* rigidity are clearly not as interesting as ascriptions of *de jure* rigidity from the perspective of philosophy of language.

the even prime's being a rigid designator, it depends on matters of fact that is not fixed by the language's design.

But then the linguistic-semantic interest of rigid*-application reduces greatly. Rigid designation was of a great interest in relation with singular terms because some of them, namely proper names arguably instantiated them *de jure* –i.e. as a semantic design feature of natural languages. As such proper names' being rigid designators could be used to give linguistic-semantic explanations of certain general patterns of semantic phenomena such as the non-contingency of identity sentences with proper name arguments, proper names' not causing sentential ambiguity in modal sentences etc. And I will contend that such explanations constitute the primary justification for attributing *de jure* rigid designation to proper names, which then is a linguistic justification. Now, if rigid*-application is not instantiated *de jure* then it cannot be used to give linguistic-semantic explanations of semantic phenomena. Nor, in the absence of such linguistic explanatory work, can its attribution to certain common nouns be given a linguistic justification. The justification of its attribution to any common noun with a decent amount of informative content will inevitably get entangled in metaphysical matters –only such common nouns with little informative content as *thing, object, kind* etc. may be exceptions.

So, to recapitulate, if rigid*-application is in some cases instantiated *de jure*, *pace* Devitt who does not seem to think so, then we will have to acknowledge that essentialism with respect to certain classes of things is forced upon us by the design of our language. On the other hand if cases of rigid*-appliers are all *de facto* cases then rigid*-application is not a significant property from a linguistic point of view. In either case rigid*-application appears to be a problematic candidate for being the analogue of what rigid-designation is for singular terms.

My final critical points will not concern the rigid*-application proposal itself but rather how it is defended by its proponents. First, Devitt, Cook and others who defend the rigid*-application approach to general term rigidity assume that all common nouns are primarily appliers –i.e. that they all have unsaturated predicative denotations of type <e,t>. Above I had criticized those who defend the rigid designation approach to general term rigidity because without any argument they assume that common nouns were all designators. I had noted that this assumption is very much in need of defense as the standard approach to the semantics of common nouns is to take them to be appliers. So, the proponents of rigid*-application are in this respect in line with the standard approach regarding common nouns. However, besides the reasons that support the standard applier treatment of common nouns there also are some phenomena that support the view that some common nouns at least should be treated as designators. Some common nouns can be used to form noun phrases which are most easily interpreted as kind designators:

Dodos are extinct.
The dodo is extinct.
The dodo is a flightless bird.
Birds have evolved from reptiles.
The bird has evolved from reptiles.
Transistors have been invented in the 20th century.
The transistor has been invented in the 20th century.

Most interestingly such common nouns can support apparently kind designating pronouns even when they do not themselves form kind designating noun phrases:

Alice shot a tiger although she knew that they were about to get extinct.[55]

The proponents of rigid*-application do not take into consideration these phenomena and tell nothing about how they can be accommodated if one treats common nouns as appliers.

Second, as we noted above, the proponents of rigid*-application does not seem to care whether their examples of rigid* common nouns are *de jure* or *de facto*. From a linguistic semantic point of view only *de jure* rigid*-appliers are of interest. If one is to claim some common nouns are *de jure* rigid*-appliers one has to find examples of semantic phenomenon, give plausible semantic analyses of them and argue that under these semantic analyses the phenomena can be explained if it is assumed that the common nouns involved are rigid* as a semantic design feature fixed by the language. Are there such phenomena? For example, one may think that for certain common nouns α the following schema yields necessarily false sentences has such a potential:

an α might not have been an α.

The proponents of rigid*-application either do not provide such arguments (Cook), or are aware of this way of arguing, even illustrate it, but ascribe secondary importance to it (Devitt). Very interestingly Devitt (2005) illustrates

[55] Such examples are discussed in Krifka et al. (1995).

how rigidity* attributions can explain certain observed semantic phenomena. As I will argue later in the special section on Devitt (2005) of the appendix these explanations are defective. But regardless the success or the failure of these explanations the point I want to highlight is that Devitt thinks that such explanations do not constitute the justification for the rigidity* attributions. Devitt regards such explanations as secondary theoretical work. He holds that the primary theoretical work for rigidity* ascriptions is that they reject what he calls, certain 'descriptive accounts of natural kind terms'. According such accounts for example the noun *tiger* is synonymous with the modified noun *large carnivorous quadrupedal felines that are tawny yellow in color with blackish transverse stripes and white belly*. Indeed if *tiger* is rigid* then this account must be false. But note that this is the case *if* that noun is indeed rigid*. Obviously, the fact that one semantic view contradicts another can hardly be a justification for either view. Thus, the theoretical role that warrants ascriptions of rigidity* cannot be the role identified by Devitt.

My Expected Contribution

The literature on the controversy on general term rigidity gives the impression that most of the contributions on the controversy about general term rigidity focuses on the problem of formulating a property of rigidity for general terms that will *prima facie* give a division of general terms into rigid/non-rigid groups. Some do it by implausibly extending the category of general terms to include definite noun phrases (LaPorte, 2000; Salmon, 2005). Some by slight modifications in the definition of rigidity normally understood as constancy of denotation, and disregarding the very important *de jure/de facto* distinction (Devitt, 2005).

But they do not give much effort to justify their semantic claims. Is it justified to take some/all common nouns to be designators/appliers? Is it justified to take some to be rigid designators/rigid*-appliers? Why should we believe that *tiger* for example is a rigid designator/rigid*-applier, even if we accept that it is a designator/applier?

The contributors can be condoned because the two pronged argument stated above has a certain urgency. First we have to find a property of rigidity which *prima facie* makes a difference among general terms, we can then strive to give more rigorous justifications for its ascription to certain general terms, they seem to think.

As I have indicated in the introduction I plan to go the other way round: I will limit my attention solely to the case of common nouns with the aim of investigating whether proper linguistic-semantic justifications can be provided for ascriptions of *de jure* rigid designation to certain common nouns but not all.[56] I will first briefly discuss how in my view ascriptions of *de jure* semantic properties should be justified, and illustrate my view by mounting such a justification for the commonly held view that proper names are *de jure* rigid designators. This will happen in the next two chapters, the third and the fourth.

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[56] I will disregard rigid*-application because although it indeed gives a division of common nouns, that division is not of interest from a linguistic point of view, for the reasons that are discussed above and also in the section on Devitt (2005) in the appendix.

In the third chapter I will describe truth-conditional semantics deployed with the help of possible worlds and the way semantic claims are justified in such theories. In the fourth chapter I will illustrate these justification methods in the case of the claim that proper names are rigidi designators. Then I will return to common nouns and consider their semantics in relation with the issue whether they should be appliers or designators. To this end, in the fifth and the sixth chapters I will examine the semantics of common nouns from a broader perspective by following the linguistic-semantic literature on the semantics of common nouns and the noun phrases formed by them. And then, drawing on the results of the examination of the semantics of common nouns, in the seventh chapter I will consider whether it is possible to mount proper linguistic-semantic arguments that justify the ascription of *de jure* rigid designation to some common nouns.

CHAPTER III

SEMANTIC PRELIMINARIES

Above I have criticized the extant literature pertaining to the issue of common noun rigidity due their omission of giving proper linguistic-semantic justifications for their ascriptions of rigidity to one or another family of terms. In this chapter I will discuss the criteria of adequacy on the basis of which we should judge claims pertaining to the issue whether there is a linguistic-semantically significant rigid/non-rigid division among common nouns. In a nutshell the criteria of adequacy in question are simply the basic criteria of the discipline to which such claims belong, namely intensional natural language semantics. Accordingly, I will here discuss the basics of the objectives, the criteria of adequacy, and the methods of intensional semantics.

Truth-conditional semantic theories and claims can be deployed in a number of different frameworks. Most common among them are the intensional frameworks deriving from the works of Richard Montague and David Lewis. In these frameworks meanings are modelled by functions or partial functions ranging over indices that involve possible worlds. And in the present work I too will adopt one such framework, a slightly modified implementation of the frameworks described in Heim and Kratzer (1998) and Heim and Fintel (2011). My second task will then be to describe that framework. In the meantime I will fix the formal notation I will use throughout the rest of the present work.

Third, I will describe how denotation is to be understood in the particular framework of truth-conditional semantics that I will adopt. I will give general definitions of denotation and rigid denotation. I will describe how the three types of denotation that will be most relevant in the present work are distinguished: *designation*, *application* and *quantifying over*.

Intensional Truth-conditional Semantics and the Criteria of Adequacy in Semantics

The claim that proper names are *de jure* rigid designators but definite descriptions are not is hardly a pre-theoretical claim that can be understood by laypeople. The same is the case for the claim some but not all common nouns denote rigidly (under a suitable formulation of denotation for common nouns). To a certain extent the notion of rigidity roughly understood as the denotation of the same entity (entities) relative to all possible worlds can be explicated in terms of whether a term pertains to the same thing when it is used in a statement about the actual states of affairs as when it is used in a statement about possible states of affairs. Still, the notion of *denotation relative to a possible world* is rather most relatable to a certain research tradition in natural language semantics which accepts an ontology of possible worlds and uses that ontology to study a certain dimension of linguistic meaning: namely the tradition of intensional truth-conditional semantics initiated by Montague and Lewis.

Kripke too appears to acknowledge the appositeness of deploying the notion of *rigidity* in the context of intensional semantics, although he himself did not do so. In the later written preface to *Naming and Neccessity* he puts the following in a footnote:

> Some of the worst misrepresentations of rigidity would have had much less currency if the relevant philosophical discussions had been conducted in the context of a rigorous presentation in terms of 'possible worlds semantics'. I did not do this in the present monograph both because I did not want to rest the argument heavily on a formal model and because I wished the presentation to be philosophical rather than technical. To readers who are thoroughly familiar with intensional semantics the rough outline of a presentation of my views in these terms should be clear enough without an explicit development… (Kripke 1981, pg15, n16)

I think that the claims pertaining to the rigidity of proper names or of some common nouns should be justified or scrutinized by using ways of argumentation available in that tradition and according to the criteria in effect in that tradition.

The discipline of truth-conditional semantics studies linguistic meaning in natural languages in so far as it determines the truth-conditions of natural language sentences relative to contexts of utterance. There certainly are many dimensions of linguistic meaning other than that. But the discipline singles out that function as its subject matter and abstracts away as far as possible from the other functions. So, within the purview of truth-conditional semantics the meaning of a sentence *is* what determines truth-conditions relative to contexts of utterance; and the meaning of its sub-sentential elements *is* their contribution to the determination of these truth-conditions. This function of meaning is singled out as an object of study because it pertains to an important boon of the use of language, if not the most important: communication of information.

Usually a sentential utterance in a given context does not have a unique truth-condition, but it has many of them. Consider an assertive utterance of the following sentence:

The liquid in this glass is not water

The condition that *actually* makes this utterance true or false is unique. But clearly this utterance fails to convey information that uniquely determines that condition. For example, suppose that this utterance is true because the liquid in the glass happens to be alcohol. Yet, we cannot say the utterance conveys the information that that specific condition obtains. Rather the utterance determines a number of conditions. One among these is the condition that the liquid in the glass is alcohol, another is the condition the liquid in question is Sprite, a further one is that it is coffee etc. Through his assertion the speaker conveys to its audience only the message that at least one member of a specific set of possible conditions actually obtains. Roughly, this is one reason why in the intensional variant of truth-conditional semantics people have had recourse to possible worlds to describe sentential meanings.[57]

But this is not the only reason. In addition to that, possible worlds are used to analyze how we can use language to convey information about what is possible, what is not possible, what must be the case if certain other things happen etc. This happens through the use of modal auxiliary verbs, modal adverbs, and conditional constructions:

The liquid in this glass cannot be ignited.
The liquid in this glass might be ignited.
If this liquid were heated over 80°C, it would ignite.

[57] There also are well established traditions of truth-conditional semantics that do not use possible worlds to study meaning. But the property of rigidity which is the main topic of the present work cannot be formulated in these traditions. In the semantic tradition that the present work follows the property of rigidity has to be invoked in the explanation of certain semantic phenomena. In other traditions that do not have an ontology of possible worlds these same phenomena should then be explained in some other ways.

In the intensional variant of truth-conditional semantics the operation of modal expressions and constructions are analyzed as different ways of quantifying over possible worlds.

The Compositionality of Lingustic Meaning

A working hypothesis about natural languages which define truth-conditional semantics in its core is what is termed as the *compositionality of linguistic meaning.* It is the production of sentential information content by the combination of the contributions of recurrent syntactic units in recurrent syntactic forms. This hypothesis is thought to explain the striking combination of two aspects of natural languages: their vast expressive power and their being learnable in less time than a one-third of average human life span.

The conjunction of the facts about the way humans master the sign systems that are languages with their temporal and mental limitations, and the fact that these systems have a vast expressive power is partly explained by attributing them the compositionality feature. This explanation can be roughly described as follows. The number of sets of possible conditions that can be determined by the use of sentences is vast, but sentences are not associated with sets of conditions directly. All sentences are constituted by the combination recurrent basic syntactic elements in recurrent syntactic ways. These basic syntactic elements and ways of combination are considerably less in number; they contribute the same way in all their occurrences in the sentences. And the information content of a sentence, is partly determined by the contributions of its basic elements and their form of combination and partly by the context of use. So that, only the mastery of the contributions of the basic syntactic elements and the forms of combination is sufficient to sort out which set of possible conditions a sentence will determine relative to a context of use.[58]

Theories of Truth-conditional Semantics

The compositionality feature of natural languages is what makes the truth-conditional natural language semantics a complicated theoretical discipline rather than a mere reporting and classifying field of study. The discipline produces theories describing how the vast array of sentential meanings are produced using a limited number of recurrent basic elements and forms. The interest can be directed to the specifics of a particular language as well as to the general aspects of all languages.

At the specific level a theory of truth-conditional semantics for a particular natural language will aim to describe how the set of possible

[58] As a working hypothesis truth-conditional semantic theories always strive to keep the hypothesis of compositionality of meaning as far as possible. But in certain cases the presupposition that recurrent syntactic constituents always contribute the same meaning in all of their occurrences is somewhat tweaked. For instance the noun phrase *dodos* figure as the subject in both of the following sentences: *Dodos are extinct*, *Dodos are running*. Yet, it seems that while in the former sentence the denotation of *dodos* is a kind whereas in the second sentence it is an existential generalized quantification. Of course it is possible to explain such cases as involving homonyms, but this would be to miss a prospect of generalization; similar pairs of examples can be formed with many other noun phrases. Instead it is postulated that the contribution of a constituent remains the same in all its occurrences but that in certain special sentential contexts certain implicit semantic operators are triggered to map that original contribution to another suitable contribution. In the following chapters when we deal with the interpretation of noun phrases we will come upon cases where recourse to such implicit operations will be inevitable. For a general discussion about such operators see Partee (1986).

conditions expressible by the sentences of that language are compositionally determined by the contributions of the constituents of those sentences. This will roughly be done in the following way. It will sort the basic recurrent syntactic elements and forms out of which the sentences are formed, and it will specify the contributions these elements and forms should bring in so that the sentences which they form can determine the truth-conditions they happen to determine relative to the contexts of use. I have been using the future tense because a unified theory for the entirety of one natural language has never been given. Instead at the present stage the output of the discipline is in the form of semantic theories for fragments of languages which may or may not be compatible with one another.

At general level, truth-conditional semantic theories aim to single out the distribution of the meaning related features among natural languages. Which types of sentential meanings are universally expressible? Which types of sentential meanings are always produced in similar ways? Which ones are produced in different ways? Which types of sentential constituent meanings are found in all languages? Which types of sentential constituent meanings always co-occur in a natural language? Which types of constituent meanings never co-occur in a language? Which features of compositional organization are universal? etc. For example, basic syntactic elements with meanings that give rise to rigid designation seems to be a type found in all natural languages.

Empirical Criteria of Success for Semantic Claims and Theories about Natural Languages

At both of these levels theories of truth-conditional semantics are empirically constrained, in much the same way as any linguistic theory about natural languages are. Natural languages may be deemed to be the abstract entities, on a par with mathematical entities or universals. But they are realized as competences in certain target communities of people.[59] Therefore any theory about a natural language spoken by a certain target community is constrained to yield results that predict the linguistic judgments and behavior of the target community. In the same vein any theory about the general features of all natural languages is constrained to entail results that are commonly attested by the specific theories about particular languages. Theories which absolve themselves from these constraints will be merely specifying unrealized languages or aspects thereof.

At this point consideration of the aims and the success criteria of the discipline of syntax will be helpful. For example, 'French' is the name for the abstract system which happens to be realized as a competence in a specific community of people. The syntax of French is the part of that system that specifies the proper sentences of French. A theory of syntax for French will sort out the basic elements and the principles of combination whereby all sentences of French are produced. This will be the description of an abstract entity. But the aim of the theory is to describe the abstract entity which happens to be

[59] Lewis (1975).

realized as a competence in a specific target community. How can we ascertain that the theory describes the right abstract entity, the one realized as competence rather than another, or at least an abstract entity which in important respects similar to the one that is realized in the target community. We can measure the success of the theory in the mentioned respects by considering whether it entails claims of well-formedness that predict the linguistic output and linguistic judgments of the target community of people. It is of course possible that sometimes some people deemed as competent speakers err in their performance or in their grammaticality judgment. But it is not possible that most of the members deemed competent most of the times err in their competence. Besides predictive accuracy another measure for the theory's success will be whether it describes an abstract system that can be realized as a competence in the target community given the humanely mental and temporal limitations of the members of the community. If for example the theory describes a system which cannot be realized as a competence through the observed language learning patterns in effect in the community, then that system cannot be the one which the theory aims to describe. The data against which the predictive accuracy of a syntactic theory is measured in principle consists of the linguistic output of the target community and their judgments. But in practice theoreticians often draw on their own intuitions, as they consider themselves as members of the community where the supposed competence is realized.

These points are also valid for theories of truth-conditional semantics about natural languages. These theories will be describing abstract systems which relate sentences with sets of possible conditions relative to contexts of utterances. But their aim will always be to describe the system which happens to realized as a competence in a target community, or at least a system which is very close to it in important respects. Their success in this respect will be measured in ways similar to those in effect in relation with theories of syntax for natural languages. Are the truth-conditions assignments to sentences relative to contexts of use entailed by the theory predict the assignments made by the target community, in so far as these can be ascertained through observation? Can the system described by the theory be realized as a competence in the target community given the observed linguistic learning patterns in the community?

Let me open up in more detail the measure of predictive accuracy in its application to truth-conditional semantic theories. How a target community assigns truth-conditions to sentences relative to contexts of use can be ascertained in several ways. One of them is of course direct query. Would *Pipits lay speckled eggs* be true although male pipits do not lay eggs? Would *Every pipit lays speckled eggs* be true although male pipits do not lay eggs? As a result of similar queries we can for example conclude that English speakers assign different truth conditions to such generalizations as *Pipits lay speckled eggs* than the ones they assign to the corresponding universal quantifications.

But besides direct queries for truth conditions we can also resort to judgments of equivalence, contradiction, ambiguity, contingency, entailment.[60]

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[60] For the content of this paragraph and for the general outlook on truth-conditional semantics and its emprical constraints adopted here see the first chapter of Chierchia and McConnell-Ginet

Are the following sentences equivalent? (would they under all conditions be both true or both false)?
Some seats are not booked.   It is not the case that every seat is booked.

Do the following sentences contradict one another?
Pipits lay speckled eggs.   Male pipits do not lay eggs.

Are the following sentences ambiguous? (Are there circumstances such that in a given single context one use of it will be true and another will be false?)
Every seat is booked by a woman.
The 37th president of US might not have resigned from office.
Birds held sacred by the ancient Egyptians might not have been long legged.
Ibises might not have been long-legged.

Are the following sentences contingent? (Are they either true relative to all circumstances or false relative to all circumstances?)
A bachelor is a novice brick layer.
One meter is 3.2808399 feet.
The woodchuck is the groundhog.
Vernon Sullivan is Boris Vian.
The 37th president of US is Richard Nixon.

Does the former sentence entail the latter? (Is it the case that relative to all circumstances if the former is true the latter will be true as well?)
Pipits lay speckled eggs; Every pipit lays speckled eggs.
Every astronaut is a heavy drinker; An astronaut is an heavy drinker.

As in the case of syntactic theories, in practice researchers often simply draw on their own intuitions and on those of the community of researchers.

The success of a truth-conditional semantic theory about a fragment of a particular language will then be measured according to the following criteria. To what extent can the theory predict the well attested ways the target community assigns truth-conditions to the sentences of the fragment. Can the partial system described by the theory be part of a system that can be learned as a competence

(2000), "The Empirical Domain of Semantics". Another relevant piece and one that illustrates the methodology briefly described here is Partee (1994).

by the target-community? Does the theory meshes well with the other successful theories given for other fragments of the language?

The value of a single semantic claim about a particular language will in turn be measured by considering whether it is required that it be entailed by successful theories about various fragments of that particular language. And the value of a single semantic claim concerning all or many languages will be measured by considering whether it is required that it be entailed by the successful semantic theories concerning these languages.

Back to Rigidity: the Criteria to Judge Claims of Rigid Reference

The claim that proper names are rigid designators but some definite descriptions are not, is a general semantic claim about categories of expressions apparently found in all languages. Thus, its value is to be measured according to the criteria laid above. It is required that it be entailed by successful semantic theories about various fragments of natural languages. Thus, given the above given of criteria of success for semantic theories it is ultimately required that the content of that claim has to be assumed to correctly predict the observable truth-condition assignments in various natural languages. The same is true for the claim that some general terms are rigid relative to their mode of denotation whilst some are not. If it turns out that predictive accuracy can be assured without making these claims, then these claims have to be rejected. Thus in principle there are clear cut criteria on the basis of which we can judge the admissibility of these claims.

The extant discussions about the rigid/non-rigid division among singular terms are, if not wanting, at least not explicit in this respect. They do not give explicit arguments showing that a theory which predicts truth-value assignments correctly has to assume that proper names are rigid designators and that some definite descriptions are not. As we indicated in the previous chapters, the same is all the more true in relation with the extant arguments for or against the existence of a rigid/non-rigid division among general terms. Those who defend the existence of such a division do not show that such a division among general terms is needed to explain and predict the observed truth-value assignments. And those who reject the existence of such a division among general terms do not show that such a division is not needed or that it leads to incorrect predictions. It is quite significant that some parties of the controversy raised the question *what is the theoretical work to be done by attributing rigidity to general terms*. The foregone discussion constitutes a clear answer to this question. The theoretical work to be done by any semantic claim, not only the rigidity claims, is in essence the same.

Representations of Meanings by Partial Functions and Compositions Thereof

Abstracting away all functions of sentential meaning other than determining truth-conditions relative to contexts of use, sentential meanings can simply be modeled by partial functions from contexts into sets of possible worlds. Equivalently, we can model them as partial functions mapping contexts into partial functions mapping possible worlds into truth-values. If our research aim does not much depend on the context dependence of the determination of sentences' truth-conditions, we can simply fix contexts and only model the operation of sentential meanings relative to fixed contexts, so as to not to complicate the models and their representations unnecessarily. That is, we can simply model the operation of sentential meanings relative to fixed contexts as partial functions mapping possible worlds into truth-values. Given that my research aim does not much depend on context dependence I will follow this latter path.

Once the operation of the meaning of a sentence relative to a fixed context of use is modeled as a partial function from the set of possible worlds into the set of truth-values, the textual representation of the model can be given thus:

$[\![\text{Bob likes Alice}]\!]^{g} = \lambda s.[\text{Bob likes Alice}]^{s,g}$

In general for any English sentence or sentential constituent X, I will use the notation $\lambda s.[X]^{s,g}$ to refer to the partial function defined over the set of worlds that models the the truth-conditional dimension of the meaning of X. I will usually use the symbol *s* as a variable ranging over possible worlds – I will use *@* to refer to the actual world. And I will use the superscript *g* to refer to the variable assignment induced by the fixed context of use and which will be relevant for the interpretation of pronouns and other pronoun like constituents. When the variation of variable assignments does not make any difference as regards the final interpretation of a sentence I will usually omit the subscript *g.*

With *s* used as variable, the representation is intended to be understood in in the same way as the textual representations of arithmetical functions using the λ-operator. $\lambda x.3x^2+5$ refers to function defined over ℤ that maps an integer x to the integer $3x^2+5$. *λs.[Bob likes Alice]^s* refers to the partial function which maps a world w for which it is defined to the truth-value [Bob likes Alice]^w.

Given the compositionality feature of natural languages sentential meanings are determined by the meanings of their constituents. Thus modeling the meaning of *Bob likes Alice* in the indicated way will be quite superficial and will not display at all the compositionality feature. For a sentential meaning model with more flesh, we can model the meanings of sentential constituents as well by suitable partial functions and then model the sentential meanings as the result of an operation defined over the partial functions that model the meanings of the constituents.[61]

Semantic Types

Before defining such an operation however I should best introduce a way to easily keep track of the descriptions of the partial functions that will be used. Partial functions that are used to model the meanings of sentential constituents

[61] For an early account and exemplary implementation of formal truth-conditional analysis of meaning with the help of functions see Lewis (1970). For a non-intensional implementation of the approach which is closer to the one to be adopted here, see Heim and Kratzer (1998), For the intensional version see Heim and Fintel (2011). For another account of the approach see Chierchia and McConell-Ginet (2000), 88-99. In this work I partly follow Heim and Kratzer (1998) and its as yet unpublished sequel Heim and Fintel (2011). Heim and Fintel (2011) give mainly an extensional theory and resort to intensions only in cases where modal expressions are involved and their rules of semantic composition is defined over extensions rather than intensions, except in the case of Intensional Functional Application which is introduced to deal with modal expressions. I instead take intensions to be the semantic values of expressions. The rules of semantic composition I will deploy below are adapted from theirs to fit semantic values that are intensions.

are typified via a recursively defined system of types according to their domains and ranges.[62]

definition of the types:
e, t, s are basic types
basic types are types
if a, b are types <a,b> too is a type

the interpretation of the types :
e is the type of individuals
t is the type of 0 and 1
s is the type of possible worlds
for a,b types, <a,b> is the type of every partial function from the set of entities of type a into the set of entities of type b

For any type a, D_a is the set of entities of type a

Sentences are modeled by partial functions from the set of possible worlds (D_s) into {0,1} (D_t). Therefore those partial functions will be of type <s,t>.

With regard to the modeling of the meanings of most sentential constituent types under the sort of set up adopted here there exists more or less common ways of proceeding, which I too will follow. Below I list how the most familiar categories of basic constituents will be modeled:

Proper names are modeled by partial functions from D_S into D_e, and thus will be of type <s,e>.
Non-transitive verbs, adjectives and common nouns are standardly modeled by partial functions from D_S into $D_{<e,t>}$, and thus will be of type <s,<e,t>>.[63]

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[62] See for example Heim and Kratzer (1998) pp. 28-29, intensional types p. 303.

[63] Although assigning intensions of type <s,<e,t>> is the standard approach, in 6th chapter we will see reasons to assign to some of them at least designator intensions of type <s,e>. As regards adjectives there are two common approaches. One takes their forming syntactic predicates as their primary role and assign then applier intensions of type <s,<e,t>>. The other takes their noun mofiying function as primary and assign them intensions of type <s,<<e,t>,<e,t>>>. Either way, then one has to account for the other function that is left out. This is done either by introducing implicit type shifting operators or introducting additional modes of semantic composition (additional to the one to be introduced below). More on this will be discussed at the 6th chapter.

Transitive verbs are modeled by partial functions from D_S into $D_{<e,<e,t>>}$, and thus will be of type <s,<e,<e,t>>>.
Quantificational determiners (every, some, most, one, two etc.) are modeled by partial functions of type <s,<<e,t>,<e,t>>>.
Quantificational noun phrases are modelled by partial functions of type <s,<<e,t>,t>>.

For constituents of other categories I will indicate the way they are to be modeled later as the need arises to do so.

The type of the partial function which is taken to model the meaning of an expression α is called *the semantic type of* α. Thus, the semantic type of *Bob* is <s,e> and the semantic type of *likes* is <s,<e,<e,t>>> etc.

Syntax and Semantics

Semantic theories are built on syntactic theories. Semantic theories describe how the meanings of sentences are determined by the meanings of their syntactic constituents. The constituents of a sentence and the hierarchical relations that obtain between them are determined by the syntactic theory. Currently there are quite a number of different schools of syntactic theories. But the most popular among them is the so called *transformational generative grammar* initiated by Chomsky. The truth-conditional semantic framework we adopt in the present work derives from Heim and Kratzer (1998) and Heim and Fintel (2011) that have adopted the syntactic approach of the transformational generative grammar.

Contemporary and common implementations of transformational generative syntax distinguish between the surface structure of a sentence and the syntactic structures termed as *logical forms*. The semantic interpretation takes place relative to the logical forms rather than the surface structure. These logical forms are are derived from the surface structure through syntactic transformation rules. There are a number of motivating factors for this distinction between the logical form level and surface structure level. Here I can only refer to one of them which will be very relevant in the present work. It is well known that sentences with multiple quantifier phrases manifest sentential ambiguity. *Everyone loves someone* is one such example. The supposition of the existence of different logical forms that can be related with a given surface structure enables the explanation of such sentential ambiguities in terms of differences in the logical forms. For example, according to this approach *Everyone likes someone* can assume either one of the logical forms.

$[_{NP}$ Everyone$]$ $[_{VP}$ $[_{V}$likes$]$ $[_{NP}$ someone$]]$
$[_{NP}$ Someone$]_1$ $[_{S}[_{NP}$ Everyone$]$ $[_{VP}$ $[_{V}$likes$]$ $t_1]]$

The subscripted element t_1 figuring in the second logical form is what is termed as a *trace*. Very roughly with regard to semantic interpretation it does the same job as the pronoun *him/her* which relate to *someone* in the following paraphrase *Someone is such that everyone likes him/her*.

Returning now to *Bob likes Alice*, it too presumably has two such logical forms but these determine the same sentential meanings.

$[_{S}$ $[_{NP}$Bob$]$ $[_{VP}$ $[_{V}$ likes$]$ $[_{NP}$ Alice$]]]$
$[_{NP}$ Alice$]_1$ $[_{S}[_{NP}$ Bob$]$ $[_{VP}$ $[_{V}$likes$]$ $t_1]]$

Since these LF's will lead to equivalent interpretation I will continue my exposition referring to the first logical form which reflects the surface structure. According to this LF we have the verb *likes* combining with the noun phrase

Alice to form the verb phrase *likes Alice*. This latter then combines with the noun phrase *Bob* to form the sentence *Bob likes Alice*. The meaning of the whole sentence has to be determined following the same path. First the meanings of *likes* and *Alice* will compose to yield the meaning of the VP *likes Alice*. Then, the meaning of the latter will combine with the meaning of *Bob* to yield the meaning of the whole LF.[64]

Semantic Composition

To model this determination, the meanings of *Bob, likes* and *Alice* will be modeled by partial functions respectively of types $<s,e>$, $<s,<e,<e,t>>>$ and $<s,e>$. The composition of meanings will be modeled by a binary operation that is defined over the set of partial functions of type $<s,a>$ (where a can be of any of a number of types to be specified).

The functions modelling the meanings of *Bob* and *Alice* can be represented thus (taking for granted that proper names are rigid designators, which we will strive to justify in the next chapter) :

$[\![\text{Bob}]\!]=\lambda s.[\text{Bob}]^s=\lambda s.\text{Bob}$
$[\![\text{Alice}]\!]=\lambda s.[\text{Alice}]^s=\lambda s.\text{Alice}$

And the meaning of *likes* can be modeled by the following function of type $<s,<e,<e,t>>>$:

[64] Although strictly speaking sentential meanings are meanings of LF's, I will in general simply write *meaning of a sentence*, so long as the sentence in question has only one LF, or all of its LF's lead to the same meaning.

$[\![\text{likes}]\!]=\lambda s.[\text{likes}]^s=\lambda s.\lambda y.\lambda x.\{\text{relative to s, x likes y}\}$[65]

Now let's define the semantic composition operation in such a way that $\lambda s.[\text{likes}]^s$ can be combined with the function $\lambda s.[\text{Alice}]^s$ to yield as result a function that can be further combined with $\lambda s.[\text{Bob}]^s$ to yield as result a function that maps situations into truth-values.

I Let γ be a branching node with α and β as daughters (i.e. $[\gamma]=[\alpha\beta]$) that respectively are of semantic types $<s,a>$ and $<s,b>$ such that $a=<b,c>$. Then the semantic composition of $[\![\alpha]\!]^g$ and $[\![\beta]\!]^g$ is $\{[\![\alpha]\!]^g, [\![\beta]\!]^g\}=\lambda s.([\alpha]^{s,g}([\beta]^{s,g}))=\lambda s.[\gamma]^{s,g}=[\![\gamma]\!]^g$ and it is of semantic type $<s,<a,c>>$.[66]

Now we have the means to model how the meaning of *Bob likes Alice* is determined by the meanings of its constituents. The meanings of the pairs of constituents that syntactically compose to form more complex syntactic constituents in the LF will compose semantically. Then, the LF

$[_S [_{NP}\text{Bob}] [_{VP} [_V \text{likes}] [_{NP} \text{Alice}]]]$

will yield the following semantic composition which amounts to a partial function of type $<s,t>$:

$\{\lambda s.[\text{Bob}]^s, \{\lambda s.[\text{likes}]^s, \lambda s.[\text{Alice}]^s\}\}=\lambda s.([\text{likes}]^s([\text{Alice}]^s))([\text{Bob}]^s)$

[65] The notation '{relative to s, x likes y}' will be interpreted as a function which maps (s,y,x) triplets into truth or falsity according to whether x likes y or not. In general in describing functions using the lambda formalism I will use the notation '{S(X)}' where S(X) will be a sentential function in our meta-language (English plus the formalism of first order logic) to refer to the characteristic function that maps a given X_0 to truth iff $S(X_0)$ is true. This use of the braces '{' , '}' should be distinguished from their use to represent the semantic composition of two meanings.

[66] This clause is adapted from the Heim & Fintel (2011)'s Functional Application rule, which concerns extensions rather than intensions.

The meaning of $[_V$ likes$]$ is $\lambda s.[\text{likes}]^s$, a function of type <s,<e,<e,t>>>. Its semantic composition with the meaning of $[_{NP}$ Alice$]$, $\lambda s.[\text{Alice}]^s$ which is of type <s,e>, yields as the meaning of the VP $[_{VP}[_V\text{likes}][_{NP}\text{Alice}]]$ the function $\lambda s.[\text{likes}]^s([\text{Alice}]^s)$ of type <s,<e,t>>:

$\lambda s.[\text{likes}]^s = \lambda s.\lambda y.\lambda x.\{\text{relative to s, x likes y}\}$
$\lambda s.[\text{Alice}]^s = \lambda s.\text{Alice}$ *assuming that* Alice *is a rigid designator*

$\{\lambda s.[\text{likes}]^s, \lambda s.[\text{Alice}]^s\}$ $\{\lambda s.\lambda y.\lambda x.\{\text{relative to s, x likes y}\}, \lambda s.[\text{Alice}]^s\}$ $\lambda s.\lambda x.\{\text{relative to s, x likes Alice}\}$ $\lambda s.[\text{likes}]^s([\text{Alice}]^s)$ $\lambda s.[\text{likes Alice}]^s$

The semantic composition of the meaning of $[_{VP}$ $[_V$ likes$]$ $[_{NP}$ Alice$]]$ with $\lambda s.[\text{Bob}]^s$ of type <s,e>, the meaning of $[_{NP}\text{Bob}]$, in turn yields the function $\lambda s.([\text{likes}]^s([\text{Alice}]^s))([\text{Bob}]^s)$ which will be of type <s,t>:

$\lambda s.[\text{likes}]^s([\text{Alice}]^s) = \lambda s.\lambda x.\{\text{relative to s, x likes Alice}\}$
$\lambda s.[\text{Bob}]^s = \lambda s.\text{Bob}$ *assuming that* Bob *is a rigid designator*

$\{\lambda s.[\text{likes}]^s([\text{Alice}]^s), \lambda s.[\text{Bob}]^s\}$ $\{\lambda s.\lambda x.\{\text{relative to s, x likes Alice}\}, \lambda s.\text{Bob}\}$ $\lambda s.\{\text{relative to s, Bob likes Alice}\}$ $\lambda s.([\text{likes}]^s([\text{Alice}]^s))([\text{Bob}]^s)$ $\lambda s.[\text{Bob likes Alice}]^s$

Above I have specified for each constituent the partial functions that can be taken as their meanings. I have assigned to *like* the partial function $\lambda s.\lambda y.\lambda x.\{\text{relative to s, x likes y}\}$, to *Alice* and *Bob* respectively the functions $\lambda s.\text{Bob}$ and $\lambda s.\text{Alice}$. Then I have illustrated how given these functions the meaning of the whole sentence *Bob likes Alice* is determined through semantic composition. In what follows I usually will not go into such details. I will not formulate the specific meanings of each constituent and I will not illustrate how these meanings semantically compose for each sentence I will analyze, unless it is relevant for the discussion at hand and it is not obvious how it can be done. Furthermore I usually will not reveal the complete compositional structure of each sentence I analyze in all its details. I will only reveal as much structure as needed. For example, if the semantic structure of the VP *likes Alice* is not relevant for the discussion at hand I may represent the meaning of *Bob likes Alice* simply in the following way:

$\lambda s.[\text{likes Alice}]^s([\text{Bob}]^s)$

In the simple example we have considered so far there did figure any pronoun or pronoun like expressions. In order to be able to deal with them we shall assume that all such expressions will come indexed in logical forms and in their interpretation we will resort to the apparatus of variable assignments. Variable assignments will map indexes to elements of D_a (where a can be any type) and the indexed constituents will be interpreted thus:

$[\![\alpha_i]\!]^g = \lambda s.[\alpha_i]^{s,g} = \lambda s.g(i)$

Accordingly relative to a variable assignment g such that g(2)=Alice, we will have the following:

$[_S\, [_{NP}\text{Bob}]\ [_{VP}\, [_V\, \text{likes}]\ \text{her}_2]]$

$[\![[[\text{Bob}]\ [[\text{likes}]\ \text{her}_2]]]\!]^g$ $\{[\![\text{Bob}]\!]^g, \{[\![\text{likes}]\!]^g, [\![\text{her}_2]\!]^g\}\}$ $\{\lambda s.[\text{Bob}]^{s,g}, \{\lambda s.[\text{likes}]^{s,g}, \lambda s.\text{Alice}\}\}$ $\{\lambda s.\text{Bob}, \{\lambda s.\lambda y.\lambda x.\{x \text{ likes } y \text{ relative to } s\}, \lambda s.\text{Alice}\}\}$ *(assuming that names are rigid designators)* $\{\lambda s.\text{Bob}, \lambda s.\{x \text{ likes Alice relative to } s\}\}$ $\lambda s.\{\text{Bob likes Alice relative to } s\}$

Meanings, Models of the Meanings and Representations of the Models

We should clearly distinguish between the following: (i) the meanings of expressions and semantic operations (ii) functions modeling these and (iii) the representations of these functions.

I do not intend to identify meanings and the semantic operations pertaining to them with the functions that model them. For one thing, these functions are not sufficiently fine grained to model every aspect of the meanings. More philosophically, I believe that meanings are robust non-mathematical, albeit quite complicated properties.

However, for ease of expression I will simply refer to those functions as the meanings themselves. So, I will allow myself to write as if the representations of these functions are the representations of the meanings themselves. From time to time I will even be briefer by referring to the semi-formal representations as the semantic representations of the sentences and their constituents. Of course my full but non-explicit meaning will always be that they are the representations of the mathematical entities which in turn model the meanings.

Generalized Quantifiers and Their Representations

Quantificational NP's are such phrases as *every student*, *some professors*, *every student and some professors, many professors, a few professors* etc. Such noun phrases are standardly analyzed as partial functions of type $<s,<<e,t>,t>>$. Quantified noun phrases analyzed thus are called *generalized quantifiers*. In representing sentences which involve quantificational noun phrases (NPs), I too will follow the generalized quantifiers analysis.[67] One advantage of the generalized quantifier analysis is that thereby we can ensure that a quantificational NPs' meaning is the result of the semantic composition of the meanings of its constituents and that it further composes with other meanings to form the meaning of the sentential clause in which it figures.[68]

I noted that quantificational NP's are such phrases as *every student*, *some professors*, *every student and some professors, many professors, a few professors* etc. Quantificational determiners are such constituents of quantificational NP's as *every*, *most*, *few* etc. According to generalized quantifiers analysis quantificational NP's are phrases of the semantic type $<s,<<e,t>,t>>$. That is, their meanings are such partial functions that for any $s \in D_s$ for which they are defined they give partial functions which map partial functions of type $<e,t>$ to $\{0,1\}$.

The generalized quantifier analysis enables the analysis of the meanings of 1a-b in the manner indicated:

1 a Every student is tired.
$[_S[_{NP}\text{every student}][_{VP}\text{is tired}]]$

$\{\lambda s.[\text{every student}]^s, \lambda s.[\text{tired}]^s\}$ $\lambda s.[\text{every student}]^s([\text{tired}]^s)$

[67] Specifically I will follow the version of Heim and Kratzer (1998). For another version see Chierchia and Mc Connell-Ginet (2000).

[68] Another advantage of the generalized quantifier analysis is that this analysis gives a unified semantic analysis of all quantificational NP's, including those like *most professors* and *few professors* whose meaning cannot be modelled using the resources of first order predicate logic.

1 b Some students are tired.
$[_S[_{NP}$ Some students$][_{VP}$are tired$]]$

{λs.[some students]^s, λs.[tired]^s} λs.[some students]^s([tired]^s)

According to these representations λs.[every student]^s is of type <s,<<e,t>,t>>which semantically composes with λs.[tired]^s of type <s,<e,t>> to yield a meaning of type <s,t>; and exactly the same thing is also true of λs.[some students]^s.

Clearly *every student* and *some student* have different meanings. And, this difference in meaning clearly depends on the differences in the meanings of *every* and *some.* The meanings of quantificational NP's themselves are the result of the semantic composition of the meanings of their semantic constituents: a common noun and a quantificational determiner. Common nouns are standardly treated as being of the semantic type <s,<e,t>> . And under the generalized quantifier analysis quantificational determiners are analyzed as being of the semantic type <s,<<e,t>,<<e,t>,t>>>. So that when the meaning of the quantificational determiner semantically composes with the meaning of a common-noun, the result is a meaning of type <s,<<e,t>,t>>, precisely the semantic type of the quantificational NP's.

So, the meanings of *every student* and *some student* can be more perspicuously represented respectively by the following:

$[_{NP}[_D$every$][_N$student$]]$

{λs.[every]^s, λs.[student]^s} λs.[every]^s([student]^s)

$[_{NP}[_{D}\text{some}][_{N}\text{students}]]$

$\{\lambda s.[\text{some}]^s, \lambda s.[\text{students}]^s\}$ $\lambda s.[\text{some}]^s([\text{students}]^s)$

And the meanings of 1a-b can be more perspicuously represented in the following way:

1 a Every student is tired.
$[_S[_{NP}[_{D}\text{every}][_{N}\text{student}]]][_{VP}\text{is tired}]]$

$\{\{\lambda s.[\text{every}]^s, \lambda s.[\text{student}]^s\}, \lambda s.[\text{tired}]^s\}$ $\{\lambda s.[\text{every}]^s([\text{student}]^s), \lambda s.[\text{tired}]^s\}$ $\lambda s.([\text{every}]^s([\text{student}]^s))([\text{tired}]^s)$

1 b Some students are tired.
$[_S[_{NP}[_{D}\text{some}][_{N}\text{students}]]][_{VP}\text{are tired}]]$

$\{\{\lambda s.[\text{some}]^s, \lambda s.[\text{students}]^s\}, \lambda s.[\text{tired}]^s\}$ $\{\lambda s.[\text{some}]^s([\text{students}]^s), \lambda s.[\text{tired}]^s\}$ $\lambda s.([\text{some}]^s([\text{students}]^s))([\text{tired}]^s)$

So, far we did not say anything about the specific meanings of quantificational determiners. The specific meanings of *every* and *some* can be formulated in the following way:

Let P,Q be variables ranging over partial functions of type <e,t>,
$\lambda s.[\text{every}]^s = \lambda s.\lambda P.\lambda Q.\{(\forall x)(P(x)=1 \supset Q(x)=1\}$[69]
$\lambda s.[\text{some}]^s = \lambda s.\lambda P.\lambda Q.\{(\exists x)(P(x)=1 \ \& \ Q(x)=1\}$

Now if we assume that,

$\lambda s.[\text{student}]^s = \lambda s.\lambda x.\{x \text{ is a student}\}$
$\lambda s.[\text{tired}]^s = \lambda s.\lambda x.\{x \text{ is tired}\}$

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[69] Here $(\forall x)(P(x)=1 \supset Q(x)=1)$ belongs to the meta-language and has its usual interpretation. $\{(\forall x)(P(x)=1 \supset Q(x)=1)\}$ is the characteristic function for that open sentence. That is, it maps the partial functions P, Q of types <e,t> into truth if and only if $(\forall x)(P(x)=1 \supset Q(x)=1)$ is true. On this matter see footnote 65.

Then, the semantic composition of the meanings of *every* and *student* yields the following:

$\{\lambda s.[\text{every}]^s, \lambda s.[\text{student}]^s\}$
$\{\lambda s.\lambda P.\lambda Q.\{(\forall x)(P(x)=1 \supset Q(x)=1\}, \lambda s.\lambda y.\{y \text{ is a student}\}\}$
$\lambda s.\lambda Q.\{(\forall x)(\lambda y.\{y \text{ is a student}\}(x)=1 \supset Q(x)=1\}$

And the semantic composition of the meanings of *every student* and *tired* yields the following:

$\{\{\lambda s.[\text{every}]^s, \lambda s.[\text{student}]^s\}, \lambda s.[\text{tired}]^s\}$
$\{\lambda s.\lambda Q.\{(\forall x)(\lambda y.\{y \text{ is a student}\}(x)=1 \supset Q(x)=1\}, \lambda s.\lambda z.\{z \text{ is tired}\}\}$
$\lambda s.\{(\forall x)(\lambda y.\{y \text{ is a student}\}(x)=1 \supset \lambda z.\{z \text{ is tired}\}(x)=1\}$

In formulating the partial functions to be taken as the meanings of quantificational determiners we have used the formalism of first order logic under its usual interpretation. We can simplify the semantic representation of quantificational determiners and quantificational noun phrases (and later the representations of the contributions of modal expressions) under the present set up if we interpret the formalism of the first order logic incorporated into our meta-language in such a way that its predicates get as values functions of type <a,t> (where a can be type e or s), rather than sets. To this end we can interpret the logical operators of first order logic (quantifiers: ∀x, ∃x and truth-functional connectives) as functions as well. Accordingly, I will interpret truth-functional connectives of the FOL as functions of type <<t,t>,t> and the quantifiers of FOL as functions of type <<a,t>,t> (where a can be type e or s). Thus we will have,

Let P,Q be functions of type <a,t>,
$\sim P(x)=1$ iff $P(x)=0$
$P(x) \supset Q(x)=1$ iff if $P(x)=1$ then $Q(x)=1$
$P(x) \& Q(x)=1$ iff $P(x)=1$ and $Q(x)=1$

$(\forall x)P(x)=1$ iff for any value of x, $P(x)=1$
$(\exists x)P(x)=1$ iff for at least one value for x, $P(x)=1$

Then, more compactly but equivalently to the former formulation we can formulate the partial functions which were assigned to *every* and *some* thus:

Let P,Q be variables ranging over partial functions of type <e,t>,
$\lambda s.[\text{every}]^s=\lambda s.\lambda P.\lambda Q.(\forall x)(P(x) \supset Q(x))$
$\lambda s.[\text{some}]^s=\lambda s.\lambda P.\lambda Q.(\exists x)(P(x) \;\&\; Q(x))$

And the semantic representations of *Every student is tired* and *Some students are tired* can more compactly be given thus:

$\lambda s.\lambda P.\lambda Q.(\forall x)(P(x) \supset Q(x))([\text{student}]^s)([\text{tired}]^s)$ $\lambda s.\lambda Q.(\forall x)([\text{student}]^s (x) \supset Q(x))([\text{tired}]^s)$ $\lambda s.(\forall x)([\text{student}]^s (x) \supset [\text{tired}]^s (x))$ $\lambda s.\lambda P.\lambda Q.(\exists x)(P(x) \;\&\; Q(x))([\text{student}]^s)([\text{tired}]^s)$ $\lambda s.\lambda Q.(\exists x)([\text{student}]^s (x) \;\&\; Q(x))([\text{tired}]^s)$ $\lambda s.(\exists x)([\text{student}]^s (x) \;\&\; [\text{tired}]^s (x))$

Quantified Phrases in Object Positions

Our presentation of how quantified phrases will be interpreted leaves out an important case which will repeatedly arise in the later chapters: the interpretation of sentences in which quantified phrases occur in object positions:

2 Alice crushed every bottle.

This sentence has the following surface structure:

2A $[_{NP}\text{Alice}][_{VP}\ [_{V}\ \text{crushed}]\ [_{NP}\ \text{every bottle}]]]$

Yet this structure cannot be interpreted on the basis of what has been deployed so far. The problem is that the transitive verb $[_{V}\ \text{crushed}]$ is of type

<s,<e,<e,t>>> and the quantified phrase [$_{NP}$ every bottle] is of type <s,<<e,t>,t>>. As such they cannot semantically compose.

It is supposed that 2 has also a logical form in which [$_{NP}$every bottle] takes wide scope relative to every other element.

2B [$_{NP}$ every bottle]$_1$ [$_S$[$_{NP}$Alice][$_{VP}$ [$_V$ crushed] t_1]]

But neither is this logical form interpretable. With the trace *t_1* interpreted as a pronoun of type <s,e>, [$_S$[$_{NP}$Alice][$_{VP}$ [$_V$ crushed] t_1]]] is now interpretable as a sentence (type <s,t>). But then [$_S$[$_{NP}$Alice][$_{VP}$ [$_V$ crushed] t_1]]] cannot semantically compose with [$_{NP}$every bottle] which is of type <s,<<e,t>,t>>.

To surmount these problems we will follow Heim and Kratzer (1998). They propose an alternative way to represent logical forms in which a noun phrase has moved to the wider scope relative to its position in the surface structure.[70] According to this proposal, when an NP moves to the wide scope, as in the logical form of 2 in which [$_{NP}$every bottle] takes wide scope relative to every other element, the result should rather be represented in the following way:

2B [$_{NP}$ every bottle]$_1$ [1 [$_S$[$_{NP}$Alice][$_{VP}$ [$_V$ crushed] t_1]]]

Here the role the index '1' is supposed to play is like the role played by *such that* in the following paraphrase of 2:

Every bottle is such that Alice crushed it.

[70] Another option they discuss is type raising the denotations of the quantifiers *in situ* without recourse to any movement. I did not follow that option because I would anyway introduce movement to deal with sentential ambiguity phenomena, which is the most common way of proceeding. Yet, It is possible to explain a range of sentential ambiguity phenomena too without movement. On this matter the reader is advised to check Steedman (2012).

We will interpret such structures as [1 $[_S[_{NP}$Alice$][_{VP}\ [_V$ crushed] t_1]]] by the adding the following clause to the definition of semantic composition:

II Let γ be a branching node with α and β as daughters (i.e. [γ]=[αβ]) where α dominates only a numerical index i and β is of semantic type <s,t>.
Then $[\![\alpha]\!]^g$=i.
Then the semantic composition of $[\![\alpha]\!]^g$ and $[\![\beta]\!]^g$ will be
$\{[\![\alpha]\!]^g, [\![\beta]\!]^g\}=\lambda s.\lambda x.[\beta]^{s,g(x/i)}$ [71]

Here g(x/i) is the variable assignment such that:

Dom(g(x/i)) = Dom(g) ∪ {i}
g(x/i)(i)=x
For any j such that i≠j and j∈Dom(g), g(j)=g(x/i)(j)

Using this new clause of semantic composition [1 $[_S[_{NP}$Alice$][_{VP}\ [_V$ crushed] t_1]]] will be interpreted in the following way:

[1 $[_S[_{NP}$Alice$][_{VP}\ [_V$ crushed] t_1]]]
$[\![1\ [[\text{Alice}][[\text{crushed}]\ t_1]]]\!]^g$
$\{1, [\![[[\text{Alice}][[\text{crushed}]\ t_1]]]\!]^g\}$
$\{1, \{\lambda s.[\text{Alice}]^{s,g}, \{\lambda s.[\text{crushed}]^{s,g}, \lambda s.[t_1]^{s,g}\}\}\}$
$\{1,\{\lambda s.[\text{Alice}]^{s,g}, \lambda s.[\text{crushed}]^{s,g}([t_1]^{s,g})\}\}$
$\{1,\lambda s.[\text{crushed}]^{s,g}([t_1]^{s,g})([\text{Alice}]^{s,g})\}$
$\lambda s.\lambda x.[\text{crushed}]^{s,g(x/1)}([t_1]^{s,g(x/1)})([\text{Alice}]^{s,g(x/1)})$
$\lambda s.\lambda x.[\text{crushed}]^{s,g}(x)([\text{Alice}]^{s,g})$

And given this interpretation of [1 $[_S[_{NP}$Alice$][_{VP}\ [_V$ crushed] t_1]]] which yielded a meaning of type <s,<e,t>> the logical form 2B can be interpreted in the following way by recourse to our first clause of semantic composition:

2B $[_{NP}$ every bottle$]_1$ [1 $[_S[_{NP}$Alice$][_{VP}\ [_V$ crushed] t_1]]]

$[\![[\text{every bottle}]_1\ [1\ [[\text{Alice}][[\text{crushed}]\ t_1]]]]\!]^g$
$\{[\![\text{every bottle}]\!]^g, [\![1\ [[\text{Alice}][[\text{crushed}]\ t_1]]]\!]^g\}$

[71] This clause is adapted from Heim&Fintel's Predicate Abstraction rule. Apart from the extensionality/intensionality difference, their rules was syncategorematic whereas here I took the liberty to assign the index nodes these same indexes as semantic values.

$\{\lambda s.\lambda Q.(\forall y)([\text{bottle}]^{s,g}(y) \supset Q(y)), \lambda s.\lambda x.[\text{crushed}]^{s,g}(x)([\text{Alice}]^{s,g})\}$
$\lambda s.(\forall y)([\text{bottle}]^{s,g}(y) \supset (\lambda x.[\text{crushed}]^{s,g}(x)([\text{Alice}]^{s,g}))(y))$
$\lambda s.(\forall y)([\text{bottle}]^{s,g}(y) \supset [\text{crushed}]^{s}(y)([\text{Alice}]^{s,g}))$

I previously indicated that in general I will not represent the logical forms and the interpretations based on them as detailed as above –unless the point I want to make requires a detailed analysis. So, in place of the detailed [1 [$_S$[$_{NP}$Alice][$_{VP}$ [$_V$ crushed] t_1]]], I would like to have to deal simply with [1 [$_S$Alice crushed t_1]]. I also indicated that I will omit reference to variable assignments unless these make any difference in the resulting interpretation. In this vein note that for any assignment pairs g, g' we will have the we have the following equality:

$[\![1\ [[\text{Alice}][[\text{crushed}]\ t_1]]]\!]^{g}$
$= \lambda s.\lambda x.[\text{crushed}]^{s,g}(x)([\text{Alice}]^{s,g})$
$=\lambda s.\lambda x.[\text{crushed}]^{s,g'}(x)([\text{Alice}]^{s,g'})$
$=[\![1\ [[\text{Alice}][[\text{crushed}]\ t_1]]]\!]^{g'}$

For, for any evaluation index s, the denotations $[\text{crushed}]^{s,g}$ and $[\text{Alice}]^{s,g}$ will remain the same no matter which variable assignment g is selected. So, I will usually take the liberty to represent and interpret the logical form 2B and logical forms like that simply in the following way:

2B [$_{NP}$ every bottle]$_1$ [1 [$_S$Alice crushed t_1]]

$[\![[\text{every bottle}]_1\ [1\ [\text{Alice crushed } t_1]]]\!]$
$\{[\![\text{every bottle}]\!], [\![[1\ [\text{Alice crushed } t_1]]]\!]\}$
$\{\lambda s.\lambda Q.(\forall y)([\text{bottle}]^{s}(y) \supset Q(y)), \lambda s.\lambda x.[\text{Alice crushed } t_x]^{s}\}$
$\lambda s.(\forall x)([\text{bottle}]^{s}(y) \supset \lambda x.[\text{Alice crushed } t_x]^{s}(y))$
$\lambda s.(\forall x)([\text{bottle}]^{s}(y) \supset [\text{Alice crushed } t_y]^{s})$

Here t_x is to be understood as a pronoun the designatum of which is x.

The Interpretations of Modal Constructions

My stated principal aim in this work is to investigate whether some sort of rigidity property makes a difference among common nouns. I indicated that to this end I will pursue the example set by the way the way the *de jure* rigidity of proper names can be justified. In the next chapter I will show that one of the principal ways in which ascriptions of *de jure* rigidity to proper names is to compare their semantic interaction with modal expression with that of definite description; such a comparison reveals that unlike definite descriptions, proper names never lead to sentential ambiguity in those interactions. So, inevitably I will have to analyze sentences involving modal expressions –mainly modal auxiliary verbs like *must*, *might*, *can*, *want* etc. Here I will now describe how I will represent the contributions of modal auxiliaries in the rest of the present work.

I will adopt a generalized quantifier analysis of modal auxiliaries such as *must*, *might*, *can*, where quantification ranges over possible worlds[72]. The modal auxiliaries will be assigned meanings of types $<s,<<s,t>,t>>$ -compare with the semantic type of quantificational noun phrases which is $<s,<<e,t>,t>>$. As such modal auxiliaries will semantically compose with sentential meanings (type $<s,t>$) to yield further sentential meanings in accordance with a new clause of semantic composition yet to be introduced. Necessity expressing auxiliaries like *must*, *ought* will introduce a universal generalized quantifier.

[72] I will adopt a simplified form of the analysis presented in Heim and Fintel (2011). These two in turn defer to the rather popular account of Kratzer presented in such works as Kratzer (1977) and Kratzer (1981).

Possibility expressing auxiliaries like *may*, *might*, *can* will introduce an existential generalized quantifier. In short I will adopt the following analyses:

$[\![\text{must}]\!]^{g}=\lambda s.[\text{must}]^{s,g}=\lambda s.\lambda p_{<s,t>}.\forall s'(R(s)(s')\supset p(s'))$
$[\![\text{might}]\!]^{g}=\lambda s.[\text{might}]^{s,g}=\lambda s.\lambda p_{<s,t>}.\exists s'(R(s)(s')\&p(s'))$[73]

That is, relative to an evaluation index s *must* will operate as a function which maps a sentential meaning α to truth iff at all worlds s' accessible to s relative to a contextually determined accessibility relation R, α(s') yields truth; relative to an evaluation index s *might* will operate as a function which maps a sentential meaning α to truth iff at some worlds s' accessible to s relative to a contextually determined accessibility relation R, α(s') yields truth.[74] The contextual variability of accessibility relations will account for the different flavors of *must*, *might* and the like which can express a wide range of necessity/possibility including epistemic, deontic, natural (circumstantial) etc. Now let's consider the analysis of the following modal sentence:

3 [to satisfy Carol's wishes] Alice must invite Bob.

We will assume that such a sentence as 3 can assume such logical forms as the following:

3A [Alice]$_1$ [1 [must [t$_1$ invite Bob]]]
3B [Alice]$_1$ [1 [[Bob]$_2$ [2 [must [t$_1$ invite t$_2$]]]]]

---

[73] Again, besides the overarching semantic values as intensions/extensions difference, these analyses differ from Heim & Fintel's (pg.38) in that according to their analysis, $[\text{must}]^{s}= \lambda R.\lambda p_{<s,t>}.\forall s'(R(s)(s')\supset p(s'))$ To support that analysis they assume that in logical forms modal auxiliaries have implicit restrictors R as sisters. I eschewed this more detailed analysis for the sake of simplicity.

[74] Of course strictly speaking in our meta-language formalism where predicates are interpreted as functions 'R' stands for functions of type <s,<s,t>> which corresponds to an accessibility relation.

3C must [Alice invite Bob]

I will illustrate how the given analysis of the modal auxiliaries will play out in the interpretation the logical form 3A.

$[\![[\text{Alice}]_1 [1 [\text{must} [t_1 \text{ invite Bob}]]]]\!]$

The meaning above should obtain as the result of the semantic composition of the meanings of the two main constituents of the logical form 3A, namely $[\![\text{Alice}]\!]$ and $[\![1[\text{must} [t_1\text{invite Bob}]]]\!]$. Here the first clause of semantic composition will apply, as $[\![\text{Alice}]\!]=\lambda s.[\text{Alice}]^s=\lambda s.\text{Alice}$ is of type <s,e> and given the second clause of semantic composition we should have for any variable assignment g:

$[\![1[\text{must} [t_1\text{invite Bob}]]]\!]$ $\{1, [\![\text{must} [t_1\text{invite Bob}]]\!]^g\}$ $\lambda s.\lambda x.[\text{must} [t_1\text{invite Bob}]]^{s,g(x/1)}$ *(type <s,<e,t>>)*

But as yet what does the meaning $\lambda s.\lambda x.[\text{must} [t_1\text{invite Bob}]]^{s,g(x/1)}$ accomplishes and how *must* contributes to that meaning is not made explicit. To make these explicit let's now focus on the interpretation of $[\![\text{must} [t_1\text{invite Bob}]]\!]^g$. It should come out as the result of the semantic composition of $[\![\text{must}]\!]^g$ and $[\![t_1 \text{ invite Bob}]\!]^g$ and should be of type <s,t>. That is, we should have,

$[\![\text{must} [t_1\text{invite Bob}]]\!]^g$ $\{[\![\text{must}]\!]^g, [\![t_1 \text{ invite Bob}]\!]^g\}$ $\{\lambda s.\lambda p_{<s,t>}.\forall s'(R(s)(s')\supset p(s')), \lambda s.[t_1 \text{ invite Bob}]^{s,g}\}$

Intuitively the result of the semantic composition, $[\![\text{must} [t_1\text{invite Bob}]]\!]^g$, should be a function that map a world w to truth iff $[\![\text{must}]\!]^g(w)=[\text{must}]^{w,g}$ maps *the proposition* $[\![t_1 \text{ invite Bob}]\!]^g$ to truth. Yet we have,

$[\![\text{must}]\!]^g=\lambda s.\lambda p_{<s,t>}.\forall s'(R(s)(s')\supset p(s'))$ *of type <s,<<s,t>,t>>*
$[\![t_1 \text{ invite Bob}]\!]^g= \lambda s.[t_1 \text{ invite Bob}]^{s,g}$ *of type <s,t>*

As such they cannot semantically compose via neither of the semantic composition clauses we have described so far. To obtain the desired result out of the semantic composition of $[\![\text{must}]\!]^g$ and $[\![t_1 \text{ invite Bob}]\!]^g$ I will add the following third clause to our definition of semantic composition:

III Let γ be a branching node with α and β as daughters (i.e. $[\gamma]=[\alpha\beta]$) that respectively are of semantic types $<s,<<s,a>,b>>$ and $<s,a>$, where a,b can be any types. Then the semantic composition of $[\![\alpha]\!]^g$ and $[\![\beta]\!]^g$ is $\{[\![\alpha]\!]^g, [\![\beta]\!]^g\}=\lambda s.([\alpha]^{s,g}(\lambda s'.[\beta]^{s',g}))=\lambda s.[\gamma]^{s,g}=[\![\gamma]\!]^g$ and it is of semantic type $<s,b>$.[75]

Armed with this third clause we can now open up $[\![\text{must } [t_1 \text{invite Bob}]]\!]^g$ in the desired way as the semantic composition of $[\![\text{must}]\!]^g$ and $[\![t_1 \text{ invite Bob}]\!]^g$:

$[\![\text{must } [t_1\text{invite Bob}]]\!]^g$
$\{[\![\text{must}]\!]^g, [\![t_1 \text{ invite Bob}]\!]^g\}$
$\{\lambda s.\lambda p_{<s,t>}.\forall s'(R(s)(s')\supset p(s')), \lambda s''.[t_1 \text{ invite Bob}]^{s'',g}\}$
$\lambda s.(\lambda p_{<s,t>}.\forall s'(R(s)(s')\supset p(s'))(\lambda s''.[t_1 \text{ invite Bob}]^{s'',g}))$ *sem. comp. clause III*
$\lambda s.\forall s'(R(s)(s')\supset \lambda s''.[t_1 \text{ invite Bob}]^{s'',g} (s'))$
$\lambda s.\forall s'(R(s)(s')\supset[t_1 \text{ invite Bob}]^{s',g})$

Using this result we can go on with the the interpretation of the logical form 3A which was the original task at hand:

$[\![[\text{Alice}]_1 [1 [\text{must } [t_1 \text{ invite Bob}]]]]\!]$
$\{[\![\text{Alice}]\!], [\![1[\text{must } [t_1\text{invite Bob}]]]\!]\}$
$\{\lambda s.\text{Alice}, [\![1[\text{must } [t_1\text{invite Bob}]]]\!]\}$
$\{\lambda s.\text{Alice}, \{1,[\![\text{must } [t_1\text{invite Bob}]]\!]^g\}\}$
$\{\lambda s.\text{Alice}, \{1, \lambda s.\forall s'(R(s)(s')\supset[t_1 \text{ invite Bob}]^{s',g})\}\}$
$\{\lambda s.\text{Alice}, \lambda s.\lambda x.\forall s'(R(s)(s')\supset[t_1 \text{ invite Bob}]^{s',g(x/1)})\}$ *semantic composition clause II*
$\lambda s.(\lambda x.\forall s'(R(s)(s')\supset[t_1 \text{ invite Bob}]^{s',g(x/1)})(\text{Alice}))$ *semantic composition clause I*
$\lambda s.\forall s'(R(s)(s')\supset[t_1 \text{ invite Bob}]^{s',g(\text{Alice}/1)})$
$\lambda s.\forall s'(R(s)(s')\supset[\text{invite}]^{s'}(\text{Bob})(\text{Alice}))$ *had we given a more detailed analysis of* $[t_1$ invite Bob$]$ *as* $[t_1 [[\text{invite}] [\text{Bob}]]]$

[75] Adapted from Heim and Fintel's Intensional Functional Application rule.

Beside auxiliaries like *must*, *might*, *can*, there are other verbs which are regarded as modal and susceptible to an analysis involving quantification over possible worlds but which unlike *must*, *might*, *can* require as arguments not just a proposition but a subject of e type as well. These include such verbs as *want*, *wish*, *believe* etc. In the coming chapters we will have to deal with some examples involving the verb *want*. So, before finishing I will briefly focus on *want*. I will adopt the following analysis of the contribution of *want*:

$⟦\text{want}⟧=\lambda s.[\text{want}]^{s}=\lambda s.\lambda p_{<e,t>}.\lambda x.\forall s'(R_b(x)(s)(s')\supset p(s'))$[76]

According to this analysis *want* is of type <s,<<s,t>,<e,t>>>. $[\text{want}]^s$ maps a sentential meaning p into a function that maps individuals x into to truth or falsity according to whether for all worlds s' in which x's desires relative to s are realized p(s') is truth. Relative to an individual x, $R_b(x)$ operates as an accessibility relation that enables $\forall s'(R_b(x)(s)(s')\supset p(s'))$ to express bouletic necessity relative to x. Now I will illustrate how this analysis of *want* will play out in the interpretation of a simple sentence.

4 Alice wants Bob to sleep.
[Alice][wants [Bob to sleep]]

⟦[Alice][wants [Bob to sleep]]⟧ {⟦Alice⟧, {⟦wants⟧, ⟦Bob to sleep⟧} $\{\lambda s.\text{Alice}, \{\lambda s.\lambda p_{<e,t>}.\lambda x.\forall s'(R_b(x)(s)(s')\supset p(s')), \lambda s.[\text{Bob to sleep}]^{s}\}\}$ $\{\lambda s.\text{Alice}, \lambda s.(\lambda p_{<e,t>}.\lambda x.\forall s'(R_b(x)(s)(s')\supset p(s'))(\lambda s''.[\text{B. to s.}]^{s''}))\}$ *sem. comp. clause III* $\{\lambda s.\text{Alice}, \lambda s.\lambda x.\forall s'(R_b(x)(s)(s')\supset \lambda s''.[\text{Bob to sleep}]^{s''}(s'))\}$ $\{\lambda s.\text{Alice}, \lambda s.\lambda x.\forall s'(R_b(x)(s)(s')\supset [\text{Bob to sleep}]^{s'})\}$ $\lambda s.(\lambda x.\forall s'(R_b(x)(s)(s')\supset [\text{Bob to sleep}]^{s'})(\text{Alice}))$ *semantic composition clause I* $\lambda s.\lambda x.\forall s'(R_b(\text{Alice})(s)(s')\supset [\text{Bob to sleep}]^{s'})$

[76] Intensionalized version of Heim and Fintel's analysis of propositional attitude verbs (p. 20).

I have already indicated that I will use the term *denote* to cover all sorts of reference, including designation, application and quantifying. Designators have denotations of type e, appliers have denotations of type <e,t>, and quantifying noun phrases have denotations of type <<e,t>,t>. Now, let me relate the notion of denotation with the notion of meaning taken as a partial function defined over D_s.

The meaning of any expression α will be modeled by a partial function that has a type of the form <s,a>, where a will be a certian type. I will take that type a as the denotation type of α. And the denotation of α relative to a certain evaluation index s_0 will be a constant or a function of type a.

For example, a proper name β is assigned a meaning of type <s,e>. β's denotation relative to a certain evaluation index s_0 will be a constant of type e. I will continue to term all expressions that have denotations of type e as *designators*.

Common nouns are usually assigned meanings of type <s,<e,t>>. So the denotation of a common noun relative to a certain evaluation index s_0 will be a function of type <e,t>. I will term all expressions that have denotations of type <e,t> as *appliers*. In some cases it will be helpful to refer to the set of things the denotation of an applier α maps to truth relative to a specific evaluation index s_0. I will term that set as the the extension of α relative to s_0.

Under the generalized quantifier analysis quantificational noun phrases are assigned meanings of type <s,<e,t>>. So the denotation of quantificational noun phrase relative to a certain evaluation index s_0 will be a function of type <<e,t>,t>. I will term all expressions that have denotations of type <<e,t>,t>as *quantifiers* and their mode of denotation as *quantification*.

I identify the property of rigidity for an expression with that expression's having the same denotation relative to all evaluation indexes for which a denotation is defined –i.e. possible worlds. In other words, rigid expressions are those whose meanings should be modeled by constant partial functions. Rigid designators will have the same designata relative to all possible worlds for which their meaning determines a designatum. Rigid appliers will have the same extensions relative to all possible worlds for which their meanings determine a denotation.

CHAPTER IV

THE ARGUMENT FOR THE RIGIDITY OF PROPER NAMES

I will now argue that by linguistic design proper names must be rigid designators although this is not the case for definite noun phrases commonly termed as *definite descriptions*. The main purpose of this exercise is to set an example which I will follow when I deal with the case of common nouns.

I will give two arguments, each of which are pieces of abductive inference for the same conclusion. Each argument will take as premises a set of linguistic data and some commonly held syntactic and semantic assumptions. I will show that the linguistic data gets a general linguistic-semantic explanation if by the design of language names must always operate as rigid designators but that definite descriptions need not operate as rigid designators.

The first argument will be concerned with modal sentences in English. I will give examples that show that there is a divergence among modal sentences which involve proper names or definite descriptions in argument positions as to whether they manifest a certain type of ambiguity. The examples will indicate that the ambiguity in question is correlated with the presence of definite descriptions. In contrast those which contain only proper names as arguments do not manifest the ambiguity in question. I will then show that this divergence and the stated correlation can be given a wholesale explanation if it is assumed that definite descriptions *can* and proper names *cannot* be rigid designators by virtue of semantic design features of English.

The second argument concerns identity sentences –sentences making identity statements. I will give examples that show that there is a divergence among such sentences as to whether they are contingent or not. Again we will discern a correlation between the presence of definite descriptions in the identity sentences and the contingency. In contrast identity sentences that contain only proper names as arguments will be seen to be always non-contingent. I will then show that this divergence among the identity sentences and the stated correlation can be given a wholesale explanation if again it is assumed that by design names must always operate as rigid designators but that definite descriptions need not operate as rigid designators.

Divergent Ambiguity Phenomenon in Modal Sentences

There are a number of different ways to convey a modal meaning. Some of them are explicit in that modal meaning is introduced by a special expression, modal auxiliary verbs such as *might* or modal adverbs such as *necessarily*. Some of them are implicit in that there is not any explicit modal expression in the sentence but the sentence's meaning is modal: conditional sentences[77] and sentences which are termed as *characterizing sentences* in the linguistic literature[78] convey a modal meaning although they do not contain any special expressions to which the generation of the modal meaning can be attributed. So,

[77] Kratzer (1986), Lewis (1973).

[78] Heim (1982), Pelletier and Schubert (1987), Krifka et al. (1995).

each of the following are examples of sentences which convey a modal meaning in one of the stated ways.

Bruce Lee might have won an Oscar. *(modal auxillary)*
Bruce Lee trained 5h per day. *(characterizing sentence)*
If Bob sits on this chair, then it will break. *(non-truth functional* if…then…*)*
If the American delegate sits on this chair it will break. *(non-truth functional* if…then…*)*
The Sun will necessarily turn into a red dwarf. *(modal adverb)*
The 40th president might have won an Oscar. *(modal auxillary)*
The prime minister wears a red poppy on the Remembrance Day. *(characterizing sentence)*
Bob wears a red hat on Christmas Eve. *(characterizing sentence)*

There is a semantic divergence among modal sentences with designator arguments. Some manifest a certain type of ambiguity and some don't. Furthermore the ones that manifest that ambiguity are those involving at least one argument which is a definite description. In contrast those which contain only proper names as arguments do not manifest that sort of ambiguity. In fact if in the ambiguous sentences we replace the definite descriptions with proper names the resulting sentences will not be ambiguous in the particular way in question here. This is the general linguistic data upon which I will base the first argument for the conclusion that proper names must be rigid designators but definite descriptions may not be so.

I will now discuss in detail the case of sentences involving modal auxillaries and arguments that designate particulars. I will also illustrate that clearly the same ambiguity divergence pattern obtains in the case of other types of modal sentences and that in all cases of modal sentences it can be explained in the same way.

A certain type of ambiguity is observable in modal sentences involving the modal auxiliaries and definite description arguments. But that type of ambiguity disappears when the definite descriptions are replaced with proper names. Consider the following sentences:

1 a The 37th president might have been female.
  b Nixon might not have been female.

1a is ambiguous. It can both be read as saying that *the actual 37th president might have been female* as well as saying that *it might have been the case that the 37th president was female*. These two readings determine different truth conditions. Consequently, 1a is false under the first reading and but true under the second reading. The actual 37th president of US was Richard Nixon. Although in the most general sense of possibility –metaphysical possibility- perhaps it was possible that he was female, rarely when we use modal auxiliaries we have in mind the whole range of metaphysical possibility. Rather any ordinary utterance of 1a will be about what is possible relative to the normal flow of affairs.

1b does not manifest such an ambiguity. Under the only reading it has where possibility is to be judged relative to the normal flow of affairs that sentence is false. This is so despite the fact that 1b differs from 1a only in that in place of *the 37th president* it has the proper name *Nixon* as argument.

A similar ambiguity divergence obtains in other types modal sentences with designator arguments depending the type of singular terms they contain. Those that contain only proper name arguments never manifest any ambiguity, but this is not the case for those that contain definite description arguments.

2 a Bob's kid is likely to develop schizophrenia.
  b Alice is likely to develop schizophrenia.

3 a Alice seldom serves the customer in the first table.

b Alice seldom serves Bob.

Ordinary conditional constructions rarely express the material conditional truth-function. Rather they are usually analyzed as modal construction expressing what must happen if certain possible circumstances obtain. That this analysis is on the right track can be ascertained by the fact that just as in the case of previous examples conditionals involving definite description arguments are often ambiguous as illustrated below. But again when these definite descriptions are replaced by proper names the ambiguity ceases to obtain.

4 a If the American delegate sits on this chair it will break.
b If Bob sits on this chair it will break.

Characterizing sentences contain no explicit element to which a modal contribution might be attributed. Yet, they are commonly analyzed as expressing what must happen in the usual flow of affairs. If such analysis of the characterizing sentences is correct then when they contain definite descriptions we should expect to observe the same sort of ambiguity as the one we have seen to obtain in other types of modal sentences involving definite descriptions. And again we should expect to see that ambiguity disappear when the definite descriptions are replaced with proper names. These expectations are borne out:

5 a Alice works for the American delegates.
b Alice works for Bob and Claire.

The examples indicate a general divergence pattern regarding ambiguity that obtains among modal sentences involving designator arguments. And the correlation of the ambiguity with the occurrence of definite descriptions suggests that somehow the occurrence of definite descriptions causes modal sentences to be ambiguous in a certain way. In contrast the absence of that sort of ambiguity in the examples that involved only proper name arguments suggests that some aspect of the proper names that distinguishes them from definite descriptions prevents the emergence of the ambiguity in question.

A general linguistic-semantic explanation can be given for the illustrated pattern if we make two assumptions. The first assumption is syntactic: modal sentences determine a multiplicity of logical forms in which noun phrase arguments scope narrowly or widely relative to the possibly implicit constituent which is responsible for the modal meaning. The second assumption is semantic: it is linguistically possible for definite descriptions to designate different individuals relative to different evaluation indexes but it is not linguistically possible for proper names to designate different individuals relative to different evaluation indexes.

If these two assumptions are granted the ambiguity of modal sentences involving definite descriptions will be explained as due to the possibility of scoping the definite descriptions narrowly or widely with respect to the modal constituent. Logical forms in which non-rigid definite descriptions take narrow scope will determine sentential meanings different than the logical forms in which these same definite descriptions take the wide scope. Modal constituents bring in quantification over evaluation indexes. In the logical forms in which the definite descriptions take narrow scope, their evaluation index variable will be bound by the modal quantifier; but in the logical forms in which the definite descriptions take the wide scope their evaluation index variables will remain free, and these definite descriptions will be interpreted relative to the same evaluation index as the whole sentence in which they figure is to be interpreted. If a definite description is not rigid then its designatum relative to the evaluation index relative to which the whole sentence is to be evaluated may be different than the designata it will have relative to the other evaluation indexes over which the modal quantifier ranges. Whence arises the difference in the sentential meanings that result when the definite descriptions take the wide scope or narrow scope.

Modal sentences with proper name arguments too should have similar logical forms in which the proper names take narrow scope or the wide scope. But in the case of these latter a logical form in which a proper name takes the wide scope will determine the same sentential meaning as the logical form in which that proper name takes the narrow scope. Because regardless whether the evaluation index variable of a proper name is bound by the modal quantifier or not it will contribute the same designatum relative to all evaluation indexes for which its meaning determines a designatum

I will now proceed to illustrate how this explanation works on the basis of the examples with modal auxiliaries. 1a determines two logical forms. In one of them the definite phrase *the 37th president* takes narrow scope. In the other *the 37th president* takes wide scope leaving behind a trace which is semantically dependent on the interpretation it will get in the wide scope.[79]

1 a The 37th president might have been female.
1aA $[_S [_T \text{might}] [_S [_{NP} \text{the } 37^{th} \text{ president}] [_{VP} \text{have been female}]]]]$

[79] For a syntactic account for the possibility of such two logical forms see Heim and Fintel (2011), pp. 83-98.

1aB [$_S$ [$_{NP}$ the 37th president] [$_S$ [$_T$ might] [$_S$ t_1 [$_{VP}$ have been female]]]]

The first of these two logical forms where *might* has the widest scope will get the following semantic analysis:

1aA [$_S$ [$_T$ might] [$_S$ [$_{NP}$ the 37th president] [$_{VP}$ have been female]]]]

1ai derived from 1aA:
$\{\lambda s[\text{might}]^s, \{\lambda s.[\text{the 37}^{th}\text{ president}]^s, \lambda s.[\text{have been female}]^s\}\}$
$\{\lambda s.[\text{might}]^s, \lambda s.[\text{have been female}]^s([\text{ The 37}^{th}\text{ president}]^s)\}$
$\{\lambda s.\lambda S.\exists s'(R(s)(s') \,\&\, S(s')), \lambda s.[\text{have been female}]^s([\text{ The 37}^{th}\text{ president}]^s)\}$
$\lambda s.\exists s'(R(s)(s') \,\&\, [\text{have been female}]^{s'}([\text{ The 37}^{th}\text{ president}]^{s'}))$
when evaluated relative to @:
$\exists s'(R(@)(s') \,\&\, [\text{have been female}]^{s'}([\text{ The 37}^{th}\text{ president}]^{s'}))$

The result is a sentential meaning in which evaluation index variable of *the 37th president* is bound by the existential quantification over evaluation indexes introduced by *might*. This sentential meaning determines the following truth conditions:

True at w iff there are worlds w' such that w' is accessible to w and the denotation of *have been female* relative to w' maps to truth the designatum of *the 37th president* relative to w'.

The second logical form associated with 1a, 1aB where the noun phrase *the 37th president* gets the widest scope will on the other hand gets the following interpretation:

1aB [$_S$ [$_{NP}$ the 37th president] [$_S$ [$_T$ might] [$_S$ t_1 [$_{VP}$ have been female]]]]

1aii derived from 1aB:
$\{\lambda s.[\text{the 37}^{th}\text{ president}]^s, \{1, \{\lambda s.[\text{might}]^s, \{\lambda s.[t_1]^{s,g}, \lambda s.[\text{have been female}]^s\}\}\}\}$
$\{\lambda s.[\text{the 37}^{th}\text{ p.}]^s, \{1, \{\lambda s.\lambda S.\exists s'(R(s)(s') \,\&\, S(s')), \{\lambda s.[t_1]^{s,g}, \lambda s.[\text{have been female}]^s\}\}\}\}$
$\{\lambda s.[\text{the 37}^{th}\text{ president}]^s, \{1, \{\lambda s.\lambda S.\exists s'(R(s)(s') \,\&\, S(s')), \lambda s.[\text{have been female}]^s([t_1]^{s,g})\}\}\}$
$\{\lambda s.[\text{the 37}^{th}\text{ president}]^s, \{1, \lambda s.\exists s'(R(s)(s') \,\&\, [\text{have been female}]^{s'}([t_1]^{s',g}))\}\}$
$\{\lambda s.[\text{the 37}^{th}\text{ president}]^s, \lambda s.\lambda x.\exists s'(R(s)(s') \,\&\, [\text{have been female}]^{s'}([t_1]^{s',g(x/1)}))\}$
$\{\lambda s.[\text{the 37}^{th}\text{ president}]^s, \lambda s.\lambda x.\exists s'(R(s)(s') \,\&\, [\text{have been female}]^{s'}(x))\}$
$\lambda s.\exists s'(R(s)(s') \,\&\, [\text{have been female}]^{s'}([\text{the 37}^{th}\text{ president}]^s))$

when evaluated relative to @: $\exists s'(R(@)(s') \& [\text{have been female}]^{s'}([\text{the } 37^{th} \text{ president}]^{@}))$

Here the evaluation index variable of *the 37th president* is not bound by the existential quantification over worlds introduced by *might*. Consequently, *the 37th president* will be evaluated relative to the same evaluation index as the whole sentence. The resulting sentential meaning determines the following truth-conditions:

True at w iff there are worlds w' such that w' is accessible to w and the denotation of *have been female* relative to w' maps to truth the designatum of *the 37th president* relative to w.

Note that in the evaluation of 1aii relative to t world w, only the the designatum of *the 37th president* relative to w is relevant. In contrast in the evaluation of 1ai relative to a world w, the designata of *the 37th president* relative to other worlds w' are relevant as well.

If *The 37th president* is not a rigid designator, an assumption which is confirmed by the way such definite phrases are semantically analyzed, it will follow that for some worlds w and w', $[\text{The } 37^{th} \text{ president}]^{w} \neq [\text{The } 37^{th} \text{ president}]^{w'}$. Then clearly the sentential meaning –i.e. the truth conditions- determined by the logical form 1ai will be different than the sentential meaning determined by the logical form 1aii.

If 1a determines two logical forms in which *the 37th president* takes the wide scope or the narrow scope, 1b, which has the same syntactic structure as 1a, should determine two similar logical forms too. These would be the following:

1 b Nixon might have been female
1bA $[_S [_T \text{might}] [_S [_{NP} \text{Nixon}] [_{VP} \text{have been female}]]]]$
1bB $[_S [_{NP} \text{Nixon}] [_S [_T \text{might}] [_S t_1 [_{VP} \text{have been female}]]]]$

And the semantic derivation of sentential meaning from these logical forms should proceed in the same way as were the case with the logical forms of 1a. The logical form in which *might* has the widest scope will thus get the following interpretation:

1bA $[_S [_T \text{might}] [_S [_{NP} \text{Nixon}] [_{VP} \text{have been female}]]]$

1bi derived from 1bA:

$\{\lambda s[\text{might}]^s, \{\lambda s.[\text{Nixon}]^s, \lambda s.[\text{have been female}]^s\}\}$

$\{\lambda s.\lambda S.\exists s'(R(s)(s') \,\&\, S(s')), \{\lambda s.[\text{Nixon}]^s, \lambda s.[\text{have been female}]^s\}\}$

$\{\lambda s.\lambda S.\exists s'(R(s)(s') \,\&\, S(s')), \lambda s.[\text{have been female}]^s([\text{Nixon}]^s)\}$

$\lambda s.\exists s'(R(s)(s') \,\&\, [\text{have been female}]^{s'}([\text{Nixon}]^{s'}))$

when evaluated relative to @:

$\exists s'(R(@)(s') \,\&\, [\text{have been female}]^{s'}([\text{Nixon}]^{s'}))$

Here the evaluation index variable of *Nixon* is bound by the existential quantification introduced by *might*. Thus, in the evaluation of the whole sentence relative to a world w, not just the designatum of *Nixon* relative to w, but its designatum relative to other possible worlds w' will as well be relevant. The sentential meaning 1bi determines the following truth conditions:

True at w iff there are worlds w' such that w' is accessible to w and the denotation of *have been female* relative to w' maps to truth the designatum of *Nixon* relative to w'.

The logical form 1bB on the other hand will get the following interpretation:

1bB $[_S [_{NP} \text{Nixon}]_1 [_S 1 [[_T \text{might}] [_S t_1 [_{VP} \text{have been female}]]]]]$

1bii derived from 1bB:

$\{\lambda s.[\text{Nixon}]^s, \{1, \{\lambda s.[\text{might}]^s, \{\lambda s.[t_1]^{s,g}, \lambda s.[\text{have been female}]^s\}\}\}\}$

$\{\lambda s.[\text{Nixon}]^s, \{1, \{\lambda s.\lambda S.\exists s'(R(s)(s') \,\&\, S(s')), \{\lambda s.[t_1]^{s,g}, \lambda s.[\text{have been female}]^s\}\}\}\}$

$\{\lambda s.[\text{Nixon}]^s, \{1, \{\lambda s.\lambda S.\exists s'(R(s)(s') \,\&\, S(s')), \lambda s.[\text{have been female}]^s([t_1]^{s,g})\}\}\}$

$\{\lambda s.[\text{Nixon}]^s, \{1, \lambda s.\exists s'(R(s)(s') \,\&\, [\text{have been female}]^{s'}([t_1]^{s',g}))\}\}$

$\{\lambda s.[\text{Nixon}]^s, \lambda s.\lambda x.\exists s'(R(s)(s') \,\&\, [\text{have been female}]^{s'}([t_1]^{s',g(x/1)}))\}$

$\{\lambda s.[\text{Nixon}]^s, \lambda s.\lambda x.\exists s'(R(s)(s') \,\&\, [\text{have been female}]^{s'}(x))\}$

$\lambda s.\exists s'(R(s)(s') \,\&\, [\text{have been female}]^{s'}([\text{Nixon}]^s))$

when evaluated relative to @:

$\exists s'(R(@)(s') \,\&\, [\text{have been female}]^{s'}([\text{Nixon}]^{@}))$

Here the evaluation index variable of *Nixon* is not bound by the existential quantification introduced by *might*. Thus in the evaluation of the whole sentence relative to a possible world w only the desigatum of *Nixon* relative to w will be relevant. The meaning 1bii determines the following truth-conditions:

truth at w iff there are worlds w' such that w' is accessible to w and the denotation of *have been female* relative to w' maps to truth the designatum of *Nixon* relative to w.

If *Nixon* were not a rigid designator then the sentential meanings 1bi and 1bii derived respectively from the logical forms 1bA and 1bB would be different and 1b would consequently be ambiguous just like 1a. But this is not the case. If *Nixon* is a rigid designator on the other hand the truth conditions determined by 1bi and 1bii will be the same:

1bi $\lambda s.\exists s'(R(s)(s') \& [\text{have been female}]^{s'}([\text{ Nixon}]^{s'}))$

truth at w iff there are worlds w' such that w' is accessible to w and the denotation of *have been female* relative to w' maps Nixon to truth.

1bii $\lambda s.\exists s'(R(s)(s') \& [\text{have been female}]^{s'}([\text{Nixon}]^{s}))$

truth at w iff there are worlds w' such that w' is accessible to w and the denotation of *have been female* relative to w' maps Nixon to truth.

For any worlds w, w' the designatum of *Nixon* relative to w' will be the same as its designatum relative to w –i.e. for any $s \in D_s$ $[\text{Nixon}]^s$ will be the same individual. Thus, unlike 1a, 1b will not be ambiguous, although like 1a it determines two distinct logical forms.

There is nothing special about the pair of sentences 1a and 1b. We can produce many such pairs at will. Whenever in an ambiguous modal sentence involving definite description arguments we replace the definite descriptions with proper names, in the resulting sentence the ambiguity will cease to obtain.

So, the pair 1a and 1b illustrates a general phenomenon. And clearly explanations similar to the one we gave of the ambiguity divergence between 1a and 1b will apply in all similar cases. If this way of explaining the ambiguity divergence in question here is to be generalized, then we will need the two assumptions already mentioned at the beginning. One of these was the syntactic assumption that modal sentences determine a multiplicity of logical forms depending on the way the noun phrases take scope with respect to the modal constituent. The other is the semantic assumption that proper names by linguistic design must be rigid designators, but that there is not such a necessity for definite descriptions. The syntactic assumption in question here is a corollary of the principles of noun phrase movement that is generally accepted in transformational generative grammar tradition for reasons independent of specific the ambiguity issue handled here. These principles then get further support because as we have seen they are also of help in the explanation of the ambiguities of the sort considered here. The semantic assumption with regard to the obligatory rigidity of proper names on the other hand does not in my opinion have a justification that is independent from the explanatory work I have illustrated above – and the one concerning identity sentences which I will illustrate below. That this assumption enables us to give a linguistic-semantic explanation of a general semantic phenomenon regarding modal sentences with designator arguments is the justification for its adoption. Had it been devoid of any such explanatory significance, it would as well lack any justification in truth-conditional semantics.

The explanation of the remaining cases of ambiguity/non-ambiguity divergence of the modal sentences involving singular term arguments will be similar to the case just considered, and will presumably further support ascription of *de jure* rigidity to proper names. For, common semantic analyses of such constituents as *seldom*, *likely*, of *if…then…* constructions and of characterizing sentences involve quantification over possible worlds. But as there are thorny issues regarding the details of those analyses I will not discuss their cases separately.

Divergent Contingency Phenomenon in Identity Sentences

Identity sentences, or their negations, whose arguments are proper names always appear to be non-contingent sentences. This can be discerned in the following examples which sound inconsistent, when *might* is read with the alethic sense of possibility:

Hesperus is Phosphorus, but this might not have been so.
It is not the case that Hesperus is Phosphorus, but it might very well be.
Leo Tesfai is Len Kahsai, but it might not be so.
Leo Tesfai is not Len Kahsai, but he might very well be.

But this non-contingency cannot be attributed to all identity sentences, and their negations. The following sentences are okay even when *might* is read with alethic sense:

The brightest star of the evening sky is Venus, but this might not have been so.
The brightest star of the evening sky is not Venus, but it might have been so.
The author known under the name ‘Leo Tesfai’ is Len Kahsai, but it might not have been so.
The author who won the 2013 Booker prize is not Len Kahsai, but he might be.

The non-contingency of identity sentences the arguments of which are proper names can be explained by attributing *de jure* rigidity to proper names; the capacity of identity sentences which contain at least one definite description argument to be contingent can in turn be explained by noting that definite descriptions need not always be rigid designators.

6 Hesperus is Phosphorus.
[[Hesperus] [is [Phosphorus]]]

{λs.[Hesperus]^s, {λs.λx.λy.{x=y}, λs.[Phosphorus]^s}} {λs.[Hesperus]^s, λs.λx.{x=[Phosphorus]^s}} λs.{[Hesperus]^s =[Phosphorus]^s}

If by linguistic design *Hesperus* has the same denotation at every evaluation index s and if the same is the case for *Phosphorus*, then either *Hesperus is Phosphorus* will be true relative to all evaluation indexes or it will be false relative to all evaluation indexes.

7 The brightest star of the evening sky is Venus.
[[The brightest star of the evening sky] [is [Venus]]]

{λs.[The brightest star of the evening sky]^s, {λs.λx.λy.{x=y}, λs.[Venus]^s}} {λs.[The brightest star of the evening sky]^s, λs.λx.{x=[Venus]^s}} λs.{[The brightest star of the evening sky]^s =[Venus]^s}

If *the brightest star of the evening sky* does not have the same denotation at every evaluation index s then even if *Venus* is rigid, then *the brightest star of the evening sky is Venus* may be true relative to some evaluation indexes and false relative to some other.

There is not much to be said about the provided explanation of the phenomenon of contingency divergence among identity sentences formed with particular level arguments. If this divergence is accepted as a datum to be explained, then the wholesale assignment of rigidity to proper names is confirmed further, and corroborates the previously given explanation of the phenomenon of the ambiguity divergence in modal sentences with particular level designator arguments.

CHAPTER V

THE VARIETY OF NOUN PHRASES FORMED BY COMMON NOUNS

In the previous chapter we have illustrated how an explicit linguistic-semantic argument can be raised to defend a rigidity/non-rigidity divergence among a certain class of terms on the basis of the non controversial case of proper names and definite descriptions. Our proclaimed objective is of course to mount similar arguments that pertain to common nouns. But we will not be able attack this objective immediately.

As indicated in the introduction and in the chapter on the relevant philosophical literature, the case of common nouns present difficulties which have no counterpart in the case of proper names. Common nouns often contribute to the interpretation of sentences by forming noun phrases the semantic contributions of which is a non-trivial function of the meanings of the common nouns that form them. Futhermore the semantic output of these noun phrases formed by common nouns is quite varied: appliers, quantifiers, designators which may be kind level or particular level. For two interconnected reasons this predicament of the common nouns should stop us from attacking the issue of the common noun rigidity headlong.

First, the mode of denotation (applier or designator) and the type of denotation (kind or particular) that should be ascribed to common nouns cannot be immediately determined. One should first consider the semantic output of the noun phrases formed by common nouns, which is not itself a straigforward matter in the case of some types of noun phrases. Only then one can judge which modes and types of denotations can be assigned to common nouns so that the semantic outputs acscribed to the noun phrases formed by them are accounted for in the best way.

Second, our ultimate objective is to determine whether there is a rigidity/non-rigidity difference among common nouns themselves. The basic data we can use on this issue will pertain to the interpretation of sentences, specifically on their ambiguity/non-ambiguity and on their modal properties. But the effects of the rigidity/non-rigidity of the common nouns on the interpretation of sentences is not immediate as common nouns's semantic contribution is effected by way of being an input to the interpretation of the noun phrases. The rigidity/non-rigidity of common nouns does not require the noun phrases they form to be rigid or non-rigid, and vice versa. So, to be able to judge whether there is a rigid/non-rigid difference among common nouns on the basis of sentence level semantic data we have to have an exact idea as to how the semantic output of noun phrases is derived from the meanings of the common nouns.

For these reasons the proper discussion on the rigidity of common nouns will come after I discuss first the semantic variety of the noun phrases formed by common nouns, and second the different ways to account for that variety.

In the present chapter I will deal with the variety of the noun phrases formed by common nouns. After a preliminary section on syntactic matters regarding common nouns and noun phrases, I will illustrate the different types of meanings commonly assigned to such noun phrase types as indefinites, bare plurals, definites. We will see that these meanings vary both with respect to their mode of denotation (designation, application or quantification) and the type of denotata they they pertain to (kinds or particulars). We will also see that regarding the types of meanings to be assigned to certain noun phrase types there is not as yet a consensus –e.g. bare plural noun phrases like *tigers*. One thing I won't do in the present chapter is to discuss how these different types of meanings for noun phrases can be derived in a principled way from the meanings of the common nouns that form them. This will be the topic of the next chapter.

Common Nouns, Modified Common Nouns and Noun Phrases

Simple common nouns are such expression as *automobile*, *planet*, *expression*, *water*, *oil*, *president*. They form a syntactically and semantically basic lexical category. Together with proper names they form the more inclusive lexical category *nouns* (N). Syntactically they can be characterized as simple expressions which can combine with determiners. Determiners are such expressions as *a*, *the*, *every*, *some*, *most*, *many*, *two* etc. Determiners combine with common nouns to form noun phrases (NP's, characterized below) as in *some water*, *every oil*, *most planets*, *two automobiles*, *few presidents*, *the water*, *an oil*, *the planet*, *the president*. Common nouns can also form nominal predicates in sentences; when they do so, some require determiners some don't:

The liquid in this glass is not water.
Pluto is not a planet anymore.

Although semantically common nouns and adjectives are often assigned similar meanings (viz. predicative meanings of type <s,<e,t>>), note that the given characterization of common nouns excludes adjectives. Adjectives can form predicates but unlike common nouns they cannot combine with determiners:

*every fresh is green.
*Two young looked for you.
The apples are fresh.
These applicants are young.

Furthermore, adjectives can be directly combined with common nouns to form new nouns. But two common nouns usually cannot be combined to form a new noun.

Fresh apples need not be green.
*Fruit apples need not be green.

Common nouns can be modified by clusters of adjectives, relative phrases and prepositional phrases to form further noun like elements.

One red apple that Alice bit yesterday is in the fridge.
One truck load of fresh apples from Amasya have scattered all over the road.

These modified nouns, like the simple common nouns, can combine with determiners to form determiner phrases as seen above or can form nominal predicates as seen in the following sentence.

The only thing in the fridge is a red apple bitten by Alice.

The category formed by simple common nouns, modified common nouns and proper names taken together is sometimes termed as *N-bar* and referred to by the sign *N*.[80] The postulation of the category of *N'* can be justified considering that every modified common noun forms a syntactic and semantic unit which is grammatically replaceable by a simple common noun and vice versa. Furthermore both simple common nouns and modified common nouns can be replaced by *one*:

The red apple on the table and the one bitten by Alice are the only red apples left.
The red apple on the table and the green one bitten by Alice are the only apples left.

For simplicity I will take both simple common nouns and the constituents that result through their modification to constitute the category common nouns. Without this convention, strictly speaking the portent of the present work should rather be redescribed as the investigation of constituents of the category *N'* as to whether some among them should be singled out as *de jure* rigid.

Nouns constitute a lexical category, alongside adjectives, verbs, adverbs etc. But the syntactic, and consequently the semantic, analysis of sentences cannot be based on lexical categories alone. The same sequence of lexical items can constitute two different sentences depending on how we partition the sequence into constituents.

Alice [saw [the man with a telescope]]
Alice [saw [the man]] with a telescope]

Hence emerges the need for another set of categories alongside lexical categories to analyze sentences into. The categories of sentence constituents are phrases. Phrases are formed by lexical elements and are named according to the

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[80] Carnie (2013), pp. 166-169.

lexical elements that *heads* them. The phrases headed by a member of category N are termed as *noun phrases* (NP).[81] [82]

NP's are phrases headed by nouns and fulfill the argument function in sentences. They include phrases formed by bare nouns as well as common nouns combined with determiners:

The dodo is extinct. (definite singular NP)
Two male dodos have recently been found in Tasmania. *(quantified NP, bare singular NP)*
Every bicycle assembled by Alice have broken. *(quantified NP)*
The conquistadors shot birds held sacred by the natives. *(definite plural NP, bare plural NP)*
Pink Cadillacs have been awarded to the winners. *(bare plural NP, definite plural NP)*
Following the process, boiling water should be poured into the sink. *(definite singular NP, bare singular NP, definite singular NP)*
It is illegal to shoot any bird held sacred by the natives. *(quantified NP)*
No planet is beyond our reach *(quantified NP)*
Automobiles became an indispensable feature of modern life. *(bare plural NP)*
Water is scarce around here. *(bare singular NP)*
Alice is convicted for shooting a bird held sacred by the natives. *(Bare singular NP, indefinite singular NP)*

In English only plural count common nouns, mass common nouns and proper names can head bare NP's. Singular count nouns can head NP's only by combining with determiners.

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[81] Traditionally NP's were regarded as arguments of verb phrases that are headed by nouns. Among NP's were included bare arguments formed by nominals alone without any determiners but also arguments formed by the combination of nominals with determiners. But recent theories in the transformational tradition distinguish the latter as Determiner Phrases, and take them to be headed by determiners. In these theories the category we singled out as N' above are regarded as NP's proper. As regards bare arguments that were previously considered as NP's there is an ongoing disagreement as to wheter they are NP's, or DP's with implicit unpronounced determiners. Despite the popularity of these recent syntactic theories however in semantic theorizing practitioners often continue to use the older framework unless a semantic point to be made is sensitive to this preference. In the present work we do the same.

[82] The category N' to which our *common nouns* belong is neither a phrasal category nor a lexical category.

Some NP's can also form predicates in sentences. The most typical of these are indefinite singular NP's, bare plural NP's and NP's headed by common nouns modified by number adjectives.[83]

The Sun is a yellow dwarf.
The Sun and the Proxima Centauri are yellow dwarves.
The Sun and the Proxima Centauri are two yellow dwarves.

In the rest of the chapter I will explore the variety in the semantic output of the NP's headed by common nouns. I will exclusively focus on the semantics of NP's headed by count common nouns (for this reason heretofore I will drop using the qualification *count*).

The Semantic Variety of Noun Phrases Formed by Common Nouns

One and the same common noun can be used to form different types of noun phrases. This variety can be illustrated by considering the case of *whale*.[84]

1 a Whales face extinction due to excessive hunting. *(bare plural)*
b The Beluga and the Narwhal are whales. *(bare plural predicate)*
c The stars of the theme park, Alice and Bob, are whales. *(bare plural predicate)*
d Whales have torn our nets last night. *(bare plural)*
e One of the stars of the theme park, Alice, is a whale. *(indefinite singular predicate)*
f Last night a whale should have torn off the fish nets. *(indefinite singular)*
g The Beluga is not a shark species, it is a whale. *(indefinite singular predicate)*
h Alice objects to the classification of a whale under the Phocoenidae family. *(indefinite singular)*

[83] Number terms in argument NP's are often distinguished from number terms figuring in predicate NP's. The former are regarded as quantifiers whereas the latter are regarded as adjectives.

[84] Similar examples based on *whale* are given in Krifka et al. (1995).

j Surely, the whale should have been disoriented to come into these waters and tore our nets off. *(definite singular)*
k Alice claims that the cladistic analysis shows that the whale should rather be put under an altogether new genus. *(definite singular)*
l The whale is a highly intelligent mammal.*(definite singular)*
m The whales escaped by jumping off the pool over the gate into the sea. *(definite plural)*
n Two whales tore out nets. *(quantified)*
o Some whales are not endangered species. *(quantified)*

Corresponding to this syntactic variety there surely is a semantic variety. The semantic variety is in fact greater than the syntactic one. For example, as the reader may have already noticed, *the whale* in its occurrence in 1j cannot be taken to make the same semantic contribution as it does in its occurrence in 1k. It happens to be the case that, as will be more amply illustrated below, noun phrases of the same syntactic types formed by the same common nouns may produce different types of semantic contributions in different sentential contexts.

More precisely we will see that noun phrases formed by common nouns shows semantic variety in two respects. First, the types of their denotations differ. That is these phrases differ in whether they designate entities (type e), apply to entities (type <e,t>), or quantify over entities (type <<e,t> t>).[85]

Second, they differ in the types entities involved in their denotations. Surely NP denotations typically pertain to particulars. That is, designate, apply to or quantify over particulars. But, as can be noticed in the examples of phrases formed by *whale*, there are reasons to think that some NP denotations should

[85] Partee (1986).

pertain to entities which are not particulars. In the semantic literature these entities are termed as kinds.

What are kinds? Following the linguistic-semantic literature on *genericity* I will simply assume that besides particulars there are such entitities as kinds and that such noun phrases as *this kind (of α), this model (of α), this type (of α)* designate kinds (and I will term such noun phrases simply as *kind phrases)*.[86]

Below I will illustrate the semantic variety of the NP's formed by common nouns in the two respects mentioned. I will illustrate the semantic contributions standardly assigned to NP's in a variety of sentential contexts so that the sentences they figure in get the truth-conditions we intuitively ascribe them to have. But I will not go into the semantic analyses of the NP's themselves. This is a job for the next chapter where I will discuss different possible ways to derive the variety in the denotations of the NP's which are formed by common nouns as a function of the meanings of the common nouns that form them.

Indefinite Singular NP's

1 e One of the stars of the theme park, Alice, is a whale. *(indefinite singular)*
f Last night a whale should have torn off the fish nets. *(indefinite singular)*
g The Beluga is not a shark species, it is a whale. *(indefinite singular)*
h Alice objects to the classification of a whale under the Phocoenidae family. *(indefinite singular)*

Indefinite singulars are NP's of the form *a(n) α*, where α is a common noun. In the syntactic organization of sentences they can operate as arguments of verbs

[86] Krifka et al. (1995), Carlson (1980).

in subject or object positions. They can also form the predicate in nominal predications. In argument positions they are often taken to have quantificational denotations (type <<e,t>,t>), but there are other, perhaps better, theoretical options as well. In predicate position they are usually taken to have predicative denotations (type <e,t>), but again there are other possibilities. In both of these positions their denotations can pertain to kinds or particulars.

Indefinite Singular NP's Denoting Particulars

The denotation of the indefinite singular NP's figuring in the following sentences pertain to particulars.

2 a The priciest gift Alice received on her birthday was a road bike.
  b A road bike stood locked next to Alice's bike.

Yet the semantic types of these NP's are not the same. *a road bike* in 2a occurs in the predicate position and it will standardly be assigned a denotation of type <e,t> that applies to particular road bikes.

2 a The priciest gift Alice received on her birthday is a road bike.
  $[[_{NP}\text{The priciest gift Alice received on her birthday}][_{VP}\text{is }[_{NP}\text{a road bike}]]]$

$$\{\lambda s'.[_{e}\text{The priciest gift Alice received on her birthday}]^{s'}, \{\lambda s'.\lambda P.P, \lambda s'.[_{<e,t>}\text{ a road bike}]\}\}$$
$$\{\lambda s'.[_{e}\text{The priciest gift Alice received on her birthday}]^{s'}, \lambda s'.[_{<e,t>}\text{ a road bike}]\}$$
$$\lambda s'.[_{<e,t>}\text{ a road bike}]([_{e}\text{The priciest gift Alice received on her birthday}]^{s'})$$

The indefinite articles occurring in NP's that figure in predicate positions are usually interpreted as vacuous. The same is the case for the predicative copula.[87]

In 2b *a road bike* occurs in an argument position and following a common approach deriving from Montague's and Lewis' work it can be assigned an existential generalized quantifier (GQ) denotation of type <<e,t>,t>> that pertains to particular tokens:[88]

2 b A road bike stood locked next to Alice's bike.
$[_S[_{NP}$ a road bike$][_{VP}$ stood next to Alice's bike$]]$

$\{\lambda s'.[_{<<et>,t>}\text{ a road bike}]^{s'}, \lambda s'.[_{<e,t>}\text{ stood next to Alice's bike}]^{s'}\}$ $\lambda s'.[_{<<e,t>,t>}\text{ a road bike}]^{s'}([_{<e,t>}\text{ stood next to Alice's bike}]^{s'})$

Here the contribution of *[NP a road bike]* relative to an evaluation index s' will be a function that maps a predicative denotation P into truth if and only if there is at least one road bike token x for which P(x) is true. That is, if for example we take the common noun *road bike* to have a predicative denotation then we will have,

$\lambda s'.[_{<<et>,t>}\text{ a road bike}]^{s'} = \lambda s'.\lambda P.\exists x([_{<e,t>}\text{road bike}]^{s'} \,\&\, P(x))$

Here the indefinite article will not be interpreted as semantically vacuous, but will be given an existential quantifying determiner interpretation,

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[87] Heim and Kratzer (1998) pgs. 61-62. Another option may be to interpret *a road bike* in 2a as an existentially quantified phrase and the copula as the *is* of identity. However then in such a sentence as *The priciest gift Alice received on her birthday is not a road bike* one should expect a reading according to which a particular road bike was not the priciest gift Alice received. Whether there indeed is such a reading is dubious.

[88] See Chapter 6, Heim and Kratzer (1998).

$\lambda s'.[_{<<e,t>,<<e,t>,t>>}a]^{s'}=\lambda s'.\lambda Q.\lambda P.\exists x(P(x)\&Q(x))$

which when it combines with *road bike* interpreted as an applier will yield the given interpretation of *[$_{NP}$ a road bike]*.[89]

From then on I will adopt this treatment of indefinite singular arguments. But it is neither the only one nor the best. It cannot account for the semantic contribution of a considerable range of indefinite singular arguments:

3 a Everyone who owns a road bike is proud of it.
  b A road bike is usually lighter than 12 kg.

For example in 3a and 3b too *a road bike* figures in argument positions, one would expect that in these sentences too it can be assigned an existential GQ meaning quantifying over particulars. But note that 3a is one of those notorious donkey sentences and interpreting *a road bike* here as an existential GQ would not yield the salient reading of the sentence. The salient reading is obtainable however if it is assigned a universal GQ meaning. And 3b is a so called generic sentence where *a road bike* can neither be interpreted as an existential GQ nor as a universal GQ. One way to deal with this variety in the meaning indefinite singular phrases may be to take indefinite singular phrases to be ambiguous between different GQ meanings –still it is not certain whether there is a GQ meaning that will work in the case of 3b. But there is also a relatively recent but common approach introduced in Heim (1982) that takes indefinite singular phrases in argument positions as introducing variables restricted by accompanying predicates which can treat all occurences of indefinite singular

[89] On the ambiguity of *a* and indefinite singular noun phrases see Heim and Kratzer (1998), p. 172.

phrases in argument positions uniformly. But under Heim's approach as well the occurrences of *a road bike* in the sentences 3a-b will denote to particular tokens.

Trying to accomodate this approach here will take us too far afield. The derivation of the semantic structures it assigns to sentences are derivable only through a considerable reshuffle of the surface syntax of sentences, and the interpretation rules for these logical forms are not straightforward. For these reasons I will ignore this approach to the semantics of indefinite noun phrases. Most of the discussion in the next chapter on the rigidity of common nouns is not based on sentences that are best handled by Heim's approach.

Indefinite Singular NP's Denoting Kinds

Indefinite singular NP's can also denote kinds. This is termed as their taxonomic reading. Consider the following specimen:

4 a The Ti Pro Race SC 1.3 is a road bike by the Czech maker Morati.
b A road bike by the Czech maker Morati has been launched today.
c This week in her blog Alice has reviewed a road bike by the Czech maker Morati.

In 4a the subject *The Ti Pro Race SC 1.3* is a kind-designating phrase, it does not designate a contextually salient particular token but a certain bike model –it can be replaced by *this model* without any change in the truth-conditions. Such phrases are called definite generics and I will separately cover them below. In the predicate position we have the indefinite singular *a road bike by the Czech maker Morati*. Given that the subject of the sentence designates a kind, the most straightforward interpretation for the indefinite singular in the predicate will be to assign it predicative denotations of type <e,t>, but one which truly applies to only bike models rather than the tokens. Thus, 4a will have receive the following interpretation:

4 a The Ti Pro Race SC 1.3 is a road bike by the Czech maker Morati.

$[[_{NP}\text{The Ti Pro Race SC 1.3}][_{VP}\text{is }[_{NP}\text{a road bike by the Czech maker Morati}]]]$

$$\{\lambda s'.{}_k[_e\text{The Ti Pro Race SC 1.3}]^{s'}, \{\lambda s'.\lambda P.P, \lambda s'.{}_k[_{<e,t>}\text{ a r. b. by the Czech maker Morati}]\}\}$$
$$\{\lambda s'.{}_k[_e\text{The Ti Pro Race SC 1.3}]^{s'}, \lambda s'.{}_k[_{<e,t>}\text{ a road bike by the Czech maker Morati}]\}$$
$$\lambda s'.{}_k[_{<e,t>}\text{ a road bike by the Czech maker Morati}]({}_k[_e\text{The Ti Pro Race SC 1.3}]^{s'})$$

In 4b, the predicate is formed by *$[_{VP}$ has been launched today]* . In relation with bikes it will truly apply only to models rather than the tokens. That predicate here combines with the subject formed by the indefinite singular *a road bike by the Czech maker Morati* which thus should be taken to denote kinds. If we pursue the described treatment of indefinite singulars in argument positions, then it should be assigned existential GQ denotations quantifying over kinds rather than over tokens. Thus we will have,

4 b A road bike by the Czech maker Morati has been launched today.

$[_S[_{NP}\text{a road bike by the Czech maker Morati}][_{VP}\text{has been launched today}]]$

$$\{\lambda s'.{}_k[_{<<et>,t>}\text{a r. b. by the Czech maker Morati}]^{s'}, \lambda s'.{}_k[_{<e,t>}\text{has been launched today}]^{s'}\}$$
$$\lambda s'.{}_k[_{<<e,t>,t>}\text{a road bike by the Czech maker Morati}]^{s'}({}_k[_{<e,t>}\text{has been launched today}]^{s'})$$

In 4c, the indefinite noun phrase *a road bike by the Czech maker Morati* figures as the object of the verb *review*. The object of a bike review in a blog is typically a certain model of bike, rather than a bike token. Even if during the review process Alice has to use five distinct token bikes, she will still be counted to have reviewed one bike. If so, then the indefinite noun phrase, figuring as the object-argument should again be taken to denote models of bike:

4 c This week in her blog Alice has reviewed a road bike by the Czech maker Morati.
$[_S[_{NP}$ a r. b. by the C. maker M.$]_1[1\ [_S$ this week in her blog Alice has reviewed $t_1]]]$

$\{\lambda s'.{}_k[_{<<e,t>,t>}$a r. b. by the C. maker M.$]^{s'}$, $\{1, \lambda s'.$[this w. in her blog A. has reviewed $t_1]^{s'}\}\}$
$\{\lambda s'.{}_k[_{<<e,t>,t>}$a r. b. by the C. maker M.$]^{s'}$, $\lambda s'.\lambda y.$[this w. in her blog A. has reviewed $t_y]^{s'}\}$
$\lambda s'.{}_k[_{<<e,t>,t>}$a r. b. by the C. maker M.$]^{s'}(\lambda y.$[this week in her blog Alice has reviewed $t_y]^{s'})$

One issue that comes immediately to mind is the connection between the kind denoting and particular denoting uses of indefinite singular phrases. Are the underlying common nouns ambiguous between a kind denoting reading and a particular denoting reading? Or is it the case that either the kind-referring reading or the particular referring reading is the native reading and the other is derived by a special operation forced by the sentential context in which the term is used? The same issue will reemerge when we consider other phrases formed by common nouns. This issue will be dealt with in the next chapter after we consider the all noun phrases formed by common nouns and all types of denotations that are commonly assigned to them.

Another issue that can first be raised in relation with kind denoting indefinite singular phrases, and one that will reemerge below as we consider other sorts of noun phrases is the possibility to use phrases that apparently are kind denoting as arguments in sentential contexts that require arguments which denote particulars (I will hitherto term such sentential contexts as particular level sentential contexts, and I will term the contexts that require kind denoting arguments as kind level sentential contexts). Consider the following sentences:

5 a Alice shot an endangered bird that was under protection.

b Bob wants to buy a road bike that was positively reviewed by most of the bike sites he follows.
c Alice found the remains of an extinct bison.

In these sentences the highlighted indefinite singulars appear to denote kinds. They appear forced to assume a taxonomic interpretation as the common nouns that form them involves the kind level modifiers, *endangered*, *that was positively reviewed by most of the bike sites he follows*, *extinct*. However the sentential contexts in which they figure are particular level. Below we will repeatedly come upon cases of such sortal discrepancies between the denotation of an argument and the denotation of the sentential context in which that argument figures. Such sortal discrepancies are usually resolved by the postulation of special operations that adjust the denotation type of either the sentential context or the argument.

Bare Plural Noun Phrases

1 a Whales face extinction due to excessive hunting.
b The Beluga and the Narwhal are whales.
c The stars of the theme park, Alice and Bob, are whales.
d Whales have torn our nets last night.

Bare plural phrases are noun phrases formed by plural common nouns, which can form predicates or operate as arguments *barely,* that is, without any overt determiner. In either of these positions they can denote particulars or kinds. In predicate position they are usually taken to predicatively apply to sum individuals, that is, pluralities of kinds or of particulars. As regards their occurences in argument positions, their denotation type and whether they pertain to kinds or particulars is a current subject of controversy. Some authors argue that virtually all non-taxonomic bare plural phrases designate a kind when they are in argument position. Some other authors argue that only in certain special sentential contexts they designate kinds but otherwise they operate like the plural version of non-taxonomic indefinite singular phrases. There also are taxonomic bare plural arguments; but their semantics is a relatively less addressed issue, although their case is quite relevant for the controversy on the semantics of the non-taxonomic bare plural arguments. Now let's look at the examples and the semantic phenomena that are taken to constitute the evidence for this semantic variety.

Bare Plural Phrases in Predicate Position

Curiously in English plural count common nouns, unlike singular count common nouns, do not require determiners to form noun phrases that can figure in predicate or argument positions. Thus in English we have bare plural phrases figuring predicate positions:

6 a The bikes at Alice's room are road bikes.
b The models reviewed this week in Alice's blog are road bikes.

The interpretation of bare plural NP's in argument positions is a controversial issue as we will see below, but as regards their interpretation in predicate positions there is not any controversy. In predicate positions they are usually assigned predicative meanings of type <s,<e,t>> that truly apply to sum individuals. Sum individuals are entities introduced to account for the semantics of plural noun phrases such *the cars in the park* or conjunctive noun phrases such as *Alice, Bob, and Carol.* They are considered entitites of type e alongside atomic individuals. Sum individuals can be sums of kinds or sums of particulars, or simultaneously of both –a little more will be said about them in the next chapter. So for example 6a and 6b will be interpreted in the following way:

6 a The bikes at Alice's room are road bikes.
$[[_{NP}$ the bikes at Alice's room$]$ $[_{VP}$ are $[_{NP}$ road bikes$]]]$

$$\{\lambda s'.{}_{pl\_p}[_{e}\text{ the bikes at Alice's room}]^{s'}, \lambda s'.{}_{pl\_p}[_{<e,t>}\text{ road bikes}]^{s'}\}$$
$$\lambda s'.{}_{pl\_p}[_{<e,t>}\text{ road bikes}]^{s'}({}_{pl\_p}[_{e}\text{ the bikes at Alice's room}]^{s'})$$

6 b The models reviewed this week in Alice's blog are road bikes.
$[[_{NP}$ The models reviewed this week in Alice's blog$]$ $[_{VP}$ are $[_{NP}$ road bikes$]]]$

$$\{\lambda s'.{}_{pl\_k}[_{e}\text{ The models reviewed this week in Alice's blog}]^{s'}, \lambda s'.{}_{pl\_k}[_{<e,t>}\text{ road bikes}]^{s'}\}$$
$$\lambda s'.{}_{pl\_k}[_{<e,t>}\text{ road bikes}]^{s'}({}_{pl\_k}[_{e}\text{ The models reviewed this week in Alice's blog}]^{s'})$$

According to these in both 6a and 6b *road bikes* has a predicative denotation. But in 6b it has a non-taxonomic denotation that applies to bike tokens, whereas in 6b it has a taxonomic denotation that applies to bike models.

Bare Plural Phrases in Argument Positions

As I indicated above there is a controversy about the interpretation of bare plural phrases in argument positions. Some authors argue that almost all non-taxonomic bare plural phrases in argument positions designate kinds; that is that they have name like denotations of type e, with kinds as the denotata. Some other authors recognize that in some sentential contexts certain non-taxonomic bare plural phrases designate kinds, but reject that they always do so.[90] This controversy focuses on non-taxonomic uses of bare plurals in argument positions. Beside this use, all parties of this controversy would agree that bare plural phrases also have a taxonomic use. Yet, the taxonomic use of bare plural arguments is not addressed with as much detail, despite the fact that as we will see later it is quite relevant for the controversy about the semantics of the the non-taxonomic bare plural arguments.

There will be a relatively long coverage of bare plural arguments' semantic output in the present chapter, and of the way they derive that output out of the meanings of the common nouns that form them in the next chapter. This is so in spite of the fact that when I discuss the rigidity of common nouns my examples will not involve bare plural phrases. The reason for this long coverage is that different possible views about bare plural arguments meanings' have repercussions on the question regarding the types and modes of denotation that should be assigned to common nouns (specifically in relation with the question whether all common nouns should be assigned kind designator meanings); which in turn will be seen to be relevant as regards the question whether there is a rigid/non-rigid distinction among common nouns.

[90] The case for the view that virtually all bare plural NP arguments formed by non-taxonomic common nouns always refer to kinds was first raised by Carlson (1980), most of the arguments to that effect in the subsequent literature derives from that text. In my presentation I mainly depend on the discussions, examples and arguments of Krifka et al. (1995), Chierchia (1998), Dayal (2004), Krifka (2004) about NP's referring to kinds.

Bare Plural Phrases as Arguments in Kind Level Sentential Contexts

Foremost among data suggesting that bare plural phrases can designate kinds are sentences in which they occur as arguments of predicates that typically take kind designating arguments, and where they are replaceable by kind-phrases, which we have at the outset assumed to designate kinds, without any change in the truth-conditions (the required plural/singular shift is overlooked as being solely due to syntactic reasons).

7 a Dodos are extinct./ This species is extinct.
b Red ants are not endangered. / This species is not endangered.
c Dot matrix printers are no longer produced. / This type of printer is no longer produced.
d L36s are no longer produced. /This printer model is no longer produced.
e Ti Pro Race SC 1.3s have been launched today. / This model has been launched today.
f This week Alice's blog has reviewed Ti Pro Race SC 1.3s. / This week Alice's blog reviewed this model.
g Ti Pro Race SC 1.3s are designed by a Czech design team. / This model is designed by Czech design team.
h Ernest Rutherford discovered protons. / Ernest Rutherford discovered this type of particle.
j Transistors are invented by Julius Edgar Lilienfeld. / This type of device is invented by Julius Edgar Lilienfeld.

The replaceability of bare plural arguments by kind phrases by itself may not be taken to show that those bare plural phrases designate kinds. Yet in conjunction with the difficulty of interpreting these phrases in other ways, this replaceability strongly suggests that, such bare plural phrases designate kinds.

In this vein one may consider treating the bare plural phrases occurring in subject or object positions in the above sentence as some sort of implicitly quantified noun phrases. Initially, one may consider the possibility to assign the bare plural arguments occurring in sentences in 7 universal or existential GQ denotations of type <<e,t>,t>. Consider the case of 7a (we assume for the time being that non-taxonomic plural common nouns have predicative denotations of type <e ,t> that applies to sums of particulars):

7 a Dodos are extinct.
$[[_{NP}\text{Dodos}][_{VP}\text{are }[_{Adj}\text{extinct}]]]$

i	$\{\lambda s.{}_{p}[_{\exists\_GQ}\text{Dodos}]^{s}, \lambda s.[\text{extinct}]^{s}\}$ $\lambda s.{}_{p}[_{\exists\_GQ}\text{Dodos}]^{s}([\text{extinct}]^{s})$ $\lambda s.\lambda P.\exists x({}_{p}[_{<e,t>}\text{Dodos}]^{s}(x)\ \&\ P(x))([\text{extinct}]^{s})$ $\lambda s.\exists x({}_{p}[_{<e,t>}\text{Dodos}]^{s}(x)\ \&\ [\text{extinct}]^{s}(x))$
ii	$\{\lambda s.{}_{p}[_{\forall\_GQ}\text{Dodos}]^{s}, \lambda s.[\text{extinct}]^{s}\}$ $\lambda s.{}_{p}[_{\forall\_GQ}\text{Dodos}]^{s}([\text{extinct}]^{s})$ $\lambda s.\lambda P.\forall x({}_{p}[_{<e,t>}\text{Dodos}]^{s}(x) \supset P(x))([\text{extinct}]^{s})$ $\lambda s.\forall x({}_{p}[_{<e,t>}\text{Dodos}]^{s}(x) \supset [\text{extinct}]^{s}(x))$
iii	$\{\lambda s.{}_{k}[_{e}\text{Dodos}]^{s}, \lambda s.[\text{extinct}]^{s}\}$ $\lambda s.[\text{extinct}]^{s}({}_{k}[_{e}\text{dodos}]^{s})$

If *dodos* is assigned an existential or universal GQ denotations quantifying over sums of particular dodos as in i and ii, then the predicate *extinct* should be taken to apply to sums of particulars. But this predicate cannot meaningfully apply to sums of particulars. If it could then, it could also meaningfully combine with the noun phrases that designate sums of particulars. But this is not the case: *#My three pets, Hyperion, Thetis and Kronos, are extinct.* Note that even if *per impossible*, *extinct* were taken to mean something like *ceased to exist* that can also apply to particulars and pluralities of particulars, interpreting the *dodos* in 7a as an existential GQ would still not be appropriate. *Dodos are extinct* implies the disappearance of all dodos, not just of some dodos. So, iii where *dodos* is taken to designate kinds seems to be the most appropriate representation.

Now lets consider 7f.

7 f This week Alice's blog has reviewed Ti Pro Race SC 1.3s.
$[_S[_{NP}\text{ Ti Pro Race SC 1.3's}]_1[1\ [_S\text{ this week in her blog Alice has reviewed } t_1]]]$

i $\{\lambda s.{}_p[_{\exists\_GQ}\text{ Ti Pro Race SC 1.3s}], \lambda s.\lambda y.[\text{this week Alice's blog has reviewed } t_y]^s\}$
$\lambda s.{}_p[_{\exists\_GQ}\text{ Ti Pro Race SC 1.3s}]^s(\lambda y.[\text{this week Alice's blog has reviewed } t_y]^s)$
$\lambda s.\lambda P.\exists x({}_{pl\_p}[_{<e,t>}\text{ Ti Pro Race SC 1.3s}]^s(x)\ \&\ P(x))(\lambda y.[\text{this w. A.'s b. has r. } t_y]^s)$
$\lambda s.\exists x({}_{pl\_p}[_{<e,t>}\text{ Ti Pro Race SC 1.3s}]^s(x)\ \&\ \lambda y.[\text{this w A.'s blog has reviewed } t_y]^s(x))$
$\lambda s.\exists x({}_{pl\_p}[_{<e,t>}\text{ Ti Pro Race SC 1.3s}]^s(x)\ \&\ [\text{this week Alice's blog has reviewed } t_x]^s)$

ii $\{\lambda s.{}_p[_{\forall\_GQ}\text{ Ti Pro Race SC 1.3s}], \lambda s.\lambda y.[\text{this week Alice's blog has reviewed } t_y]^s\}$
$\lambda s.{}_p[_{\forall\_GQ}\text{ Ti Pro Race SC 1.3s}]^s(\lambda y.[\text{this week Alice's blog has reviewed } t_y]^s)$
$\lambda s.\lambda P.\forall x({}_{pl\_p}[_{<e,t>}\text{ Ti Pro Race SC 1.3s}]^s(x) \supset P(x))(\lambda y.[\text{this w. A.'s blog has r. } t_y]^s)$
$\lambda s.\forall x({}_{pl\_p}[_{<e,t>}\text{ Ti Pro Race SC 1.3s}]^s(x) \supset \lambda y.[\text{this w. A.'s blog has reviewed } t_y]^s(x))$
$\lambda s.\forall x({}_{pl\_p}[_{<e,t>}\text{ Ti Pro Race SC 1.3s}]^s(x) \supset [\text{this week Alice's blog has reviewed } t_x]^s)$

iii $\{\lambda s.{}_k[_e\text{ Ti Pro Race SC 1.3s}], \lambda s.\lambda y.[\text{this week Alice's blog has reviewed } t_y]^s\}$
$\lambda s.\lambda y.[\text{this week Alice's blog has reviewed } t_y]^s({}_k[_e\text{ Ti Pro Race SC 1.3s}]^s)$

Under the salient reading of 7f, *Ti Pro Race SC 1.3s* cannot be interpreted as an existential GQ quantifying over bike tokens, which is synonymous with *Ti Pro Race SC 1.3s* . Surely it is possible to review bike tokens; for example one can review tokens of a rare vintage bike model. But the salient reading of 7f is not that. It is rather, *This week Alice's blog has reviewed the Ti Pro Race SC 1.3.* According to this 7f will be true even if in preparing the review Alice sees and uses only one token of Ti Pro Race SC 1.3. But according to interpretation i the truth of 7f would require that Alice uses at least two tokens of the Ti Pro Race SC 1.3 in preparing the review. Obviously nor could *Ti Pro Race SC 1.3's* can interpreted as a universal GQ as in ii, which is synonymous with *All Ti Pro Race SC 1.3's*. So, again iii where *Ti Pro Race SC 1.3's* is taken to designate a specific model seems to be the appropriate analysis.

Similar considerations can be raised against interpreting the bare plural phrases in the remaining sentences in 7 as universal or existential GQ's. And given the repleacability of these bare plural arguments by kind phrases designating kinds it then seems appropriate to interpret these phrases as designating kinds.

Apparently alongside their interpretation as kind designators some of these phrases have also the option to be interpreted as taxonomic existential GQ's.[91] As phrases that quantificationally denote the sub-kinds of the kind corresponding to the common noun that forms the phrase. In this vein consider 7j.

7 j Transistors are invented by Julius Edgar Lilienfeld.

i $\lambda s.[\text{are invented by Julius Edgar Lilienfeld}]^{s}({}_{k}[_{e}\,\text{transistors}]^{s})$

ii $\lambda s.{}_{k}[_{\exists\_GQ}\text{transistors}]^{s}(\lambda y.[\text{are invented by Julius Edgar Lilienfeld}]^{s}(y))$
$\lambda s.\lambda P.\exists x(\,{}_{pl\_k}[_{<e,t>}\,\text{transistors}]^{s}(x)\ \&\ P(x))(\lambda y.[\text{are i. by Julius Edgar Lilienfeld}]^{s}(y))$
$\lambda s.\exists x(\,{}_{pl\_k}[_{<e,t>}\,\text{transistors}]^{s}(x)\ \&\ [\text{are invented by Julius Edgar Lilienfeld}]^{s}(x))$

If you know about the controversial status of Julius Edgar Lilienfeld as the inventor of the the transistor, when used out of blue the salient reading of 7j will be one that is paraphrasable by *The transistor is invented by Julius Edgar Lilienfeld* (7ji). But besides this reading it can also be used to say that Lilienfeld invented a number of transistor models.[92] This second reading obtains when *transistors* is interpreted taxonomically as an existential GQ (7jii), and it does not imply that Lilienfeld is the inventor of the transistor. Both of these are legitimate readings of 7j.

[91] Not all these phrases are interpretable taxonomically. Apparently this is the case because the kinds corresponding to the common noun occuring in them is an infima species below which there is no further specification.

[92] Curiously, the non-taxonomic kind designating reading is not available but the taxonomic reading is particularly salient when the sentence is in the active voice: *Julius Edgar Lilienfeld invented transistors.*

Note that as in the case of indefinite singular phrases, apparently the same bare plural noun phrase can support different interpretations. In the *transistors* case considered here this happens more strikingly in the same sentential context. As told before the ways whereby these readings are derived will be considered in the next chapter where we will analyze noun phrases internally and consider the semantic options for the common nouns that form these phrases.

Bare Plural Phrases as Arguments in Particular Level Contexts

Besides the non-taxonomic kind designating interpretation and the taxonomic kind denoting quantificational interpretations so far considered, bare plural arguments can apparently assume a third type of interpretation under which they rather quantificationally denote particulars.

8 a Alice did not steal Cadillac Eldorados from Bob's gallery.
b Every witness saw Cadillac Eldorados in Alice's junkyard.

The sentences in 8 appear to have meanings similar to those in 9, and in both sentences in 8 the bare plural argument *Cadillac Eldorados* appears to denote automobile tokens, as do the indefinite singular arguments in the sentences in 9.

9 a Alice did not steal a Cadillac Eldorado from Bob's gallery.
b Every witness saw a Cadillac Eldorado in Alice's junkyard.

Yet there is something peculiar about bare plural arguments that figure in particular level episodic contexts. To see this let's compare the readings that can be assigned to the sentences in 8 and 9.

The indefinite singular objects in 9 will normally be assigned existential GQ denotations. Note that 9a and 9b are ambiguous. Each can be used to express two distinct truth-conditions. This ambiguity can be explained by the existence of logical forms in which the highlighted indefinite arguments take narrow or wide scope relative to the negation (9a) and the quantificational noun phrase *every witness* in (9b). Each of these sentences will thus have a pair of non-equivalent interpretations which will account for their ambiguity. Let's focus on the readings of 9a. Pre-theoretically it is known that it has two readings: one according to which there is a Cadillac Eldorado which Alice did not steal, and another according to which Alice did not steal any Cadillac Eldorado. These two readings are accounted for by the following logical forms and derivations:

9 a Alice did not steal a Cadillac Eldorado from Bob's gallery.

9aA [a Cadillac Eldorado]$_1$ [1 [not [Alice stole t_1 from Bob's gallery]]]

9ai derived from 9aA:

$\{\lambda s'.{}_{p}[_{\exists\_GQ}\text{a Cadillac Eldorado}]^{s'}, \{1, \{\lambda s'.\sim, \lambda s'.[\text{Alice stole } t_y \text{ from Bob's gallery}]^{s'}\}\}\}$

$\{\lambda s'.{}_{p}[_{\exists\_GQ}\text{a Cadillac Eldorado}]^{s'}, \{1, \lambda s'.\sim[\text{Alice stole } t_y \text{ from Bob's gallery}]^{s'}\}\}$

$\{\lambda s'.{}_{p}[_{\exists\_GQ}\text{a Cadillac Eldorado}]^{s'}, \lambda s'.\lambda y.\sim[\text{Alice stole } t_y \text{ from Bob's gallery}]^{s'}\}$

$\lambda s'.{}_{p}[_{\exists\_GQ}\text{a Cadillac Eldorado}]^{s'} (\lambda y.\sim[\text{Alice stole } t_y \text{ from Bob's gallery}]^{s'})$

Assuming that the common noun Cadillac Eldorado has a predicative denotation of type <e,t>:

$\lambda s'.\lambda P.\exists x({}_{p}[_{\langle e,t\rangle}\text{Cadillac Eldorado}]^{s'}(x) \,\&\, P(x))(\lambda y.\sim[\text{Alice stole } t_y \text{ from Bob's gallery}]^{s})$

$\lambda s'.\exists x({}_{p}[_{\langle e,t\rangle}\text{Cadillac Eldorado}]^{s'}(x) \,\&\, \lambda y.\sim[\text{Alice stole } t_y \text{ from Bob's gallery}]^{s'} (x))$

$\lambda s'.\exists x({}_{p}[_{\langle e,t\rangle}\text{Cadillac Eldorado}]^{s'}(x) \,\&\, \sim[\text{Alice stole } t_x \text{ from Bob's gallery}]^{s'})$

9 a Alice did not steal a Cadillac Eldorado from Bob's gallery.
9aB not [[a Cadillac Eldorado]$_1$ [1 [Alice stole t_1 from Bob's gallery]]]

9aii derived from 9aB:

$\{\lambda s'.\sim, \{\lambda s'._p[_{\exists\_GQ}$ a Cadillac Eldorado$]^{s'}, \{1, \lambda s'.[$Alice stole t_y from Bob's gallery$]^{s'}\}\}\}$

$\{\lambda s'.\sim, \{\lambda s'._p[_{\exists\_GQ}$ a Cadillac Eldorado$]^{s'}, \lambda s'.\lambda y.[$Alice stole t_y from Bob's gallery$]^{s'}\}\}$

$\{\lambda s'.\sim, \lambda s'._p[_{\exists\_GQ}$ a Cadillac Eldorado$]^{s'}(\lambda y.[$Alice stole t_y from Bob's gallery$]^{s'})\}$

Assuming that the common noun Cadillac Eldorado has a predicative denotation of type <e,t>:

$\{\lambda s'.\sim, \lambda s'.\lambda P.\exists x(_p[_{<e,t>}$C. E.$]^{s'}(x)$ & $P(x))(\lambda y.[$Alice stole t_y from Bob's gallery$]^{s})\}$

$\{\lambda s'.\sim S, \lambda s'.\exists x(_p[_{<e,t>}$Cadillac Eldorado$]^{s'}(x)$ & $\lambda y.[$Alice stole t_y from Bob's gallery$]^{s'}(x))$

$\{\lambda s'.\sim, \lambda s'.\exists x(_p[_{<e,t>}$Cadillac Eldorado$]^{s'}(x)$ & [Alice stole t_x from Bob's gallery$]^{s'})$

$\lambda s'.\sim\exists x(_p[_{<e,t>}$Cadillac Eldorado$]^{s'}(x)$ & [Alice stole t_x from Bob's gallery$]^{s'})$

The similarity in meaning between the sentences in 8 and 9 suggests that the bare plural phrases in 8 too should be assigned GQ denotations like the indefinite phrases in 9. In the case of bare plural *Cadillac Eldorados* the suitable GQ denotation seem to be existential plural. However there seems to be one important difference between the sentences in 8 and those in 9. The sentences in 8 are not ambiguous. They curiously appear to lack the readings that would correspond to the wide scope existential GQ interpretation of the bare plural phrase *Cadillac Eldorados*, despite the fact that the sentences in 8 should in principle be capable to assume the same logical forms as those in 9. Let's focus on the case of 8a. It seems that 8a does not have a reading that corresponds to the interpretation 8ai which can be paraphrased as *There is a Cadillac Eldorado token which Alice did not steal*:

8 a Alice did not steal Cadillac Eldorados from Bob's gallery.
8aA [Cadillac Eldorados]$_1$ [1 [not [Alice stole t_1 from Bob's gallery]]]

8ai derived from 8aA:
$\{\lambda s'.{}_{pl\_p}[_{\exists\_GQ}$ Cadillac Eldorados$]^{s'}$, $\lambda s'.\lambda y.\sim$[Alice stole t_y from Bob's gallery]$^{s'}\}$[93]
$\lambda s'.{}_{pl\_p}[_{\exists\_GQ}$ Cadillac Eldorados$]^{s'}$ ($\lambda y.\sim$[Alice stole t_y from Bob's gallery]$^{s'}$)
Assuming that the common noun Cadillac Eldorados has a predicative denotation of type <e,t>:
$\lambda s'.\lambda P.\exists x({}_{pl\_p}$ $[_{<e,t>}$Cadillac Eldorados$]^{s'}(x)$ & $P(x))(\lambda y.\sim$[A. stole t_y from Bob's gallery]^{s})
$\lambda s'.\exists x({}_{pl\_p}$ [Cadillac Eldorados]$^{s'}(x)$ & $\lambda y.\sim$[Alice stole t_y from Bob's gallery]$^{s'}$ (x))
$\lambda s'.\exists x({}_{pl\_p}$ [Cadillac Eldorados]$^{s'}(x)$ & $\sim$[Alice stole t_x from Bob's gallery]$^{s'}$)

8aB not [[Cadillac Eldorados]$_1$ [1 [Alice stole t_1 from Bob's gallery]]]

8aii derived from 8aB:
$\{\lambda s'.\sim$, $\{\lambda s'.{}_{pl\_p}$ $[_{\exists\_GQ}$ Cadillac Eldorados$]^{s'}$, $\lambda s'.\lambda y.$[Alice stole t_y from Bob's gallery]$^{s'}\}\}$
$\{\lambda s'.\sim$, $\lambda s'.{}_{pl\_p}$ $[_{\exists\_GQ}$ Cadillac Eldorados$]^{s'}$ ($\lambda y.\sim$[Alice stole t_y from Bob's gallery]$^{s'}$)$\}$
Assuming that the common noun Cadillac Eldorados has a predicative denotation of type <e,t>:
$\{\lambda s'.\sim$, $\lambda s'.\lambda P.\exists x({}_{pl_p}[_{<e,t>}$Cadillac Eldorados$]^{s'}(x)$ & $P(x))(\lambda y.$[A. stole t_y from Bob's g.]^{s})$\}$
$\{\lambda s'.\sim$, $\lambda s'.\exists x({}_{pl\_p}$[Cadillac Eldorados]$^{s'}(x)$ & $\lambda y.$[Alice stole t_y from Bob's gallery]$^{s'}$ (x))
$\{\lambda s'.\sim$, $\lambda s'.\exists x({}_{pl\_p}$[Cadillac Eldorados]$^{s'}(x)$ & [Alice stole t_x from Bob's gallery]$^{s'}$)
$\lambda s'.\sim\exists x({}_{pl\_p}$[Cadillac Eldorados]$^{s'}(x)$ & [Alice stole t_x from Bob's gallery]$^{s'}$

Carlson (1980) and the Neo-Carlsonians, Chierchia (1998) and Dayal (2004), take this peculiarity of non-taxonomic bare plural NP arguments in particular level episodic sentential contexts as a piece of evidence that almost all non-taxonomic bare plural NP arguments designate kinds, and not just in kind-level contexts. They show how by assigning bare plural arguments kind designation their forced narrow scope interpretation can be explained. Without going into the details of this explanation, which will be covered later, the reader can assess how assigning kind designation to bare plural arguments can explain the appearance of forced narrow-scope interpretation, by considering the following

[93] For simplicity's sake I don't explicitly show all steps of the derivation here.

sentences which are obtained by replacing the occurrences of *Cadillac Eldorados* in 8 by the occurrences of the kind phrase *this Cadillac model*, assuming that the model in question is the Cadillac Eldorado:

10 a Alice did not steal this Cadillac model from Bob's gallery.
   b Every witness saw this Cadillac model in Alice's junkyard.

This Cadillac model designates a model but nonetheless it can also non-problematically occur in particular level contexts (explanations of how kind denoting phrases can sometimes occur in particular level sentential contexts will be covered in the next main section of this chapter). The sentences in 10 does not appear to be ambiguous and they seem to have the same truth-conditions as the sentences in 8, assuming that *this model* designates the Cadillac Eldorado. At any evaluation index s, 10a will be true if and only if at s it is not the case that there is an instance of the Cadillac Eldorado that Alice stole. And 10b will be true at s if and only if at s every witness x is such that x saw at least one instance of Cadillac Eldorado in Alice's junkyard. 8a and 8b respectively seem to have readings with exactly these same truth-conditions, and no other readings than these.

Of course the mentioned authors who take non-taxonomic bare plural arguments to always designate kinds are due an explanation as to why bare plural arguments in particular level contexts, such as those in 8, appear to denote particulars rather than kinds. They do so by means extrinsic to the bare plural noun phrases. Specifically by postulating an operator that applies to the particular level predicative meanings of the verbs/verb phrases of which the bare plural phrases are the arguments. In this vein I will below discuss the DKP operation postulated by Chierchia (1998). Anyway, as the sentences in 10 show, an explanation of how kind designating arguments can occur in particular level contexts is required independently from the case of bare plural arguments, and the explanations given by these authors cover both cases.

Bare Plural Arguments in Particular Level Contexts as Antecedents of Kind Designating Pronouns

Another phenomenon invoked by Carlson (1980) as evidence for taking non-taxonomic bare arguments to designate kinds are cases of pronominal co-reference. Bare plural arguments which occur in particular level sentential contexts and which apparently denote particulars appear to constitute referential antecedents for pronouns designating kinds (Carlson 1980):

11 Bill trapped bald eagles last night even though he knows full well that they are on the verge of extinction.

The pronoun *they* occurring in the second clause of 11 appears to designate the bald eagle kind, the species Haliaeetus leucocephalus. The most straightforward way to explain this will be to to take the bare plural phrase *bald eagles* in the first clause to function as the referential antecedent of the pronoun. Yet, if here the bare plural *bald eagles* functions as a particular level existential GQ, then *they* can only get as its designatum the sum of the eagle tokens trapped by Bill last night; and these tokens cannot sensibly be attributed extinction. Carlson reasons that then the bare plural *bald eagles* should in fact be functioning as a kind designator, and that the appearance of existential GQ reading is effected by some mechanism that is external to the bare plural *bald eagles*.

This reasoning is compromised by the fact that the indefinite singular *a bald eagle* too can constitute an antecedent to a kind designating pronoun in the same sentential context as the one in 11.

12 Bill trapped a bald eagle last night although he knows full well that they are on the verge of extinction.

To take a non-taxonomic indefinite singular like *a bald eagle* to designate a kind will be an unwarranted move however. We have seen that bare plural phrase can non-problematically figure in kind-level sentential contexts, but non-taxonomic indefinite singular phrases cannot.

A more plausible move will be to locate kind designation in the common noun *bald eagle* and to argue that the pronoun *they* derives its kind-level designation from the common noun itself, whilst the indefinite singular noun phrase itself interpreted as a particular level existential GQ.

Later I will refer back to this phenomenon to motivate the approach according to which semantically simple non-taxonomic common nouns designate kinds.

Points against the Claim that Non-taxonomic Bare Plural Arguments Always Designate Kinds

Other authors such as Wilkinson (1991), Krifka et al. (1995), Van Geenhoven (2000), Krifka (2004) reckon that in kind level contexts, such as those present in the sentences in 7, bare plural arguments designate kinds, they however reject the idea that bare plural arguments designate kinds when they occur in particular level contexts, such as those present in the sentences in 8.

8 a Alice did not steal Cadillac Eldorados from Bob's gallery.
b Every witness saw Cadillac Eldorados in Alice's junkyard.

Let's now see some of the reasons why the Carlsonian view on bare plural arguments occurring in particular level contexts has been criticized. The critical points to be discussed below have been covered in Krifka et al. (1995).

Of course one of the principal reasons for resisting the idea that bare plural arguments designate kinds in particular level contexts is the appearance that in these contexts they rather seem to denote particulars.

Another reason is the divergence between bare plurals and definite generics, another kind designating noun phrase type which I will cover next. Definite generics are a sort of definite singular phrase that designate kinds –e.g. *the lion*, *the transistor*, *the road bike*. If a bare plural argument such as *Cadillac Eldorados* can designate a kind in particular level contexts one may expect that the same kind can be designated by the corresponding definite generic *the Cadillac Eldorado*. And whatever means is proposed to explain how the former can figure in particular level contexts which normally require particular level arguments, the same means can presumably apply to the occurrences of the latter in the same sentential contexts. However these plausible expectations do not materialize. Compare sentences in 8 with those in 13.

8 a Alice did not steal Cadillac Eldorados from Bob's gallery.
b Every witness saw Cadillac Eldorados in Alice's junkyard.

13 a Alice did not steal the Cadillac Eldorado from Bob's gallery.
b Every witness saw the Cadillac Eldorado in Alice's junkyard.

If *the Cadillac Eldorado* could designate a Cadillac model in the sentences in 13 then these sentences would have readings that are equivalent to the readings the sentences in 8 have. But the sentences in 13 do not have such readings. For example, 8a is naturally read as saying that Alice did not steal any Cadillac Eldorado from Bob. But 13a cannot ever be used with such a reading.

A third reason for dissatisfaction with the claim that bare plural arguments designate kinds in particular level contexts is that it implies a questionably permissive attitude as to which common nouns have corresponding kinds. The principal argument for taking non-taxonomic bare plural arguments to designate kinds in particular level contexts is their peculiar way of scope taking in such contexts. Now this peculiarity appear to obtain not just when the bare plural arguments are formed by simple common nouns such as *lion*, *transistor*, *Cadillac Eldorado* but also when bare plural arguments are formed by modified common nouns such as *wounded lion*, *faulty transistor*, *crashed Cadillac Eldorado*:

14 Alice did not discern wounded lions in the area. *(apparent forced narrow scope for* wounded lions*)*
Every circuit on the main-board is ruined by faulty transistors. *(apparent forced narrow scope for* faulty transistors*)*
No witness saw crashed Cadillac Eldorados in Alice's junkyard. *(apparent forced narrow scope for* Cadillac Eldorados*)*

So, if this peculiarity is the principal reason for taking bare plural arguments in particular level contexts to designate kinds then the bare plural arguments *wounded lions*, *faulty transistors*, *crashed Cadillac Eldorados* too should be taken to designate kinds. Then one would expect that definite generics designating the same kinds can be formed using the same modified common nouns. That is, one would expect the definite singular phrases *the wounded lion*, *the faulty transistor*, *the crashed Cadillac Eldorado* could operate as kind designating definite generics. However, although one can form kind designating definite generics using the simple common nouns *lion*, *transistor, Cadillac Eldorado*, as illustrated below,

15 The lion is near extinction in this part of Africa.
The transistor is invented in the 19th century.
The Cadillac Eldorado has been launched in 1949.

it seems impossible to form such definite generics on the basis of the modified common nouns such as *wounded lion*, *faulty transistor*, *crashed Cadillac Eldorado*. In general most modified common nouns cannot form kind designating definite generic phrases (Krifka et al., 1995). A neat explanation of this difference between modified common nouns and semantically simple common nouns would be that the former don't designate kinds whilst the latter do. Such an explanation would however imply that bare plural phrases formed by modified common nouns cannot designate kinds as the underlying common nouns don't designate kinds.

The authors who for such reasons do not accept Carlson's and the Neo-Carlsonians' views on bare plural arguments should however provide alternative explanations of the phenomena that lead to hold that bare plural arguments are kind designators even in particular level sentential contexts. Foremost among such phenoma is the illustrated scope peculiarity manifested by the bare plural arguments. Among these authors critical of the Carlsonian view Geenhoven (1998, 2000) and Krifka (2004) have indeed proposed and defended alternative explanations; and in the next chapter we will have occasion to illustrate an explanation along the lines of those proposed by those authors.

Definite Phrases

1 j Surely, the whale should have been disoriented to come into these waters and tore our nets off.
k Alice claims that the cladistic analysis shows that the whale should rather be put under an altogether new genus.
l The whale is a highly intelligent mammal.
m The whales escaped by jumping off the pool over the gate into the sea.

Definite phrases are noun phrases of the form *the* α where α is a common noun. They usually operate as arguments of verb-phrases. In these positions they are usually regarded as designators (i.e. assigned denotations of type e). Another common way to interpret their occurrences in argument positions is to assign them GQ denotations of type <<e,t>,t>. They can be used to designate particulars as well as kinds. Prima facie there seem to be two distinct ways in which they designate a kind. First, like bare plural phrases and indefinite singular phrases, they seem to have a taxonomic use. In their taxonomic use they designate a specific sub-kind of the kind which corresponds to the common noun that forms them. Second, they can be used to directly designate the kind corresponding to the common noun that forms them. Under this latter use they are termed as *definite generics*. Now let's consider these different uses of definite phrases in a more detailed way.

Definite Phrases Denoting Particulars

Definite noun phrases in argument positions are often used to denote particulars as is the case in the following sentences.

16 a The biker irritated the passerby with his loud rev up.

b All of us saw the bear coming out of the woods, picking the basket and swiftly disappearing into the woods again.
c The winner of the 2012 London Games' 100m final is from Jamaica.
d The finalists of the 2012 London Games' 100m final are black people.
e The self-absorbed cyclists knocked Alice down.

Some authors, including Montague, assign definite arguments that denote particulars GQ denotations of type <<e,t>,t>. However more commonly they are interpreted as designators (denotation type e). According to this latter approach a definite singular phrase designate the unique particular that satisfies the descriptive condition set by the common noun that forms the definite phrase. A definite plural phrase on the other hand designates the maximal sum individual that satisfies the descriptive condition set by the plural common noun that forms the plural definite phrase. Thus the sentences 16c and 16d will be interpretated along the following lines:

16 c The winner of the 2012 London Games' 100m final is from Jamaica.
$[_{NP}$ The winner of the 2012 London Games' 100m final$][_{VP}$ is from Jamaica$]$

$\{\lambda s._{sg\_p}[_{e}$ The w. of the 2012 London Games' 100m final$]^{s}, \lambda s.\lambda x.[$ is from Jamaica$]^{s}(x)\}$
$\lambda s.[$is from Jamaica$]^{s}(_{sg_p}[_{e}$The winner of the 2012 London Games' 100m final$]^{s})$

16 d The finalists of the 2012 London Games' 100m final are black people.
[$_{NP}$ The finalists of the 2012 London Games' 100m final][$_{VP}$ are black people]

{λs.$_{pl\_p}$[$_e$ The finalists of the 2012 L. Games' 100m final]^s,λs.λx.[are black people]^s(x)}   λs.[are black people]^s($_{pl\_p}$[$_e$ The finalists of the 2012 London Games' 100m final]^s)

Often however the common nouns forming the definite arguments do not by themselves identify unique individuals independently from the context of use – e.g. 16a,b and e. To account for these cases a function that restricts the discursive domain as a function of the contexts of use can be included in the analysis of the definite singular arguments. We will see how this is done in the next chapter. In this chapter I only present the denotation types commonly assigned to various types of noun phrases, I will discuss the analysis of the noun phrases, including the definite phrases, in the next chapter.

Definite Phrases Denoting Kinds

Definite phrases can also be used to designate kinds. This apparently happens in two different ways. In some sentential contexts definite singular (or plural) phrases are used taxonomically to designate a specific sub-kind of the kind corresponding to the common noun that forms them (or a specific sum consisting of some of the subkinds). Let's term definite phrases used this way as *taxonomic definites*. But in other sentential contexts the same definite singular phrases can also be used to specifically designate the kind corresponding to the common noun that forms them. I had previously indicated that definite singular phrases used the latter way are termed as *definite generics*. In English there are no plural definite generics, and definite generic usage is possible only with definite singular phrases. Let's now first consider the evidence for the definite generic usage.

Definite Generics

In certain sentential contexts definite singular phrases seems to operate like names for kinds. Consider the following sentences:

17 a The Ti Pro Race SC 1.3 has been launched at 2001.
b The iPad2 is out of stock within days of its launch in the country.
c The Anatolian leopard is now extinct in the Aegean region.
d At the time, the bicycle industry was not impressed with the mountain bike, which many regarded as a short-term fad.

In the sentences in 17 the definite singular arguments appear to operate like names of the kinds corresponding to the common nouns that form them. This idea is supported by the repleacability, without any apparent change in the truth conditions of the sentences, of these definite singular arguments by kind phrases designating the kinds corresponding to the common noun that forms the definite arguments:

18 a This model has been launched at 2001.
b This version of iPad is out of stock within days of its launch in the country.
c This feline species is now extinct in the Aegean region.
d At the time, the bicycle industry was not impressed with that type of bike, which many regarded as a short-term fad.

Definite singular phrases which operate in the manner illustrated in 17 are called definite generics. Definite generic interpretation of definite singular phrases is not possible in non-generic (episodic) particular level sentential contexts (20), although kind phrases sound better in such contexts (19). We had already given the relevant examples above in the section on bare plural phrases. I reproduce them below:

19 a Alice did not steal this model from Bob's shop
   b Every witness saw this model in Alice's junkyard

20 a *Alice did not steal the Cadillac Eldorado from Bob's gallery
   b *Every witness saw the Cadillac Eldorado in Alice's junkyard

Taxonomic Definite Phrases

I indicated that there apparently are two different sorts of definite singular phrases that can designate kinds. One of these sorts are the definite generics we have just considered. The other sort, which we will cover now, are the taxonomic definite phrases. Consider the following sentences:

21 a Alice invented a molecular transistor and sold the transistor to Intel for $ 100 millon.
   b The transistor has been invented by Edgar Lilienfeld.
   c A new whale species has been discovered in New Zealand and the team who made the discovery proposed to name the whale as *Tasmacetus shepherdi*.
   d If one day the whale becomes extinct it will not be the fault of the Japanese alone.

Both of the *the transistor*'s in 21a and 21b designate a kind. But the one in 21b is a definite generic and designates the whole transistor-kind, whereas the one in 21a designates only a new transistor type invented by Alice. Similarly, both of the *the whale*'s in 21c and 21d designate a kind. But *the whale* of 21d is a definite generic and designates the whole whale kind, whereas *the whale* of 21c designates a new whale species or genus.

The transistor of 21a and *the whale* of 21c are taxonomic definite singulars. They seem to operate in the same way as the definite singulars that designate particulars. For example, *the biker* and *the passerby* in the previously considered 16a,

16 a The biker irritated the passerby with his loud rev up.

respectively designate the contextually salient particular who is a biker and the contextually salient particular who is a passerby. In the same vein, *the transistor* of 21a designates the contextually salient transistor type and *the whale* of 21c designates the contextually salient whale species. *The transistor* of 21b and *the whale* of 21d in contrast manage to designate respectively the whole transistor-kind and the whole whale-kind without any contextual input.

Is There Just One Sort of Kind Designating Definite Singular?

There are two views about the definite generics. Dayal (2004) proposed to reduce definite generics to a special case of taxonomic definite singulars. That is according to Dayal the manner whereby each of *the transistor*'s and *the whale*'s in 21 designate a kind is the same as the familiar one whereby definite singulars designates the contextually salient particulars that uniquely satisfy the descriptive condition expressed by the common nouns that form them. Another view, held for example by Krifka et al. (1995) and Longobardi (2005) is that the definite articles of the definite generics such as *the transistor* of 21b and *the whale* of 21d are semantically different than the definite articles of the taxonomic definite singulars such as *the transistor* of 21a and *the whale* of 21c and those of the ordinary definite singulars that designate particulars. According to this view the articles of definite generics is rather like the one occurring in such proper names as *the Sudan*, *the Sahara* etc. Such definite articles are called *expletives*. I will not further discuss these views here as I will return to this issue later in the next chapter where I will consider the internal analysis of all the noun phrase types covered here.

CHAPTER VI

EXPLAINING THE SEMANTIC VARIETY OF NOUN PHRASES FORMED BY COUNT COMMON NOUNS

In the previous chapter we have seen that the denotations of the noun phrases formed by common nouns differ from one another both with respect to the type of entity they denote and with respect to their mode of denotation. Below I reproduce the bunch of sentences illustrating the noun phrases formed by the term *whale*, now indicating also their denotation modes and the types of the entities they denote to in light of the foregone discussion:[94]

1 a Whales face extinction due to excessive hunting. *(bare plural, kind designating)*
  b The Beluga and the Narwhal are whales. *(bare plural, taxonomic predicative, applying to kinds)*
  c The stars of the theme park, Alice and Bob, are whales. *(bare plural, predicative, applying to particulars)*
  d Whales have torn our nets last night. *(bare plural, kind designating or GQ quantifying over particulars)*
  e One of the stars of the theme park, Alice, is a whale. *(indefinite singular, predicative, applying to particulars)*
  f Last night a whale should have thorn off the fish nets. *(indefinite singular, GQ, quantifying over particulars)*
  g The Beluga is not a shark species, it is a whale. *(indefinite singular, taxonomic predicative, applying to kinds)*
  h Alice objects to the classification of a whale under the Phocoenidae family. *(indefinite singular, taxonomic GQ, quantifying over kinds)*
  j Surely, the whale should have been disoriented to come into these waters and tore our nets off. *(definite singular, designating a particular)*
  k Alice claims that the cladistic analysis shows that the whale should rather be put under an altogether new genus.*(definite singular, taxonomic, kind designating)*

[94] In the present chapter we will consider the semantic analysis of noun phrases which we kept unanalyzed in the previous chapter, and we will deal with the same example sentences as those given in the previous chapters. For this reason, the numbering of sentences in this chapter continues the numbering of the fifth chapter, and sentences which have already been numbered in the fifth will be referred to under the same numbering labels.

l <u>The whale</u> is a highly intelligent mammal.*(definite singular, generic, kind designating)*
m <u>The whales</u> escaped by jumping off the pool over the gate into the sea. *(definite plural, designating particulars)*
n <u>Two whales</u> tore out nets. *(quantified, GQ, quantifying over particulars)*
o <u>Some whales</u> are not endangered species. *(quantified, taxonomic GQ, quantifying over kinds)*

The denotations of the phrases formed by common nouns are surely a function of the the meanings of the common nouns, and when present, of the determiners that combine with the common nouns. But clearly the meaning differences among the noun phrases formed by the same common nouns cannot be accounted simply by the involvement of different determiners. For one thing, some noun phrases do not involve any determiner at all (e.g. *whales*) but they can assume different meanings in different sentential contexts. For another, noun phrases formed by the same common noun and determiner can assume different meanings (e.g. *the whale*).

Ideally a common noun α has the same meaning in all of its uses. The different noun phrases formed by α involve different operations which take as argument the meaning ofα. Some of these operations can be identified as the semantic contribution of the determiners that are involved. But as indicated there are more noun phrase meanings around than the number of distinct determiners. For this reason there is a need to postulate implicit semantic operations that are not associated with any explicit determiner.

A futher reason to postulate implicit semantic operations is to account for the occurrence of a noun phrase that have a certain type of denotation as an argument in a sentential context which normally requires arguments with denotations of a different type.

The illustrated variety in the denotations of the noun phrases is derived from the meanings of the common nouns in different ways by different authors. Authors sometimes have different views as to the range of the real variety in the denotation types assumed by the tokens of a certain noun phrase type. A denotation-type variation attributed by some authors to phrases of a certain type is deemed to be only apparent by certain other authors. The latter then derive the apparent denotation-type variety by means extrinsic to the phrase. We have already seen that this is the case for example in relation with bare plural arguments: Carlson (1980), Chierchia (1998) and Dayal (2004) take them to operate as kind designators in all sorts of sentential contexts. Other authors on the other hand takes them to operate as kind-designators only in kind-level sentential contexts, otherwise they take them to operate then as the plural version of indefinites (Krifka et al. (1995); Wilkinson (1991)) or even as appliers (Geenhoven, (1998), (2000)).

Even when there is agreement about the range of denotation-type variety manifested by the tokens of a certain phrase type, the variety may still be derived in different ways. In this case the authors' accounts may differ in the meaning type to be assigned to the underlying common nouns and/or in the implicit operators to be postulated to yield the phrasal meanings.

In short, due to different ways of assessing the linguistic evidence at hand the semantic literature presents different means to account for the variety illustrated in the previous chapter. And in particular it presents different means to account for the kind-level denotation/particular-level denotation variation manifested by these phrases.

In the present chapter I will present two frameworks which represent two basically diffent strategies to derive the meanings of noun phrases from the meanings of the common nouns that form them.

One is the C-framework which follows the Neo-Carlsonian authors Chierchia (1998) and Dayal (2004) –these two authors have identical accounts except the treatment of definite generics. C-framework assigns predicative meanings (type <s,<e,t>>) to all count common nouns; it takes count common nouns to be ambiguous between kind level taxonomic variants and particular level non-taxonomic variants; and it derives the variety in the meanings of the noun phrases formed by common nouns on this basis.

The second framework to be presented is the K-framework which assigns kind designator meanings to semantically simple non-taxonomic common nouns. As regards modified common nouns and taxonomic common nouns the K-framework assigns them applier meanings of type <s,<e,t>> which will be kind level or particular level depending on whether the common noun in question is taxonomic or not.

For the K-framework we cannot cite any specific author as the source, at least not for every aspect of it. It partially follows the account of Krifka et al. (1995) and Krifka (1995) as regards the type of meaning to be assigned to common nouns and the analysis of certain types of noun phrases; but it diverges from it as regards certain aspects of the analysis of indefinite phrases and bare plural phrases which are analyzed in Krifka et al. (1995) as Heimian indefinites.[95]

In the present work our stated goal is to explore the semantics of common nouns to see whether we can raise a plausible argument to hold that some class of common nouns should be singled out as *de jure* rigid. As we have seen in the first two chapters the philosophical literature on general term rigidity either promotes an applier analysis of common nouns or a kind designator analysis of common nouns. Each of the C-framework and the K-framework to be presented below will adopt one of these two popular views regarding at least the meanings of simple non-taxonomic common nouns. But improving on the philosophical literature in the formulation of the said frameworks we will work out the details of how these two views can support the variety of noun phrases formed by common nouns.

The C-framework will in fact take all common nouns, regardless whether they are taxonomic or modified, to be appliers. So, it will really represent a worked out version of the decision to take common nouns to be primarily appliers. Yet the K-framework will treat only simple non-taxonomic common nouns as kind designators, while treating taxonomic or modified common nouns as appliers. Why don't we simply choose a framework which rather follows one part of philosophical literature in analyzing *all* common nouns as kind designators and work out the details of this decision regarding the

[95] As mentioned before I avoid the Heimian analysis of certain NP's as variables due to its complexity. The discussion regarding the issue of the rigidity/non-rigidity of the common nouns could presumably have been conducted by adopting the Heim's treatment as well.

interpretation of noun phrases? I can only fully answer this question after I finish the descriptions of the C-framework and the K-framework, and therby illustrate the issues one has to face in accounting for the semantic output of the noun phrases as a function of the meanings of the common nouns that form them. In the course of this description it will be seen that assigning kind designation to modified common nouns or to taxonomic common nouns has implausible theoretical consequences which disadvantage it both with respect to the option of assigning applier meanings to all common nouns and with respect to the option of assigning kind designating meanings only to the semantically simple non-taxonomic common nouns. Simply put, to take all common nouns to be appliers, as the C-framework will do, is a theoretically better option than to take all common nouns to be kind designators. But to take only the semantically simple non-taxonomic common nouns to be kind designators while assigning appliers meanings to modified or taxonomic common nouns, as the K-framework will do, has certain theoretical advantages over treating all common nouns as appliers. I will return to this issue at the end of the chapter where I will comparatively assess the advantages of the C-framework and the K-framework.

However, it will not be viable for me to present, compare and critically assess all approaches regarding the semantics of noun phrases formed by common nouns that have ever been defended. It will not even be viable to give a full assesssment of the two frameworks that will be presented below. I will briefly state their relative advantages and disadvantages. But I will not be able to discuss them in as much detail as is required to promote one over the other.

The decisive issues about these frameworks are quite complicated and too far afield from the issue of common noun rigidity pursued here. This does not mean that these decisive issues are not relevant. In fact they are relevant because as we will see in the next chapter, it will be possible to construe linguistic arguments to single out some common nouns as *de jure* rigid only under the K-framework. The linguistic semantic phenomena that indicates from the standpoint of the K-framework the need to single out some class of common nouns as *de jure* rigid will not have such a portent relative to the the C-framework.

Here is a rough sketch of what will come in the present chapter. After giving a short description of the basic ontology presupposed by the two frameworks to be presented I will pass to the said presentations. I will present the framework separately, first the C-framework and then the K-framework. In the presentation of each framework I will start with a description of their treatment of the common nouns. In these descriptions I will describe the meaning types they assign to the common nouns, how they account for modification and finally the fundamental semantic operations on the meanings of the common nouns which they will use in accounting for noun phrase meanings. Each of the frameworks to be presented need such operations. The C-framework assigns predicative meanings to common nouns, but assign kind designating meanings to bare plural noun phrases. The K-framework assigns kind designating meanings to semantically simple non-taxonomic common nouns, but assigns particular level generalized quantifier meanings to quantified phrases or indefinite phrases formed by them. The former then needs an operation to derive kind designating meanings from the common nouns' meanings, and the latter needs an operation to derive particular level predicative meanings from kind designating common noun meanings.

After the descriptions of how common nouns will be treated, I will describe how each framework accounts for the variety in the meaning of the noun phrases on the basis of its treatment of the common nouns. That is for each framework I will describe how they derive the meanings of various subtypes of indefinite phrases, bare plural phrases, definite phrases from the meanings they assign to the common nouns.

Finally at the end of the chapter I will assesss the advantages and the disadvantages each of the frameworks has relative to one another, and relative to the option of taking all common nouns to be kind designators.

There will be a relatively long coverage of the analysis of bare plural arguments. We have already seen in the previous chapter that bare plural arguments manifest a scope related peculiarity. One proposed way to explain this peculiarity is that these bare plural arguments are kind designators (Carlson (1980); Chierchia (1998)). This peculiarity is not just manifested by bare plurals formed by simple non-taxonomic common nouns; certain bare plural arguments formed by taxonomic common nouns and modified common nouns manifest it as well. Yet, at the same time there are good reasons to think that such common nouns are not kind designators. So, the treatment of bare plural arguments and the explanation of their scope peculiarity has implications regarding whether any, some or all common nouns should be treated as kind designators. And this in turn is relevant in relation with the issue of the common noun rigidity. Because as we will later see a rigid/non-rigid division among common nouns can be supported by linguistic-semantic arguments of the sort illustrated in the fourth chapter only under the K-framework which assigns kind designator meanings only to semantically simple common nouns; yet it is not supported under the C-framework which treats all common nouns as appliers.

The Ontological Structure of the Domain of Individuals

Before the description of the C-framework and the K-framework I have to describe the structure of the domain of individuals D_e, which will be presupposed by both of these frameworks, notwithstanding their differences.

The domain of individuals D_e will include particular individuals, kind individuals. In addition to them to account for the denotations of plural NP's and plural predicates, we will postulate that D_e contains sum-individuals which have as parts other individuals and themselves; and for any subset A of D_e, it is postulated that there is an individual +A of which members of A are parts and which is a part of every individual of which +A's parts are parts. For example, a cycling team roaster formed by Alice, Bob and Carol has as its parts (i) each of Alice, Bob and Carol, (ii) every pair formed by Alice, Bob and Carol, and (iii) Alice, Bob and Carol all together. The part relation intended here of course is not one that holds for example between a cyclist and his left leg. Otherwise we would have to count among Skyteam's Tour de France 2012 roaster Bradley Wiggins's left leg as well. For another example consider the components of a computer. The computer is not the sum of its components. For, the sum of components can exist whilst the computer does not. So, the components cannot be parts of the computer in the sense of *part* highlighted here.[96] [97]

I will occasionally indicate what sort of individuals a certain meaning pertains to by using subscripts adjoined to the sign *e*. I will use combinations of the following abbreviations: *pl.* for sum individuals, *sg.* for atomic individuals, *k* for kinds and *p* for particulars. For example, $<s,e_{pl\_p}>$ will be used to indicate that the meaning in question is a designator meaning that pertains to sums of particulars; $<s,< e_{sg\_k},t>>$ will be used to indicate that the meaning in question is a predicative meaning pertaining to kinds.

The C-framework

The Treatment of Common Nouns under the C-framework

We have seen that noun phrases formed by count common nouns can designate, apply to or quantify over particulars as well as kinds. Ideally count common nouns should have the same native meaning in all sentential contexts. The semantic variety the noun phrases that can be formed by a certain count

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[96] The sums and the parthood in question here form a structure very similar to the one formed by sets and set membership, but they are different. Landman (1989) argues that they are very similar to sets theoretic structures and shuns sums for sets. But then he is forced to take the referents of names to be singletons. To avoid this consequence we follow here Link (1983).

[97] Given the postulation of the special part relation and the sum individuals D_e becomes a #complete join semi-lattice with atoms. Such a structure has the following specifications: A set S is a #complete join semi lattice with atoms iff there is a partial order ≪ on S, every non-empty subset A of S has a least upper bound relative to ≪, there are members a of S such that for every b∈S, if b≪a then b=a. Let S be #complete join semi lattice, let + (join) be the binary operation over S such that for every a,b∈S a+b=the least upper bound of {a,b}, then + is idempotent, commutative and associative, moreover for every a,b∈S, a+b=a iff b≪a.

common noun should be derivable from that native meaning in a principled manner.

Now the question is which type of native meanings should be assigned to count common nouns so as to account in the best way for the semantic variety of the phrases they form. In the present section I will present how the C-framework, derived from Chierchia (1998) and Dayal (2004), handles the semantics of count common noun meanings with a regard to derive from them the variety in the meanings of the noun phrases in the most efficient way possible. I will also discuss how under that framework the meanings of the semantically complex common nouns (common nouns modified by adjectives, relative clauses or prepositional phrases) will be derived as a function of the meanings of their constituents.

<u>Simple Non-taxonomic Common Nouns under the C-framework</u>

Simple common nouns are such common nouns as *metal*, *tiger*, *bachelor*, *transitor, Iphone5*. They are not modified by any adjective, relative clause or prepositional phrase; they present no inner syntactic or semantic complexity. Some such common nouns appear to be natively taxonomic: *species*, *halogen*, *alloy*. Some apparently cannot ever be used taxonomically: *electron*. And some can be used both taxonomically and non-taxonomically: *transistor*, *whale.* Regarding cases of the latter type there may be different approaches to explain the relation between the taxonomic and the non-taxonomic uses. But the non-taxonomic use is usually taken to be native and irreducible; either the taxonomic use is derived from the non-taxonomic use or such common nouns are taken to be ambiguous. Here I will first present the C-framework's treatment of simple non-taxonomic count common nouns.

The C-framework will follow the standard treatment of common nouns. Under the C-framework the non-taxonomic simple singular common nouns will be assigned predicative meanings of type $<s,<e_{sg\_p},t>>$ which truly apply to atomic particulars –And non-taxonomic simple plural common nouns will be assigned meanings of the type $<s,<e_{pl_p},t>>$that truly apply to sums of particulars. The meanings of singular common nouns will be taken as basic and that of the plural common nouns will be derived by a simple operation applying to the meaning singular common noun. There are different ways to formulate such a *pluralizing* operator. For example, Chierchia (1998) formulates the following operation which we will adopt under the C-framework:

$$\begin{aligned}&\lambda s._{pl\_p}[_{<e,t>}\text{whales}]^s\\&= PL(\lambda s._{sg\_p}[_{<e,t>}\text{whale}]^s)\\&= \lambda s.\lambda x.(\sim_{sg\_p}[_{<e,t>}\text{whale}]^s(x)\ \&\ \forall y((y \ll x\ \&\ Atom(y)) \supset_{sg\_p}[_{<e,t>}\text{whale}]^s(y)))\end{aligned}$$

In the previous part of the present chapter we have seen that certain noun phrases formed by semantically simple non-taxonomic common nouns are best treated as kind designators: *Cadillac Eldorados are out of production*, *The Cadillac Eldorado is out of production*. We have also seen such phenomena as pronominal kind designation by pronouns the antecedents of which are apparently particular level noun phrases: *Alice shot a tiger, unwitting that they are on the brink of extinction*. Then the C-framework is bound to somehow explain such phenomena on the basis of common noun meanings that are predicative and that pertain to particulars (type $<s,<e_p,t>>$). On this matter the C-framework will follow Chierchia (1998) and Dayal (2004).

Chierchia (1998) takes common nouns to have predicative meanings of type $<s,<e_p,t>>$. To derive kind designating meanings from such meanings Chierchia postulates an implicit operation $\cap$ (read as *down operation*). We can render his definition for this operator in the following way:[98]

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[98] In fact Chierchia identifies kinds with certain intensions of type $<s,e_p>$: functions that map possible worlds into maximal sums or groups of particulars that share a common characteristic. Not every such intension is accepted to be a kind. Such intensions are taken to be the denotata of bare noun phrases which are *kind designators* according to Chierchia –not their meaning. Chierchia's original definition of the down operator reads thus (pg.351*): Let* α *be a predicative meaning of type* $<s,<e_{pl\_p},t>>$, ${}^{\cap}\alpha=\lambda s.\iota\alpha(s)$, *if* $\lambda s.\iota\alpha(s)$ *is a kind.* Here i is the iota operator defined thus: *Let* α *be a predicative meaning of type* $<s,<e_p,t>>$*, relative to an evaluation index s,* $\iota\alpha(s)$*=the largest individual x (under* $\ll$*) such that* $\alpha(s)(x)$*.* Chierchia treats the result of the operation, ${}^{\cap}\alpha=\lambda s.\iota\alpha(s)$, as the denotation of bare noun phrases rather than as their intensions (i.e. meaning in my terminology) and Chierchia's discussion is laid in terms of denotations rather than intensions. Note that these denotations are of type $<s,e_p>$, hence strictly speaking they will not be designata. For, *designata* are commonly understood to be denotata of type e. Still, Chierchia 'for the sake of simplicity', includes entities of type $<s,e_p>$ which are kinds into D_e, and conducts this discussion for the most part as if kinds were entities of type e. Apparently there is a certain conflictual tension between the identification of kinds with entities of type $<s,e_p>$ and the subsequent treatment of them as entities of type e –i.e. as designata. Chierchia taps on both of these conflicting assumptions. The latter assumption enables him to claim that English is a language in which bare noun phrases formed by common nouns are used as designators (semantic arguments) without the involvement of any implicit determiners, just like proper names. The former assumption however is required given the definition of the crucial operator $\cap$ as ${}^{\cap}\alpha=\lambda s.\iota\alpha(s)$. This definition plays a crucial role in Chierchia's explaining as to why singular count nouns cannot undergo this type shift, and consequently why we cannot have bare singular NP's formed by English count nouns. In this work it is not possible for us to assess whether these conflicting threads amounts to a contradiction. Anyway any contradiction can be avoided by not including kinds conceived as entities of type $<s,e_p>$ into D_e. Yet, then the presentation of Chierchia's theory and its embedding into an account which covers certain other types of kind denoting NP which are not considered by Chierchia himself faces certain complications. For example, Chierchia does not discuss the ramification of his identification of kinds with entities of type $<s,e_p>$ for the denotations of kind level predicates such as *invent* and *extinct* which would normally be assigned denotations respectively of types $<e_k,<e_p,t>>$ and $<e_k,t>$. If the identification is to be kept these rather have to be treated as having denotations respectively of types $<<s,e_p>, <e_p,t>>$ and $<<s,e_p>, t>$. Another complication is related with the denotations of taxonomic common nouns, an issue which Chierchia (1998) does not address at all. Taxonomic nouns are usually treated as kind level appliers (denotation type $<e_k,t>$). Under Chierchia's official doctrine these would have to be treated has having denotations of type $<<s,e_p>,t>$. Furthermore these taxonomic nouns can be modified by kind level predicates such *extinct* as in *extinct mammal*, can be used to form indefinite noun phrases (*an extinct mammal*), or to form quantified noun phrases (*every extint mammal*). If taxonomic common nouns are assigned denotations of type $<<s,e_p>,t>$, one will have to add additional clauses into the definition of modification rules and into the analysis of indefinite and quantificational

Let α be a predicative meaning of type $<s,<e_p,t>>$,
${}^\cap\alpha=\lambda s.k_\alpha$, *if there is a unique kind* k_α *such that* $\forall s'\forall x(I(s')(x, k_\alpha) \equiv \alpha(s)(x))$.
Otherwise undefined.

Here I(s)(x,y) is meant to be a function which relative to an evaluation index s maps x,y to truth iff x is an instance of y at s.

Chierchia (1998) and Dayal (2004) uses the implicit operator $^\cap$ to explain bare plural noun phrases' capacity to designate kinds. And under the C-framework we will follow suit. I will describe the details of this account below when I give the analysis of bare plural noun phrases according to the C-framework.

Besides bare plurals we have seen that definite noun phrases termed as *definite generics* such as *the Iphone*, *the whale*, *the transistor* too can be used to designate kinds. Chierchia (1998) and Dayal (2004), whom we follow in the formulation of the C-framework, give different accounts on the matter of definite generics. But neither use the implicit operator $^\cap$ in these accounts. Chierchia (1998) postulates that the definite article *the* has a variant which inheres an operation which derives a kind designating meaning from the particular level predicative meaning of the singular count noun that forms it.

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determiners. To avoid all these complications in the present work I present Chierchia's view by treating kinds as entities of type e and ignoring his identification of them with entities of type $<s,e_p>$. For this reason I defined $^\cap$ in such a way that it does not presuppose such an identification. For our purposes this simplification does not present any inconvenience as all the points to be made in the next chapter regarding the issue of the rigidity/non-rigidity of common nouns and of the noun phrases formed by them could as well be made under Chierchia's official doctrine as well –albeit the semantic analyses leading to these points would be considerably more complicated. And anyway Chierchia himself wrote "Let me immediately qualify: I am not saying that kinds *are* individual concepts. Kinds are whatever your favorite worldview says that they are. However, in a compositional semantic system that computes truth conditions they can be represented as individual concepts of sort. For simplicity's sake, let us assume that such individual concepts are members of the domain of individuals (i.e., they live in the domain of quantification U)." (p. 350).

Dayal (2004) gives an account according to which the singular common nouns forming definite generics are the taxonomic variants of these common nouns. On this matter the C-framework will follow Dayal (2004)'s account the details of which will be presented later below.

Simple Taxonomic Common Nouns under the C-framework

Previously in the present chapter we have seen that common nouns can form taxonomic noun phrases that denote the sub-kinds of the kind corresponding to these common nouns' native meaning. We have seen that such phrases as *every whale*, *a whale*, *some road bikes*, *two Cadillacs* besides their 'ordinary' particular denoting uses can be used to denote the sub-kinds of the kind which supposedly corresponds to the common noun that forms them. We can account for the ambiguity of such phrases in a number of ways. We can take the determiners involved in such phrases to be ambiguous. Or we can take the common nouns involved to be ambiguous. Or else we can postulate implicit operations, triggered in certain sentential contexts, which derive predicative taxonomic meanings from the natively non-taxonomic meanings of the common nouns. The first of these options is rarely adopted, the most commonly adopted options are the second and the third.

The C-framework we set out to describe is derived from Carlson (1980) and the Neo-Carlsonian authors Dayal (2004) and Chierchia (1998). Carlson

(1980) and Dayal (2004) explicitly posits such an ambiguity.[99] They take common nouns to be natively ambiguous between between predicative particular applying meanings of type $<s,<e_p,t>>$and predicative kind applying meanings of type $<s,<e_k,t>>$. According to this, for example such a common noun as *whale* has in fact two variants: a particular level applier that is true of whale tokens and a kind level applier which is true of whale species or genera.

Modification of Common Nouns under the C-framework

New nouns can be obtained by modifying simple common nouns with adjectives, relative clauses or prepositional phrases:

wounded whale, whale wounded by Japanese harpooners, extinct whale, new whale, whale from the arctic

The meaning of a modified common noun should be a function of the denotations of the simple common noun and the modifiers that form it. In this section I will describe how the meanings of modified common nouns will be determined under the C-framework.

Regarding the meanings of the modifiers there are two common approaches: (i) to assign modifiers meanings of type $<s,<e,t>>$ or (ii) to assign modifiers meanings of type $<s,<<e,t>,<e,t>>$. The reason for this bifurcation is that adjectives and prepositional phrases most commonly occur in two different positions in sentences. Either they combine with common nouns as

[99] Carlson (1980) himself takes certain common nouns to be ambiguous between a taxonomic and non-taxonomic variant. The initiator of the Neo-Calrsonian approach Chierchia (1998) does not cover taxonomic uses at all.

modifiers: *Alice treated a wounded whale, Alice met a man from the Alaska* . Or they form the predicate: *This whale was wounded, This man is from Alaska* . Each approach regarding the semantics of modifiers seem to take one of these positions as primary, assigns a native meaning which is suitable for that position. Then to account for the contribution of modifiers in the other position, certain theoretical adjustments or operations are called in.[100]

Here I will adopt the former approach in the formulation of the C-framework. I adopt this approach because it is less complicated than the other, given the simpler semantic types assigned to the modifiers. Then, under the C-framework the meaning of modified noun will be the result of the composition of the meaning of a modifier (type <s,<e,t>>) and the meaning of a common noun (type <s,<e,t>> according to the C-framework). Note that as it stands our semantic composition operation introduced in the third chapter is not defined over pairs of meanings of type <s,<e,t>>; to adopt the stated approach we then have to add a fourth clause to the semantic composition operation. Such a clause as the following will do:

IV Let γ be a branching node with α and β as daughters (i.e. $[\gamma]=[\alpha\beta]$) that both are of the semantic type <s, <e,t>>. Then the semantic composition of $[\![\alpha]\!]^{s,g}$ and $[\![\beta]\!]^{s,g}$ is $\{[\![\alpha]\!]^{s,g}, [\![\beta]\!]^{s,g}\}=\lambda s.\lambda x.([\alpha]^{s,g}(x) \,\&\, [\beta]^{s,g}(x))=\lambda s.[\gamma]^{s,g}=[\![\gamma]\!]^{g}$ and it is of semantic type <s,<e,t>>.[101]

[100] There appears to be no linguistic-semantic reason to assing universal designating meanings of type $<s,<e_u,t>>$ to adjectives. Unlike common nouns adjectives cannot form phrasal arguments that designate such universals. The case of color terms appears to belie this observation. But it seems to be more coherent to treat color terms as having one nominal and one adjectival variant. Since the remaining adjectives have morphologically distinct nouns that correspond to them.

[101] This clause is adapted from the Kratzer & Heim (1998)'s Predicate Modification rule.

Under the C-framework simple non-taxonomic common nouns, their modifiers and the modified common nouns will all be assigned meanings of type $<s,<e_p,t>>$. Meanings of this type for modified common nouns are derived through the semantic composition of the meanings of the modifiers and the meanings of the simple common nouns.

Then under the C-framework the meaning of the non-taxonomic *wounded whale* will be derived thus:

$[_{N'}[_{Adj}\text{ wounded}]\ [_{N}\text{ whale}]]$
$\{\lambda s._{p}[_{<e,t>}\text{wounded}]^{s}, \lambda s._{p}[_{<e,t>}\text{whale}]^{s}\}$
$\lambda s.\lambda x.({}_{p}[_{<e,t>}\text{wounded}]^{s}(x)\ \&\ {}_{p}[_{<e,t>}\text{whale}]^{s}(x))$

The derivation of the meanings of modified taxonomic common nouns under the C-framework will proceed in a similar manner. Under the C-framework taxonomic common nouns and their modifiers will all be assigned meanings of type $<s,<e_k,t>>$. For example the derivation of the meaning of *extinct whale* can be described thus:

$[_{N'}[_{Adj}\text{ extinct}]\ [_{N}\text{ whale}]]$
$\{\lambda s._{k}[_{<e,t>}\text{extinct}]^{s}, \lambda s._{k}[_{<e,t>}\text{whale}]^{s}\}$
$\lambda s.\lambda x_{k}.({}_{k}[_{<e,t>}\text{extinct}]^{s}(x_{k})\ \&\ {}_{k}[_{<e,t>}\text{whale}]^{s}(x_{k}))$

Above we have illustrated the semantics of modification of common nouns by adjectives. But as mentioned above common nouns can also be modified by relative clauses as in *whale which is wounded by Japanese harpooners*, and by prepositional phrases as in *whale from Arctic*.

Relative clauses will be assumed to have a logical form as the following:[102]

[102] Heim & Kratzer (1998).

$[_{CP}$ which$_1$ $[t_1$ is wounded by Japanese harpooners$]]$

The semantic contribution of such relative clauses will be derived using the semantic composition clause II, which I reproduce below:

II Let γ be a branching node with α and β as daughters (i.e. $[\gamma]=[\alpha\beta]$) where α dominates only a numerical index i and β is of semantic type <s,t>.
Then $[\![\alpha]\!]^g=i$ and the semantic composition of $[\![\alpha]\!]^g$ and $[\![\beta]\!]^g$ will be $\{[\![\alpha]\!]^g, [\![\beta]\!]^g\}=\lambda s.\lambda x.[\beta]^{s,g(x/i)}$.

Then we will have,

$[\![[_{CP}$ which$_1$ $[t_1$ is wounded by Japanese harpooners$]]]\!]$
$\{[\![$which$_1]\!]$, $[\![t_1$ is wounded by Japanese harpooners$]\!]\}$
$\{1,\ \lambda s.[\ t_1$ is wounded by Japanese harpooners$]^{s,g}\}$
$\lambda s.\lambda x.[t_1$ is wounded by Japanese harpooners$]^{s,g(x/1)}$

which we will conveniently render as follows:

$\lambda s.\lambda x.[t_x$ is wounded by Japanese harpooners$]^s$

Then under the C-framework a common noun can compose with a relative clauses in the same way as it does with an adjective:

$[_{N'}[_N$ whale$][_{CP}$ which is wounded by Japanese harpooners$]]$
$\{\ \lambda s._p[_{<e,t>}$whale$]^s$, $\lambda s.\lambda y.[t_y$ is wounded by Japanese harpooners$]^s\}$
$\lambda s.\lambda x.(\ _p[_{<e,t>}$whale$]^s(x)$ & $\lambda y.[t_y$ is wounded by Japanese harpooners$]^s(x))$
$\lambda s.\lambda x.(\ _p[_{<e,t>}$whale$]^s(x)$ & $[t_x$ is wounded by Japanese harpooners$]^s)$

The Semantic Analyses of Noun Phrases under the C-framework

Above we have described how the C-framework will treat the semantics of common nouns. Now, I turn to the description of how noun phrases formed by common nouns will be analysed under the C-framework drawing on the assumptions regarding the native meanings of the common nouns and the semantic machinery introduced above. I begin with indefinite singular noun phrases.

Indefinite Singular Noun Phrases under the C-framework: Non-taxonomic Indefinite Singulars

2 a The priciest gift Alice received on her birthday is a road bike.
[[$_{NP}$ The priciest gift Alice received on her birthday][$_{VP}$ is [$_{NP}$ a road bike]]]

{λs'.[$_e$ The priciest gift Alice received on her birthday]$^{s'}$, λs'.[$_{<e,t>}$ a road bike]} {λs'.[$_e$ The priciest gift Alice received on her birthday]$^{s'}$, λs'.[$_{<e,t>}$ a road bike]} λs'.[$_{<e,t>}$ a road bike]([$_e$ The priciest gift Alice received on her birthday]$^{s'}$)

Non-taxonomic indefinite singular phrases in predicate positions, as in 2a, are standardly assigned predicative denotations of type $<e_{sg\_p},t>$. If non-taxonomic common nouns are assigned native meanings of type $<s,<e_{sg\_p},t>>$ as is done under the C-framework then the meanings of the indefinite singulars in predicate positions are taken to be the same as those of the common nouns that form them. The indefinite article *a* in indefinite singulars occurring in the predicate position is often considered as semantically vacuous.

[$_{NP}$ a [road bike]] *in predicate position*

{λs.λP.P, λs.$_p$[$_{<e,t>}$road bike]^s} λs.$_p$[$_{<e,t>}$road bike]^s

Non-taxonomic indefinite singulars can also occur in argument positions:

2 b A road bike stood locked next to Alice's bike.

I have previously mentioned that two different treatments are common in the literature for indefinite singular arguments as the one in 2b: the

Montague/Lewis way of assigning them existential GQ denotations (type <<e,t>,t>), and the Heim way of of treating them introducing variables. In describing the C and the K frameworks we will follow the GQ analysis.

Under the Montague/Lewis treatment of indefinite singulars in argument positions the indefinite singular determiner *a* is given the following analysis:

$\lambda s'.[_{<<e,t>,<<e,t>,t>>}a]^{s'}=\lambda s'.\lambda Q_{<e,t>}.\lambda P_{<e,t>}.\exists x(Q(x)\&P(x))$

Then under the C-framework according to which singular non-taxomic common nouns are assigned meanings of type $<s,<e_{sg\_p},t>>$ the sentence 2b will get the following interpretation:

2 b A road bike stood locked next to Alice's bike.
[S[NP [D a] [N road bike]][VP stood next to Alice's bike]]

the interpretation of 2b according to the C-framework:
$\{\{\lambda s'.[_{<<e,t>,<<e,t>,t>>}a]^{s'}, \lambda s'.{}_p[_{<e,t>}\text{road bike}]^{s'}\}, \lambda s'.[_{<e,t>}\text{stood next to Alice's bike}]^{s'}\}$
$\{\{\lambda s'.\lambda Q.\lambda P.\exists x(Q(x)\&P(x)), \lambda s'.{}_p[_{<e,t>}\text{road bike}]^{s'}\}, \lambda s'.[_{<e,t>}\text{stood next to Alice's bike}]^{s'}\}$
$\{\lambda s'.\lambda P.\exists x({}_p[_{<e,t>}\text{road bike}]^{s'}(x)\ \&\ P(x)), \lambda s'.[_{<e,t>}\text{stood next to Alice's bike}]^{s'}\}$
$\lambda s'.\exists x({}_p[_{<e,t>}\text{road bike}]^{s'}(x)\ \&\ [_{<e,t>}\text{stood next to Alice's bike}]^{s'}(x))$

Indefinite Singular Noun Phrases under the C-framework: Taxonomic Indefinite Singulars

In the first part of the present chapter we had seen that certain indefinite singular phrases are taxonomically used in argument positions or in predicate positions to denote kinds. I reproduce the relevant examples below:

4 a The Ti Pro Race SC 1.3 is a road bike by the Czech maker Morati.
b A road bike by the Czech maker Morati has been launched today.
c This week in her blog Alice has reviewed a road bike by the Czech maker Morati.

Under the C-framework the taxonomic indefinite singular arguments will be treated in the same way as the non-taxonomic indefinite singular arguments.

The only difference is that the common nouns forming the taxonomic indefinite phrases will be the taxonomic variants. Remember that according to the C-framework taxonomic common nouns are assigned kind level applier meanings of type $<s,<e_{sg\_k},t>>$.

4a where the indefinite singular *a road bike by the Czech maker Morati* figures in the predicate position will be interpreted under the C-framework in the following way:

4 a The Ti Pro Race SC 1.3 is a road bike by the Czech maker Morati.
$[[_{NP}\text{The Ti Pro Race SC 1.3}][_{VP}\text{is }[_{NP}[_{D}\text{a}]\ [_{N'}\text{ r. b. by the Czech maker Morati}]]]]$

$\{\lambda s'.{}_{k}[_{e}\text{The Ti Pro Race SC 1.3}]^{s'}, \{\lambda s'.\lambda P.P, \lambda s'.{}_{k}[_{<e,t>}\text{ r. b. by the Czech maker Morati}]\}\}$
$\{\lambda s'.{}_{k}[_{e}\text{The Ti Pro Race SC 1.3}]^{s'}, \lambda s'.{}_{k}[_{<e,t>}\text{road bike by the Czech maker Morati}]\}$
$\lambda s'.{}_{k}[_{<e,t>}\text{ road bike by the Czech maker Morati}]({}_{k}[_{e}\text{The Ti Pro Race SC 1.3}]^{s'})$

And 4b where the indefinite singular *a road bike by the Czech maker Morati* figures in the argument position will be interpreted under the C-framework in the following way:

4 b A road bike by the Czech maker Morati has been launched today.
$[_{S}[_{NP}[_{D}\text{a}]\ [_{N}\text{road bike by the Czech maker Morati}]][_{VP}\text{has been launched today}]]$

$\{\{\lambda s'.[_{<<e,t>,<<e,t>,t>>}\text{a}]^{s'}, \lambda s'.{}_{k}[_{<e,t>}\text{ r. b. by the C. maker M.}]^{s'}\}, \lambda s'.[_{<e,t>}\text{has been l. today}]^{s'}\}$
$\{\{\lambda s'.\lambda Q.\lambda P.\exists x(Q(x)\&P(x)), \lambda s'.{}_{k}[_{<e,t>}\text{ r. b. by the C. maker M.}]^{s'}\}, \lambda s'.[_{<e,t>}\text{has been l. t.}]^{s'}\}$
$\{\lambda s'.\lambda P.\exists x({}_{k}[_{<e,t>}\text{ r. b. by the Czech maker Morati}]^{s'}(x)\ \&\ P(x)), \lambda s'.[_{<e,t>}\text{has been l. t.}^{s'}\}$
$\lambda s'.\exists x({}_{k}[_{<e,t>}\text{ r. b. by the Czech maker Morati}]^{s'}(x)\ \&\ [_{<e,t>}\text{has been launched today}]^{s'}(x))$

Taxonomic indefinite phrases naturally occur in kind level sentential contexts. But occasionally some taxonomic phrases which appear to be inherently taxonomic occur in particular level episodic sentential contexts as in the case of the following examples:

22 a Alice found the carcass of an extinct bison.
b The bird on that lower bough is an endangered game bird.

c Alice shot an endangered game bird.
d Alice drove a Cadillac model designed by Damon.

It appears that in such examples either particular level arguments become the subjects of kind level taxonomic predicates (22b) or taxonomic arguments become objects of particular level verbs (22c,d) or taxonomic arguments combine with particular level common nouns to form genitive constructions (22b). So, the interpretation of these sentences according to the native meanings of the constituents will inevitably result in sortal conflicts. In the literature on the semantics of noun phrases this issue has not been addressed. Specifically, Chierchia (1998) and Dayal (2004) whom we follow in the formulation of the C-framework, does not consider such examples as in 22.

To resolve sortal conflicts that obtain in such sentences as those in 22 I will introduce an operator labelled as detax that applies to taxonomic applier meanings to map them into particular level applier meanings.

Let α be a meaning of type $<s,<e_k,t>>$
$Detax(\alpha)=\lambda s.\lambda x.\exists y(I(s)(x,y) \ \& \ \alpha(s)(y))$

Detax maps a kind level applier meaning α into a particular level applier meaning which relative to a given evaluation index s will map a token x to truth iff x is an instance of a kind y to which α applies truly relative to s.

I will assume that such common nouns as *endangered game bird*, *extinct bison*, *Cadillac model designed by Damon* are natively taxonomic. Yet, I will also assume that when they form noun phrases which occur in particular level sentential contexts, their meaning can optionally undergo the operation detax to yield particular level predicative meanings. Assuming this option to undergo detax for common nouns that are inherently taxonomic, 22c can be interpreted thus:

22 c Alice shot an endangered game bird.
[[an] [endangered game bird]][1 [Alice][[shot][t_1]]]

$$\{\{\lambda s.\lambda Q.\lambda P.\exists x(Q(x)\&P(x)), \text{detax}(\lambda s.{}_{k}[_{<e,t>}\text{e. game bird}]^{s})\}, \lambda s.\lambda y.[\text{shot}]^{s}(y)([\text{Alice}]^{s})\}$$
$$\{\{\lambda s.\lambda Q.\lambda P.\exists x(Q(x)\&P(x)),\lambda s.\lambda x.\exists y(I(s)(x,y)\ \&\ {}_{k}[_{<e,t>}\text{e. g. b.}]^{s}(y))\}, \lambda s.\lambda y.[\text{shot}]^{s}(y)([\text{A.}]^{s})\}$$
$$\{\lambda s.\lambda P.\exists x(\exists y(I(s)(x,y)\ \&\ {}_{k}[_{<e,t>}\text{e. g. b.}]^{s}(y))\&P(x)), \lambda s.\lambda y.[\text{shot}]^{s}(y)([\text{Alice}]^{s})\}$$
$$\lambda s.\exists x(\exists y(I(s)(x,y)\ \&\ {}_{k}[_{<e,t>}\text{endangered game bird}]^{s}(y))\&\ [\text{shot}]^{s}(x)([\text{Alice}]^{s}))$$

Above I have reported that the issue we here suggest to resolve via the postulation of the operator detax has not been addressed by Chierchia and Dayal. Yet, although they do not directly address the issue, they introduce a sortal conflict resolution mechanism called DKP in relation with kind designating phrases that occur in episodic particular level sentential contexts, and this mechanism may be thought to be useful in the interpretation of such sentences as those in 22 as well. I will cover the DKP in the coming section about bare plural phrases. And in a later section I will show that DKP faces problems in dealing with such sentences as the following:

23 Alice did not film a bird which was long thought to be extinct.
The bird in the lower bough is an endangered bird.

Then we will see that under the C-framework we need both detax and DKP to deal with taxonomically interpreted NP's.

Bare Plural Phrases under the C-framework

In this section I will present how C-framework will deal with bare plural phrases. We have previously seen that bare plural phrases apparently manifest a great semantic variety both as regards what they denote and as regards how they denote. This variety was observed even in the uses of the same bare plural phrase in different sorts of sentential contexts.

24 a The stars of the theme park, Alice and Bob, are whales.
   b Alice did not see whales in the theme park.
   c Whales are an endangered mammal family.
   d The Beluga and the Narwhal are whales.
   e Alice discovered whales and insisted to name one of them *Monodon aliciae*.

Above we had noted there is an ongoing controversy about the interpretation bare plural phrases in argument positions. First however let me remind you points of consensus about the interpretation of bare plural phrases. There is a consensus about the semantics of bare plural phrases in predicate positions: in predicate positions they have predicative denotations and can either be taxonomic (24d) or non-taxonomic (24a). There is a consensus that in argument positions they can designate kinds in kind level sentential contexts (24c). The C-framework's treatment of bare plural phrases will follow the consensus on these points.

The disagreement in relation with bare plural phrases concerns the interpretation of non-taxonomic bare plural arguments in particular level contexts as in (24b). Authors such as Chierchia (1998) and Dayal (2004), from whose papers we derive the C-framework, argue that most non-taxonomic bare plural phrases designate kinds even when they occur in argument positions in particular level sentential contexts. Yet, this position is criticized by Geenhoven (2000) and Krifka (2004).

Finally, as regards the interpretation of taxonomic bare plural arguments (24e), there is not any documented disagreement but the reason may simply be that Chierchia (1998) and Dayal (2004) does not have anything to say about them. However I will show that the principal piece of evidence which lead Chierchia (1998) and Dayal (2004) to argue that non-taxonomic bare plural arguments should be kind designators applies in the case of taxonomic bare plural arguments as well.

The way Chierchia (1998) and Dayal (2004) argue for their taking bare plural arguments to be kind designators has ramifications as to which common nouns should be seen as having corresponding kinds. For, given their arguments which we will present now it follows that taxonomic common nouns and modified common nouns as well should have corresponding kinds. This last issue in turn is very much relevant in judging the advantages and the disadvantages of adopting the C-framework or the K-framework, which we will present after the C-framework's presentation. The K-framework will take simple non-taxonomic common nouns to be kind designators, but it will take modified common nouns and taxonomic common nouns to be appliers –for reasons to be discussed later. And in the next chapter we will show that a rigid/non-rigid distinction among common nouns will be significant only under a framework like the K-framework which takes simple non-taxonomic common nouns to be designators but takes modified and/or taxonomic common nouns to be appliers. Hence our long dwelling on the issue of the interpretations of bare plural arguments is not out of place.

Bare Plural Phrases under the C-framework: Predicates

Under the C-framework which takes all common nouns to have predicative meanings of type <s,<e,t>> the interpretation of bare plural phrases in predicate positions will be the same as the plural common nouns that form them. That is, they will be assigned meanings of type $<s,<e_{pl},t>>$. Non-taxonomic common nouns will yield non-taxonomic bare plural predicates, and taxonomic common nouns will yield taxonomic bare plural predicates. Thus, under the C-framework 6a and 6b will get the following interpretations:

6 a The bikes at Alice's room are road bikes.
[[$_{NP}$ The bikes at Alice's room] [$_{VP}$ are [$_{NP}$ [$_{N}$ road bikes]]]]

b The models reviewed this week in Alice's blog are road bikes.
[[$_{NP}$ The models reviewed this week in Alice's blog] [$_{VP}$ are [$_{NP}$ [$_{N}$ road bikes]]]]

The interpretation of 6a according to the C-framework:
{λs'.$_{pl\_p}$[$_e$ the bikes at Alice's room]$^{s'}$,λs'.$_{pl\_p}$[$_{<e,t>}$ road bikes]$^{s'}$}
λs'.$_{pl\_p}$[$_{<e,t>}$ road bikes]$^{s'}$($_{pl\_p}$[$_e$ the bikes at Alice's room]$^{s'}$)

The interpretation of 6b according to the C-framework:
{λs'.$_{pl\_k}$[$_e$ The models reviewed this week in Alice's blog]$^{s'}$,λs'.$_{pl\_k}$[$_{<e,t>}$ road bikes]$^{s'}$}
λs'.$_{pl\_k}$[$_{<e,t>}$ road bikes]$^{s'}$($_{pl\_k}$[$_e$ The models reviewed this week in Alice's blog]$^{s'}$)

Bare Plural Phrases under the C-framework: Bare Plural Non-taxonomic Arguments

Previously we noted that there is a general agreement that in such sentences as the following bare plural phrases designate a specific kind:

Red ants are not endangered.
Dot matrix printers are out of production.
Protons are discovered by Ernest Rutherford .
Transistors are invented by Julius Edgar Lilienfeld.

But according to Carlson (1980), Chierchia (1998), Dayal (2004), whose work we follow in formulating the C-framework, most non-taxonomic bare plural arguments always operate as kind designators, even when they occur in particular level sentential contexts such as the following:

Alice bought dot matrix printers to print out receipts.
Alice replaced faulty transistors with new ones.

The thesis that bare plural arguments operate as kind designators was first defended by Carlson (1980). Some of the arguments Carlson gave for this thesis and the specific manner in which he accounted for the appearance that bare plural arguments denote particulars in particular level contexts were found problematic later. But all of the authors who defend this thesis still defend it on the basis of the arguments first introduced by Carlson (1980). Some of these arguments were presented in the first part of the present chapter. Here, instead of Carlson (1980) I will present Chierchia (1998)'s analysis. Chierchia's analysis is more recent and it has been influential and adopted by quite a number of authors, whilst Carlson's ingenious analysis does not currently have such following.

Chierchia (1998) reasserts, under the banner *a neo-Carlsonian approach*, Carlson (1980)'s view that most bare plural phrases in argument positions always designate kinds. He of course reckons that they designate kinds when figuring in kind level sentential contexts. But following Carlson (1980) he furthermore argues that previously illustrated scope peculiarities of bare plural arguments in particular level contexts is better explained by taking them to be kind designating as well. Thus, according to Chierchia (1998) *mountain bikes* in all of the following sentences designate kinds:

25 a Mountain bikes have evolved from road bikes.
b Mountain bikes stand locked to next to Alice's bike.
c Mountain bikes have wide tires.
d Alice repaired mountain bikes.

Assigning kind designation to the *mountain bikes* in 25a appears non problematic; the sentential context in which it figures as an argument is kind-level. However the sentential contexts in 25b-d are particular level and if *mountain bikes* designate a kind then it seems that both sentences are either bound to be false or will not make sense at all.

Below I will first describe how Chierchia analyses bare plural arguments as kind designating phrases. Then I will describe his account of how kind designating bare plural arguments can meaningfully figure in particular level contexts.

Previously while describing C-framework's account of non-taxonomic common noun meanings we have presented the implicit operator $^{\cap}$ introduced by Chierchia (1998). I reproduce its definition below:

Let α be a predicative meaning of type $<s,<e_p,t>>$,
$^{\cap}\alpha=\lambda s.k_\alpha$, *if there is a unique kind* k_α *such that* $\forall s'\forall x(I(s')(x)(k_\alpha) \equiv \alpha(s)(x))$.
Otherwise undefined.

Chierchia argues that in English the meanings of non-taxonomic bare plural arguments are derived through the application of $^{\cap}$ to the meanings of the non-taxonomic plural common nouns that form them. This is so regardless whether these bare plural arguments occur in kind level sentential contexts or in particular level sentential contexts. For example, the meaning of the bare plural argument *mountain bikes* occurring in the sentences in 25 is derived from the meaning of the plural common noun *mountain bikes* forming it, thus:

$[_{NP}$ mountain bikes$]$

$^{\cap}(\lambda s'._{pl_p}[_{<e,t>}$mountain bikes$]^{s'}))$ $\lambda s'$.the-mountain-bike-kind

Then according to Chierchia (1998) the interpretation of 25a will proceed thus:

25 a Mountain bikes have evolved from road bikes.
$[[_{NP}$ Mountain bikes$][_{VP}$ have evolved from road bikes$]]$

the interpretation of 25a according to the C-framework: $\{^{\cap}(\lambda s'._{pl_p}[_{<e,t>}$mountain bikes$]^{s'}), \lambda s._{k}[_{<e,t>}$ have evolved from road bikes$]^{s}\}$ $\{\lambda s'$.the-mountain-bike-kind , $\lambda s._{k}[_{<e,t>}$ have evolved from road bikes$]^{s}\}$ $\lambda s._{k}[_{<e,t>}$ have evolved from road bikes$]^{s}$(the-mountain-bike-kind)

Now I pass to Chierchia's account of how bare plurals as kind designating phrases can figure in argument positions in particular level contexts as in 25b.

25 b Mountain bikes stand locked to next to Alice's bike.

To account for the occurrence of kind designating bare plurals in particular level sentential contexts Chierchia formulates an implicit operation which he labels as *derived kind predication* (DKP). This operation is triggered when a kind designating argument is to combine with a particular level predicative constituent. It applies to the meaning of predicative constituents to make them kind level.[103]

[103] There are two sorts of particular level contexts: episodic contexts and sentential contexts. DKP concerns only the treatment of bare plural arguments in episodic contexts. For generic contexts Chierchia has another proposal which I will not present here, as the semantics of generic sentences involve complications which will deflect us far from the coverage of the semantic analysis of noun phrases.

Let α be a a meaning of type $<s,<e_p,t>>$:
$DKP(\alpha)=\lambda s'.\lambda z_k.\exists x(I(s')(x)(z_k)\ \&\ \alpha(s')(x))$ (Here z_k is a variable ranging over kinds)[104]

Using DKP the truth-conditions of 25b can be derived thus:

25 b Mountain bikes stand locked next to Alice's bike.
$[_{NP}$ mountain bikes$][_{VP}$ stand locked next to Alice's bike$]$

the interpretation of 25b according to the C-framework:
$\{^{\cap}(\lambda s'.{}_{pl_p}[_{<e,t>}$m. bikes$]^{s'}), \lambda s.{}_{p}[_{<e,t>}$ s. l. n. to Alice's b.$]^{s}\}$ *type misfit DKP is triggered*
$\{\lambda s.$the-montain-bike-kind, DKP$(\lambda s.{}_{p}[_{<e,t>}$ stand locked next to Alice's bike$]^{s})\}$
$\{\lambda s.$the-montain-bike-kind, $\lambda s.\lambda z_k.\exists x(I(s)(x)(z_k)\ \&\ {}_{p}[_{<e,t>}$ s. l. next to Alice's bike$]^{s}(x))\}$
$\lambda s.\lambda z_k.\exists x(I(s)(x)(z_k)\ \&\ {}_{p}[_{<e,t>}$ s. l. next to Alice's bike$]^{s}(x))($ the-montain-bike-kind$)$
$\lambda s.\exists x(I(s)(x)($the-montain-bike-kind$)\ \&\ {}_{p}[_{<e,t>}$ stand locked next to Alice's bike$]^{s}(x))$

What about the cases in which a bare plural argument occurs in the object position of a verb which take only particular level arguments? When we attempt to derive the truth-conditions of such a sentence on the basis of the logical form which reflects the surface form, the DKP operation defined in the manner Chierchia does is of no help.

25 d Alice repaired mountain bikes.
[Alice][[repaired][mountain bikes]]

$\{\lambda s.[\text{Alice}]^{s}, \{\lambda s.[\text{repaired}]^{s}, {}^{\cap}(\lambda s'.{}_{pl_p}[_{<e,t>}$mountain bikes$]^{s'})\}\}$
misfit, but DKP is not available for such types

The transitive verb *repair* should have a native meaning of the sorted type $<s,<e_p,<e_p,t>>$. But the DKP operation as defined by Chierchia can only apply to applier meanings (i.e. type $<s,<e_p,t>>$). Chierchia does not discuss this

[104] The original definition of DKP reads, *Let α be a denotation of type $<e_p,t>$: $DKP(\alpha)=\lambda z_k.\exists x(x \ll z_k(s')\ \&\ \alpha(s')(x))$.* In footnote 98 I reported that Chierchia (1998) originally identifies kinds with intensions of type $<s,<e_p,t>>$, but that he nonetheless treats them as entities of type e. In the same footnote I indicated that to avoid a complicated presentation I will ignore the identification of kinds with intensions and I will treat kinds straightforwardly as entities of type e. That's the reason why here I have to give a formulation of DKP slightly different than Chierchia's original.

problem; he semantically analyzes only a logical form in which the object argument is raised to the wide scope:

I did not see spots on the floor.
[spots on the floor]$_1$[I did not see t_1][105]

Yet he reckons that there are logical forms in which the object argument remains in its place.[106] It is thus desirable to formulate the operation DKP in such a way that it can also be used in cases where the kind level argument occurs in the object position (specifically for the reasons we indicated in the footnote 105). This can be accomplished by the following reformulation:

Let α be a meaning of type <s,<e_p,a>>, where a can be any of the types t, <e,t>, <e,<e,t>>, <e,<e,<e,t>>> …
$DKP(\alpha)=\lambda s'.\lambda z_k.\exists y(I(s')(y)(z_k)\ \&\ \alpha(s')(y))$, if a=t
$DKP(\alpha)=\lambda s'.\lambda z_k.\lambda x.\exists y(I(s')(y)(z_k)\ \&\ \alpha(s')(y)(x))$, if a=<e,t>
$DKP(\alpha)=\lambda s'.\lambda z_k.\lambda x'.\lambda x''\exists y(I(s')(y)(z_k)\ \&\ \alpha(s')(y)(x')(x''))$, if a=<e,<e,t>>
…

Now we are in a position to use DKP in dealing with 25d where the noun phrase *mountain bikes* which is taken to be a kind designator occurs in its original object position:

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[105] Yet, when interpreting this logical form he urges that the trace t_1 left by the bare plural argument *spots on the floor* be interpreted as a kind level trace, so that he can explain the peculiar scope behavior of bare plural arguments in terms of their being kind designators. But then in the interpretation of [I did not see t_1] we confront again the same problem: a kind level argument occurring as the object of a verb which admits only particular level arguments! In Chierchia's analysis this problem remains inconspicuous because he immediately gives the following quasi-formal representation, $\lambda x.[\sim see(I)(x_k)](^\cap spots\ on\ the\ floor)$ without getting into the details of how *see* which as a transitive verb is commonly treated as of type <e_{object},<$e_{subject}$,t>> can compose with the subject *I* before composing with the trace in the object position that is assumed to be kind level.

[106] Chierchia (1998), pgs. 368-369. He even approvingly cites a paper by D. Fox according to which raising of arguments are banned when the logical form that would result from the raising gets the same interpretation as the logical form that obtains without raising.

25 d Alice repaired mountain bikes.
[Alice][[repaired][mountain bikes]]

the interpretation of 25d according to the C-framework:
$\{\lambda s.[\text{Alice}]^{s}, \{\lambda s.[\text{repaired}]^{s}, {}^{\cap}(\lambda s'._{pl\_p}[_{<e,t>}\text{mountain bikes}]^{s'})\}\}$
$\{\lambda s.[\text{Alice}]^{s}, \{\lambda s.[\text{repaired}]^{s}, \lambda s.(\lambda s'.i(_{pl\_p}[_{<e,t>}\text{mountain bikes}]^{s'}))\}\}$ *misfit*
$\{\lambda s.[\text{Alice}]^{s}, \{\lambda s.\lambda z_{k}.\lambda x.\exists y(I(s')(y)(z_{k})\ \&\ [\text{repaired}]^{s}(y)(x)),\ \lambda s.\text{the-mountain-bike-kind}\}\}$
DKP triggered
$\{\lambda s.[\text{Alice}]^{s}, \lambda s.\lambda z_{k}.\lambda x.\exists y(I(s')(y)(z_{k})\ \&\ [\text{repaired}]^{s}(y)(x))(\text{ the-mountain-bike-kind})\}$
$\{\lambda s.[\text{Alice}]^{s}, \lambda s.\lambda x.\exists y(I(s')(y)(\text{ the-mountain-bike-kind})\ \&\ [\text{repaired}]^{s}\ (y)(x))\}$
$\lambda s.\lambda x.\exists y(I(s')(y)(\text{ the-mountain-bike-kind})\ \&\ [\text{repaired}]^{s}\ (y)(x))\ ([\text{Alice}]^{s})$
$\lambda s.\lambda x.\exists y(I(s')(y)(\text{ the-mountain-bike-kind})\ \&\ [\text{repaired}]^{s}\ (y)([\text{Alice}]^{s}))$

The postulation of DKP to accommodate the occurrence of supposedly kind designating bare plurals in particular level sentential contexts may look *ad hoc*. However as previously indicated kind-phrases, which are uncontroversially thought to designate kinds, can sometimes occur in argument positions in such sentential contexts. And DKP can be used to account for such occurrences as well. For example, DKP can be used to account for the occurrence of *this model* in the particular level sentential context *Alice rode* ___ in the following sentence in just the same way as it was used in the interpretation of 25d:

26 Alice rode this model.
[Alice][[rode][this model]]

the interpretation of 26 according to the C-framework:
$\{\lambda s.[\text{Alice}]^{s}, \{\lambda s.[\text{rode}]^{s}, \lambda s.[\text{this model}]^{s}\}\}$
$\{\lambda s.[\text{Alice}]^{s}, \{\lambda s.[\text{rode}]^{s}, \lambda s.[\text{this model}]^{s}\}\}$ *misfit*
$\{\lambda s.[\text{Alice}]^{s}, \{\lambda s.\lambda z_{k}.\lambda x.\exists y(I(s)(y)(z_{k})\ \&\ [\text{rode}]^{s}(y)(x)),\ \lambda s.[\text{this model}]^{s}\ \}\}$ *DKP triggered*
$\{\lambda s.[\text{Alice}]^{s}, \lambda s.\lambda z_{k}.\lambda x.\exists y(I(s)(y)(z_{k})\ \&\ [\text{rode}]^{s}(y)(x))([\text{this model}]^{s})\}$
$\{\lambda s.[\text{Alice}]^{s}, \lambda s.\lambda x.\exists y(I(s)(y)([\text{this model}]^{s})\ \&\ [\text{rode}]^{s}(y)(x))\}$
$\lambda s.\exists y(I(s)(y)([\text{this model}]^{s})\ \&\ [\text{rode}]^{s}(y)([\text{Alice}]^{s}))$

So, from the standpoint of Chierchia (1998) who holds that bare plural arguments always designate kinds, the case of bare plurals arguments in particular level sentential contexts is just a special case of a more general phenomenon, which anyway has to be given an account even though one does not hold bare plural arguments to designate kinds in such contexts.

Why to take bare Plural Arguments to be Kind Designators Even in Particular Level Sentential Contexts?

In the previous chapter we have indicated that bare plural phrases in argument position in particular level sentential contexts seem to manifest a scope behavior which is unlike indefinite singular phrases and like kind phrases. In this vein we had compared the following examples:

8 a Alice did not steal Cadillac Eldorados.
9 a Alice did not steal a Cadillac Eldorado.
10 a Alice did not steal this model of Cadillac.

Whilst 9a is ambiguous, 8a and 10a do not appear to be so. The ambiguity of 9a was previously shown to be explainable as due to the different ways the indefinite noun phrase *a Cadillac Eldorado* interpreted as an existential quantified noun phrase can take scope relative to the negation. Given this explanation it follows that, if, as is generally held, bare plural arguments like *Cadillac Eldorados* too were to be interpreted as plural versions of indefinite phrases then a similar ambiguity should have obtained in 8a as well. But apparently 8a is not ambiguous and its sole reading appears to be similar to the sole reading of 10a; according to this reading there are not any Cadillac Eldorados stolen by Alice from Bob's gallery. Chierchia (1998) argues that that this state of affairs can be explained if the bare plural argument *Cadillac*

Eldorados is a kind designating phrase like the kind-phrase argument *this model of Cadillac* figuring in 10a.

10a has only one pre-theoretically distinguishable reading and according to that reading Alice stole no tokens of the Cadillac model in question. Yet, 10a can assume logical forms in which the kind phrase argument *this model of Cadillac* can take wide scope or narrow scope relative to *not*. That is, 10a can assume either one of the following logical forms:

10aA $[_{NP}$this model of Cadillac$]_1$ [1 [[not][$_S$ [Alice] [[stole] [t_1]]]]]
10aB [not][$_S$ [Alice] [[stole] [$_{NP}$ this model of Cadillac]]]

Since there is only one pretheoretically distinguishable reading for 10a the interpretation of both of these logical forms should yield the same truth conditions. Both of these logical forms inheres a sortal misfit. [$_{NP}$ this model of Cadillac] has a kind level designator meaning whereas the constituents with which it has to semantically compose with [1 [[not][$_S$ [Alice] [[stole] [t_1]]]]] and [stole] require kind level arguments. Above we have formulated the operation DKP for the resolution of such misfits.

According to Chierchia (1998) the interpretation of the 10aB where *this model of Cadillac* takes the narrow scope should then proceed along the following lines:

10aB [not][$_S$ [Alice] [[stole] [$_{NP}$ this model of Cadillac]]]

the interpretation of 10aB according to the C-framework:
$\{\lambda s.\sim, \{\lambda s._p[_e \text{Alice}]^s, \{\lambda s.[_{<e,<e,t>>}\text{stole}], \lambda s._k[_e \text{this model of Cadillac}]^s\}\}\}$ *misfit*
$\{\lambda s.\sim,\{\lambda s._p[_e \text{A.}]^s,\{\lambda s.\lambda z_k.\lambda x.\exists y(I(s)(y)(z_k)\&[\text{s.}]^s(y)(x)),\lambda s._k[_e\text{this m. of C.}]^s\}\}\}$ *DKP trig.*
$\{\lambda s.\sim, \{\lambda s._p[_e \text{Alice}]^s, \lambda s.\lambda x.\exists y(I(s)(y)([\text{this model of C.}]^s) \& [\text{stole}]^s(y)(x))\}\}$
$\{\lambda s.\sim, \lambda s.\exists y(I(s)(y)([\text{this model of C.}]^s) \& [\text{stole}]^s(y)([\text{Alice}]^s))\}$
$\lambda s.\sim\exists y(I(s)(y)([\text{this model of C.}]^s) \& [\text{stole}]^s(y)([\text{Alice}]^s))$

So the interpretation of the logical form in which *this model of Cadillac* takes narrow scope relative to *not* along the lines of Chierchia (1998) successfuly yields the sole reading of 10a which is pretheoretically distinguishable.

Now let's consider from the standpoint of Chierchia's theory the interpretation of the logical form in which *this model of Cadillac* takes wide scope relative to *not*. *Prima facie* it may be thought that this interpretation will proceed along the following lines:

10aA $[_{NP}$ this model of Cadillac$]_1$ [1 [[not][$_S$ [Alice] [[stole] [t_1]]]]]

$\{\lambda s._k[_e\text{this model of Cadillac}]^s, \{1, \{ \{\lambda s.\sim, \{\lambda s.[\text{Alice}]^s, \{\lambda s.[\text{stole}]^s, \lambda s.[t_1]^{s,g}\}\}\}\}\}\}$
$\{\lambda s._k[_e\text{this model of Cadillac}]^s, \lambda s.\lambda x.\sim[\text{stole}]^s(t_x)([\text{Alice}]^s)\}$ *sortal misfit*
$\{\lambda s._k[_e\text{this m. of Cadillac}]^s, \lambda s.\lambda x_k.\exists y(I(s)(y)(x_k) \,\&\, \sim[\text{stole}](t_y)([\text{Alice}]^s))\}$ *DKP triggered*
$\lambda s.\exists y(I(s)(y)(_k[_e\text{this model of Cadillac}]^s) \,\&\, \sim[\text{stole}](t_y)([\text{Alice}]^s))$

Note however that this way of interpreting 10aA too gave the reading which is consistent with there being some tokens of the Cadillac model in question stolen by Alice, a reading which 10a does not have. How then 10aA should be interpreted so as obtain 10a's sole pre-theoretically ascertainable reading?

In response to this problem Chierchia assumes that conflict resolution by DKP cannot take place outside the scope of any scope taking constitutent. And this is exactly what happens in the interpretation 10aA above. Yet, how else DKP can be used to render [1 [[not][$_S$ [Alice] [[stole] [t_1]]]]] a sentential context which can compose with a kind level argument? This can be ensured by interpreting the trace t_1 occuring in [1 [[not][$_S$ [Alice] [[stole] [t_1]]]]] as a kind level designator. Chierchia supports this move by indicating that the trace left by a kind level designator moving to the wide scope should itself be treated as kind level. Then a local semantic discrepancy obtains within [1 [[not][$_S$ [Alice]

$[[\text{stole}]\ [t_1]]]]]$, which can internally be resolved via DKP, and this resolution will not take scope over any scope taking element.

$[\![[\text{not}][_S [\text{Alice}]\ [[\text{stole}]\ [t_1]]]]\!]$
$\{\lambda s.{\sim}, \{\lambda s._p[_e \text{Alice}]^s, \{\lambda s.[_{<e,<e,t>>}\text{stole}], \lambda s._k[_e\, t_1]^{s,g}\}\}\}$ *sortal misfit*
$\{\lambda s.{\sim},\{\lambda s._p[_e A.]^s,\{\lambda s.\lambda z_k.\lambda x.\exists y(I(s)(y)(z_k)\ \&\ [\text{stole}]^s(y)(x)), \lambda s._k[_e\, t_1]^{s,g}\}\}\}$ *DKP is triggered*
$\{\lambda s.{\sim}, \{\lambda s._p[_e \text{Alice}]^s, \lambda s.\lambda x.\exists y(I(s)(y)(_k[t_1]^{s,g})\ \&\ [\text{stole}]^s(y)(x))\}\}$
$\{\lambda s.{\sim}, \lambda s.\exists y(I(s)(y)(_k[t_1]^{s,g})\ \&\ [\text{stole}]^s(y)([\text{Alice}]^s))\}$
$\lambda s.{\sim}\exists y(I(s)(y)(_k[t_1]^{s,g})\ \&\ [\text{stole}]^s(y)([\text{Alice}]^s))$

With $[\text{not}][_S [\text{Alice}]\ [[\text{stole}]\ [t_1]]]$ interpreted thus $[1\ [[\text{not}][_S [\text{Alice}]\ [[\text{stole}]\ [t_1]]]]]$ will become a kind level applier:

$[\![[1\ [[\text{not}][_S [\text{Alice}]\ [[\text{stole}]\ [t_1]]]]]]\!]$
$\{1, \lambda s.{\sim}\exists y(I(s)(y)(_k[t_1]^{s,g})\ \&\ [\text{stole}]^s(y)([\text{Alice}]^s))\}$
$\lambda s.\lambda x_k.{\sim}\exists y(I(s)(y)(_k[t_1]^{s,g(1/x)})\ \&\ [\text{stole}]^s(y)([\text{Alice}]^s))$
$\lambda s.\lambda x_k.{\sim}\exists y(I(s)(y)(x_k)\ \&\ [\text{stole}]^s(y)([\text{Alice}]^s))$

And the interpretation of 10aA will proceed as follows:

10aA $[_{NP}\text{this model of Cadillac}]_1\ [1\ [[\text{not}][_S [\text{Alice}]\ [[\text{stole}]\ [t_1]]]]]$

the reconsidered interpretation of 10aA according to the C-framework:
$\{\lambda s._k[_e\text{this model of Cadillac}]^s, \lambda s.\lambda x_k.{\sim}\exists y(I(s)(y)(x_k)\ \&\ [\text{stole}]^s(y)([\text{Alice}]^s))\}$
$\lambda s.{\sim}\exists y(I(s)(y)(_k[_e\text{this model of Cadillac}]^s)\ \&\ [\text{stole}]^s(y)([\text{Alice}]^s))$

Finally we have been able to obtain the sole pretheoretically ascertainable reading of 10a. Now, let's finish the topic we started. I previously indicated that the 8a like 10a and unlike 9a is unambiguous.

8 a Alice did not steal Cadillac Eldorados.
9 a Alice did not steal a Cadillac Eldorado.
10 a Alice did not steal this model of Cadillac.

9a has both a reading according to which Alice stole no Cadillac Eldorado tokens and another reading which is consistent with her having stolen some Cadillac Eldorado tokens provided that there is at least one Cadillac Eldorado token which she did not steal. But 8a and 10a does not have readings which is consistent with Alice's having stolen some Cadillac Eldorado tokens (assuming that *this model of Cadillac* is meant to refer to the Cadillac Eldorado). Chierchia (1998), on the basis of similar examples, argues that this state of affairs is hard to explain if the bare plural argument *Cadillac Eldorados* is treated as the plural version of *a Cadillac Eldorado*, namely as an existential quantifier. But that it gets a ready explanation if the bare plural argument *Cadillac Eldorados* is treated as a kind designator. And the way to treat the $[_{NP}$Cadillac Eldorados] as a kind designator is to apply the implicit operator $^{\cap}$ to the meaning of the underlying plural common noun $[_{N}$Cadillac Eldorados]. Since the state of affairs illustrated by 8a, 9a and 10a very generally obtains in English, with the exception of certain special cases, Chierchia argues that in English bare plural arguments are always interpreted in this way: as having kind designating meanings (type $<s,e_k>$) derived from the meanings of the underlying plural common nouns, which according to Chierchia are of type $<s,<e_{pl\_p},t>>$.

Then according to Chierchia (1998) the interpretation of 8a when *Cadillac Eldorados* takes wide scope should proceed in the same way as the reconsidered interpretation of 10aA illustrated above:

8aA $[_{NP}$ Cadillac Eldorados$]_1$ [1 [[not]$[_S$ [Alice] [[stole] $[t_1]$]]]]]

the interpretation of 8aA according to the C-framework:
$\{^{\cap}(\lambda s._{p\_pl}[_{<e,t>}\text{Cadillac Eldorados}]^s), \{1, \{\lambda s.\sim, \{\lambda s.[\text{Alice}]^s, \{\lambda s.[\text{stole}]^s, \lambda s._k[t_1]^{s,g}\}\}\}\}\}$
$\{\lambda s.\text{the-Cadillac-Eldorado-Model}, \{1, \{\lambda s.\sim, \{\lambda s.[\text{A.}]^s, \{\lambda s.[\text{s.}]^s, \lambda s._k[t_1]^{s,g}\}\}\}\}\}$ *sortal misfit*
$\{\lambda s.\text{the-C.-E.-M.}, \{1, \{\lambda s.\sim, \{\lambda s.[\text{A.}]^s, \{\lambda s.\lambda z_k.\lambda x.\exists y(I(s)(y)(z_k) \& [\text{stole}]^s(y)(x)), \lambda s._k[t_1]^{s,g}\}\}\}\}\}$
DKP is triggered
$\{\lambda s.\text{the-C.-E.-M.}, \{1, \{\lambda s.\sim, \{\lambda s.[\text{Alice}]^s, \lambda s.\lambda x.\exists y(I(s)(y)(_k[t_1]^{s,g}) \& [\text{stole}]^s(y)(x))\}\}\}\}$
$\{\lambda s.\text{the-C.-E.-M.}, \{1, \{\lambda s.\sim, \lambda s.\exists y(I(s)(y)(_k[t_1]^{s,g}) \& [\text{stole}]^s(y)([\text{Alice}]^s))\}\}\}$
$\{\lambda s.\text{the-C.-E.-M.}, \{1, \lambda s.\sim\exists y(I(s)(y)(_k[t_1]^{s,g}) \& [\text{stole}]^s(y)([\text{Alice}]^s))\}\}$
$\{\lambda s.\text{the-C.-E.-M.}, \lambda s.\lambda x_k.\sim\exists y(I(s)(y)(_k[t_1]^{s,g(1/x)}) \& [\text{stole}]^s(y)([\text{Alice}]^s))\}$

$\{\lambda s.\text{the-C.-E.-M.}, \lambda s.\lambda x_k.\sim\exists y(I(s)(y)(x_k)\ \&\ [\text{stole}]^s(y)([\text{Alice}]^s))\}$
$\lambda s.\sim\exists y(I(s)(y)(\text{the-C.-E.-M})\ \&\ [\text{stole}]^s(y)([\text{Alice}]^s))$

The scope peculiarity manifested by non-taxonomic bare plural arguments in particular level contexts and the similarity of this peculiarity to the one manifested by kind phrases constitutes part of Chierchia's main evidence for his view that non-taxonomic bare plural phrases operate as kind designators even in such contexts.[107]

Can All Non-Taxonomic Bare Plural Arguments be Taken to be Kind Designators?

The scope peculiarity of bare plural arguments is manifested by most bare plural arguments. Significantly it seems to be manifested even by bare plural phrases formed by modified common nouns:

27 a Alice did not steal pink Eldorados.
b Alice did not steal Eldorados which had a mileage over 100K.

[107] This just part of the evidence the other part is the apparent suspension of the scope peculiarity in the case of such bare plural phrases as *parts of this machine*, *people in the next room* (to be covered in the next section). Chierchia argues that the latter bare plural phrases do not manifest scope peculiarity because they do not designate kinds as there can be no kinds corresponding to the indexicality involving common nouns that form them. Scope peculiarity and special cases in which the scope peculiarity is suspended combines to form Chiechia's complete evidence. There is another piece of evidence related with the scope peculiarity of bare plurals given by Chierchia. It is the divergence illustrated in the following pair of sentences: *Miles killed a rabbit repeatedly*, *Miles killed rabbits repeatedly* (cannot be read as *There are some rabbits which Miles killed repeatedly*), *Miles killed people sitting in the next room repeatedly*. The first sentence appears to have only the weird reading according which there is a rabbit which Miles killed repeatedly. So it seems that for some reason *repeatedly* is forced to be interpreted in narrowest scope in the closest position to the verb. The same should the case for in the second sentence. Yet, the sole reading the second sentence has sounds as if *rabbits* have taken narrow scope relative to *repeatedly*. Chierchia's account can explain the divergence by indicating that *rabbits* is a kind designators, and leave a kind level trace which forces *killed* to be accommodated via DKP; in the resulting interpretation the existential quantification introduced by the DKP will be under the scope of *repeatedly*. The third sentence indicates that the scope peculiarity is again suspended in the case of noun phrases with indexical elements.

If this type of scope peculiarity indeed supports assigning kind designation to bare plural phrases that manifest it, as Carlson (1980) and the Neo-Carlsonian authors argue, then not just bare plural phrases formed by simple common nouns but a considerable part of those formed by modified common nouns as well should be assigned kind designation. This outcome of the Neo-Carlsonian theory has been criticized. We have seen that in English besides bare plurals there are other means to designate kinds. One of them were the definite generic phrases –e.g. *the tiger*, *the Iphone5s* etc. Curiously one cannot form definite generics with modified common nouns like *pink Cadillac*. *the pink Cadillac* cannot be used to designate a kind. I will return to this point later when I comparatively assesss the C-framework which is being presented now and the K-framework which will be presented further below.

Although Carlson (1980) and Chierchia (1998) accepts that most bare plural arguments formed by modified noun phrases are kind designators, they do not extend this claim to *all* bare plural arguments. For they think that some bare plural phrases formed by modified common nouns do not manifest the scope peculiarity which is seen as the hallmark of kind designation. Carlson and Chierchia thinks that such phrases as *parts of that machine*, *boys sitting here* do not manifest any scope peculiarity and that they behave like indefinite phrases:

28 a John did not see parts of that machine.
b John did not see boys sitting here.

As far as 28a is concerned Chierchia appears to be right in that that sentence is ambiguous between the readings *John did not see any parts of that machine* and *Some parts of that machine is such that John did not see them*. But 28b does not appear to me to be ambiguous in this way; it seems that its only reading is *John did not see any boys sitting here*.

Notwithstanding my divergent intuition on this matter, let me briefly describe Chierchia's proposal regarding such bare plural phrases which he thinks to behave like indefinite phrases. According to Chierchia common nouns such as *parts of that machine*, *boys sitting here* do not determine a kind, and for this reason the operation $^{\cap}$ is not defined for them. Yet, bare plural phrases formed by such common nouns too can figure in argument positions which require contributions either of type $\langle s,e\rangle$ (designator) or $\langle s,\langle\langle e,t\rangle,t\rangle\rangle$ (quantifier); as such somehow a contribution of either of these types should be derived from the common nouns which are of type $\langle s,\langle e,t\rangle\rangle$ according to Chierchia. Chierchia postulates that in cases where $^{\cap}$ does not apply there is another implicit operation termed as $\exists$ which plural common nouns that form bare plural noun phrases can undergo. This operation is defined thus:

Let α be of the sorted type $\langle s,\langle e_p,t\rangle\rangle$
$\exists([\![\alpha]\!])=\exists(\lambda s.[\alpha]^s)=\lambda s.\lambda P.\exists x([\alpha]^s(x) \,\&\, P(x))$ with x of type e_p and P of type $\langle e_p,t\rangle$.

Then according to Chierchia for example the interpretation of the logical form of 28a where *parts of the machine* takes wide scope should proceed along the following lines:

28aA $[_{NP}$ parts of that machine$]_1$ $[1\ [[\text{not}][_S\ [\text{John}]\ [[\text{see}]\ [t_1]]]]]$

As $^{\cap}(\lambda s.\,_p[_{\langle e,t\rangle}$ parts of that machine$]^s)$ *is not defined,* $[\![[_{NP}$ parts of that machine$]]\!]$ *will have to be interpreted as* $\exists(\lambda s.\,_p[_{\langle e,t\rangle}$ parts of that machine$]^s)$:
$\{\exists(\lambda s.\,_p[_{\langle e,t\rangle}\text{parts of that machine}]^s), \lambda s.\lambda x.(\sim[\text{see}]^s([t_x]^s)([\text{John}]^s))\}$
$\{\lambda s.\lambda P.\exists y(_p[_{\langle e,t\rangle}\text{parts of that machine}]^s(y) \,\&\, P(y)), \lambda s.\lambda x.(\sim[\text{see}]^s([t_x]^s)([\text{John}]^s))\}$
$\lambda s.\exists y(_p[_{\langle e,t\rangle}\text{parts of that machine}]^s(y) \,\&\, \lambda x.(\sim[\text{see}]^s([t_x]^s)([\text{John}]^s))(y))$
$\lambda s.\exists y(_p[_{\langle e,t\rangle}\text{parts of that machine}]^s(y) \,\&\, \sim[\text{see}]^s([t_y]^s)([\text{John}]^s))$

So, the bare plural phrase *parts of the machine* does not operate as a kind designator, but as a particular level existential GQ. And as such the reading that results when it takes wide scope relative to negation will be different than the one that results when it remains in the narrow scope.

The postulation of the availability of such an operation as ∃ raise certain questions. First, if ∃ is available to derive argument denotations out of common nouns, then why in English we do not have bare singular nouns formed out of count nouns? Given ∃, such a singular count noun as *tiger* as well could be used to form a bare singular argument which has the meaning $\exists(⟦[_{CN}\text{ tiger}]⟧)$with an existential GQ meaning. In response to this question Chierchia refers to a certain *Blocking Principle* which limits the postulation and applicability of type-shifting operations like ∃. According to this principle an implicit operation cannot be invoked if there is an explicit determiner in the language which is assigned the same operation as its meaning. As it happens, the operation termed as ∃ here is also assigned to the indefinite article *a* as its semantic contribution. For this reason, Chierchia argues, in English ∃ can be invoked only in relation with bare plural phrases as in English there is not a plural version of the indefinite article *a*.

A second question raised by Chierchia's resort to ∃ is the following. If ∃ is available at least for plural count nouns, then why it is not freely used in place of $^{\cap}$? For, if it could freely be used then any bare plural noun phrase, and not just those like *parts of that machine*, could be interpreted as an indefinite phrase and could be expected to cause scope ambiguity. In response to this second question Chierchia argues that $^{\cap}$ and ∃ are not on a par, but that ∃ should be applicable only if ∩ is not. The reason Chierchia gives for this supposed ordering between ∩ and ∃ is that ∩ is more meaning preserving than ∃, as the latter brings about existential import. This answer by Chierhia raises further questions, yet I cannot pursue them here.[108]

Bare Plural Phrases under the C-framework:
Taxonomic Bare Plural Arguments

In the previous chapter we have seen that like some indefinite singular arguments some bare plural arguments too are used taxonomically.

29 a Alice reviewed obsolete Japanese mobile models.
b Alice has discovered extinct whale species.

How will such taxonomic bare plural arguments be treated under the C-framework? Unfortunately, neither Chierchia (1998) nor Dayal (2004) whom we follow in the formulation of the C-framework has anything to say about the treatment of taxonomic bare plural phrases (although as we will see their case is highly relevant for their theory regarding bare plural arguments). So, on this matter we will have to improvise ourselves.

The C-framework, following Chierchia (1998), treated non-taxonomic bare plural arguments as kind designators, excepting some special bare plural phrases like *parts of the machine* which were treated as existential GQ's. Which of these treatments are suitable for such taxonomic bare plural arguments as *obsolete Japanese mobile models* and *extinct whale species*?

[108] For a discussion of the indicated problems in Chierchia's account see Krifka (2004).

First, let's consider how we understand the sentences in 29. Their portent appears to be paraphrasable by the following respectively:

Alice has reviewed some obsolete Japanese mobile models.
Alice has discovered some extinct whale species.

Thus, it appears that the NP's *obsolete Japanese mobile models* and *extinct whale species* can be treated simply as existential GQ's, just like the non-kind designating *parts of that machine*, that result from the application of the operation ∃ on the meanings of the taxonomic common nouns that form them. The difference from the case of the NP *parts of that machine* will be that, *parts of the machine* is formed by a particular level common noun of the sorted type $<s, <e_p,t>>$ and as a result the application of ∃ yields a particular level, non-taxonomic existential generalized quantifier; whereas the NP's *obsolete Japanese mobile models* and *extinct whale species* are formed by taxonomic common nouns which are of the sorted type $<s,<e_k,t>>$, so the application of ∃ will yield a taxonomic existential generalized quantifier:

$[\![[_{NP}\text{obsolete Japanese mobile models}]]\!]$
$\exists([\![[_{N'}\text{ obsolete Japanese mobile models}]]\!])$
$\exists(\lambda s._{k\_pl}[_{<e,t>}\text{ obsolete Japanese mobile models}])$
$\lambda s.\lambda P.\exists x(_{k\_pl}[_{<e,t>}\text{ o. Japanese mobile models}]^s(x)\ \&\ P(x))$ *sorted type* $<s,<<e_k,t>,t>>$

Given this interpretation for $[_{NP}$obsolete Japanese mobile models$]$, 29a can be interpreted in the following way:

29 a Alice reviewed obsolete Japanese mobile models.
$[_{NP}\text{ obsolete Japanese mobile models}]_1[1\ [[\text{Alice}][[\text{reviewed}][t_1]]]]$

$\{\exists(\lambda s._{k\_pl}[_{<e,t>}\text{ obsolete Japanese mobile models}]), \lambda s.\lambda y.([\text{reviewed}]^s([t_y]^s)([\text{Alice}]^s))\}$
$\{\lambda s.\lambda P.\exists x(_{k\_pl}[_{<e,t>}\text{o. J. mobile models}]^s(x)\ \&\ P(x)), \lambda s.\lambda y.([\text{reviewed}]^s([t_y]^s)([\text{Alice}]^s))\}$
$\lambda s.\exists x(_{k\_pl}[_{<e,t>}\text{ o. J. mobile models}]^s(x)\ \&\ \lambda s.\lambda y.([\text{reviewed}]^s([t_y]^s)([\text{Alice}]^s))(x))$
$\lambda s.\exists x(_{k\_pl}[_{<e,t>}\text{ obsolete Japanese mobile models}]^s(x)\ \&\ \lambda s.[\text{reviewed}]^s([t_x]^s)([\text{Alice}]^s))$

However it seems that it will be more consistent and preferable for the C-framework to take most taxonomic bare plural arguments to be kind designators along the lines of most non-taxonomic bare plural arguments. The reason is that the taxonomic bare plural NPs *obsolete Japanese mobile models* and *extinct whale species*, and arguably many other such NPs manifest the very scope related peculiarity which we have above seen to be manifested by their non-taxonomic kins:

30 a Alice did not review obsolete Japanese mobile models.
   b Alice did not discover extinct whale species.

The only available readings for 30a and b appear to be the following:

Alice did not review any obsolete Japanese mobile models.
Alice did not discover any extinct whale species.

If the NP's *obsolete Japanese mobile models* and *extinct whale species* were to be treated as existential GQ's as described above 30a and b would be expected to be ambiguous. Remember this phenomenon was the principal reason which lead Chierchia (1998), whom we follow in the formulation of the C-framework, to take non-taxonomic bare plural arguments to operate as kind designators even when they occured in particular level contexts. So, it appears that Chierchia (1998)'s treatment of non-taxonomic bare plural arguments as kind designators should also be extended to the case of taxonomic ones as well. If this extension is possible, the bare plural arguments like *obsolete Japanese mobile models* and *extinct whale species* will have to designate higher order kinds (hk), the instances of which are themselves kinds. This kind designating meaning for these phrases will presumably be derived from the taxonomic common nouns that form them through the operation $^{\cap}$. Furthermore, in the analysis of such sentences as 30a,b and 29a,b an operation like DKP will have to be invoked because as we understand these sentences what has been rewieved or discovered by Alice are not putative higher order kinds but the kinds which are instances thereof. Thus for example the interpretation of the logical form of 30a in which the NP *obsolete Japanese mobile models* take wide scope will proceed along the following lines:

30 a Alice did not review obsolete Japanese mobile models.
[Obsolete Japanese mobile models]$_1$[1 [not [[Alice][[review][t$_1$]]]]

$$\{^{\cap}(\lambda s.[\text{O. Jap. m. m.}]^s), \{1, \{\lambda s.\sim, \{\lambda s.[\text{Alice}]^s, \{\lambda s.[\text{review}]^s, \lambda s.{}_{hk}[{}_{e}t_1]^{s,g}\}\}\}\}\}$$
$$\{\lambda s.\text{the-obsolete-Jap.-mobile-model-kind}, \{1, \{\lambda s.\sim, \{\lambda s.[\text{A.}]^s, \{\lambda s.[\text{r.}]^s, \lambda s.{}_{hk}[{}_{e}t_1]^{s,g}\}\}\}\}\}$$ [109]
$$\{\lambda s.\text{the-oJmmk.}, \{1, \{\lambda s.\sim, \{\lambda s.[\text{A.}]^s, \{\lambda s.\lambda z_{hk}.\lambda x.\exists y(I(s)(y)(z_{hk}) \& [\text{r.}]^s(y)(x)), \lambda s.{}_{hk}[{}_{e}t_1]^{s,g}\}\}\}\}\}$$
$$\{\lambda s.\text{the-oJmmk.}, \{1, \{\lambda s.\sim, \{\lambda s.[\text{Alice}]^s, \lambda s.\lambda x.\exists y(I(s)(y)({}_{hk}[{}_{e}t_1]^{s,g}) \& [\text{review}]^s(y)(x))\}\}\}\}$$
$$\{\lambda s.\text{the- oJmmk.}, \{1, \{\lambda s.\sim, \lambda s.\exists y(I(s)(y)({}_{hk}[{}_{e}t_1]^{s,g}) \& [\text{review}]^s(y)([\text{Alice}]^s))\}\}\}$$
$$\{\lambda s.\text{the- oJmmk.}, \{1, \lambda s.\sim\exists y(I(s)(y)({}_{hk}[{}_{e}t_1]^{s,g}) \& [\text{review}]^s(y)([\text{Alice}]^s))\}\}$$
$$\{\lambda s.\text{the- oJmmk.}, \lambda s.\lambda x_{hk}.\sim\exists y(I(s)(y)({}_{hk}[{}_{e}t_1]^{s,g(1/x)}) \& [\text{review}]^s(y)([\text{Alice}]^s))\}$$
$$\{\lambda s.\text{the- oJmmk.}, \lambda s.\lambda x_{hk}.\sim\exists y(I(s)(y)(x_{hk}) \& [\text{review}]^s(y)([\text{Alice}]^s))\}$$
$$\lambda s.\lambda x_{hk}.\sim\exists y(I(s)(y)(\text{the-oJmmk.}) \& [\text{review}]^s(y)([\text{Alice}]^s))$$

The idea of taking the scope peculiarity manifested by bare plural arguments as an indicator for kind designation by such arguments forces the Neo-Carlsonians, on pain of inconsistency, to assume higher level kinds and to take taxonomic bare plural arguments to designate such kinds. Yet, apart from this theory dependent pressure to accept that taxonomic bare plural phrases are designators for higher level kinds, there does not seem to be any piece of evidence that supports the admittance of higher level kinds into the ontology of natural language semantics (in contrast the case for non-taxonomic bare plural

[109] Sortal misfit between [review]^s which cannot take higher kinds as arguments and ${}_{hk}[{}_{e}t_1]^{s,g}$ which as the trace of [Obsolete Japanese mobile models] can have only higher kinds as values will trigger DKP.

arguments' being kind designators was not just supported by their scope peculiarity but it was also supported also by their capacity to figure in kind level sentential contexts). Instead, there are reasons to think that taxonomic bare plural arguments cannot be designators for higher level kinds. I will consider these reasons later. What I want to point out now is that this forced commitment to higher level kinds can be seen as a further reason to doubt the Neo-Carlsonian way of explaining the scope peculiarity manifested by bare plural arguments by taking them to be kind designators. Later as we present the K-framework we will introduce an alternative way to explain these scope peculiarities which does not require the bare plurals to be kind designators.

Definite Phrases under the C-framework

1 j Surely, the whale should have been disoriented to come into these waters and tore our nets off.
k Alice claims that the cladistic analysis shows that the whale should rather be put under an altogether new genus. *(about a contextually salient species of whale)*
l The whale is a highly intelligent mammal. *(about the whale kind as whole)*
m The whales escaped by jumping off the pool into the sea.

Previously we have seen that definite phrases can be used both to designate kinds and particulars. Singular definites are usually used to designate a contextually salient particular (1j), or if they are taxonomic they are used to designate a contextually salient sub-kind of the kind corresponding to the common noun that forms them (1k). Plural definites are taken to designate a contextually salient sum of particulars (1m), or if they are taxonomic they are taken to designate a contextually salient sum consisting of the sub-kinds of the common noun that forms them. Apart from these uses where a definite singular phrase is used to designate a contextually salient entity that satisfies a certain description, we have seen that in kind level sentential contexts a definite singular can be used apparently like a name to designate the very kind corresponding to the common noun that forms it (1l). The definite singulars used in the latter way are termed as *definite generics*. Below I reproduce further examples of definite generics:

17 a The Ti Pro Race SC 1.3 has been launched at 2001.
   b The iPad2 is out of stock within days of its launch in the country.
   c The Anatolian leopard is now extinct in the Aegean region.
   d At the time, the bicycle industry was not impressed with the mountain bike, which many regarded as a short-term fad.

Now I will present how this variety in the semantics of definite phrases formed by count common nouns will be accounted under the C framework.

Definite Phrases under the C-framework: Particular Level Phrases

We had previously noted that definite phrases such as those figuring in the following sentences were usually taken to be particular level designators (type $<s,e_p>$):

16 a The biker irritated the passerby with his loud rev up.
   b All of us saw the bear coming out of the woods, picking the basket and swiftly disappearing into the woods again.
   c The winner of the 2012 London Games' 100m final is from Jamaica.
   d The finalists of the 2012 London Games' 100m final are black people.
   e The self-absorbed cyclists knocked Alice down.

Given an evaluation index s, some such definite phrases simply pick the entity which uniquely satisfies at s the descriptive conditions expressed by common nouns that form them. This is the case for the definite phrase arguments in 16c and 16d. Yet the same cannot be said of the definite phrase arguments of the remaining sentences in 16; for example *the biker* in 16a can be successfully used to designate a person relative to an evaluation index s, although in that evaluation index there may be more than one biker. The interpretation of the latter type of definite phrases is sensitive to the context of utterance.

First let's cover how the definite phrase arguments such as those occurring in 16c and 16d will be treated under the C-framework. According to the standard approach common nouns have predicative meanings of type $<s,<e,t>>$, and the determiner *the* expresses a function of type $<s,<<e,t>,e>>$ which involves the iota operator (i):

Let α of type $<e,t>$
$i(\alpha)$=the largest individual x (under $\ll$) such that $\alpha(x)=1$
$[\![\text{the}]\!]=\lambda s.\lambda P.i(P)$

This standard analysis can be adopted under the C-framework as it is because the C-framework assigns predicative meanings to count common nouns. Then the analysis of 16c and 16d under the C-framework will be as follows:

16 c The winner of the 2012 London Games' 100m final is from Jamaica.

$[_{NP}\text{The }[_{N'}\text{winner of the 2012 London Games' 100m final}]][_{VP}\text{is from Jamaica}]$
$\{\{\lambda s.\lambda P.i(P), \lambda s.[_{<e,t>}\text{ w. of the 2012 L. Games' 100m final}]^s\}, \lambda s.[_{<e,t>}\text{from Jamaica}]\}$
$\{\lambda s.i([_{<e,t>}\text{ winner of the 2012 London Games' 100m final}]^s\}, \lambda s.[_{<e,t>}\text{from Jamaica}]\}$
$\lambda s.[_{<e,t>}\text{from Jamaica}](i([_{<e,t>}\text{ winner of the 2012 London Games' 100m final}]^s)$

16 d The finalists of the 2012 London Games' 100m final are black people.

$[_{NP}\text{The }[_{N'}\text{finalists of the 2012 London Games' 100m final}]][_{VP}\text{are black people}]$
$\{\{\lambda s.\lambda P.i(P), \lambda s.[_{<e,t>}\text{ finalists of the 2012 L. Games' 100m final}]^s\}, \lambda s.[_{<e,t>}\text{black people}]\}$
$\{\lambda s.i([_{<e,t>}\text{ finalists of the 2012 London Games' 100m final}]^s\}, \lambda s.[_{<e,t>}\text{black people}]\}$
$\lambda s.[_{<e,t>}\text{black people}](i([_{<e,t>}\text{ finalists of the 2012 London Games' 100m final}]^s)$

In 16c [$_{NP}$ The [$_{N'}$ winner of the 2012 London Games' 100m final]] designates relative to each possible world w for which its meaning is defined the largest entity of type e_{sg} which is a winner of the 2012 London Games' 100m final. Since [$_{N'}$ winner of the 2012 London Games' 100m final] is singular it truly applies only to atoms, and there can be a largest entity to which it truly applies only if there is only one atom to which it truly applies.

In 16d [$_{NP}$ The [$_{N'}$ finalists of the 2012 London Games' 100m final]] designates relative to each possible world w for which its meaning is defined the largest entity of type e_{pl} which is the sum of the finalists of the 2012 London Games' 100m final at w.

Building on this analysis of the definite phrases, we can also formulate an account for the definite phrases the designatum of which is determined on the basis of contextual input. To this end we will suppose that an implicit predicate d_c (type <s,<e,t>>) which is only true of the entities which are salient relative to the context utterance is implicitly involved in such definite phrases. So that the definite phrase subject *the biker* in 16a can for example be paraphrased as *the biker who is salient at the moment*. Then under the C-framework we can give the following analyses of 16a:

16 a The biker irritated the passerby with his loud rev up.
[$_{NP}$The [$_{N}$biker]] [$_{VP}$irritated the passerby with his loud rev up]

$\{\{\lambda s.\lambda P.i(P), \{\lambda s.[_{<e,t>}\text{biker}]^s, \lambda s.d_c\}\}, \lambda s.[_{<e,t>}\text{irritated the passerby with his loud rev up}]^s\}$
$\{\{\lambda s.\lambda P.i(P), \lambda s.\lambda x.([_{<e,t>}\text{biker}]^s(x)\ \&\ d_c(x))\}, \lambda s.[_{<e,t>}\text{i. the p. with his loud rev up}]^s\}$
$\{\lambda s.i(\lambda x.([_{<e,t>}\text{biker}]^s\ \&\ d_c(x))), \lambda s.[_{<e,t>}\text{irritated the passerby with his loud rev up}]^s\}$
$\lambda s.[_{<e,t>}\text{irritated the passerby with his loud rev up}]^s(i(\lambda x.([_{<e,t>}\text{biker}]^s\ \&\ d_c(x))))$

Definite Phrases under the C-framework:
Taxonomic Definite Phrases

We have previously seen that definite phrases can also be used to designate a contextually salient kind which satisfies a taxonomically interpreted common noun.

21 a Alice invented a molecular transistor and sold the transistor to Intel for $ 100 millon.
b Alice invented new transistors and sold the transistors to Intel for $ 100 millon.
c A new whale species has been discovered in New Zealand and the team who made the discovery proposed to name the whale as *Tasmacetus shepherdi*.

In 21a the definite phrase *the transistor* does not designate a transistor token; nor does it designate the transistor kind. It designates a certain type of transistor which is contextually salient.

Under the C-framework the analysis of such taxonomic definite phrases will be the same as those that designate particulars, except that the common nouns involved in them will be taxonomically interpreted (type $\langle s,\langle e_k,t\rangle\rangle$).

31 Alice sold the transistor. *relative to a context c set by a sentence like 21a*
[Alice][[sold][[the][transistor]]]

$$\{\lambda s.[\text{Alice}]^{s}, \{\lambda s.\lambda y.\lambda z.[\text{sold}]^{s}, \{\lambda s.\lambda P.i(P), \{\lambda s.{}_{k}[_{\langle e,t\rangle}\text{transistor}]^{s}, \lambda s.d_{c}\}\}\}\}$$
$$\{\lambda s.[\text{Alice}]^{s}, \{\lambda s.\lambda y.\lambda z.[\text{sold}]^{s}, \{\lambda s.\lambda P.i(P), \lambda s.\lambda x.({}_{k}[_{\langle e,t\rangle}\text{transistor}]^{s}(x) \,\&\, d_{c}(x))\}\}\}$$
$$\{\lambda s.[\text{Alice}]^{s}, \{\lambda s.\lambda y.\lambda z.[\text{sold}]^{s}, \lambda s.i(\lambda x.({}_{k}[_{\langle e,t\rangle}\text{transistor}]^{s}(x) \,\&\, d_{c}(x)))\}\}$$
$$\{\lambda s.[\text{Alice}]^{s}, \{\lambda s.\lambda z.[\text{sold}]^{s}(i(\lambda x.({}_{k}[_{\langle e,t\rangle}\text{transistor}]^{s}(x) \,\&\, d_{c}(x))))\}$$
$$\lambda s.[\text{sold}]^{s}(i(\lambda x.({}_{k}[_{\langle e,t\rangle}\text{transistor}]^{s}(x) \,\&\, d_{c}(x))))([\text{Alice}]^{s})$$

Definite Phrases under the C-framework:
Definite Generics

Besides taxonomic definite phrases, we have previously noted that there apparently are definite phrases of another sort where the underlying common nouns are not used taxonomically and which rather simply designate kinds that correspond to the common nouns that forms them. Such definite phrases are commonly labelled as *definite generics*. The highlighted definite phrases in the sentences below are examples of definite generics:

17 a The Ti Pro Race SC 1.3 has been launched at 2001.
b The iPad2 is out of stock within days of its launch in the country.
c The Anatolian leopard is now extinct in the Aegean region.
d At the time, the bicycle industry was not impressed with the mountain bike, which many regarded as a short-term fad.
e Edgar Lilienfeld has invented the transistor but did not construct any prototypes.

The Neo-Carlsonians, Chierchia and Dayal, which the C-framework follow have different views about the analysis of definite generics. According to Chierchia (1998), definite generics designate kinds but the common nouns that form them are predicative and the denotation of the definite generic is derived from the predicative meaning of the common noun through a complicated chain of implicit operations.[110] According to Dayal (2004) definite generics are in fact taxonomic definite phrases involving taxonomically interpreted common nouns. The C-framework will adopt Dayal (2004)'s account, due to the overcomplexity of Chierchia (1998)'s account.

According to Dayal a common noun such as *camel* has a taxonomic variant with a kind level predicative meaning of type $<s,<e_k,t>>$. Dayal assumes that among the camel-kinds mapped to truth by the taxonomically interpreted *camel*, the genus *Camelus* too is included, besides the camel species *Camelus dromadeirus* and *Camelus bacterianus*. This assumption then enables her to

[110] For the problems in Chierchia (1998)'s account of definite generic phrases see Krifka (2004).

interpret the definite generic as a taxonomic definite phrase which designates the genus *Camelus*, when that genus is the unique contextually salient kind to which *camel* truly applies. Thus according to Dayal the analysis of the definite generic *the camel* will be as follows:

$[\![[[_D\text{the}][_{NP}\text{camel}]]]\!]$
$\{\lambda s.\lambda P.i(P), \{\lambda s.d_c, \lambda s._{sg\_k}[_{<e,t>}\text{camel}]^s\}\}$
$\{\lambda s.\lambda P.i(P), \lambda s.\lambda x.(d_c(x)\ \&\ _{sg\_k}[_{<e,t>}\text{camel}]^s(x))\}$
$\lambda s.i(\lambda x.(d_c(x)\ \&\ _{sg\_k}[_{<e,t>}\text{camel}]^s(x)))$
relative to a given index @ and a context c in which the unique salient kind to which camel truly applies is the genus Camelus:
Camelus$=i(\lambda x.(d_c(x)\ \&\ _{sg_k}[_{<e,t>}\text{camel}]^{@}(x)))=$the largest individual x (under $\ll$) such that $_{sg\_k}[_{<e,t>}\text{camel}]^{@}(x)=1$ and $d_c(x)=1$

According to this account definite generics are then just a special sorts of taxonomic definite phrases. Relative to a context of utterance where the salient kind level individuals include only mammal genera but not the mammal species *the camel* will designate the genus *Camelus*. Relative to another context of utterance where the salient kind level individuals are for example {*Panthera tigris, Camelus bacterianus*, *Elephas maximus*} *the camel* will designate *Camelus bacterianus* but not the genus *Camelus*. And relative to a context of utterance where both the *Camelus bacterianus* and the *Camelus dromadeirus* are salient, then *the camel* will not be able to pick a designatum.

So, according to Dayal (2004) the analysis of 17a will be thus:

17 a The Ti Pro Race SC 1.3 has been launched at 2001.
$[_{NP}[_D\text{The}]\ [_N\text{Ti Pro Race SC 1.3}]]\ [_{VP}\text{has been launched at 2001}]$

$\{\{\lambda s.\lambda P.i(P), \{\lambda s.d_c, \lambda s._k[_{<e,t>}\text{ Ti Pro Race SC 1.3}]^s\}\}, \lambda s._k[_{<e,t>}\text{ has been l. at 2001}]^s\}$
$\{\lambda s.\lambda P.i(P), \lambda s.\lambda x.(d_c(x)\ \&\ _k[_{<e,t>}\text{ Ti Pro Race SC 1.3}]^s(x))\}, \lambda s._k[_{<e,t>}\text{ has been l. at 2001}]^s\}$
$\{\lambda s.i(\lambda x.(d_c(x)\ \&\ _k[_{<e,t>}\text{ Ti Pro Race SC 1.3}]^s(x)), \lambda s._k[_{<e,t>}\text{ has been launched at 2001}]^s\}$
$\lambda s._k[_{<e,t>}\text{ has been launched at 2001}]^s(\ i(\lambda x.(d_c(x)\ \&\ _k[_{<e,t>}\text{ Ti Pro Race SC 1.3}]^s(x)))$

Certain aspects of this analysis are problematic. First, such semantically simple count nouns as *Ti Pro Race SC 1.3* can form definite generics. The peculiar thing about such common nouns as *Ti Pro Race SC 1.3* is that they correspond to kinds which are infima species –i.e. kinds which do not have any taxa. Other examples of such common nouns are *electron*, *tiger* etc. So, Dayal (2004) has to assume that besides non-taxonomic variants which have particular level applier meanings, these common nouns also have taxonomic variants which have kind level applier meanings. Yet, given that the kinds that correspond to such common nouns are infima species, the meanings of their taxonomic variants will truly apply to a single kind relative to every possible world. That is, for example the common noun *electron* will have to have a taxonomic variant, and that taxonomic variant can only be true of the electron relative to any possible world. Postulation of taxonomic common nouns that can truly apply to only one kind appears superfluous.

Another problem with Dayal's account is that it predicts that any taxonomic common noun, including modified ones can form definite generics. For example, it predicts that the definite phrase *the extinct whale* can be used as a definite generic to designate a single kind, the extinct-whale-kind, the instances of which are tokens of extinct whale species. Yet, this prediction does not materialize. Regardless the question whether such a kind exists, it is clear that in English *the extinct whale* can only be used to designate the unique whale sub-kind (in general or among the salient individuals) that is extinct.

Despite these problems we will adopt Dayal (2004)'s account for the analysis of definite generic phrases under the C-framework. The other alternative, Chierchia (1998)'s account, is far too complicated and it has its own problems.

Hereby I finish my presentation of the analyses of noun phrases formed by count common nouns from the standpoint of the C-framework. I will now pass to the presentation of an alternative framework, which differently from the C-framework, will seek to account for the semantic variety of the noun phrases formed by count nouns on the by assigning kind designating meaning to semantically simple non-taxonomic common nouns.

The K-framework

At the beginning of the chapter we have indicated that the semantic literature presents different means to account for the semantic variety manifested by noun phrases formed by count nouns. And in particular it presents different means to account for the kind-level denotation/particular-level denotation variation manifested by these phrases. Previously we presented the C-framework which is defended by Chierchia (1998) and Dayal (2004). C-framework assigns predicative meanings (type $<s,<e,t>>$) to all count common nouns; it takes count common nouns to be ambiguous between kind level taxonomic variants and particular level non-taxonomic variants; and it derives the variety in the meanings of the noun phrases formed by common nouns on this basis.

Now I will present the K-framework which will assign kind designator meanings (type $<s,e_k>$) to semantically simple common nouns such as *dodo*, *Ipad2*, *Coke bottle*; and given this fundamental difference its derivation of the variety in the meanings of the noun phrases formed by count common nouns will proceed differently than that of the C-framework.

The Treatment of Common Nouns under the K-framework

The K-Framework: Assigning Kind Designating Meanings to Simple Non-taxonomic Common Nouns

In response to the kind designation related phenomena discussed in the previous chapter, Krifka et al. (1995) claims that non-taxonomic common nouns should fulfill at least two functions: referring to kinds and applying to instances of these kinds. They suggest that either of these functions can be taken as native, and in cases where it is needed the other function can be derived from the primary function by means of a semantic operation. The C-framework described above takes application to instances as the primary function and derives kind reference from that function. The other option will be to directly assign kind designating meanings of type $<s,e_{sg\_k}>$ to non-taxonomic simple common nouns, and to derive predicative meanings from them through semantic operations.[111] The K-framework we set out describe now will follow the latter option.

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[111] Krifka et al. (1995), Krifka (1995), Zamparelli (2000) and Longobardi (2005) assign native kind designating meanings to simple common nouns. Krifka et al. (1995), Krifka (1995), Zamparelli (2000) account for the particular level denotations of the predicates or noun phrases formed by simple common nouns by postulating implicit operations such as the pred I describe just below.

According to the K-framework kinds will be *sui generis* individuals, members of the domain of individuals (D_e). The singular common noun *dodo* and the plural common noun *dodos* will have the same kind designating meaning. The benefit of this option is that kind designation by such noun phrases as bare plurals (e.g. *Dodos are extinct*) and definite generics *(*e.g. *the dodo is extinct*) will get a straightforward derivation (I will discuss certain details later, when I discuss the analysis of the noun phrases below).

The drawback of this approach is that simple non-taxonomic common nouns can also form quantiying noun phrases or predicates that denote particulars –e.g. *Two dodos have been spotted in the area*, *What you spotted is definetely not a dodo*. If we preserve the standard analysis of quantifiers as meanings of type $<s,<<e,t>,<<e,t>,t>>>$ then the meanings they semantically compose with has to be of type $<s,<e,t>>$. Moreover if we continue to regard the article *a* figuring in predicates as semantically vacuous then the common nouns occurring in predicates should somehow contribute meanings of type $<s,<e,t>>$. So, under the K-framework one will have to postulate a non-vacuous operation that yields predicative meanings that apply to particulars from native simple common noun meanings that designate kinds.

If the common nouns *whale* and *whales* are natively assigned a meaning of type $<s,e_{sg\_k}>$, then predicative meanings that rather apply respectively to the instances and sums of the insances of the kind which is the designatum of *whale(s)* under its native meaning can be derived by using an operation such as the following:

Let α be a common noun with a meaning of type $<s,e_{sg\_k}>$:

$Pred(\lambda s._k[_e\alpha]^s)=\lambda s.\lambda x.I(s)(x)(_{sg\_k}[_e\alpha]^s)$

$Pred(\lambda s._k[_e\alpha s]^s)$
$=PL(\lambda s.\lambda x.I(s)(x)(_{sg\_k}[_e\alpha s]^s))$
$=\lambda s.\lambda x.(\sim I(s)(x)(_{sg\_k}[_e\alpha s]^s)\ \&\ \forall y((y\ll x\ \&\ Atom(y))\supset I(s)(y)(_{sg\_k}[_e\alpha s]^s)))$ [112]

Under the K-framework I will assume that simple common nouns which are native kind designators always have the option to undergo Pred.

Taxonomic Uses of Simple Common Nouns According to K-framework

We have previosly seen that such phrases as *every whale*, *a whale*, *some road bikes*, *two Cadillacs* besides their 'ordinary' particular denoting uses can be used to denote to sub-kinds of the kind which supposedly corresponds to the common noun that forms them.

To account for such taxonomic NP's the C-framework posited an ambiguity at the level of common nouns. According to this for example the common noun *Cadillac* had a non-taxonomic applier meaning which applied to Cadillac tokens, and alongside it also had a taxonomic applier meaning which applied to Cadillac models.

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[112] Such an operation is proposed in Krifka et al. (1995) and Krifka (1995) for singular count nouns. For the non-intensional version see Krifka et al. (1995, 66); for the intensional version see Krifka (1995, 399); in relation with English common nouns Krifka (1995, 406) embeds this operation in the interpretation of number words –e.g. *three*. Krifka (1995) does not say anything about the interpretation of quantificational determiners such as *every*, *some* or the indefinite determiner *a*. It is possible for him and would be more coherent for him to embed the predicativizing operation in the interpretation of these determiners as well. But in the K-framework I am describing I will not follow this path. I rather keep standard interpretation of quantificational determiners and of the indefinite article *a* as of semantic type <s,<<e,t>,<<e,t>,t>> and take pred to be a self-standing implicit operator. This is not a gratuitous divergence. If one takes simple common nouns to be kind designators and one embeds the predicativizing operator in the interpretation of determiners, then it becomes impossible to account for the phenomenon of non-specific *de re* readings to be discussed in the next chapter.

Having assigned kind designator meanings to simple common nouns under the K-framework, to account for the taxonomic interpretation of such common nouns we can posit a similar ambiguity. We can take such common nouns as *Cadillac*, *whale* which admit both a taxonomic reading and a non-taxonomic reading to be ambiguous between two distinct kind designating meanings. For example under its non-taxonomic reading *Cadillac* will taken to designate a kind the instances of which are Cadillac tokens; whilst under its taxonomic reading the same common noun will be taken to designate a higher order kind the instances of which are rather Cadillac models. We will not follow this approach under the K-framework as it presents certain problems which we will consider later.

Instead of positing such an ambiguity at the level of simple common nouns, we have the possibility to postulate an operation that derives taxonomic applier meanings from the kind designating meanings the K-framework assigns to simple common nouns.[113] Such an operation can be formulated in the following way:

Let α be a partial function of type $<s,e_{sg\_k}>$,
Let $T(s)(x,y)=1$ iff x is sub-kind of y relative to s
$\text{K-pred}(\alpha)=\lambda s'.\lambda x.T(s')(x,\alpha(s'))$

$\text{K-pred}(\lambda s._{sg\_k}[_e \text{whale}]^s)=\lambda s.\lambda x_{sg\_k}.T(s)(x_{sg\_p,\, sg\_k}[_e\text{whale}]^s)$

[113] For example in Krifka (1995) who assigns kind designating meanings to simple common nouns such an operation is embedded in the interpretation of number words.

An operation such as K-pred can be used to account for the use of a common noun to form noun phrases that denote the sub-kinds of the kind that corresponds to that common noun:

Some endangered species are whales.
Some whales are endangered species.
This whale is on the brink of extinction.

It will be triggered in sentential contexts where neither the interpretation of the common noun under its native kind designating interpretation nor the application of the particular level predicativizing operator pred previously described yields an interpretation.

Under the K-framework we will adopt the account of taxonomically interpreted common nouns according to which the taxonomic interpretation is derived from the kind designating meanings of common nouns, and no higher order kind will be involved. For the sake of simplicity however in the formal derivations of the meanings under the K-freamework I will not indicate the involvement of the K-pred operation and take the taxonomically interpreted common nouns as if they were natively so. So, effectively these will look the same as the corresponding derivations under the C-framework.

Before we go on I want to talk about a further implicit operation, detax. We had already introduced it under the C-framework and it applied to the meanings of taxonomically interpreted common nouns to derive predicative meanings that apply to the instances of these kinds. First, let me remind you why this operation was needed. Consider the following sentences:

22 a Alice found the carcass of an extinct bison.
b The bird on that lower bough is an endangered game bird.
c Alice shot an endangered game bird.

d Alice drove a Cadillac model designed by Damon.

Such modified common nouns as *endangered bird* and *extinct bison* are formed by the modifying adjectives *endangered* and *extinct* that are kind level. These kind level modifiers force a taxonomic interpretation of the common nouns with which they combine. Consequently the resulting modified common nouns in question here have to be taxonomic appliers. It is implausible that these be kind designators for the same reason that it is implausible for the taxonomic variants of simple common nouns *whale* and *Iphone* to be kind designators (an issue which will be discussed later). Now, the sentential contexts in 22 where the noun phrases formed by these taxonomic common nouns figure are particular-level. For example 22c and 22a paraphrasable respectively as *Alice shot a token of an endangered bird* and *Alice found the remains of an extinct bison*. To account for these readings despite the indicated semantic discrepancy it will be useful to postulate an implicit operation that maps taxonomic applier meanings into non-taxonomic applier meanings in the following manner:

Let α be a meaning of type $<s,<e_k,t>>$,
$detax(\alpha)=\lambda s.\lambda x.\exists y(\alpha(s)(y) \& I(s)(x,y))$

I have already illustrated how in the semantic interpretation of 22c under the C-framework detax is involved. As both under the C-framework and the K-framework taxonomically interpreted common nouns come out as kind-level appliers, the treatment of 22c will be the same under the K-framework as well.

Modified Common Nouns under the K-framework

New common nouns can be obtained by modifying simple common nouns with adjectives, relative clauses or prepositional phrases:

wounded whale, whale wounded by Japanese harpooners, extinct whale, new whale, whale from the arctic

The meaning of a modified common noun should be a function of the denotations of the simple common noun and the modifiers that form it. In this section I will describe how the meanings of modified common nouns will be determined under the K-framework. Clearly this account will have to be different for non-taxonomic modified common nouns than the one given under the C-framework. For, according to the C-framework simple non-taxonomic common nouns were particular level appliers, whilst according to the K-framework they are kind designators. However as regards the modification of taxonomic simple common nouns similar accounts will apply, since under both the K-framework and C-framework taxonomic common nouns are appliers for kinds.

The K-framework we have been describing assigned kind designating meanings to simple common nouns. Such simple common nouns can be modified by adjectives, relative clauses or prepositional phrases to form modified common nouns. We may consider to assign kind designating meanings to these modified common nouns as well. But this approach is theoretically disadvantageous for a number of reasons. The derivation of kind designating meanings for modified common nouns out of the meanings of the modifiers and the kind designating simple common nouns that form them will be unnecessarily complicated; and the impossibility to form definite generic noun phrases with modified common nouns suggest that one should rather not take the modified common nouns to be kind designators. I will return to these points later.

Instead of such an approach under the K-framework we will take the result of modification to be applier meanings of type <s,<e,t>>. For example, *wounded whale* will have a meaning type $<s,<e_{sg\_p},t>>$. One of its constituents, the simple common noun *whale*, will have a kind designating meaning of type $<s,e_k>$. Its other constituent the adjective *wounded* will be assigned a meaning of type $<s,<e_{sg\_p},t>>$. As such the denotations for *wounded* and *whale* cannot semantically compose under any of the semantic composition clauses have assumed so far. We however already have introduced the operation pred which maps meanings of type $<s,e_k>$ into applier meanings of type $<s,<e_{sg\_p},t>>$. Applying pred to the native meaning of *whale* will thus result in a applier meaning of type $<s,<e_{sg\_p},t>>$ the denotations of which will truly apply to token whales. This predicative meaning can then semantically compose with the meaning of *wounded* in accordance with the fourth clause of semantic composition we had introduced above to account for noun-modification under the C-framework.

$[\![[_{N'} [_{Adj}\, \text{wounded}]\ [_N\, \text{whale}]]]\!]$
$\{\lambda s._p[_{<e,t>}\text{wounded}]^s, \lambda s._k[_e\text{whale}]^s\}$ *type discrepancy, pred is triggered*
$\{\lambda s._p[_{<e,t>}\text{wounded}]^s, \text{pred}(\lambda s._k[_e\text{whale}]^s)\}$
$\{\lambda s._p[_{<e,t>}\text{wounded}]^s, \lambda s.\lambda y.I(s)(y)(_k[_e\text{whale}]^s)\}$
$\lambda s.\lambda x.(_p[_{<e,t>}\text{wounded}]^s(x)\ \&\ \lambda y.I(s)(x)(_k[_e\text{whale}]^s))$ *semantic composition clause IV*

The modification by relative clauses and prepositional phrases will proceed analogously under the K-framework. Pred will be triggered to yield a meaning that can semantically compose with the predicative meanings assigned to relative clauses and prepositional phrases.

We assumed that under the K-framework such common nouns as *whale, transistor* can also be interpreted taxonomically via the operation K-pred which yields kind level predicative meanings of type $<s,<e_k,t>>$. The modification of such taxonomically interpreted common nouns by such modifiers as *extinct*, *which is invented by Bell Laboratories* will then proceed in the same way as under the C-framework and will not require the triggering of any other special operation.

The Semantic Analyses of the Noun Phrases Formed by Count Common Nouns According to the K-framework

Now, I turn to the description of how noun phrases formed by common nouns will be analysed under the K-framework drawing on the assumptions regarding the meanings of the common nouns and the semantic machinery introduced above. I begin with indefinite singular noun phrases.

The Semantic Analyses of Indefinite Singular Noun Phrases under the K-framework: Non-Taxonomic Indefinite Singulars

2 a The priciest gift Alice received on her birthday is a road bike.

Non-taxonomic indefinite singular phrases in predicate positions, as in 2a, are standardly assigned predicative denotations of type $<e_{sg\_p},t>$. Under the K-framework simple non-taxonomic common nouns are assigned designator meanings of type $<s,e_{sg\_k}>$. Then when such a common noun occurs in the predicate position it should be predicativised by undergoing pred. The indefinite article *a* occurring in predicates will be taken to be semantically vacuous:

$[[_{NP}\text{The priciest gift Alice received on her birthday}][_{VP}\text{is }[_{NP}[_{D}\text{a}]\ [_{N}\text{road bike}]]]]$
2a interpreted according to K-framework:
$\{\lambda s'.[_{e}\text{The priciest g. A. r. in her b.}]^{s'}, \{\lambda s'.\lambda P_{<e,t>}.P_{<e,t>}, \lambda s'.{}_{k}[_{e}\text{r. b.}]^{s'}\}\}$ *type discrepancy*
$\{\lambda s'.[_{e}\text{The p. g. A. r. in her b.}]^{s'}, \{\lambda s'.\lambda P_{<e,t>}.P_{<e,t>}, Pred(\lambda s'.{}_{k}[_{e}\text{r. b.}]^{s'})\}\}$ *pred is triggered*
$\{\lambda s'.[_{e}\text{The p. g. A. r. in her b.}]^{s'}, \{\lambda s'.\lambda P_{<e,t>}.P_{<e,t>}, \lambda s'.\lambda x.I(s)(x)\ ({}_{k}[_{e}\text{road bike}]^{s'})\}\}$
$\{\lambda s'.[_{e}\text{The priciest gift Alice received on her birthday}]^{s'}, \lambda s'.\lambda x.I(s)(x)({}_{k}[_{e}\text{road bike}]^{s'})\}$
$\lambda s'.\ I(s)\ ([_{e}\text{The priciest gift Alice received on her birthday}]^{s'})\ ({}_{k}[_{e}\text{road bike}]^{s'})$

Non-taxonomic indefinite singulars can also occur in argument positions:

2 b A road bike stood locked next to Alice's bike.

We have already seen that under the Montague/Lewis treatment of indefinite singulars in argument positions the indefinite singular determiner *a* is given the following analysis:

$$\lambda s'.[_{<<e\_sg,t>,<<e\_sg,t>,t>>}a]^{s'}=\lambda s'.\lambda Q_{<e\_sg,t>}.\lambda P_{<e\_sg,t>}.\exists x(Q(x)\&P(x))$$

The determiner *a* occurring in indefinite singular arguments requires an applier meaning to combine with. The result, the meaning of the indefinite singular argument, will be an existential GQ meaning (type $<s,<<e,t>,t>>$. This GQ analysis of indefinite singular arguments can also be implemented in the K-framework which takes simple non-taxonomic common nouns to be native kind designators (meaning type: $<s,e_{k}>$). The semantic type discrepancy between the indefinite determiner *a* analyzed as a quantifier (semantic type: $<s,<<e,t>,<<e,t>,t>>>$) and the kind designating common noun will require the application of the operation pred. Thus under the K-framework 2b will be assigned the following interpretation:

2 b A road bike stood locked next to Alice's bike.
$[_S[_{NP}[_D \text{a}]\ [_N \text{road bike}]][_{VP} \text{stood next to Alice's bike}]]$

2b interpreted according to K-framework:
$\{\{\lambda s'.[_{<<e,t>,<<e,t>,t>>} \text{a}]^{s'}, \lambda s'._k[_e \text{r. b.}]^{s'}\}, \lambda s'.[_{<e,t>} \text{s. n. to A.'s b.}]^{s'}\}$ *type disc. pred is triggered*
$\{\{\lambda s'.\lambda Q.\lambda P.\exists x(Q(x) \,\&\, P(x)), \text{Pred}(\lambda s'._k[_e \text{road bike}]^{s'})\}, \lambda s'.[_{<e,t>} \text{s. next to Alice's bike}]^{s'}\}$
$\{\{\lambda s'.\lambda Q.\lambda P.\exists x(Q(x) \,\&\, P(x)), \lambda s'.\lambda y.I(s')(y)(_k[_e \text{road bike}]^{s'})\}, \lambda s'.[_{<e,t>} \text{s. n. to A.'s bike}]^{s'}\}$
$\{\lambda s'.\lambda P.\exists x(\lambda y.I(s')(y)(_k[_e \text{road bike}]^{s'})(x) \,\&\, P(x)), \lambda s'.[_{<e,t>} \text{stood next to Alice's bike}]^{s'}\}$
$\{\lambda s'.\lambda P.\exists x(I(s')(x,_k[_e \text{road bike}]^{s'}) \,\&\, P(x)), \lambda s'.[_{<e,t>} \text{stood next to Alice's bike}]^{s'}\}$
$\lambda s'.\exists x(I(s')(x,\, _k[_e \text{road bike}]^{s'}) \,\&\, [_{<e,t>} \text{stood next to Alice's bike}]^{s'}(x))$

According to the K-framework only semantically simple non-taxonomic common nouns are kind designators; modified non-taxonomic common nouns are interpreted as particular level appliers (meanings of type: $<s,<e_{sg\_p},t>>$). Thus under the K-framework the interpretation of indefinite singular arguments formed by such common nouns will not involve the operation pred and will proceed in the same way as in the C-framework.

The Semantic Analyses of Indefinite Singular Noun Phrases under the K-framework: Taxonomic Indefinite Singulars

We had seen that certain indefinite singular phrases that occurred in argument or in predicate positions were interpreted taxonomically, as pertaining to kinds rather than tokens:

4 a The Ti Pro Race SC 1.3 is a road bike by the Czech maker Morati.
b A road bike by the Czech maker Morati has been launched today.
c This week in her blog Alice has reviewed a road bike by the Czech maker Morati.

Under the K-framework the taxonomical interpretation of common nouns yields kind level applier meanings (sorted type $<s,<e_k,t>>$). The meanings of taxonomic indefinite predicates or arguments formed by taxonomically interpreted common nouns can thus be accounted for as the result of the semantic composition of the indefinite determiner *a*, treated as semantically vacuous in predicates and as $\lambda s'.\lambda Q_{<e\_sg\,,t>}.\lambda P_{<e\_sg\,,t>}.\exists x(Q(x)\&P(x))$ in indefinite arguments, with these kind level applier meanings. 4a where the indefinite singular *a road bike by the Czech maker Morati* figures in the predicate position will then be interpreted under the K-framework in the following way:

4 a The Ti Pro Race SC 1.3 is a road bike by the Czech maker Morati.
$[[_{NP}\text{ The Ti Pro Race SC 1.3}][_{VP}\text{ is }[_{NP}[_{D}\text{ a}]\ [_{N'}\text{ r. b. by the Czech maker Morati}]]]]$

$$\{\lambda s'.{}_k[_e\text{ The Ti Pro Race SC 1.3}]^{s'}, \{\lambda s'.\lambda P.P, \lambda s'.{}_k[_{<e,t>}\text{ r. b. by the Czech maker Morati}]\}\}$$
$$\{\lambda s'.{}_k[_e\text{ The Ti Pro Race SC 1.3}]^{s'}, \lambda s'.{}_k[_{<e,t>}\text{ road bike by the Czech maker Morati}]\}$$
$$\lambda s'.{}_k[_{<e,t>}\text{ road bike by the Czech maker Morati}]({}_k[_e\text{The Ti Pro Race SC 1.3}]^{s'})$$

And 4b where the indefinite singular *a road bike by the Czech maker Morati* figures in the argument position will be interpreted in the following way:

4 b A road bike by the Czech maker Morati has been launched today.
$[_S[_{NP}[_D\text{ a}]\ [_N\text{ road bike by the Czech maker Morati}]][_{VP}\text{ has been launched today}]]$

$$\{\{\lambda s'.[_{<<e,t>,<<e,t>,t>>}\text{a}]^{s'}, \lambda s'.{}_k[_{<e,t>}\text{ r. b. by the C. maker M.}]^{s'}\}, \lambda s'.[_{<e,t>}\text{ has been l. today}]^{s'}\}$$
$$\{\{\lambda s'.\lambda Q.\lambda P.\exists x(Q(x)\&P(x)), \lambda s'.{}_k[_{<e,t>}\text{ r. b. by the C. maker M.}]^{s'}\}, \lambda s'.[_{<e,t>}\text{ has been l. t.}]^{s'}\}$$
$$\{\lambda s'.\lambda P.\exists x({}_k[_{<e,t>}\text{ r. b. by the C. maker M.}]^{s'}(x)\ \&\ P(x)), \lambda s'.[_{<e,t>}\text{ has been l. today}]^{s'}\}$$
$$\lambda s'.\exists x({}_k[_{<e,t>}\text{ r. b. by the Czech maker Morati}]^{s'}(x)\ \&\ [_{<e,t>}\text{ has been launched today}]^{s'}(x))$$

Previously I had drawn attention to the possibility of having taxonomic indefinites in particular level contexts. The examples I had produced were the following:

22 a Alice found the carcass of an extinct bison.
b The bird on that lower bough is an endangered game bird.

c Alice shot an endangered game bird.
d Alice drove a Cadillac model designed by Damon.

To accommodate the occurences of such taxonomic phrases in particular level sentential contexts I had proposed that the following operator can optionally apply to the meanings of the taxonomic common nouns:

Let α be a meaning of type $<s,<e_k,t>>$,
$Detax(\alpha)=\lambda s.\lambda x.\exists y(I(s)(x,y)\ \&\ \alpha(s)(y))$

As both under the C-framework and the K-framework taxonomic phrases are taken to be formed by taxonomically interpreted common nouns, and the latter are taken to be kind level appliers, the same treatment of taxonomic indefinites occurring in particular level contexts can be adopted under the K-framework as well.

22 c Alice shot an endangered game bird
[[an] [endangered game bird]][1 [Alice][[shot][t_1]]]

$\{\{\lambda s.\lambda Q.\lambda P.\exists x(Q(x)\&P(x)),detax(\lambda s._k[_{<e,t>}e.\ game\ bird]^s)\}, \lambda s.\lambda y.[shot]^s(y)([Alice]^s)\}$
$\{\{\lambda s.\lambda Q.\lambda P.\exists x(Q(x)\&P(x)),\lambda s.\lambda x.\exists y(I(s)(x,y)\ \&\ _k[_{<e,t>}e.\ g.\ b.]^s(y))\}, \lambda s.\lambda y.[shot]^s(y)([A.]^s)\}$
$\{\lambda s.\lambda P.\exists x(\exists y(I(s)(x,y)\ \&\ _k[_{<e,t>}e.g.b.]^s(y))\&P(x)), \lambda s.\lambda y.[shot]^s(y)([Alice]^s)\}$
$\lambda s.\exists x(\exists y(I(s)(x,y)\ \&\ _k[_{<e,t>}endangered\ game\ bird]^s(y))\&\ [shot]^s(x)([Alice]^s))$

<u>The Semantic Analyses of Bare Plural Phrases under the K-framework: Bare Plural Phrases in Predicate Positions</u>

Bare plural predicates are standardly assigned predicative meanings of type $<s,<e_{pl},t>>$, that truly applies exclusively to sums of kinds or sums of particulars depending on whether they are taxonomically interpreted or not. On this matter the K-framework, like the C-framework, will follow the consensus.

However these frameworks differ about the type of meaning they assign to simple common nouns. For this reason the derivation of these meanings for bare plural predicates formed by simple plural common nouns will be different under the K-framework.

The K-framework took both plural and singular simple common nouns to have kind designating meanings of type $<s,e_k>$. Therefore, as in the case of indefinite singular predicates formed by simple singular common nouns, in the interpretation of bare plural predicates formed by simple plural common nouns, the meanings of the common nouns will have to undergo the operation pred. Thus, under the K-framework 6a will get the following interpretation:

6 a The bikes at Alice's room are road bikes.
$[[_{NP}\text{ the bikes at Alice's room}]\ [_{VP}\text{ are }[_{NP}\ [_{N}\text{ road bikes}]]]]$

6a interpreted according to K-framework:

$\{\lambda s'.{}_{pl\_p}[_e\text{ the b. at A.'s room}]^{s'}, \lambda s'.{}_{k}[_e\text{ road bikes}]^{s'}\}$ *type discrepancy pred is triggered*

$\{\lambda s'.{}_{pl\_p}[_e\text{ the bikes at Alice's room}]^{s'}, \text{pred}(\lambda s'.{}_{k}[_e\text{ road bikes}]^{s'})\}$

$\{\lambda s'.{}_{pl\_p}[_e\text{ the bikes at Alice's room}]^{s'}, \text{PL}(\lambda s'.\lambda x.I(s')(x,{}_{k}[_e\text{ road bikes}]^{s'}))\}$

$\{\lambda s'.{}_{pl\_p}[_e\text{theb.at...}]^{s'},\lambda s'.\lambda x.({\sim}I(s')(x,{}_{k}[_e\text{rbs}]^{s'})\&\forall y((y\ll x\&\text{Atom}(y))\supset I(s')(y,{}_{k}[_e\text{rbs}]^{s'}))))\}$

$\{\lambda s'.{}_{pl\_p}[_e\text{theb.at...}]^{s'},\lambda s'.\lambda x.({\sim}I(s')(x,{}_{k}[_e\text{ rbs}]^{s'})\&\forall y((y\ll x\&\text{Atom}(y))\supset I(s')(y,{}_{k}[_e\text{rbs}]^{s'}))))\}$

$\lambda s'.({\sim}I(s')({}_{pl\_p}[_e\text{theb.a...}]^{s'},{}_{k}[_e\text{rbs}]^{s'})\&\forall y((y\ll{}_{pl\_p}[_e\text{theb.a...}]^{s'}\&\text{At.}(y))\supset I(s')(y,{}_{k}[_e\text{ rbs}]^{s'})))$[114]

With regard to the derivation of the meanings of the bare plural predicates formed by taxonomic common nouns or modified common nouns the C and the K frameworks' approaches will be the same. Like the C-framework, the K-

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[114] The analysis of 6a under the C-framework looks much less complex than the analysis of the same sentence under the K-framework. However the truth-conditions expressed by the resulting formula are the same. There is a difference in complexity because when I gave the analysis under the C-framework I spared the analysis of the meaning of the plural common noun *road bikes* in terms of the meaning of the singular *road bike*. Had I not done so under the C-framework as well we would end up with a rather long end formula which would have the same structure as the end formula of the K-framework analysis.

framework too assigns applier meanings to such common nouns. So, the meanings bare plural predicates formed by such common nouns can be straigforwardly identified with the meanings of the common nouns that form them, and the operation pred need not to be invoked. Below in 6b $[_{N}$ road bikes$]$ is taxonomically interpreted and for this reason has an applier meaning of the sorted type $<s,<e_{k},t>>$, rather than a kind designating meaning as in 6a.

6 b The models reviewed this week in Alice's blog are road bikes.
$[[_{NP}$ The models reviewed this week in Alice's blog$]$ $[_{VP}$ are $[_{NP}$ $[_{N}$ road bikes$]]]]$

$$\{\lambda s'._{pl\_k}[_{e}\text{The models reviewed this week in Alice's blog}]^{s'},\lambda s'._{pl\_k}[_{<e,t>}\text{road bikes}]^{s'}\}$$
$$\lambda s'._{pl\_k}[_{<e,t>}\text{road bikes}]^{s'}(_{pl\_k}[_{e}\text{The models reviewed this week in Alice's blog}]^{s'})$$

<u>The Semantic Analyses of Bare Plural Phrases under the K-framework: Non-taxonomic Bare Plural Arguments</u>

The C-framework adopted the Neo-Carsonian theory of bare plural arguments defended by Chierchia (1998) and Dayal (2004). According to that theory bare plural arguments (with certain special exceptions) were treated as kind designators, even when they occurred in particular level episodic sentential contexts. Due to reasons to be clarified later the K-framework will not follow this theory.

I will assume that under the K-framework bare plural NP's will have the same meanings as the common nouns that form them. This is a natural assumption in so far as in the formation of bare plural NP's no explicit determiners are involved. Now, according to K-framework, non-taxonomic simple common nouns have kind designating meanings, whilst modified non-taxonomic common nouns have particular level predicative meanings of type

<s,<e$_p$,t>>. Then, given the stated assumption under the K-framework the bare plural phrases formed by the former sort of common nouns will be kind designators wheras bare plural phrases formed by the latter sort of common nouns will be particular level appliers.

Now let's see how such an account of non-taxonomic bare plural arguments can be implemented in the K-framework by referring to the following sentences:

32 a Mountain bikes have evolved from road bikes.
(in the sense of The mountain bike has evolved from the road bike*)*
b Mountain bikes stand locked to next to Alice's bike.
c Red mountain bikes stand locked next to Alice's bike.

Let's begin with 32a which will be the simplest case:

32 a Mountain bikes have evolved from road bikes.
$[_{NP}\,[_{N}$ Mountain bikes$]][_{VP}$ have evolved from road bikes$]$

Here the NP $[_{NP}\,[_{N}$ Mountain bikes$]]$ designates a kind, namely the mountain bike. Under the K-framework bare plural NP *mountain bikes*'s having a kind designating meaning can easily be accounted for. The K-framework takes non-taxonomic simple common nouns, be they plural or singular, to have kind designating meanings of type <s,e$_k$>. Moreover we stipulated that according to the K-framework bare plural NP arguments formed by simple non-taxonomic common nouns have the same meanings as these common nouns. Then 32a can be given the following straightforward analysis under the K-framework.

the interpretation of 32a according to the K-framework
$\{\lambda s._k[_e$Mountain bikes$]^s$, $\lambda s._k[_{<e,t>}$ have evolved from road bikes$]^s\}$
$\lambda s._k[_{<e,t>}$ have evolved from road bikes$]^s(_k[_e$Mountain bikes$]^s)$

Second consider 32b:

32 b Mountain bikes stand locked next to Alice's bike.
[$_{NP}$[$_N$ Mountain bikes]][$_{VP}$ stand locked next to Alice's bike]

The assumption that bare plural arguments have the same meanings as the common nouns that form them creates a complication in the case of 32b. The bare plural argument [$_{NP}$[$_N$ Mountain bikes]] will have a kind designating meaning (type $<s,e_k>$) as it is formed by the simple non-taxonomic common noun [$_N$mountain bikes] which according to the K-framework should have a kind designating meaning. In 32b this argument has to semantically compose with the VP [$_{VP}$ stand locked next to Alice's bike] which requires either a particular level designator argument of type $<s,e_p>$ or particular level GQ argument of type $<s,<<e_p,t>,t>>$. To resolve this discrepancy we can import the operation DKP already introduced under the C-framework to account for the interpretation of sentences in which a kind designating argument occurs in a particular level episodic sentential context:

Let α be a meaning of type $<s,<e_p,a>>$, where a can be any of the types t, $<e,t>$, $<e,<e,t>>$, $<e,<e,<e,t>>>$ …
$DKP(\alpha)=\lambda s'.\lambda z_k.\exists y(I(s')(y)(z_k)\ \&\ \alpha(s')(y))$, if a=t
$DKP(\alpha)=\lambda s'.\lambda z_k.\lambda x.\exists y(I(s')(y)(z_k)\ \&\ \alpha(s')(y)(x))$, if a=$<e,t>$
$DKP(\alpha)=\lambda s'.\lambda z_k.\lambda x'.\lambda x''\exists y(I(s')(y)(z_k)\ \&\ \alpha(s')(y)(x')(x''))$, if a=$<e,<e,t>>$
…

Then we can derive the interpretation of 32b in a way very similar to C-framework (the only difference is that under the K-framework the underlying plural common nouns is the ground of kind designation whereas under the C-framework that common noun was a particular level applier and the kind designation for the bare plural NP was derived through the operation ∩):

32 b [$_{NP}$[$_N$ Mountain bikes]][$_{VP}$ stand locked next to Alice's bike]

the interpretation of 32b according to the K-framework:
$\{\lambda s.{}_k[{}_e\text{mountain bikes}]^s, \lambda s.{}_p[{}_{<e,t>}\text{ s. l. next to Alice's bike}]^s\}$ *sortal misfit DKP is triggered*
$\{\lambda s.{}_k[{}_e\text{mountain bikes}]^s, \text{DKP}(\lambda s.{}_p[{}_{<e,t>}\text{ stand locked next to Alice's bike}]^s)\}$
$\{\lambda s.{}_k[{}_e\text{mountain bikes}]^s, \lambda s.\lambda z_k.\exists x(I(s)(x)(z_k)\ \&\ {}_p[{}_{<e,t>}\text{ s. l. next to Alice's bike}]^s(x))\}$
$\lambda s.\lambda z_k.\exists x(I(s)(x)(z_k)\ \&\ {}_p[{}_{<e,t>}\text{ s. l. next to Alice's bike}]^s(x))({}_k[{}_e\text{mountain bikes}]^s)$
$\lambda s.\exists x(I(s)(x)({}_k[{}_e\text{mountain bikes}]^s)\ \&\ {}_p[{}_{<e,t>}\text{ stand locked next to Alice's bike}]^s(x))$

Third consider 32c:

32 c Red mountain bikes stand locked next to Alice's bike.
$[{}_{NP}[{}_N\text{Red mountain bikes}]][{}_{VP}\text{stand locked next to Alice's bike}]$

Again the assumption that under the K-framework bare plural NP's will have the same meanings as the common nouns that form them creates a complication for the interpretation of 32c, similar to but different than the one related with 32b. According to K-framework the bare plural argument $[{}_{NP}[{}_N\text{Red mountain bikes}]]$ will have a particular level predicative meaning (type $<s,<e_p,t>>$) as it is formed by the modified common noun $[{}_N\text{Red mountain bikes}]$, which according to K-framework's previously set assumptions about modified common nouns is not a kind designator. However $[{}_{NP}[{}_N\text{Red mountain bikes}]]$ has to semantically compose with the VP $[{}_{VP}\text{stand locked next to Alice's bike}]$ which requires either particular level designator arguments of type $<s,e_p>$ or particular level GQ arguments of type $<s,<<e_p,t>,t>>$. Now this discrepancy cannot be resolved via DKP as was the case in 32b. DKP is useful only in resolving *sortal* discrepancies where a *kind* designating NP (sorted type $<s,e_k>$) has to semantically compose with with a *particular* level V or VP (sorted type $<s,<e_p,a>>$, where *a* can be any of the types t, $<e,t>$, $<e,<e,t>>$, $<e,<e,<e,t>>>$ etc. Here in the case of 32c, instead of a sortal misfit we have a type discrepancy where a particular level applier NP (sorted type $<s,<e_p,t>>$) has to semantically compose with a particular level VP, another applier of the sorted type $<s,<e_p,t>>$. To resolve such discrepancies under the K-framework I will introduce the operator DPP (derived property predication) which I will assume to be triggered when a V or VP has to semantically compose with a particular level applier in a particular level episodic sentential context, as is the case in 32c:

Let α be a meaning of type $<s,<e_p,a>>$, where a can be any of the types t, $<e,t>$, $<e,<e,t>>$, $<e,<e,<e,t>>>$ …
$DPP(\alpha)=\lambda s'.\lambda P_{<e,t>}.\exists y(P(y)\ \&\ \alpha(s')(y))$, if a=t
$DPP(\alpha)=\lambda s'.\lambda P_{<e,t>}.\lambda x.\exists y(P(y)\ \&\ \alpha(s')(y)(x))$, if a=$<e,t>$
$DPP(\alpha)=\lambda s'.\lambda P_{<e,t>}.\lambda x'.\lambda x''\exists y(P(y)\ \&\ \alpha(s')(y)(x')(x''))$, if a=$<e,<e,t>>$

Availing ourselves the operation DPP under the K-framework 32c's interpretation will be as follows:

32 c $[_{NP}[_{N}$ red mountain bikes$]][_{VP}$ stand locked next to Alice's bike$]$

$\{\lambda s._p[_{<e,t>}$ red mountain bikes$]^s$, $\lambda s._p[_{<e,t>}$ s. l. n. to A.'s bike$]^s\}$ *type misfit DPP is triggered*
$\{\lambda s._p[_{<e,t>}$ red mountain bikes$]^s$, DPP($\lambda s._p[_{<e,t>}$ stand locked next to Alice's bike$]^s$)$\}$
$\{\lambda s._p[_{<e,t>}$ red mountain bikes$]^s$, $\lambda s.\lambda P.\exists x(P(x)\ \&\ _p[_{<e,t>}$ s. l. next to Alice's bike$]^s(x))\}$
$\lambda s.\lambda P.\exists x(P(x)\ \&\ _p[_{<e,t>}$ s. l. next to Alice's bike$]^s(x))(_p[_{<e,t>}$ red mountain bikes$]^s)$
$\lambda s.\exists x(_p[_{<e,t>}$ red mountain bikes$]^s(x)\ \&\ _p[_{<e,t>}$ stand locked next to Alice's bike$]^s(x))$

The operation DPP is not purely our invention. Van Geenhoven (1998) who suggests to interpret bare plural arguments of English as appliers, take verbs to have 'incorporating' versions which correspond to the DPP applied versions of the standard interpretations of verbs.[115] And Chierchia (1998) refers to

[115] Differently from DPP Van Geenhoven's operation is a lexical operation. That is, theoretically it does not belong to the phrasal semantics, but to lexical semantics. A type discrepancy resolution strategy which is equivalent in its outcome is proposed by Krifka (2004) where bare plural arguments are generally taken to be appliers.

Geenhoven's mentioned proposal as involving an operation on predicate meanings which is "essentially very similar" to his DKP.[116]

<u>Explaining Bare Plural Phrases' Scope Peculiarity without Having to Take Bare Plural Arguments to Be Kind Designators</u>

Above in the first part of the present chapter we have seen that in particular level episodic sentences involving bare plural arguments (e.g. *Cadilac Eldorados*) bare plural arguments manifested a scope behaviour which was rather like the behavior of kind phrases (e.g. *this model of Cadillac*) than the behavior of indefinite singular phrases.

8 a Alice did not steal Cadillac Eldorados.
9 a Alice did not steal a Cadillac Eldorado.
10 a Alice did not steal this model of Cadillac.

Under the C-framework we adopted Chierchia (1998)'s theory of bare plural arguments which accounted for this peculiarity by assuming that bare plural NP's which manifested the scope peculiarity in question were kind designators. According to Chierchia (1998) in logical forms in which kind designating bare plural arguments took wide scope the trace they left behind too will be kind level. Thus the accommodation of that kind level trace in a particular level episodic sentential context through DKP will take place in the narrow scope. I reproduce here the relevant derivation:

[116] But Chierchia criticizes an operation like DPP by claiming that it cannot account for the behavior of bare plural arguments like *parts of the machine* and *people sitting here* which do not seem to manifest the scope peculiarity (see also note 107 above). It take us too far afield to address these criticism of Chierchia in the main text. I will restrain my self with the following remarks to justify the adoption of DPP under the K-framework.

8aA $[_{NP}$ Cadillac Eldorados$]_1$ [1 [[not][$_S$ [Alice] [[stole] [t_1]]]]]

Interpretation of 8aA according to the C-framework:

$\{^{\cap}(\lambda s._{p}[_{<e,t>}\text{C. Eldorados}]^{s'}), \{1, \{\{\lambda s.\sim, \{\lambda s.[\text{A.}]^{s}, \{\lambda s.[\text{stole}]^{s}, \lambda s._{k}[t_1]^{s,g}\}\}\}\}\}\}$ *sortal misfit*

$\{^{\cap}(\lambda s._{p}[_{<e,t>}\text{C. E.s}]^{s'}), \{1, \{\{\lambda s.\sim, \{\lambda s.[\text{A.}]^{s}, \{DKP(\lambda s.[\text{stole}]^{s}), \lambda s._{k}[t_1]^{s,g}\}\}\}\}\}\}$ *DKP triggered*

$\{^{\cap}(\lambda s._{p}[_{<e,t>}\text{C.E.s}]^{s'}), \{1, \{\{\lambda s.\sim, \{\lambda s._{p}[_{e}\text{A.}]^{s}, \lambda s.\lambda x.\exists y(I(s)(y)(_{k}[t_1]^{s,g})\ \&\ [\text{stole}]^{s}(y)(x))\}\}\}\}\}$

$\{^{\cap}(\lambda s._{p}[_{<e,t>}\text{Cadillac Eldorados}]^{s'}), \{1, \lambda s.\sim\exists y(I(s)(y)(_{k}[t_1]^{s,g})\ \&\ [\text{stole}]^{s}(y)([\text{Alice}]^{s}))\}\}$

$\{^{\cap}(\lambda s._{p}[_{<e,t>}\text{Cadillac Eldorados}]^{s'}), \lambda s.\lambda x.\sim\exists y(I(s)(y)(_{k}[t_x]^{s,g})\ \&\ [\text{stole}]^{s}(y)([\text{Alice}]^{s}))\}$

$\{\lambda s.\text{the-Cadillac-Eldorado-Model}, \lambda s.\lambda x.\sim\exists y(I(s)(y)(_{k}[t_x]^{s,g})\ \&\ [\text{stole}]^{s}(y)([\text{Alice}]^{s}))\}$

$\lambda s.\sim\exists y(I(s)(y)(\text{the-Cadillac-Eldorado-Model})\ \&\ [\text{stole}]^{s}(y)([\text{Alice}]^{s}))$

Chierchia (1998) and following him the C-framework implemented this theory in a framework according to which all common nouns had applier meanings, from which kind designating meanings for bare plural arguments were derived through the operation $^{\cap}$.

The K-framework however adopted different views both as regards the contributions of common nouns and as regards the contribution of bare plural arguments. It took simple common nouns to be kind designators and modified common nouns to be appliers. And it took bare plural arguments to have the same meanings as the plural common nouns that form them. Given these differences, can the K-framework account for the scope peculiarity manifested by bare plural arguments?

As far as bare plural arguments formed by simple common nouns are concerned the K-framework can explain their narrow scope behavior in the same way as the C-framework does. Given the assumptions in effect under the K-framework these bare plural arguments will be kind designators. And to account for the interpretability of such kind designating bare plural arguments occuring in particular level episodic contexts the K-framework too has adopted Chierchia's DKP operation. If we assume along Chierchia (1998) that the traces of kind level NP's which take wide scope will also be kind level, then the apparent forced narrow scope interpretation of such NP's can be accounted as due to the fact that DKP has to be applied in the narrow scope to accommodate the kind level trace occurring in a particular level sentential context. The only difference from the C-framework's account will be that bare plural arguments will directly derive their kind designating meanings from the simple common nouns which are kind designators according to the K-framework, and thus no such operation as $^{\cap}$ will be involved.

8aA $[_{NP}\text{Cadillac Eldorados}]_1\ [1\ [[\text{not}][_{S}\ [\text{Alice}]\ [[\text{stole}]\ [t_1]]]]]$

8aA interpreted according to the K-framework:
$\{\lambda s._{k}[_{e}\text{Cadillac Eldorados}]^{s}, \{1, \{\ \{\lambda s.\sim, \{\lambda s.[\text{Alice}]^{s}, \{\lambda s.[\text{stole}]^{s}, \lambda s._{k}[t_1]^{s,g}\}\}\}\}\}\}$ *sortal misfit*
$\{\lambda s._{k}[_{e}\text{C. Eldorados}]^{s}, \{1, \{\ \{\lambda s.\sim, \{\lambda s.[\text{A.}]^{s}, \{\text{DKP}(\lambda s.[\text{stole}]^{s}), \lambda s._{k}[t_1]^{s,g}\}\}\}\}\}\}$ *DKP triggered*
$\{\lambda s._{k}[_{e}\text{C.Eldorados}]^{s}, \{1, \{\ \{\lambda s.\sim, \{\lambda s._{p}[_{e}\text{A.}]^{s}, \lambda s.\lambda x.\exists y(I(s)(y)(_{k}[t_1]^{s,g})\ \&\ [\text{stole}]^{s}(y)(x))\}\}\}\}\}\}$
$\{\lambda s._{k}[_{e}\text{Cadillac Eldorados}]^{s}, \{1, \lambda s.\sim\exists y(I(s)(y)(_{k}[t_1]^{s,g})\ \&\ [\text{stole}]^{s}(y)([\text{Alice}]^{s}))\}\}$
$\{\lambda s._{k}[_{e}\text{Cadillac Eldorados}]^{s}, \lambda s.\lambda x.\sim\exists y(I(s)(y)(_{k}[t_x]^{s,g})\ \&\ [\text{stole}]^{s}(y)([\text{Alice}]^{s}))\}$
$\lambda s.\sim\exists y(I(s)(y)(_{k}[_{e}\text{Cadillac Eldorados}]^{s})\ \&\ [\text{stole}]^{s}(y)([\text{Alice}]^{s}))$

This way of accounting for the scope peculiarity of bare plural arguments cannot however be extended to the case of bare plural arguments formed by modified common nouns. We have previously noted that these too manifest the scope peculiarity in question:

27 a Alice did not steal pink Eldorados.

According to the K-framework such bare plural arguments as *pink Eldorados* will be appliers rather than kind designators. They are formed by modified common nouns which are not kind designators but appliers according to the K-framework, and they should have the same meanings as the common nouns that form them. So, we cannot invoke DKP in their case. But we can then invoke DPP.

It seems that the crucial assumption which accounts for the scope peculiarity manifested by bare plural phrases is not their being kind designators (*pace* Chierchia and Carlson). To obtain an explanation it suffices to assume that bare plural arguments are not generalized quantifiers or particular level designators and that when they move to the wide scope they leave traces of the same sorted type as themselves. If these assumptions are granted, then under the K-framework we can claim that the bare plural arguments which are not kind designators but appliers and which move to the wide scope will leave traces which are particular level appliers. To accommodate such traces when they figure in positions which require either designators or quantifiers, DPP will be triggered; as in the case of DKP, the application of DPP will take place in the narrow scope and thus the apparent narrow scope interpretation of bare plural arguments which are in fact in the wide scope will be accounted for even if these bare plural arguments are not taken to be kind designators:

27aA $[_{NP}\text{Pink Eldorados}]_1\,[1\,[[\text{not}][_S[\text{Alice}]\,[[\text{stole}]\,[t_1]]]]]$

27aA interpreted according to the K-framework:

$\{\lambda s._p[_{<e,t>}\text{P. Eldorados}]^s, \{1, \{\lambda s.\sim, \{\lambda s.[\text{Alice}]^s, \{\lambda s.[\text{stole}]^s, \lambda s._p[_{<e,t>} t_1]^{s,g}\}\}\}\}\}$ *type misfit*

$\{\lambda s._p[_{<e,t>}\text{P. Eldorados}]^s, \{1, \{\lambda s.\sim, \{\lambda s.[\text{A.}]^s, \{\text{DPP}(\lambda s.[\text{s.}]^s), \lambda s._p[_{<e,t>} t_1]^{s,g}\}\}\}\}\}$ *DPP triggered*

$\{\lambda s._p[_{<e,t>}\text{P.Eldorados}]^s, \{1, \{\lambda s.\sim, \{\lambda s.[\text{A.}]^s, \{\lambda s.\lambda P.\lambda x.\exists y(P(y)\&[\text{s.}]^s(y)(x)), \lambda s._p[_{<e,t>} t_1]^{s,g}\}\}\}\}\}$

$\{\lambda s._p[_{<e,t>}\text{P. Eldorados}]^s, \{1, \{\lambda s.\sim, \{\lambda s._p[_e\text{A.}]^s, \lambda s.\lambda x.\exists y(_p[_{<e,t>} t_1]^{s,g}(y)\ \&\ [\text{stole}]^s(y)(x))\}\}\}\}$

$\{\lambda s._p[_{<e,t>}\text{Pink Eldorados}]^s, \{1, \lambda s.\sim\exists y(_p[_{<e,t>} t_1]^{s,g}(y)\ \&\ [\text{stole}]^s(y)([\text{Alice}]^s))\}\}$

$\{\lambda s._p[_{<e,t>}\text{Pink Eldorados}]^s, \lambda s.\lambda Q.\sim\exists y(_p[_{<e,t>} t_Q]^{s,g}(y)\ \&\ [\text{stole}]^s(y)([\text{Alice}]^s))\}$

$\{\lambda s._p[_{<e,t>}\text{Pink Eldorados}]^s, \lambda s.\lambda Q.\sim\exists y(Q(y)\&\ [\text{stole}]^s(y)([\text{Alice}]^s))\}$

$\lambda s.\sim\exists y(_p[_{<e,t>}\text{Pink Eldorados}]^s(y)\&\ [\text{stole}]^s(y)([\text{Alice}]^s))$

So, it emerges that the nub of Chierchia's derivation of forced narrow scope readings for bare plural arguments are the assumptions that bare plural NP's moving to the wide scope leave a trace of the same sorted type as themselves and that these NP's are not quantifiers or particular level designators.[117] Ascribing kind designation to bare plural arguments is not essential to derive these narrow scope readings. As we have just seen even if we assume bare plural arguments are appliers we can derive the narrow scope readings on the basis of these assumptions using an operation like DPP, which is similar to Chierchia's DKP.[118]

The Semantic Analyses of Bare Plural Phrases under the K-framework: Taxonomic Bare Plural Arguments

We know that bare plural arguments can also be used taxonomically.

33 Alice reviewed Czech road bikes from the last century.

In 33 the bare plural argument *Czech road bikes from the last century* may be used in such a way that it pertains to models of Czech road bikes rather than the tokens. That is, 33 can be used in such a way that it says that Alice has reviewed some Czech road bike models from the last century.

K-framework will treat taxonomic bare plural arguments in the same manner as it dealt with the non-taxonomic ones. Under the K-framework we will assume that taxonomic bare plural arguments too have the same meanings as the common nouns that form them. These common nouns will be taxonomic

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[117] Krifka (2004) too illustrates that postulating kind designation is not essential to account for the scope peculiarity manifested by bare plural arguments.

[118] Then however there is a need to explain why such bare plural phrases like *parts of this machine* do not manifest the scope peculiarity in question. For, the DPP account adopted under the K-framework under its present form predicts that these bare plural phrases will appear to have forced narrow scope interpretations like the other bare plural arguments.

common nouns; and according to the K-framework taxonomic common nouns have kind level applier meanings. Thus under the K-framework taxonomic bare plural arguments will be kind level appliers.

As argument positions require either designator or quantifier meaning types, the interpretation of taxonomic bare plural arguments under the K-framework will require the involvement of the operation DPP. The interpretation of 33 will then proceed as follows:

33 Alice reviewed Czech road bikes from the last century.
$[_S$ [Alice] [[reviewed] [Czech road bikes from the last century]]]

33 interpreted according to the K-framework:
$\{\lambda s.[\text{Alice}]^s, \{\lambda s.[\text{r.}]^s, \lambda s._k[_{<e,t>} \text{Czech road bikes from the last century}]^s\}\}$ *type misfit*
$\{\lambda s.[\text{Alice}]^s, \{\text{DPP}(\lambda s.[\text{reviewed}]^s), \lambda s._k[_{<e,t>} \text{Czech road bikes from} \ldots]^s\}\}$ *DPP triggered*
$\{\lambda s.[\text{Alice}]^s, \{\lambda s.\lambda P.\lambda x.\exists y(P(y)\ \&\ [\text{r.}]^s(y)(x)), \lambda s._k[_{<e,t>} \text{Czech road bikes from} \ldots]^s\}\}$
$\{\lambda s._p[_e \text{Alice}]^s, \lambda s.\lambda x.\exists y(_k[_{<e,t>} \text{Czech road bikes from} \ldots]^s(y)\ \&\ [\text{reviewed}]^s(y)(x))\}$
$\lambda s.\exists y(_k[_{<e,t>} \text{Czech road bikes from} \ldots]^s(y)\&\ [\text{reviewed}]^s(y)([\text{Alice}]^s))$

Remember that these bare plural arguments too, like their non-taxonomic kins and differently from taxonomic indefinite singulars, manifest the peculiarity of not producing a wide scope reading.

34 a Alice did not review Czech road bikes from the last century.
b Alice did not review a Czech road bike from the last century.

The C-framework, was forced to account for this scope related peculiarity manifested by taxonomic bare plural arguments by ascribing them kind designation as well –albeit taking as designata higher order kinds, the instances of which were first order kinds. It was forced because it followed Chierchia (1998) in assigning kind designation to non-taxonomic bare plural arguments that manifested the scope peculiarity in question, and parity in reasoning required that the same account be given when the same peculiarity is seen to be manifested by taxonomic bare plural arguments as well. Now the K-framework can handily account for this phenomenon without any commitment to higher order kinds; this will proceed in the same way as in the previous section we accounted for the scope related peculiarity of such bare plural arguments as *pink Eldorados* (see sentence 27 above) which the K-framework took to be non-taxonomic and non-kind-designating. Being a kind level applier the bare plural object argument *Czech road bikes from the last century* will leave a kind level applier trace when it moves to the wide scope. The trace which is an applier occurring in an argument position will have to be accommodated in the narrow scope via DPP. Thus the existential quantification introduced by DPP will remain in the narrow scope relative to the negation.

34 a Alice did not review Czech road bikes from the last century.
34aA $[_{NK}$ Czech road bikes from the last century$]_1$ [1 [[not][$_S$ [Alice] [[reviewed] [t_1]]]]]

34aA interpreted according to the K-framework:

$\{\lambda s._{k}[_{<e,t>}\text{C.r.b.f...}]^{s},\{1,\{\{\lambda s.\sim,\{\lambda s.[\text{A.}]^{s},\{\lambda s.[\text{rev.}]^{s},\lambda s._{k}[_{<e,t>}t_1]^{s,g}\}\}\}\}\}\}$ *type misfit*

$\{\lambda s._{k}[_{<e,t>}\text{C.r.b.f...}]^{s},\{1,\{\{\lambda s.\sim,\{\lambda s.[\text{A.}]^{s},\{\text{DPP}(\lambda s.[\text{r.}]^{s}),\lambda s._{k}[_{<e,t>}t_1]^{s,g}\}\}\}\}\}\}$ *DPP triggered*

$\{\lambda s._{k}[_{<e,t>}\text{C.r.b.f...}]^{s},\{1,\{\{\lambda s.\sim,\{\lambda s.[\text{A.}]^{s},\{\lambda s.\lambda P.\lambda x.\exists y(P(y)\&[\text{r.}]^{s}(y)(x)),\lambda s._{k}[_{<e,t>}t_1]^{s,g}\}\}\}\}\}\}$

$\{\lambda s._{k}[_{<e,t>}\text{C.r.b.f...}]^{s},\{1,\{\{\lambda s.\sim,\{\lambda s._{k}[_{e}\text{A.}]^{s},\lambda s.\lambda x.\exists y(_{k}[_{<e,t>}t_1]^{s,g}(y)\&[\text{reviewed}]^{s}(y)(x))\}\}\}\}\}$

$\{\lambda s._{k}[_{<e,t>}\text{C.r.b.f...}]^{s},\{1,\lambda s.\sim\exists y(_{k}[_{<e,t>}t_1]^{s,g}(y)\&[\text{reviewed}]^{s}(y)([\text{Alice}]^{s}))\}\}$

$\{\lambda s._{k}[_{<e,t>}\text{C.r.b.f...}]^{s},\lambda s.\lambda Q.\sim\exists y(_{k}[_{<e,t>}t_Q]^{s,g}(y)\&[\text{reviewed}]^{s}(y)([\text{Alice}]^{s}))\}$

$\lambda s.\sim\exists y(_{k}[_{<e,t>}\text{Czech road bikes from ...}]^{s}(y)\&[\text{reviewed}]^{s}(y)([\text{Alice}]^{s}))$

The Analysis of Definite Phrases under the K-framework

1 j Surely, the whale should have been disoriented to come into these waters and tore our nets off.
k Alice claims that the cladistic analysis shows that the whale should rather be put under an altogether new genus.
l The whale is a highly intelligent mammal.
m The whales escaped by jumping off the pool over the gate into the sea.

Previously we have seen that definite phrases could be used both to designate kinds and particulars. Singular definites are usually used to designate a contextually salient particular (1j), or if they are taxonomic they are used to designate a contextually salient sub-kind of the kind corresponding to the common noun that forms them (1k). Plural definites are taken to designate a contextually salient sum of particulars (1m), or if they are taxonomic they are taken to designate a contextually salient sum consisting of the sub-kinds of the common noun that forms them. Apart from these uses where a definite singular phrase is used to designate a contextually salient entity that satisfies a certain description, we have seen that in kind level sentential contexts a definite singular can be used, apparently like a name, to designate the very kind corresponding to the common noun that forms it (1l). The definite singulars used in the latter way were termed as *definite generics*. I will now present how this variety in the semantics of definite phrases formed by count common nouns will be accounted under the K framework.

Definite Phrases that Designate Particulars under the K-framework

We had previously noted that definite phrases such as those figuring in the following sentences were usually taken to be particular level designators (type $<s,e_p>$):

16 a The biker irritated the passerby with his loud rev up.
b All of us saw the bear coming out of the woods, picking the basket and swiftly disappearing into the woods again.
c The winner of the 2012 London Games' 100m final is from Jamaica.
d The finalists of the 2012 London Games' 100m final are black people.
e The self-absorbed cyclists knocked Alice down.

Given an evaluation index s, some such definite phrases simply pick the entity which uniquely satisfies at s the descriptive conditions expressed by common nouns that form them. This is the case for the definite phrase arguments in 16c and 16d. Yet the same cannot be said of the definite phrase arguments of the remaining sentences in 16; for example *the biker* in 16a can be successfully used to designate a person relative to an evaluation index s, although in that evaluation index there may be more than one biker. The interpretation of the latter type of definite phrases is sensitive to the context of utterance.

The K-framework's analysis of the definite phrase arguments occurring in 16 will virtually be the same as the C-framework's. The definite article will have the same definition, which is reproduced below:

Let α of type $<e,t>$
$i(\alpha)$=the largest individual x (under $\ll$) such that $\alpha(x)=1$
$[\![the]\!]=\lambda s.\lambda P.i(P)$

And under the K-framework too the context dependency of certain definite phrases will be accounted by the presence of an implicit restrictor d_c which maps to truth only entities that are salient relative to the context.

The only difference between the analyses of the C-framework and the K-framework will arise in the case of definite phrases formed by simple common nouns. The K-framework took simple common nouns to be kind designators. As such, the definite article *the* under the analysis assumed here cannot compose with simple common noun meanings. To compose with *the* under the above analysis the meanings of these common nouns will have to undergo the Pred operation. Thus under the K-framework 16a will get the following analysis:

16 a The biker irritated the passerby with his loud rev up.
$[_{NP}\text{The } [_{N}\text{biker}]]\ [_{VP}\text{irritated the passerby with his loud rev up}]$

the interpretation of 16a under the K-framework
$\{\{\lambda s.\lambda P.i(P), \{\lambda s._{k}[_{e}\text{biker}]^{s}, \lambda s.d_{c}\}\}, \lambda s.[_{<e,t>}\text{irr. the passerby with his loud rev up}]^{s}\}$ *misfit*
$\{\{\lambda s.\lambda P.i(P), \{Pred(\lambda s._{k}[_{e}\text{biker}]^{s}), \lambda s.d_{c}\}\}, \lambda s.[_{<e,t>}\text{irritated …}]^{s}\}$ *pred triggered*
$\{\{\lambda s.\lambda P.i(P), \{\lambda s.\lambda x.I(s)(x,_{k}[_{e}\text{biker}]^{s}), \lambda s.d_{c}\}\}, \lambda s.[_{<e,t>}\text{irritated …}]^{s}\}$
$\{\{\lambda s.\lambda P.i(P), \lambda s.\lambda x.(I(s)(x,_{k}[_{e}\text{biker}]^{s}) \& d_{c}(x))\}, \lambda s.[_{<e,t>}\text{irritated …}]^{s}\}$
$\{\lambda s.i(\lambda x.(I(s)(x,_{k}[_{e}\text{biker}]^{s}) \& d_{c}(x))), \lambda s.[_{<e,t>}\text{irritated …}]^{s}\}$
$\lambda s.[_{<e,t>}\text{irritated the passerby with his loud rev up}]^{s}(i(\lambda x.(I(s)(x,_{k}[_{e}\text{biker}]^{s}) \& d_{c}(x))))$

Taxonomic Definite Phrases According to the K-framework

Taxonomic definite phrases designate a contextually salient sub-kind of the kind corresponding to the common nouns that form them.

21 a Alice invented a molecular transistor and sold the transistor to Intel for $ 100 millon.

In 21a the definite phrase *the transistor* does not designate a transistor token; nor does it designate the transistor kind. It designates a certain type of transistor which is contextually salient.

As was the case under the C-framework, under the K-framework too the analysis of such taxonomic definite phrases will be the same as those that designate particulars, except that the common nouns involved in them will be taxonomically interpreted (type $<s,<e_{K},t>>$).

31 Alice sold the transistor. *relative to a context c set by a sentence like 21a*
[Alice][[sold][[the][transistor]]]

$\{\lambda s.[\text{Alice}]^{s}, \{\lambda s.\lambda y.\lambda z.[\text{sold}]^{s}, \{\lambda s.\lambda P.i(P), \{\lambda s._{k}[_{<e,t>}\text{transistor}]^{s}, \lambda s.d_{c}\}\}\}\}$
$\{\lambda s.[\text{Alice}]^{s}, \{\lambda s.\lambda y.\lambda z.[\text{sold}]^{s}, \{\lambda s.\lambda P.i(P), \lambda s.\lambda x.(_{k}[_{<e,t>}\text{transistor}]^{s}(x) \ \& \ d_{c}(x))\}\}\}$
$\{\lambda s.[\text{Alice}]^{s}, \{\lambda s.\lambda y.\lambda z.[\text{sold}]^{s}, \lambda s.i(\lambda x.(_{k}[_{<e,t>}\text{transistor}]^{s}(x) \ \& \ d_{c}(x)))\}\}$
$\{\lambda s.[\text{Alice}]^{s}, \{\lambda s.\lambda z.[\text{sold}]^{s}(i(\lambda x.(_{k}[_{<e,t>}\text{transistor}]^{s}(x) \ \& \ d_{c}(x))))\}$
$\lambda s.[\text{sold}]^{s}(i(\lambda x.(_{k}[_{<e,t>}\text{transistor}]^{s}(x) \ \& \ d_{c}(x))))([\text{Alice}]^{s})$

Definite Generics According to the K-framework

Besides taxonomic definite phrases, we have previously noted that there apparently are definite phrases of another sort where the underlying common nouns are not used taxonomically and which rather simply designate the kinds that correspond to the common nouns that form them. Such definite phrases are commonly labelled as *definite generics*. The highlighted definite phrases in the sentences below are examples of definite generics:

17 a The Ti Pro Race SC 1.3 has been launched at 2001.
b The iPad2 is out of stock within days of its launch in the country.
c The Anatolian leopard is now extinct in the Aegean region.
d At the time, the bicycle industry was not impressed with the mountain bike, which many regarded as a short-term fad.
e Edgar Lilienfeld has invented the transistor but did not construct any prototypes.

The K-framework will adopt the account of Krifka et al. (1995). According to that account definite generics operate as the names of the kinds corresponding to simple count common nouns. Simple non-taxonomic common nouns designate kinds. And apparently only such common nouns can form definite generic phrases. The role of the definite article *the* figuring in these definite generic phrases however will be different than the one figuring in other types of definite phrases covered above. It is taken to be expletive article which is also present in certain names in English that designate particulars: *The Sudan*, *the Sun, The Earth* etc. Although the singular non-taxonomic count common nouns by themselves natively designate kinds, in English they cannot be used determinerless in argument positions. For this reason, they take the expletive *the* when they do so and the expletive does not have any semantic effect. So for example the analysis of 17a under the K-framework will proceed thus:

17 a The Ti Pro Race SC 1.3 has been launched at 2001.

17a interpreted according to the K-framework:
$[_{NP}$ The $[_{N}$Ti Pro Race SC 1.3]] $[_{VP}$has been launched at 2001]
$\{\lambda s._{k}[_{e}$ Ti Pro Race SC 1.3$]^{s}$, $\lambda s._{k}[_{<e,t>}$ has been launched at 2001]}
$\lambda s._{k}[_{<e,t>}$ has been launched at 2001]($_{k}[_{e}$ Ti Pro Race SC 1.3$]^{s}$)

We have previously noted not all count common nouns can form definite generics. For example, *coke bottle* can be used to form the definited generic *the coke bottle*. But apparently one cannot use *the green bottle* as kind designating definite generic, at least so long as *green bottle* is regarded as a modified, semantically complex common noun. Under the K-framework this difference among count common nouns receives a neat explanation. The common noun *coke bottle* is semantically simple though syntactically it consists of two words. We can ascertain that *coke* does not operate as a modifier in the noun *coke bottle* by noting that *bottle which contains coke* is not a possible paraphrase of *coke bottle*. As a semantically simple common noun, *coke bottle* should have a kind designating meaning according to the K-framework. For this reason it can be used to form a definite generic. In contrast the common noun *green bottle* is semantically complex. Here *green* operates as a modifier; *green bottle* can be paraphrased by *bottle which is green*. So, according to the K-framework *green bottle* does not have a kind designating meaning, and for this reason it cannot be used to form a definite generic phrase.

Besides semantically complex common nouns taxonomically interpreted common nouns, even if they are semantically simple, cannot form definite generic phrases. For example, the phrases *the halogen*, *the metal, the species* cannot be used as definite generics to designate respectively the halogen-kind, the metal-kind, the species-kind. These phrases can apparently only be used as taxonomic definite phrases which designate a contextually salient halogen, metal or species. Under the K-framework this again gets a straightforward explanation. *Metal*, *halogen*, *species* are natively taxonomic common nouns; they do not have non-taxonomic variants. And according to the K-framework taxonomic common nouns are kind level appliers (type <s,<e,t>>). Since they are not designators taxonomic common nouns cannot form definite generic phrases.

Here I finish my presentation of the K-framework. In the next section I will deal with a loose end pertaining to the interpretation of taxonomic noun phrases in particular level contexts, and which will be relevant in interpreting the examples to be considered in the next chapter's discussion on common nouns' rigidity. Then in the subsequent section I will give a comparative assesssment of the frameworks presented in the present chapter.

Kind Denoting Phrases in Particular Level Contexts: Detax vs. DKP

Above we have seen examples of sentences in which a kind denoting noun phrase occurred in a particular level context. Mainly there were two sorts of cases. First we had kind designating phrases such as bare plural arguments or kind phrases (*e.g. This species*, *this model* etc.) occurring in particular level episodic contexts:

8 a Alice did not steal Cadillac Eldorados from Bob's gallery.
10 a Alice did not steal this model of Cadillac from Bob's gallery.

Second we have seen cases where taxonomic indefinites (or for that matter any taxonomic phrase interpreted as a generalized quantifier) occur in particular level episodic contexts:

22 a Alice found the carcass of an extinct bison.
   b The bird on that lower bough is an endangered game bird.
   c Alice shot an endangered game bird.
   d Alice drove a Cadillac model designed by Damon.
   e Alice found the carcassess of two extinct bisons.
   f Alice shot no/many/few/two endangered game birds.

For the resolution of the first of type cases we adopted the implicit semantic operator DKP under the C and the K-frameworks to accommodate such occurences by way of modifying the meanings of the verbs/verb phrases which took the kind designating arguments. For the resolution of the cases of the second type we have formulated the operator detax which rather targeted the meanings of the common nouns that formed the taxonomic quantified arguments. One may think that perhaps in both type of cases a similar approach should have been adopted: either one that targets the meanings of the verbs/verb phrases or one which targets the meanings of the arguments. In this section I will first review the relevant examples. Then I will show that both DKP and detax are needed to obtain all the pretheoretically ascertainable readings of certain sentences involving scope taking elements like negation.

Accomodating Kind Designating Phrases in Particular Level Contexts

The most striking examples of kind denoting phrases occurring in particular level contexts are those in which a kind designating argument occurs in a particular level sentential context. We have seen two sorts of such cases: bare plural arguments and kind phrases occurring in particular level episodic contexts. The C-framework and the K-framework dealt with both of these cases in the same way.

10 a Alice did not steal this model of Cadillac from Bob's gallery.

The C-framework and the K-framework has the operation DKP, introduced by Chierchia (1998), to deal with *this model of Cadillac*'s occurrence in the particular level context of 10a:

Let α be a meaning of type $<s,<e_p,a>>$, where a can be any of the types t, $<e,t>$, $<e,<e,t>>$, $<e,<e,<e,t>>>$ …
$DKP(\alpha)=\lambda s'.\lambda z_k.\exists y(I(s')(y)(z_k) \& \alpha(s')(y))$, if $a=t$
$DKP(\alpha)=\lambda s'.\lambda z_k.\lambda x.\exists y(I(s')(y)(z_k) \& \alpha(s')(y)(x))$, if $a=<e,t>$
$DKP(\alpha)=\lambda s'.\lambda z_k.\lambda x'.\lambda x''\exists y(I(s')(y)(z_k) \& \alpha(s')(y)(x')(x''))$, if $a=<e,<e,t>>$
…

Let us remember how DKP operated. 10a can assume different logical forms in which the phrase *this model of Cadillac* takes wide scope or narrow scope relative to *not*.

10 a Alice did not steal this model of Cadillac from Bob's gallery.
10aA $[_{NP}$ this model of Cadillac$]_1$ [1 [[not][$_S$ [Alice] [[stole] [t_1]]]]]
10aB [not][$_S$ [Alice] [[stole] [$_{NP}$ this model of Cadillac]]]

Yet, these logical forms should lead to the same reading for we pretheoretically know that 10a is not ambiguous. In the logical form 10aB there is a sortal discrepancy between the kind designator $[_{NP}$ this model of Cadillac$]_1$ and the particular level verb *stole*. In the resolution of this discrepancy DKP is triggered and maps the meaning of *stole* into a suitable meaning that can combine with kind level arguments:

10aB [[not][[$_{NP}$ this model of Cadillac]$_{1}$ [1 [$_{S}$ Alice stole t_{1} from Bob's gallery]]]

the interpretation of 10aB according to the C-framework and the K-framework:

$\{\lambda s.\sim, \{\lambda s._{p}[_{e}\text{Alice}]^{s}, \{\lambda s.[_{\langle e,\langle e,t\rangle\rangle}\text{stole}]^{s}, \lambda s._{k}[_{e}\text{this model of Cadillac}]^{s}\}\}\}$ *misfit*

$\{\lambda s.\sim, \{\lambda s._{p}[_{e}\text{Alice}]^{s}, \{\text{DKP}(\lambda s.[_{\langle e,\langle e,t\rangle\rangle}\text{stole}]^{k}), \lambda s._{k}[_{e}\text{this model of C.}]^{s}\}\}\}$ *DKP triggered*

$\{\lambda s.\sim, \{\lambda s._{p}[_{e}\text{Alice}]^{s}, \{\lambda s.\lambda z_{k}.\lambda x.\exists y(I(s)(y)(z_{k}) \,\&\, [\text{stole}]^{s}(y)(x)), \lambda s._{k}[_{e}\text{this m. of C.}]^{s}\}\}\}$

$\{\lambda s.\sim, \{\lambda s._{p}[_{e}\text{Alice}]^{s}, \lambda s.\lambda x.\exists y(I(s)(y)([\text{this model of C.}]^{s}) \,\&\, [\text{stole}]^{s}(y)(x))\}\}$

$\{\lambda s.\sim, \lambda s.\exists y(I(s)(y)([\text{this model of C.}]^{s}) \,\&\, [\text{stole}]^{s}(y)([\text{Alice}]^{s}))\}$

$\lambda s.\sim\exists y(I(s)(y)([\text{this model of C.}]^{s}) \,\&\, [\text{stole}]^{s}(y)([\text{Alice}]^{s}))$

In the logical form 10aA a similar semantic discrepancy obtains between the trace t_{1} of the kind designator [$_{NP}$ this model of Cadillac] and the particular level applier verb *stole*. Remember that following Chierchia we have crucially assumed that when non-quantificational NP's move to the wide scope they leave behind a trace of the same sorted type as themselves. The said semantic discrepancy between suitable assignments to t_{1} and the verb *stole* triggers DKP; and the resolution which introduces an existential quantification occurs within the scope of *not*; thereby it becomes possible to explain the non-ambiguity of 10a:

10aA [$_{NP}$ This model of Cadillac]$_{1}$ [1 [[not][$_{S}$ [Alice] [[stole] [t_{1}]]]]]

the interpretation of 10aA according to the C-framework and the K-framework:

$\{\lambda s._{k}[_{e}\text{This m. of Cadillac}]^{s}, \{1, \{\{\lambda s.\sim, \{\lambda s.[\text{Alice}]^{s}, \{\lambda s.[\text{stole}]^{s}, \lambda s._{k}[t_{1}]^{s,g}\}\}\}\}\}\}$ *sortal misfit*

$\{\lambda s._{k}[_{e}\text{This m. of C.}]^{s}, \{1, \{\{\lambda s.\sim, \{\lambda s.[\text{A.}]^{s}, \{\text{DKP}(\lambda s.[\text{stole}]^{s}), \lambda s._{k}[t_{1}]^{s,g}\}\}\}\}\}\}$ *DKP triggered*

$\{\lambda s._{k}[_{e}\text{This m. of C.}]^{s}, \{1, \{\{\lambda s.\sim, \{\lambda s._{p}[_{e}\text{A.}]^{s}, \lambda s.\lambda x.\exists y(I(s)(y)(_{k}[t_{1}]^{s,g}) \,\&\, [\text{stole}]^{s}(y)(x))\}\}\}\}\}$

$\{\lambda s._{k}[_{e}\text{This model of Cadillac}]^{s}, \{1, \lambda s.\sim\exists y(I(s)(y)(_{k}[t_{1}]^{s,g}) \,\&\, [\text{stole}]^{s}(y)([\text{Alice}]^{s}))\}\}$

$\{\lambda s._{k}[_{e}\text{This model of Cadillac}]^{s}, \lambda s.\lambda x.\sim\exists y(I(s)(y)(_{k}[t_{x}]^{s,g}) \,\&\, [\text{stole}]^{s}(y)([\text{Alice}]^{s}))\}$

$\lambda s.\sim\exists y(I(s)(y)(_{k}[_{e}\text{This model of Cadillac}]^{s}) \,\&\, [\text{stole}]^{s}(y)([\text{Alice}]^{s}))$

Accomodating Taxonomic Indefinite Phrases Occuring in Particular Level Contexts

To resolve sortal conflicts that obtain in such sentences as those in 22 we have introduced the operator detax that optionally applies to taxonomic applier meanings to map them into particular level applier meanings.

22 a Alice found the carcass of an extinct bison.
b The bird on that lower bough is an endangered game bird.
c Alice shot an endangered game bird.
d Alice drove a Cadillac model designed by Damon.
e Alice found the carcassess of two extinct bisons.
f Alice shot no/many/few/two endangered game birds.

Let α be a meaning of type $<s,<e_k,t>>$,
$Detax(\alpha)=\lambda s.\lambda x.\exists y(I(s)(x,y)\ \&\ \alpha(s)(y))$

Detax maps a kind level applier meaning α into a particular level applier meaning $\lambda s.\lambda x.\exists y(I(s)(x,y)\ \&\ \alpha(s)(y))$ which relative to a given evaluation index s will map a token x to truth iff x is an instance of a kind y to which α applies truly relative to s.

I have assumed such inherently taxonomic common nouns as *endangered game bird*, *extinct bison*, *Cadillac model designed by Damon* can undergo the operation detax to yield particular level predicative meanings which is then fed to the functions expressed by determiners to yield the meanings of the quantified noun phrases or indefinite noun phrases they form. Under this assumption 22c was interpreted thus:

22 c Alice shot an endangered game bird.
[[an] [endangered game bird]][1 [Alice][[shot][t_1]]]

Interpretation of 22c via detax:

$\{\{\lambda s.\lambda Q.\lambda P.\exists x(Q(x)\&P(x)), detax(\lambda s._{k}[_{<e,t>}e.\ game\ bird]^{s})\}, \lambda s.\lambda y.[shot]^{s}(y)([Alice]^{s})\}$
$\{\{\lambda s.\lambda Q.\lambda P.\exists x(Q(x)\&P(x)), \lambda s.\lambda x.\exists y(I(s)(x,y)\ \&\ _{k}[_{<e,t>}e.\ g.\ b.]^{s}(y))\}, s.\lambda y.[shot]^{s}(y)([A.]^{s})\}$
$\{\lambda s.\lambda P.\exists x(\exists y(I(s)(x,y)\ \&\ _{k}[_{<e,t>}endangered\ \ldots]^{s}(y))\&P(x)), \lambda s.\lambda y.[shot]^{s}(y)([Alice]^{s})\}$
$\lambda s.\exists x(\exists y(I(s)(x,y)\ \&\ _{k}[_{<e,t>}endangered\ game\ bird]^{s}(y))\&\ [shot]^{s}(x)([Alice]^{s}))$

Note that in the logical form that is the basis for the above interpretation we have the NP *an endangered game bird* not in its original surface form position but in the wide scope. This move is necessitated because the NP *an endangered game bird* has an existential quantifier meaning and we cannot interpret logical forms in which quantified NP's remain in the object position under the general semantic composition framework we adopted in the present work –i.e. that of Heim & Kratzer (1998).[119]

Can DKP Do the Job Done by Detax?

In the interpretation of 22c through detax the NP *an endangered game bird* was in fact interpreted as particular level, although it is formed by a common noun which is inherently taxonomic. This was possible due to the assumption that taxonomic common nouns' meanings can optionally undergo detax.

Now it appears that the interpretation of 22c can as well proceed through the application of DKP and the interpretation of *an endangered animal* as a kind-level indefinite. We have a moment ago noted that under the paradigm of semantic composition adopted here we cannot interpret the logical forms in which there are NP's with quantifier meanings figuring in object positions;

[119] Verbs require objects of type <s,e>, quantificational phrases however are of the type <s,<<e,t>,t>>.

instead we have to consider logical forms in which such NP's have moved outside the verb phrase, even if in the surface form of the sentences they figure in the object position:

22cA [Alice][[shot][[an] [endangered game bird]]] *is not interpretable*

22cB [[an] [endangered game bird]][1 [Alice][[shot][t_1]]] *is interpretable*

If we did not have the option of detaxification or simply if that option is not selected then *an endangered game bird* in 22c will be interpreted as a kind level indefinite argument; and when it moves to the wide scope it is plausible to think that it will leave a kind level trace t_1 (22cB). But then a sortal conflict will obtain between that the kind level trace t_1 and the particular level verb *shot* for which t_1 constitutes the argument. This conflict can be resolved via DKP, in a manner similar to what took place for example in the interpretation of the logical form 10aA. I now present how this envisaged interpretation via DKP will work out:

22 c Alice shot an endangered game bird.
[[an] [endangered game bird]][1 [Alice][[shot][t_1]]]

Interpretation of 22c via DKP:
$\{\lambda s.\lambda P.\exists x({}_{k}[_{<e,t>}e.g.b.]^{s}(x)\&P(x)),\{1,\{\lambda s.[Alice]^{s},\{\lambda s.[shot]^{s},\lambda s.{}_{k}[_{e}t_{1}]^{s,g}\}\}\}\}$ *sortal misfit*
$\{\lambda s.\lambda P.\exists x({}_{k}[_{<e,t>}e.g.b.]^{s}(x)\&P(x)),\{1,\{\lambda s.[A.]^{s},\{DKP(\lambda s.[s.]^{s}),\lambda s.{}_{k}[_{e}t_{1}]^{s,g}\}\}\}\}$ *DKP triggered*
$\{\lambda s.\lambda P.\exists x({}_{k}[_{<e,t>}e.g.b.]^{s}(x)\&P(x)),\{1,\{\lambda s.{}_{p}[_{e}A.]^{s},\lambda s.\lambda x.\exists y(I(s)(y)({}_{k}[_{e}t_{1}]^{s,g})\ \&\ [s.]^{s}(y)(x))\}\}\}$
$\{\lambda s.\lambda P.\exists x({}_{k}[_{<e,t>}e.g.b.]^{s}(x)\&P(x)),\{1,\lambda s.\exists y(I(s)(y)({}_{k}[_{e}t_{1}]^{s,g})\ \&\ [shot]^{s}(y)({}_{p}[_{e}Alice]^{s}))\}\}$
$\{\lambda s.\lambda P.\exists x({}_{k}[_{<e,t>}e.g.b.]^{s}(x)\&P(x)),\ \lambda s.\lambda x.\exists y(I(s)(y)({}_{k}[_{e}t_{x}]^{s})\&\ [shot]^{s}(y)([Alice]^{s}))\}$
$\lambda s.\exists x({}_{k}[_{<e,t>}endangered\ g.\ b.]^{s}(x)\ \&\exists y(I(s)(y)({}_{k}[t_{x}]^{s})\&\ [shot]^{s}(y)([Alice]^{s}))$
$\lambda s.\exists x({}_{k}[_{<e,t>}endangered\ g.\ b.]^{s}(x)\ \&\exists y(I(s)(y)(x)\ \&\ [shot]^{s}(y)([Alice]^{s}))$

Note that as a result we have obtained the same truth conditions as we did when we interpreted 22c using detax. This result may be taken to suggest there is no need to adopt detax as an optional operator, provided that we have DKP. And DKP is indispensable as it is needed to account for sentences in which kind designating arguments occur in particular level contexts and do not give rise to scope ambiguity.

I will give three reasons showing that we infact need the detax option alongside the DKP. First, indefinite phrases formed by inherently taxonomic common nouns can constitute nominal predicates for particular level subjects:

The bird in the lower bough is an endangered bird
The second car in the left row is a rare model
Alice's Cadillac is a pre-1970 model, as the tail light chrome cover indicates

There is no straightforward way to use DKP in the interpretation of such sentences. Second the following sentence appears to be ambiguous:

35 Alice filmed two birds that were long thought to be extinct.

It can either be read as saying that Alice filmed two tokens of a bird species that was long thought to be extinct or as saying that Alice filmed tokens of two bird species that were long thought to be extinct. Now, this ambiguity cannot be scope related, as there is not any constituent which can take narrow or wide scope relative to the NP two birds that were long thought to be extinct to affect the interpretation of the sentence. Then, the sentential ambiguity in 35 should be due to the ambiguity of some constituent. The only possible candidate appears to be the NP two birds that were long though to be extinct. This ambiguity can readily be explained by the adoption of detax. Third, if we did not have the detax option then we cannot account for all the pre-theoretically ascertainable readings of such sentences as the following:

36 Alice did not film a bird which was long thought to be extinct.

Note that 36 has a variety of readings. Among these, one says (i) that there is a bird species which was long thought to be extinct such that Alice did film any token of it. Another one says (ii) that there is a token, of a bird species that was thought to be extinct, which Alice did not film. Surely both of these readings follow from a logical form in which the taxonomic indefinite singular *a bird that was long tought to be extinct* takes wide scope over the negation.

36A $[_{NP}\,[_{D}\,a]\,[_{N'}\,\text{bird that was long thought to be extinct}]]_{1}\,[1\,[[\text{not}]\,[\text{Alice film } t_{1}]]]$

If detax was not an option and we only had DKP to interpret the logical form 36A we could capture only one of the indicated readings (specifically the reading 36Ai):

36A $[_{NP}\,[_{D}\,a]\,[_{N'}\,\text{bird that was long thought to be extinct}]]_{1}\,[1\,[[\text{not}][\text{Alice}][[\text{film}][t_{1}]]]]$

36Ai obtained from the interpretation of 36A via DKP :
$\{\lambda s.\lambda Q.\exists x({}_{k}[_{\langle e,t\rangle}b.that...]^{s}(x)\&Q(x)),\{1,\{\{\lambda s.\sim,\{\lambda s.[A.]^{s},\{\lambda s.[f.]^{s},\lambda s.{}_{k}[t_{1}]^{s,g}\}\}\}\}\}\}$ *sortal misfit*
$\{\lambda s.\lambda Q.\exists x({}_{k}[_{\langle e,t\rangle}b.that...]^{s}(x)\&Q(x)),\{1,\{\{\lambda s.\sim,\{\lambda s.[A.]^{s},\{DKP(\lambda s.[f.]^{s}),\lambda s.{}_{k}[t_{1}]^{s,g}\}\}\}\}\}\}$ *DKP*
$\{\lambda s.\lambda Q.\exists x({}_{k}[_{\langle e,t\rangle}b]^{s}(x)\&Q(x)),\{1,\{\{\lambda s.\sim,\{\lambda s.{}_{p}[_{e}A]^{s},\lambda s.\lambda x.\exists y(I(s)(y)({}_{k}[t_{1}]^{s,g})\&[f]^{s}(y)(x))\}\}\}\}$
$\{\lambda s.\lambda Q.\exists x({}_{k}[_{\langle e,t\rangle}b.that...]^{s}(x)\&Q(x)),\{1,\lambda s.\sim\exists y(I(s)(y)({}_{k}[t_{1}]^{s,g})\&[film]^{s}(y)([Alice]^{s}))\}\}$
$\{\lambda s.\lambda Q.\exists x({}_{k}[_{\langle e,t\rangle}\text{bird that }...]^{s}(x)\&Q(x)),\lambda s.\lambda x.\sim\exists y(I(s)(y)({}_{k}[t_{x}]^{s,g})\&[film]^{s}(y)([Alice]^{s}))\}$
$\lambda s.\exists x({}_{k}[_{\langle e,t\rangle}\text{bird that }...]^{s}(x)\&\sim\exists y(I(s)(y)({}_{k}[t_{x}]^{s,g})\&[film]^{s}(y)([Alice]^{s})))$
$\lambda s.\exists x({}_{k}[_{\langle e,t\rangle}\text{bird that }...]^{s}(x)\&\sim\exists y(I(s)(y)(x)\&[film]^{s}(y)([Alice]^{s})))$

If we have the detax option however *a bird that was long thought to be extinct* can be interpreted as a particular level indefinite phrase. Thereby the reading (36Aii) can as well be derived out of 36A.

36A $[_{NP}\,[_{D}\,a]\,[_{N'}\,\text{bird that was long thought to be extinct}]]_{1}\,[1\,[[\text{not}][\text{Alice}][[\text{film}][t_{1}]]]]$

36Aii obtained from the interpretation of 36A via detax:
$\{\{\lambda s.\lambda P.\lambda Q.\exists x(P(x)\&Q(x)),detax(\lambda s.{}_{k}[_{\langle e,t\rangle}b.]^{s})\},\{1,\{\lambda s.\sim,\{\lambda s.[A.]^{s},\{\lambda s.[f.]^{s},\lambda s.{}_{p}[t_{1}]^{s,g}\}\}\}\}\}$
$\{\{\lambda s.\lambda P.\lambda Q.\exists x(P(x)\&Q(x)),detax(\lambda s.{}_{k}[_{\langle e,t\rangle}b.]^{s})\},\{1,\{\lambda s.\sim,\lambda s.[f.]^{s}({}_{p}[t_{1}]^{s,g})([Alice]^{s})\}\}\}$
$\{\{\lambda s.\lambda P.\lambda Q.\exists x(P(x)\&Q(x)),detax(\lambda s.{}_{k}[_{\langle e,t\rangle}b.]^{s})\},\{1,\lambda s.\sim[film]^{s}({}_{p}[t_{1}]^{s,g})([Alice]^{s})\}\}$
$\{\{\lambda s.\lambda P.\lambda Q.\exists x(P(x)\&Q(x)),detax(\lambda s.{}_{k}[_{\langle e,t\rangle}b.]^{s})\},\lambda s.\lambda x.\sim[film]^{s}({}_{p}[t_{x}]^{s})([Alice]^{s})\}$
$\{\{\lambda s.\lambda P.\lambda Q.\exists x(P(x)\&Q(x)),\lambda s.\lambda x.\exists y(I(s)(x,y)\&{}_{k}[_{\langle e,t\rangle}b.]^{s}(y))\},\lambda s.\lambda x.\sim[f.]^{s}({}_{p}[t_{x}]^{s})([A.]^{s})\}$

$\{\lambda s.\lambda Q.\exists x(\exists y(I(s)(x,y)\&_k[_{<e,t>}b.]^s(y))\&Q(x)), \lambda s.\lambda x.\sim[\text{film}]^s(_p[t_x]^s)([\text{Alice}]^s)\}$
$\lambda s.\exists x(\exists y(I(s)(x,y)\ \&\ _k[_{<e,t>}b.]^s(y))\ \&\ \sim[\text{film}]^s(_p[t_x]^s)([\text{Alice}]^s))$
$\lambda s.\exists x(\exists y(I(s)(x,y)\ \&\ _k[_{<e,t>}\text{bird that ...}]^s(y))\ \&\ \sim[\text{film}]^s(x)([\text{Alice}]^s))$

So we see that in the case of such sentences as 36 all the pretheoretically ascertainable readings can be obtained only if it is possible for the indefinite NP's formed out of inherently taxonomic common nouns to be interpreted as particular level indefinites. Here we ensure that possibility by adopting the optional operator detax.

In the next chapter we will consider sentences similar to 36 where we will have to deal with scope related ambiguities generated by the involvement of modal auxillaries. In the analysis of these sentences too we will see that both DKP and detax are needed to capture all the pre-theoretically ascertainable readings.

Conclusion of the Analyses of Noun Phrases Formed by Count Common Nouns

In the present chapter I presented two frameworks, fashioned out of the literature on semantics of noun phrases, destined to account for the variety in the semantic output of the noun phrases as a function of the meanings of the common nouns. One of these frameworks assigned applier meanings to simple common nouns and the other assigned kind designator meanings to them.

The variety to be accounted for concerned both variation with regard to the mode denotation (quantification, designation, application) and variation as regards whether the denotata were kind-level or particular level. It went beyond syntactic variety in that the same noun phrase could be used with different types of meanings in different sentential contexts (e.g. *the whale* can be used as a definite generic, taxonomic definite and particular level definite). There was also a need to account for the not so few cases of kind level arguments combining with particular level predicates (e.g. *Alice did not steal this model of Cadillac*). Moreover, among the noun phrases types that have been considered bare plural phrases manifested some peculiar behavior, the explanation of which is still a point of controversy in the semantic literature (some bare plural phrases designated kinds in kind level contexts, and most bare plural phrases appeared forced to take narrow scope in particular level episodic contexts). All these points recounted here inevitably lead to complex accounts. Not the least because it was not possible to account for them without watering the principle of the compositonality by the introduction of several types of implicit operators.

Now in the present section I will review the theoretical options adopted by the frameworks presented in response to these points and assesss their relative advantages and disadvantages.

The Assessment of K-framework's Theoretical Decisions Regarding the Semantics of the Count Common Nouns

The K-framework distinguishes between three types of common noun meanings. Simple non-taxonomic common nouns are kind designators. Modified non-taxonomic common nouns are particular level appliers. Taxonomic common nouns are kind level appliers.

Two questions arises regarding this position of the K-framework. Why to assign kind designation to simple non-taxonomic common nouns? How can the division of common nouns into appliers and designators be justified?

Assigning Kind Designation to Simple Common Nouns

The main motivation behind K-framework's assigning kind designating meanings to semantically simple non-taxonomic common nouns is to be able to give a straightforward account of the semantics of bare plural phrases and definite generics. In the first part of the present chapter we have seen that such phrases can be used to designate kinds. I produce a few more examples below:

37 The MacBook Air was greeted with a mixed reception when it was introduced.
Dodos have become extinct in the 19^{th} Century.

The K-framework accounts for kind designation by definite generics and bare plural pharese simply by identifying their meaning with the kind designating common nouns they are formed by.

Another reason for taking semantically simple non-taxonomic common nouns to designate kinds is that, they appear to be able to support kind designating pronouns although they themselves figure in particular level noun phrases. In this vein we had previously given the following example:

38 Bill trapped a bald eagle last night although he knows full well that they are on the verge of extinction.

The pronoun *they* figuring in the second clause apparently designates the bald eagle. A straightforward explanation of this phenomenon is that previously in the discouse the bald eagle has been designated and that the pronoun picks that designatum again. When we consider the sentence above we see that the noun phrase *a bald eagle* cannot be the source of that designatum. The indefinite argument *a bald eagle* rather operates as a particular level existential GQ, as such it can only introduce particular level objects into discourse. So that kind level designatum of the pronoun should have been provided by the common noun *bald eagle* itself.

Assigning Applier Meanings to Modified Common Nouns and Taxonomic Common Nouns

Now let's turn to the postponed question as to why the K-framework takes only non-taxonomic simple common nouns to have kind designator meanings. The basic reason is that apparently only semantically simple common nouns appear to be able to form definite generic phrases.

39 a The dodo has become extinct in the 19^{th} century.
b *The wounded dodo has become extinct in the 19^{th} century.

If the modified common noun *wounded dodo* too could designate a kind then it too should be able to form a definite generic phrase; and if the dodo kind can be ascribed extinction as in 39a, the wounded-dodo-kind too should be able to be ascribed extinction via a sentence like 39b. Yet, the latter does not appear to be an acceptable sentence. The same considerations apply to the bare plural phrases *dodos* and *wounded dodos*.

40 a Dodos have become extinct in the 19^{th} Century.
b *Wounded dodos have become extinct in the 19^{th} century.

Only the former appears acceptable in kind level sentential context, and thus to be capable of designating a kind.

Taxonomic common nouns too appear not capable of forming definite generic phrases:

41 a The dodo will soon become extinct.
b *The endangered bird will someday become extinct. *(not possible with the endangered bird taken to designate something like the-endangered-bird-kind, even if such a kind is supposed to exist)*

Apart from the the kind level sentential contexts, definite generics can figure as the subjects of generic sentences. Yet again, in such sentences we cannot have definite generics formed by modified common nouns:

42 a The coke bottle has a well-known shape.
b *The half-full coke bottle has a well-known shape.

This division among common nouns regarding their capacity to form definite generics gets a simple explanation if it is assumed that not all common nouns are kind designators.

Notwithstanding this it may look as if it would be more desirable to assign the same type of meanings to all non-taxonomic common nouns at least; and to take them all to be kind designators. This idea is further supported by the fact that there are certain predicates which appear to be able to combine both with kind designating phrases and also with bare plural phrases formed by modified common nouns. Yet according to K-framework the latter are not kind designators:

43 a The dodo was common in this island.
b This kind of bird is widespread in this island.
c The blue diamond is very rare.
d Decrepit houses are widespread in this island.

e Weirdly shaped rocks are common along this shore.
f Houses painted red are very rare.

If, judging from the ability of these predicates to combine with kind designating arguments, we take them to be predicates that exclusively require kind designating arguments then we should take such bare plural phrases as *decrepit houses*, *houses painted red* too to be kind designators. And if we furthermore wish to continue to identify the meanings of the kind designating bare plural phrases with that of the common nouns that form them then we will have to admit that modified common nouns too can be kind designators. Then we may seek to explain the impossibility to form definite generics with such modified common nouns on syntactic or pragmatic grounds.

Yet there are reasons to think that unlike *extinct* predicates such as *rare*, *widespread*, *common* are not exclusively kind level, although somehow they can accommodate kind designating arguments. To see this consider the following sentences, in which these predicates receive arguments that are non-controversially treated as particular level phrases:[120]

44 a A blue diamond is very rare.
b A female lion with three cubs is quite common.
c The effects of the year without the summer were widespread and lasted beyond the winter.
d The elephantbirds were widespread as late as the tenth century.

Besides, if modified common nouns too are taken to be kind designators then there will be need for a complicated account to derive the kind designator meanings for modified common nouns out of the meanings of the modifiers and

[120] Such predicates are taken to have quantificational meanings rather than ordinary kind level applier meanings. For more on this view about these predicates see Krifka et al. (1995).

kind designating simpler common nouns that constitute them. For example, if *decrepit houses* is taken to have a kind designating meaning then we should be able to derive that meaning from the meanings of the adjective *decrepit* and the common noun *houses*. This cannot happen via the semantic composition operations as we defined them. Because while the adjective has a predicative meaning of type $<s,<e,t>>$, the common noun has a kind designating meaning of type $<s,e_k>$. Moreover we want the result to be another kind designating meaning. This will require a more complicated account of noun modification than the one deployed under the K-framework. Under the K-framework *decrepit houses* is assigned a particular level applier meaning. Its meaning is derived by the application of the operation pred to the kind designating meaning of *houses* and the semantic composition of the resulting applier meaning with that of *decrepit* which is again considered to be an applier (type $<s,<e,t>>$). Now, if we furthermore wish that *decrepit houses* too has a kind designator meaning then we have to embed an additional implicit operation that maps particular level applier meanings of type $<s,<e_p,t>>$ to kind designator meanings of type $<s,e_k>$ (exactly like the C-framework's ∩) into the semantic composition rule of noun modification. An alternative approach would be to assign meanings of the sorted types $<s,<e_k,e_k>>$ to the modifiers. For example if *decrepit* is assigned such a meaning, it can semantically compose with *houses* taken as a kind designator (sorted type $<s,e_k>$) and yield as result a kind designator meaning for *decrepit houses*. Yet, such modifiers as *decrepit* can also form predicates which apply to particulars (*This house is decrepit*). Then we will need an operator that will derive applier meanings suitable for predicate positions from the meanings of such adjectives as *decrepit* (which according to the suggestion under consideration will be of the sorted type $<s,<e_k, e_k>>$).

Note also that by way of taking modified common nouns to be kind designators, however we do it, we ditch the K-frameworks' simple account as to why not all common nouns can form definite generic phrases –this advantage was acquired at the cost of taking only non-taxonomic simple common nouns to have kind designating meanings. For example, the alternative C-framework which takes all common nouns to be appliers is not able to give a semantic explanation for this difference among common nouns. If we are willing to ditch this advantage of the K-framework, then rather than adding futher complications pertaining to noun modification it will be simpler to just assume that all common nouns are appliers, and to explain kind designation by bare plural phrases and definite generics along the lines of the C-framework.

The Assessment of C-framework's Theoretical Decisions Regarding the Semantics of the Count Common Nouns

According to the C-framework all common nouns are appliers. The taxonomic ones apply to kinds and the non-taxonomic ones apply to particulars. This is the standard treatment for common nouns, and it fits quite well with the standard treatment of determiners, with the capacity of common nouns to form predicates etc.

Yet, the C-framework has to give an account how such predicative common nouns can form kind designators such as bare plural phrases and definite generics. The C-framework gives different accounts for these types of kind designating phrases.

Following Dayal (2004) the C-framework treats definite generics phrases as taxonomic definite phrases. Here, the definite article *the* is assigned its usual interpretation of the iota operator, and that definite article semantically composes with a taxonomic common noun to pick the unique kind which satisfies both the taxonomic common noun and contextually determined constraints. And following Chierchia (1998) the C-framework derives kind designating meanings for bare plural noun phrases via the implicit operation $\cap$ which is partially defined over particular level plural predicative meanings and map these meanings into the corresponding kinds if there exists such a kind.

These accounts by the C-framework are not without problems, to which I now turn.

Excessive Permissibility about the Kinds that can be Designated by Bare Plural Phrases

According to C-framework's account kind designating bare plural arguments can be formed even by such heavily modified common nouns as *broken red bikes*. This is regarded as a welcome consequence by the authors whom the C-framework follows. Because bare plural phrases, including ones such as *broken red bikes* appear to behave in particular level episodic contexts more like the kind phrases such as *this bike model* than the indefinite and the quantified phrases (remember the issue of scope peculiarity). Yet, we have seen that that semantic peculiarity can be explained by means other than assigning kind designation to bare plurals formed by modified noun phrases. The problem with the view that even such common nouns as *broken red bikes* can form kind designating bare plural phrases is that such bare plurals can hardly figure in genuine kind level contexts set by such adjectives and verbs as *extinct*, *out of production*, *invent*, *review*, *launch* etc.

Another problem is that the singular common noun *broken red bike* cannot form a definite generic phrase, the other important type of kind designating noun phrase: *the broken red bike* can hardly be used as a definite generic like *the Trek Madone 6*, *the electron* can. If there is a kind corresponding to the common noun *broken red bike* why cannot it be used a definite generic?

Can the Selectivity of the Definite Generic Formation be Explained in Pragmatic Terms

In response to this last issue, Dayal (2004) argues that the inability manifested by such modified common nouns as *broken red bike* has a pragmatic explanation rather than a semantic one (like the one given under the K-framework). According to her given an elaborate context setting it is possible to use for example *the green bottle* as a definite generic. She believes that in such context as the following,

45 The factory produces two kinds of bottles, a green one for medicinal purposes and a clear one for cosmetics. The green bottle has a long neck. The clear bottle …

the green bottle is used as a definite generic. Yet, this appears to be an ordinary taxonomic definite phrase use of *the green bottle*. The phrase appears to simply designate a type of bottle made salient by the context, and nothing like the-green-bottle-kind of which all green bottles are instances. In contrast, for instance the definite generic *the coke bottle* designates the kind of which all coke bottles are instances.

Dayal can insist that here *green bottle* too corresponds to a special kind of bottle, which does not cover all bottles which are green but only those special ones produced by the factory in question. That is, just as not all bottles containg coke are *coke bottles*, not all bottles that are green are *green bottles*, in the sense intended here. But then we can no longer identify the common noun *green bottle* figuring in the putative definite generic *the green bottle* with the ordinary modified common noun *green bottle*, the extension of which covers every bottle that is green.

It appears that it is not impossible for *the green bottle* to be used as definite generic in English, provided that a special sort of bottle which is usually green acquires a particular relevance in our lives. Yet, then the common noun involved in the definite generic *the green bottle* will not be the modified common noun *green bottle* but a new, semantically simple common noun.

Higher order Kinds?

We have seen that the argument the C-framework gives to support assigning kind designating meanings to almost all non taxononomic bare plural pharases can as well be extended to the cases of taxonomic bare plurals arguments. That argument consisted of indicating that the scope behavior of non-taxonomic bare plural arguments in particular level contexts was exactly like that of kind phrases like *this model of Cadillac*: notwithstanding whether they stood in the wide scope or in the narrow scope they yielded the same reading (a reading which corresponds to the narrow scope interpretation of an existential quantified phrase). Yet we have seen that the same behavior is manifested also by bare plural arguments which clearly have to be interpreted taxonomically:

30 a Alice did not review obsolete Japanese mobile models.

30a appears to have only the reading *Alice did not review any obsolete Japanese mobile models*. Then the C-framework to preserve its coherence has to give an account of taxonomic bare plural arguments which is similar to its account of non-taxonomic bare plural arguments. But this will then commit the C-framework to such higher order kinds as obsolete-Japanese-mobile-kind. This is not a desirable consequence in so far as there is not any other piece of evidence indicating that natural languages require in their ontology such higher order kinds. And whether we accept the scope peculiarity of taxonomic bare plural arguments as an evidence depends on whether we are ready to accept Chierchia's general way of explaining bare plural phrases' scope peculiarity by way of assigning them kind designation. Yet, as we have seen while presenting the K-framework, that peculiarity could very well be explained without taking the bare plural phrases involved to be kind designators.

Moreover if there are such higher order kinds in the ontology and they correspond to taxonomic common nouns' intensions, the C-framework is again due an explanation as to why we cannot form with taxonomic common nouns definite generics which designate these higher order kinds.

Problems with the C-framework's Account of Definite Generics

C-frameworks's account of definite generics too result in more definite generic phrases than we would like to acknowledge. Remember that according to that account definite generics were merely taxonomic definite phrases formed by taxonomically interpreted common nouns. To make the accout work Dayal supposes that the taxonomically used *whale* for example has in its extension not just the various whale species and genera, but also the-whale-kind of which any whale is an instance. *The whale*, as a taxonomic definite phrase, designates the-whale-kind rather than a species or genus when among the contextually salient kinds we do not have any particular species or genera of whales.

Now, since the account is treating definite generics as mere taxonomic definite phrases formed by taxonomic common nouns it predicts that even such modified taxonomic common nouns as *Cadillac which is out of production*, *road bike reviewed by Alice's blog* can form definite generics like *the Cadillac which is out of production* and *the road bike reviewed by Alice's blog* that respectively designate such kinds as out-of-production-Cadillac-kind and *road-bike-reviewed-by-Alice's-blog* kind. A prediction which is not materialized.

A second problem related with the C-framework's treatment of definite generics is that to account for such definite generics as *the electron* it is forced to take such common nouns as *electron* which correspond to *infima species* to have taxonomic variants. Yet such a taxonomic variant for *electron* can truly apply only to the electron. For instance Dayal acknowledges that her account predicts that such a sentence as *The electron is an electron*, with the meaning that the-electron-kind itself is a kind of electron, will be acceptable. But it is not clear whether there indeed are such simple taxonomic common nouns which can only truly apply to a single kind –namely the kind corresponding to their non-taxonomic variant.

Kind Level Anaphora

Apart from the issues pertaining to C-framework's accounts about bare plural and definite generic phrases, another problem for the C-framework is to explain what is going on in such sentences as 38:

38 Bill trapped a bald eagle last night although he knows full well that they are on the verge of extinction.

Here it appears that the common noun *bald eagle* which figures in a particular level indefinite noun phrase supports the kind designating pronoun *they*. As we have seen the K-framework which takes simple common nouns to be kind designators, can simply take this appearance at face value. But the C-framework cannot give such an account in so far as it takes non-taxonomic common nouns to be particular level appliers. One possible option for the framework may be to introduce a double denotation theory for common nouns. According to such a theory a common noun will both be an applier and a kind designator. But then all the meanderings of the C-framework to derive kind designation for the paradigmatic kind designating NP's, the definite generic phrases and bare plural phrases, will appear needless and unmotivated. A better option, more consistent with the general outlook of the C-framework, may be to suggest that the pronoun *they* inheres the composition of the operations PL and ∩. According to this suggestion *they* will be dependent on the count noun *bald eagle*: its designatum will be $^{\cap}(\mathrm{PL}[\![\text{bald eagle}]\!])$. Yet, it is beyond me to work out the details and to motivate on independent grounds such a proposal.

Final Assessment and Interlude before Passing to the Rigidity Investigation

In this chapter we have considered the semantics of common nouns together with the semantics of noun phrases formed by them. We have strived to show that there are plausible reasons to assign kind designation to simple, non-taxonomic common nouns.

This was relevant for the question about the *de jure* rigidity of common nouns in the following way. We had previously seen that the general consensus in the relevant philosophical literature was that unless common nouns are taken to be kind designators the property of *de jure* rigidity will apply to virtually no common nouns. But the literature did not involve any attempt to justify the view that common nouns should be kind designators. Furthermore, if common nouns are generally taken to be kind designators then it appeared that the *de jure* rigidity will have to apply to all of them, with the consequence of reducing the theoretical significance of that property in relation with the common nouns.

Now acknowledging the existence of noun phrases that denote kinds warrants the assignment of kind designation to common nouns as a means to give a straightforward explanation of at least some cases of phrasal kind denotations. Furhermore the observation that some important types of kind designating phrases cannot be formed by modified and taxonomic common nouns, warrants the idea that assigning kind designation to all common nouns is not the optimal way to go. The K-framework, which partially followed Krifka et al. (1995), has been formulated bearing on these warrants. It assigned kind designation only to semantically simple non-taxonomic common nouns, while it treated modified common noun and taxonomic common nouns as appliers. On that basis, and introducing certain implicit operations to fix things, the K-framework is able to give plausible accounts for the variety in the semantics of the noun phrases formed by common nouns.

Yet we have also seen that the warrants on which the K-framework draw did not amount to a full justification. Even if it is granted that certain noun phrases are best analysed as denoting kinds one can as well give a defensible account for all of them in terms of common nouns that are taken to be appliers. The C-framework we have formulated in this chapter did so by adopting the standard treatment of common nouns as appliers and following such works as Chierchia (1998) and Dayal (2004). We have seen that the C-framework has its problems, but these may be thought to be balanced by its uniformly assigning applier meanings to all common nouns.

Now returning to our main subject of investigation which is whether the property of *de jure* rigidity has any theoretical significance in relation with common nouns, we can cite the preliminary prospects in the following way.

On intuive grounds it is clear that under the K-framework *de jure* rigidity will be a significant property for common nouns. The semantically simple non-taxonomic common nouns such as *road bike*, *electron*, *Iphone4s*, *transistor* which are taken to be kind designators will all be *de jure* rigid designators. Consider the case of *transistor*. When it is used to talk about possible circumstances it will continue to designate the same device type as as it did when it is used to talk about actual circumstances. As for the other common nouns, the modified ones and taxonomic ones which are treated as appliers, most of them cannot be *de jure* rigid appliers. It is intuitively clear that *broken road bike* cannot be a rigid applier. It is also clear that the taxonomic variant of *transistor* which is an applier according to the K-framework should apply to different types of transistors relative to different possible circumstances; a transistor model that actually exists might not have been invented at all, and vice versa a transistor model that is not as yet invented might have been invented.

However, from the standpoint of the C-framework according to which all common nouns are appliers *de jure* rigidity will not be significant for common nouns. Virtually all of them will be non-rigid appliers. For virtually every non-abstract common noun the kinds and particulars which it truly applies to will shift if things had been different then they actually are.

Notwithstanding the intuitive certainity of our assesssment of the prospects, in the next chapter I will painstakingly strive to show they are indeed correct. In the fourth chapter I have illustrated the way to give a proper justification of the intuitively certain view that proper names are *de jure* rigid designators. I will do the same for the common nouns in the next chapter on the basis of similar arguments.

CHAPTER VII

COMMON NOUNS AND RIGIDITY

In the previous chapter we have described two frameworks to explain the semantic variety of the noun phrases formed by count common nouns. The K-framework contained three distinct types of common nouns. Semantically simple non-taxonomic common nouns that designated kinds, modified non-taxonomic common nouns that had particular level predicative denotations, and taxonomic common nouns that had kind level predicative denotations. Under this framework the meanings of the kind designating noun phrases were the same as the meanings of the kind designating common nouns that formed them. As regards the denotations of noun phrases that denoted particulars, these were derivable through the application of the operator pred to the meanings of the kind designating common nouns.

The C-framework acknowledged only two semantically distinguishable types of common nouns: non-taxonomic common nouns that had particular level predicative denotations and taxonomic common nouns that had kind level predicative denotations. This framework did not have kind designating common nouns, and accounted for the kind designating noun phrases by having recourse to an appropriately defined operator which mapped the meanings of the predicative common nouns into kind designating meanings.

In this chapter I will explore, relative to each of these frameworks, whether there is any reason to take some common nouns to be *de jure* rigid. I will take the rigidity of a term to be constancy of denotation across evaluation indexes for which the term has a defined denotation.

We have already discussed what sorts of reasons would entitle one to take a class of expressions to be rigid, and illustrated such reasons in relation with the singular terms. The existence of a reason for taking a class of expressions to be *de jure* rigid depends on whether assigning constant denotations to that class of expressions is needed to explain the pre-theoretically observed truth conditions of the sentences in which these expressions occur.

Now, are there sentences the truth-conditions of which are best explained only if a specific class of common nouns are assigned constant denotations across evaluation indexes?

Previously when we sought the reasons for taking proper names among singular terms to be *de jure* rigid, we found such reasons in relation with two phenomena. First, modal sentences involving proper name arguments did not manifest a certain type of ambiguity manifested by the sentences which had definite description arguments in place of proper names. Second, any identity sentence which involved two proper name arguments were non-contingent, but this was not the case for identity sentences which instead involved at least one definite description.

I will now seek reasons for assigning *de jure* rigidity to some class of common nouns or other by considering similar phenomena. I will therefore first look into modal sentences and explore whether we can find a class of common nouns whose occurrences in modal sentences inhibit the manifestation of a certain type of ambiguity which normally obtains when they are replaced by common nouns of another class.

Second I will look into identity sentences involving common nouns. The consideration of identity sentences that are non-contingent cannot directly give a reason to assign rigidity to common nouns involved is such sentences. In English count common nouns cannot figure as arguments in sentences, *a fortiori* they cannot figure as arguments in identity sentences. Count common nouns rather occur in definite noun phrases which in turn can be arguments in identity sentences. Thus, even if some such identity sentences were found to be non-contingent that can at best indicate the rigidity of the definite noun-phrases involved, and may have no implications regarding the rigidity of the common nouns that form these definite noun phrases; this is so however unless in addition the rigidity of certain such definite noun phrases depended on the rigidity of the common nouns that formed them.

Common Nouns in Modal Sentential Contexts

One piece of argument that establishes that proper names are rigid designators and definite descriptions are not derives from the following observation. Modal sentences involving definite descriptions have multiple truth-conditionally non-equivalent readings, whereas when these definite descriptions are replaced by proper names, while keeping the modal sentential context the same, the resulting sentences do not have non-equivalent readings.

The multiple readings of the modal sentences involving definite descriptions is explained by the possibility for the definite descriptions to take wide scope or the narrow scope relative to the modal operator and by their being non-rigid designators.

The same scope taking options should be available for proper names that replace the definite descriptions in the same modal sentential contexts. However, the modal sentences with the proper names in place of the definite descriptions do not have non-equivalent readings corresponding to the different ways proper names take scope relative to the modal operator. Thus it is concluded we should assume proper names to be rigid designators.

In this section I will explore whether a similar piece of argument can be given for a rigid/non-rigid distinction among common nouns. I will compare the sets of readings that result when common nouns of different classess are used in the same modal sentential context. I will look whether there is any difference in the resulting sets of readings the explanation of which would require assigning *de jure* rigidity to one the classess of common nouns to be considered.

Specifically my discussion will be laid as an examination and comparison of the different readings of the following pair of sentences (clearly there are many such pairs of sentences, and the points of the discussion to follow will equally apply to them):

1 a [to satisfy Claire's wish] Alice must use a Japanese mobile which is out of production.
  b [to satisfy Claire's wish] Alice must use a Sharp SH903i.

Each of these sentences has a multiplicity of readings due to the different combinations of a variety of interpretation options. Some of these options are related with the existence of logical forms in which certain constituents take scope in different ways relative to *must*. Some other options derive from the availability of different ways of resolving sortal discrepancies that obtain between the denotations of certain elements. I will distinguish between the non-equivalent readings that can be associated with 1a and 1b, and describe how they derive from possible logical forms *cum* possible sortal discrepancy resolving strategies.

In considering these readings I will specifically be interested in differences that result from the way the highlighted common nouns of 1a and 1b take scope with regard to *must*. I will explore whether as a consequence of this parameter both 1a and 1b yield similar sets of readings, or there are discrepancies in this respect. I will discern one such discrepancy between 1a and 1b.

I will argue that under the K-framework to the semantics of common nouns, the explanation of this discrepancy will require to assume that *Sharp SH903i* is a rigid designator. However I will also show that the same discrepancy can be explained under the C-framework without any such assumption.

Readings in Which Noun-phrases Formed by Common Nouns Take Wide Scope or Narrow Scope

It is well known that indefinite noun phrases formed by common nouns generate sentential ambiguities when they occur in modal sentential contexts. Consider 1b. We can distinguish between two non-equivalent readings of 1b:

1 b [to satisfy Claire's wish] Alice must use a Sharp SH903i.

First there is a reading of 1b under which it will be true relative to @ (the actual world) if and only if for all worlds w in which Claire's desires at @ are satisfied there is a token at w of Sharp SH903i which is used by Alice in w. This is the so called *de dicto* reading. According to this reading there is not an actual specific Sharp SH903i token which Alice must use to satisfy Claire. Any SH903i token will do.

Then there is also a reading of 1b according to which it will be true relative @ if and only if there is token of Sharp SH903i at @ such that for all worlds w in which Claire's desires at @ are satisfied Alice uses at w that token. This is the so called *de re* reading according to this second reading there is a specific Sharp SH903i token which Alice must use to satisfy Claire. Not any token of Sharp SH903i will do.

Clearly there will be situations in which these two readings of 1b will get different truth values. If for example, Claire just asked Alice to acquire and use a Sharp SH903i rather than any other model and brand without specifying a token, then the first reading will be true, but the second reading will be false. There is not any specific Sharp SH903i token which Alice must use.

The illustrated ambiguity of 1b is explained as the result of scope ambiguity. The first reading results from a logical form in which the noun phrase *a Sharp SH903i* is in the narrow scope relative to the modal operator; whereas the second reading results from a logical form in which *a Sharp SH903i* takes the wide scope relative to the modal operator. The resulting logical forms will presumably be thus:

1bA $[_S[_T \text{must}]\ [_S[_{NP}\text{a}\ [_N \text{Sharp SH903i}]]_1[1\ [_S \text{Alice uses } t_1]]]]]$

1bB $[_S[_{NP}\text{a}\ [_N \text{Sharp SH903i}]]_1[1\ [[_T \text{must}][_S \text{Alice uses } t_1]]]]$

The interpretations of these logical forms will be a little bit different under the K-framework and the C-framework, as these frameworks differ on the denotation-type of simple non-taxonomic common nouns like *Sharp SH903i*. The former takes such common nouns to designate kinds natively, and derives particular level predicative denotations via the type shift pred; whilst the latter assigns them predicative denotations that apply to particulars. But as a result under both approaches we end up with the same pair of non-equivalent truth-conditions.

I will first consider the interpretations of 1bA and 1bB under the K-framework. Let's first remember how indefinite noun phrase arguments such as the *a Sharp SH903i* of 1bA and 1bB, which are formed by a kind designating common like *Sharp SH903i* were interpreted.

Under the K-framework simple common nouns such as *Sharp SH903i* are kind designators; they are of the sorted-type $<s,e_k>$. But indefinite noun phrase forming *a* has the following analysis:

$[\![a]\!]=\lambda s'.\lambda Q.\lambda P.\exists x(Q(x)\ \&\ P(x))$,
with P and Q variables ranging over functions of type $<e,t>$

The indefinite article *a* is of type $<s,<<e,t>,<e,t>>>$. And as such it can semantically combine only with constituents of the predicative semantic type $<s,<e,t>>$. Thus it cannot directly semantically combine with the kind designator *Sharp SH903i*. For this reason the K-framework had recourse to the operator Pred to type-shift the meaning of a designator from type $<s,e_k>$ into type $<s,<e_p,t>>$:

Let α be a meaning of type $<s,e_k>$:
$\mathrm{Pred}(\alpha)=\lambda s'.\lambda x.I(s')(x,\alpha(s'))$

So, the meaning of the indefinite noun phrase *a Sharp SH903i* as the semantic composition of *a* with *Sharp SH903i* will have the following derivation under the K-framework:

$\lambda s'.[_{NP}[_{D}\text{a}]\ [_{N}\text{Sharp SH903i}]]^{s'}$
$\{\lambda s'.[\text{a}]^{s'}, \lambda s'.[\text{Sharp SH903i}]^{s'}\}$
$\{\lambda s'.\lambda Q.\lambda P.\exists x(Q(x)\ \&\ P(x)), \lambda s'.[\text{Sharp SH903i}]^{s'}\}$ *unapplicable due to type discrepancy*
$\{\lambda s'.\lambda Q.\lambda P.\exists x(Q(x)\ \&\ P(x)), \mathrm{pred}(\lambda s'.[\text{Sharp SH903i}]^{s'})\}$ *Pred is triggered*
$\{\lambda s'.\lambda Q.\lambda P.\exists x(Q(x)\ \&\ P(x)), \lambda s'.\lambda y.I(s')(y,[\text{Sharp SH903i}]^{s'})\}$
$\lambda s'.\lambda P.\exists x(\lambda y.I(s')(y,[\text{Sharp SH903i}]^{s'})(x)\ \&\ P(x))$
$\lambda s'.\lambda P.\exists x(I(s')(x,[\text{Sharp SH903i}]^{s'})\ \&\ P(x))$

Now implementing this analysis of the indefinite noun phrase *a Sharp SH903i* , under the K-framework 1bA and 1bB will be interpreted in the following way, leading to the readings of $1bi_K$ and $1bii_K$.

1bA $[_{S}[_{T}\text{must}]\ [_{S}[_{NP}\text{a}\ [_{N}\text{Sharp SH903i}]]_1[1\ [_{S}\text{Alice uses } t_1]]]]]$

$1bi_K$, obtained from 1bA:
$\lambda s'.[[_{T}\text{must}]\ [_{S}[_{NP}\text{a}\ [_{N}\text{Sharp SH903i}]]_1[1\ [_{S}\text{Alice uses } t_1]]]]]^{s'}$
$\{\lambda s'.\lambda S.\forall s(R(s')(s)\supset S(s)), \{\lambda s'.\lambda P.\exists x(I(s')(x,[\text{Sharp SH903i}]^{s'})\ \&\ P(x)), \lambda s'.\lambda y.[\text{A. u. } t_y]^{s'}\}\}$
$\{\lambda s'.\lambda S.\forall s(R(s')(s)\supset S(s)), \lambda s'.\exists x(I(s')(x,[\text{Sharp SH903i}]^{s'})\ \&\ [\text{Alice uses } t_x]^{s'})\}$
$\lambda s'.\forall s(R(s')(s)\supset\exists x(I(s)(x,[\text{Sharp SH903i}]^{s})\ \&\ [\text{Alice uses } t_x]^{s}))$
when evaluated relative to @:
$\forall s(R(@)(s)\supset\exists x(I(s)(x,[\text{Sharp SH903i}]^{s})\ \&\ [\text{Alice use } t_x]^{s}))$

1bB $[_{S}[_{NP}\text{a}\ [_{N}\text{Sharp SH903i}]]_1\ [1\ [[_{T}\text{must}][_{S}\text{Alice uses } t_1]]]]$

$1bii_K$, obtained from 1bB:
$\lambda s'.[_{S}[_{NP}\text{a}\ [_{N}\text{Sharp SH903i}]]_1\ [1\ [[_{T}\text{must}][_{S}\text{Alice uses } t_1]]]]^{s'}$
$\{\lambda s'.\lambda P.\exists x(I(s')(x,[\text{Sharp SH903i}]^{s'})\ \&\ P(x)), \{1, \{\lambda s'.\lambda S.\forall s(R(s')(s)\supset S(s)), \lambda s'.[\text{A. u. } t_1]^{s'}\}\}\}$
$\{\lambda s'.\lambda P.\exists x(I(s')(x,[\text{Sharp SH903i}]^{s'})\ \&\ P(x)), \{1, \{\lambda s'.\forall s(R(s')(s)\supset[\text{Alice use } t_1]^{s})\}\}$
$\{\lambda s'.\lambda P.\exists x(I(s')(x,[\text{Sharp SH903i}]^{s'})\ \&\ P(x)), \lambda s'.\lambda y.\forall s(R(s')(s)\supset[\text{Alice use } t_y]^{s})\}$

$\lambda s'.\exists x(I(s')(x,[\text{Sharp SH903i}]^{s'})\&\forall s(R(s')(s)\supset[\text{Alice use } t_x]^s))$
when evaluated relative to @:
$\exists x(I(@)(x,[\text{Sharp SH903i}]^{@})\&\forall s(R(@)(s)\supset[\text{Alice use } t_x]^s))$

Note that the meaning determined by the logical form B will be true relative to @ iff there is a token of SharpSH903i at @ which Alice uses in all worlds that conform to Claire's wishes at @. On the other the evaluation of the logical form A relative to @ does not require that there be such a token. The logical form A will be true relative to @ iff at all worlds w which conform to Claire's wishes at @ there is a token of SharpSH903i which Alice uses at w. Relative to different worlds w these tokens can be different.

The semantic interpretation of the logical forms 1bA and 1bB will be very similar under the C-framework; and the same truth conditions that differ in the same way as described in the previous paragraph will obtain. The only difference will be that under the C-framework the contribution of the indefinite noun phrase *a SharpSH903i* will be represented by

$\lambda s'.\lambda P.\exists x({}_p[_{<e,t>}\text{Sharp SH903i}]^{s'}(x)\&P(x))$

in place of

$\lambda s'.\lambda P.\exists x(I(s')(x,{}_k[_e\text{Sharp SH903i}]^{s'})\ \&\ P(x))$

due to the fact that differently from the K-framework, under the C-framework the common noun *SharpSH903i* has particular level predicative denotations of type <e,t>.

1 b [to satisfy Claire's wish] Alice must use a Sharp SH903i.
1bA $[[_T\text{must}]\ [_S[_{NP}\text{a Sharp SH903i}]_1[1\ [_S\text{Alice use } t_1]]]]]$

$1bi_c$, obtained from 1bA:
$\{\lambda s'.\lambda S.\forall s(R(s')(s)\supset S(s)), \{\lambda s'.\lambda P.\exists x({}_p[{}_{<e,t>}\text{Sharp SH903i}]^{s'}(x)\&P(x)), \lambda s'.\lambda y.[\text{A. use } t_y]^{s'}\}\}$
$\{\lambda s'.\lambda S.\forall s(R(s')(s) \supset S(s)), \lambda s'.\exists x({}_p[{}_{<e,t>}\text{Sharp SH903i}]^{s'}(x)\& \ \lambda y.[\text{Alice use } t_y]^{s'}(x))\}$
$\lambda s'.\forall s(R(s')(s) \supset \exists x({}_p[{}_{<e,t>}\text{Sharp SH903i}]^{s}(x)\& \ [\text{Alice use } t_x]^{s}))$
when evaluated relative to @:
$\forall s(R(@)(s) \supset \exists x({}_p[{}_{<e,t>}\text{Sharp SH903i}]^{s}(x) \ \& \ [\text{Alice use } t_x]^{s}))$

1bB $\lambda s'.[_S[_{NP}\text{ a Sharp SH903i}]_1[1\ [[_T\text{ must}][_S\text{ Alice uses } t_1]]]]^{s'}$

$1bii_c$, obtained from 1bA:
$\{\lambda s'.\lambda P.\exists x({}_p[{}_{<e,t>}\text{Sharp SH903i}]^{s'}(x)\&P(x)), \{1, \{\lambda s'.\lambda S.\forall s(R(s')(s)\supset S(s)), \lambda s'.[\text{A. u. } t_1]^{s'}\}\}\}$
$\{\lambda s'.\lambda P.\exists x({}_p[{}_{<e,t>}\text{Sharp SH903i}]^{s'}(x)\&P(x)), \{1, \{\lambda s'.\forall s(R(s')(s)\supset [\text{Alice use } t_1]^{s})\}\}$
$\{\lambda s'.\lambda P.\exists x({}_p[{}_{<e,t>}\text{Sharp SH903i}]^{s'}(x)\&P(x)), \lambda s'.\lambda y.\forall s(R(s')(s)\supset [\text{Alice use } t_y]^{s})\}$
$\lambda s'.\exists x({}_p[{}_{<e,t>}\text{Sharp SH903i}]^{s'}(x)\& \lambda y.\forall s(R(s')(s)\supset [\text{Alice use } t_y]^{s})(x))$
$\lambda s'.\exists x({}_p[{}_{<e,t>}\text{Sharp SH903i}]^{s'}(x)\& \forall s(R(s')(s)\supset [\text{Alice use } t_x]^{s}))$
when evaluated relative to @:
$\exists x({}_p[{}_{<e,t>}\text{Sharp SH903i}]^{@}(x)\& \forall s(R(@)(s)\supset [\text{Alice use } t_x]^{s}))$

I label the derived readings that resulted from the interpretations of the logical forms A and B of 1b respectively as 1bi and 1bii, instead of simply putting 1bA and 1bB. The reason for this shift is that as we will see later when we consider other readings of 1a and 1b, there is not a one to one correspondence between logical forms and pre-theoretically distinguishable readings. Some logical forms of these sentences will support two pre-theoretically distinguishable readings.[121]

Now let's consider 1a.

1a [to satisfy Claire's wish] Alice must use a Japanese mobile which is out of production.

[121] For example, eventually we will distinguish between five readings of 1a, which derive from three distinct logical forms. First we will see how two logical forms that can be assumed by 1a give rise to the three readings to be described just below. Later we will discern one more logical form giving rise to further two readings.

1a too has distinguishable readings which depend on the way the noun phrase *a Japanese mobile which is out of production* takes scope relative to *must*.

First, 1a has a reading which will be true if and only if at all worlds w in which Alice satisfies Claire's wishes Alice uses a token at w of a Japanese mobile model which is out of production at w. This is the *de dicto* reading of 1a which corresponds to the reading i of 1b. According to this reading there is neither an actual specific out of production Japanese model nor an actual specific token, which Alice must use to satisfy Claire. Claire is satisfied in a world w, provided only that Alice uses at w a token at w of a Japanese model out of production at w.

Second, 1a has a reading which will be true if and only if there is an actual token of an actually out of production Japanese model such that at all worlds w in which Claire's wishes are satisfied Alice uses that token of that model. This is the *de re* reading of 1a which corresponds to the reading ii of 1b. According to this reading there is a specific actual token of a specific actually out of production Japanese model which Alice must use to satisfy Claire.

Now, in the case of 1a a further *de re* reading can be distinguished from the previous two readings. According to this reading 1a is true if and only there is a Japanese mobile actually out of production such that at all worlds w in which Claire's wishes are satisfied Alice uses a token at w of that model. This is a *de re* reading which does not have a parallel in the case of 1b. This is so because unlike *a Sharp SH903i*, *a Japanese actually out of production* can also be interpreted as a taxonomic indefinite singular, the denotations of which apply to kind-level predicative denotations. According to this third reading of 1a there is a specific Japanese model actually out of production such that Alice must use its tokens to satisfy Claire; but differently from the second reading of 1a described above, there is not a specific actual token of that model which Alice must use. There are different worlds w, w' in which Claire is satisfied although Alice uses different tokens of that model at w and at w'.

The first two readings of 1a can get different truth-values. If Claire asks Alice just to acquire and use a token of an out of production Japanese model without specifying a model or a token, then the first reading will be true but the second reading will be false. There will not be any specific actual token which Alice must use to satisfy Claire.

Again under the same scenario that Claire asks Alice just to acquire and use a token of an out of production Japanese model without specifying a model or a token, the first reading will be true but the third reading will be false. As there will not be any specific actually out of production model such that Alice must use its tokens to satisfy Claire.

The second and the third readings of 1a too can get different truth values. If for example Claire specifically asks Alice to use a token of Sharp SH903i, which is Japanese and actually out of production, but without specifying any specific token of that model then the third reading will be true but the second reading will be false. As there will not be any specific actual token which Alice must use to satisfy Claire.

These three non-equivalent readings of 1a too depend on the existence of different logical forms for 1a in which the indefinite noun phrase *a Japanese* *mobile which is out of production* takes narrow or wide scope relative to *must*. These logical forms are the following:

1 a [to satisfy Claire's wish] Alice must use a Japanese mobile which is out of production.

1aA [$_S$[$_T$ must] [$_S$[$_{NP}$ a J. mobile which is out of production]$_1$[1 [$_S$ Alice uses t_1]]]]]

1aB [$_S$[$_{NP}$ a Japanese mobile which is out of production]$_1$[1 [[$_T$ must][$_S$ Alice uses t_1]]]]

In the case of 1a however this scope ambiguity gives way to three, rather than two non-equivalent readings. This can be explained in the following way. The exclusively kind-level relative clause *which is out of production* forces a taxonomic interpretation for the common noun *Japanese mobile which is out of production*. As we have seen in the previous chapter regardless we adopt the C-framework or the K-framework taxonomic common nouns are assigned predicative denotations that apply to kinds. Thus the indefinite noun phrase *a Japanese mobile which is out of production* is formed by a taxonomic common noun. So long as this indefinite singular phrase is used in kind level sentential contexts, it will be interpreted as a taxonomic indefinite phrase. For example as in,

The product manager plans to relaunch a Japanese mobile which is out of production

But in 1aA and 1aB it semantically composes with constituents that are originally particular level due their being formed around the particular level verb *use*:

[1 [$_S$ Alice uses t_1]]
[1 [[$_T$ must][$_S$ Alice uses t_1]]]

To get a sensible interpretation this discrepancy should somehow be resolved. The theoretical machinery of both the K-framework and the C-framework regarding the taxonomic common nouns is the same and it allows two ways of resolving such discrepancies. One by lowering the meaning of *[$_N$ a Japanese mobile which is out of production]* from kind level into particular level and the other by raising the meanings *[1 [$_S$ Alice uses t_1]]* and *[1 [[$_T$ must][$_S$ Alice uses t_1]]]* into kind level.

The first way will be the interpretation of *a Japanese mobile which is out of production* as a particular level indefinite phrase. In the previous chapter we have assumed that taxonomic appliers always have the option to be interpreted as particular level appliers through the application of detax to their meaning. If the meaning of the taxonomic common noun *Japanese mobile which is out of production* undergoes detax, it will yield a particular level predicative meaning which applies to the tokens of the kinds it originally denotes. Then *a Japanese mobile which is out of production* will be a particular level indefinite and its meaning can sensibly compose with the meanings of *[1 [$_S$ Alice uses t_1]]* and *[1 [[$_T$ must][$_S$ Alice uses t_1]]]*.

The other way to set things straight will be to keep the indefinite phrase *[a Japanese mobile which is out of production]* kind level but highering up the meanings of *[1 [$_S$ Alice uses t_1]]* and *[1 [[$_T$ must][$_S$ Alice uses t_1]]]* into kind level. This will be accomplished by interpreting the trace t_1 as kind level and applying DKP to the meaning of *use* to enable it to compose sensibly with t_1.

As indicated in the first scenario under both the C-framework and the K-framework the operator detax, already introduced and motivated in the previous chapter, will be involved.

let α be a kind level meaning of type <s,e>:
$detax(\alpha)=\lambda s'.\lambda x.\exists z(\alpha(s')(z) \& I(s')(x,z))$

And via the application of detax to the meaning of the taxonomic common noun the indefinite *a Japanese mobile which is out of production* will be interpreted as a particular level phrase in the following way:

$[\![[[_D a]\ [_N \text{Japanese mobile which is out of production}]]]\!]$
$\{\lambda s'.\lambda Q.\lambda P.\exists x(Q(x)\&P(x)), detax(\lambda s'._k[_{<e,t>}\text{J. mobile which is out of production}]^{s'})\}$
$\{\lambda s'.\lambda Q.\lambda P.\exists x(Q(x)\&P(x)), \lambda s'.\lambda y.\exists z(_k[_{<e,t>}\text{J. m. which is out of p.}]^{s'}(z)\&I(s')(y,z))\}$
$\lambda s'.\lambda P.\exists x(\exists z([\text{Japanese mobile which is out of production}]^{s'}(z)\&I(s')(x,z)) \& P(x))$

In the second scenario *[1 [$_S$ Alice uses t_1]]* and *[1 [[$_T$ must][$_S$ Alice uses t_1]]]* will receive kind level interpretations through the interpretation of *[$_S$ Alice uses t_1]* in in such a way that the trace *t_1* is interpreted as a kind designator and the meaning of *use* is DKP'ed.:

Let α be a meaning of type $<s,<e_p,a>>$, where a can be any of the types t, <e,t>, <e,<e,t>>, <e,<e,<e,t>>> …
$DKP(\alpha)=\lambda s'.\lambda z_k.\exists y(I(s')(y)(z_k) \& \alpha(s')(y))$, if a=t
$DKP(\alpha)=\lambda s'.\lambda z_k.\lambda x.\exists y(I(s')(y)(z_k) \& \alpha(s')(y)(x))$, if a=<e,t>
$DKP(\alpha)=\lambda s'.\lambda z_k.\lambda x'.\lambda x''\exists y(I(s')(y)(z_k) \& \alpha(s')(y)(x')(x''))$, if a=<e,<e,t>>
…

$[\![[_S \text{Alice uses } t_1]]\!]$
$[\![[[\text{Alice}][[\text{uses}][t_1]]]\!]$
$\{\lambda s.[\text{Alice}]^s, \{\lambda s.[\text{uses}]^s, \lambda s._k[_e t_1]^{s,g}\}\}$ *sortal discrepancy*
$\{\lambda s.[\text{Alice}]^s, \{DKP(\lambda s.[\text{uses}]^s), \lambda s._k[_e t_1]^{s,g}\}\}$
$\{\lambda s.[\text{Alice}]^s, \{\lambda s.\lambda x.\lambda z_k.\exists y(I(s)(y,z_k) \& [\text{uses}]^s(y)(x)), \lambda s._k[_e t_1]^{s,g}\}\}$
$\{\lambda s.[\text{Alice}]^s, \lambda s.\lambda x.\exists y(I(s)(y,[t_1]^{s,g}) \& [\text{uses}]^s(y)(x))\}$
$\lambda s.\exists y(I(s)(y,[t_1]^{s,g}) \& [\text{uses}]^s(y)([\text{Alice}]^s))$

When in 1a *a Japanese mobile which is out of production* takes narrow scope relative to *must* (1aA) the described two ways of resolving the sortal discrepancy gives exactly the same truth conditions, and thus no non-equivalent pair of *de dicto* readings results.

1aA $[_S[_T \text{must}]\ [_S[_{NP}[_D \text{a}]\ [_N \text{J. mobile which is out of production}]]_1[1\ [_S \text{Alice uses } t_1]]]]$

1ai, obtained from 1aA by interpreting [$_{NP}$ a Japanese mobile which is out of production] as a particular level phrase through the application of Detax to [$_N$Japanese mobile which is out of production]:

$\llbracket[\text{must}]\ [[[\text{a}][\text{Japanese mobile which is out of production}]]_1\ [1\ [_S \text{Alice uses } t_1]]]\rrbracket$

$\{\lambda s'.\lambda S.\forall s(R(s')(s)\supset S(s)),\{\{\lambda s'.\lambda Q.\lambda P.\exists x(Q(x)\&P(x)),\text{detax}(\lambda s'.{}_k[_{<e,t>}\text{J.}])\},\lambda s'.\lambda y.[\text{A.u.}t_y]^{s'}\}\}$

$\{\lambda s'.\lambda S.\forall s(R(s')(s)\supset S(s)),\{\{\lambda s'.\lambda Q.\lambda P.\exists x(Q(x)\&P(x)),\lambda s'.\lambda x.\exists z({}_k[_{<e,t>}\text{J.}]^{s'}(z)\&I(s')(x,z))\}, \lambda s'.\lambda y.[\text{A.u. }t_y]^{s'}\}\}$

$\{\lambda s'.\lambda S.\forall s(R(s')(s)\supset S(s)),\{\lambda s'.\lambda P.\exists x(\exists z({}_k[_{<e,t>}\text{J.}]^{s'}(z)\&I(s')(x,z)) \& P(x)),\lambda s'.\lambda y.[\text{A.u. }t_y]^{s'}\}\}$

$\{\lambda s'.\lambda S.\forall s(R(s')(s)\supset S(s)), \lambda s'.\exists x(\exists z({}_k[_{<e,t>}\text{Japanese} \ldots]^{s'}(z)\&I(s')(x,z)) \& [\text{Alice use } t_x]^{s'})\}$

$\lambda s'.\forall s(R(s')(s)\supset \exists x(\exists z({}_k[_{<e,t>}\text{Japanese} \ldots]^{s}(z)\&I(s)(x,z)) \& [\text{Alice use } t_x]^{s}))$

when evaluated relative to @:

$\forall s(R(@)(s)\supset \exists x(\exists z({}_k[_{<e,t>}\text{Japanese} \ldots]^{s}(z)\&I(s)(x,z)) \& [\text{Alice use } t_x]^{s}))$

$\forall s(R(@)(s)\supset \exists x\exists z(({}_k[_{<e,t>}\text{Japanese} \ldots]^{s}(z)\&I(s)(x,z)) \& [\text{Alice use } t_x]^{s}))$

1ai, obtained from 1aA by interpreting both [$_{NP}$ a Japanese mobile which is out of production] and [1 [$_S$Alice uses t_1]] as kind level constituents treating t_1 as kind level and using DKP:

$\llbracket[_T \text{must}]\ [_S[_{NP} \text{a Japanese mobile which is out of production}]_1[1\ [_S \text{Alice uses } t_1]]]]\rrbracket$

$\{\lambda s'.\lambda S.\forall s(R(s')(s)\supset S(s)),\{\lambda s'.\lambda P.\exists z({}_k[_{<e,t>}\text{J.}]^{s'}(z)\&P(z)),\{1,\lambda s'.\exists y(I(s')(y,[t_1]^{s',g})\&[\text{u.}]^{s'}(y)(\ [\text{A.}]^{s'}))\}\}\}$

$\{\lambda s'.\lambda S.\forall s(R(s')(s)\supset S(s)),\{\lambda s'.\lambda P.\exists z({}_k[_{<e,t>}\text{J.}]^{s'}(z)\&P(z)),\lambda s.\lambda x.\exists y(I(s')(y,x)\&[\text{u.}]^{s}(y)([\text{A.}]^{s}))\}\}$

$\{\lambda s'.\lambda S.\forall s(R(s')(s)\supset S(s)),\lambda s'.\exists z({}_k[_{<e,t>}\text{J.}]^{s'}(z) \& \exists y(I(s')(y, z) \& [\text{uses}]^{s'}(y)([\text{Alice}]^{s'})))\}$

$\lambda s'.\forall s(R(s')(s)\supset \exists z({}_k[_{<e,t>} \text{Japanese...}]^{s}(z) \& \exists y(I(s)(y, z) \& [\text{uses}]^{s}(y)([\text{Alice}]^{s}))))$

when evaluated relative to @:

$\forall s(R(@)(s)\supset \exists z({}_k[_{<e,t>} \text{Japanese}\ldots]^{s}(z) \& \exists y(I(s)(y, z) \& [\text{uses}]^{s}(y)([\text{Alice}]^{s}))))$

$\forall s(R(@)(s)\supset \exists y\ \exists z(({}_k[_{<e,t>} \text{Japanese}\ldots]^{s}(z) \& I(s)(y, z)) \& [\text{uses}]^{s}(y)([\text{Alice}]^{s})))$

With innocuous rearrangements in the end formulas it can be seen that both of these ways of interpreting 1aA yields the same truth-conditions. The determined truth conditions can be expressed as,

truth at @ iff all worlds w in which the wishes Claire has at @ are realized are such that there is an instance at w of a Japanese mobile model out of production at w which Alice uses at w.

These truth conditions are exactly the truth conditions corresponding to the reading we have above singled out as the *de dicto* reading or the first reading of 1a (heretofore we will label it as 1ai).

Now let's consider the interpretation of the logical form 1aB, the one in which *a Japanese mobile which is out of production* takes wide scope relative to *must*:

1aB $[_S[_{NP}\text{a Japanese mobile which is out of production}]_1[1\ [[_T\text{must}][_S\text{Alice uses } t_1]]]]$

In this case, the two ways of resolving the discrepancy between *$[_{NP}$a Japanese mobile which is out of production]* and *$[1[[_T$must$][_S$Alice uses $t_1]]]]$* will give rise to different truth-conditions. Whence will be explained the non-equivalent second and third readings of 1a, both of which are *de re*. I first consider the interpretation of 1aB in which *a Japanese mobile which is out of production* is interpreted as a particular level indefinite phrase with *Japanese mobile which is out of production*'s meaning undergoing detax:

1aB $[_S[_{NP}\text{a Japanese mobile which is out of production}]_1[1\ [[_T\text{must}][_S\text{Alice uses } t_1]]]]$

1aii, obtained from 1aB by interpreting $[_{NP}$ a Japanese mobile which is out of production] as a particular level phrase through the application of Detax to $[_N$Japanese mobile which is out of production]:

$[\![[_{NP}[_D\text{a}]\ [_N\text{Japanese mobile which is out of production}]]_1[1\ [[_T\text{must}][_S\text{Alice uses } t_1]]]]]\!]$

$\{\{\lambda s'.\lambda Q.\lambda P.\exists x((Q(x)\&P(x)),detax(\lambda s'._k[_{<e,t>}J.]^{s'})\},\{1,\{\lambda s'.\lambda S.\forall s(R(s')(s)\supset S(s)),\lambda s'.[A.u.\ t_1]^{s'}\}\}\}$

$\{\{\lambda s'.\lambda Q.\lambda P.\exists x((Q(x)\&P(x)),\lambda s'.\lambda x.\exists z(_k[_{<e,t>}J.]^{s'}(z)\&I(s')(x,z))\},\{1,\{\lambda s'.\lambda S.\forall s(R(s')(s)\supset S(s)),\lambda s'.[A.\ u.\ t_1]^{s'}\}\}\}$

$\{\lambda s'.\lambda P.\exists x(\exists z(_k[_{<e,t>}J.]^{s'}(z)\&I(s')(x,z))\&P(x)),\{1,\{\lambda s'.\lambda S.\forall s(R(s')(s)\supset S(s)),\lambda s'.[A.u.\ t_1]^{s'}\}\}\}$

$\{\lambda s'.\lambda P.\exists x(\exists z(_k[_{<e,t>}J.]^{s'}(z)\&I(s')(x,z))\ \&\ P(x)),\ \{1,\ \{\lambda s'.\forall s(R(s')(s)\supset[\text{Alice use } t_1]^s)\}\}$

$\{\lambda s'.\lambda P.\exists x(\exists z(_k[_{<e,t>}J.]^{s'}(z)\&I(s')(x,z))\ \&\ P(x)),\ \lambda s'.\lambda y.\forall s(R(s')(s)\supset[\text{Alice use } t_y]^s)\}$

$\lambda s'.\exists x(\exists z(_k[_{<e,t>}\text{Japanese} \ldots]^{s'}(z)\&I(s')(x,z))\ \&\ \forall s(R(s')(s)\supset[\text{Alice use } t_x]^s))$

when evaluated relative to @:

$\exists x(\exists z(_k[_{<e,t>}\text{Japanese} \ldots]^{@}(z)\&I(@)(x,z))\ \&\ \forall s(R(@)(s)\supset[\text{Alice use } t_x]^s))$

$\exists x\exists z((_k[_{<e,t>}\text{Japanese} \ldots]^{@}(z)\&I(@)(x,z))\ \&\ \forall s(R(@)(s)\supset[\text{Alice use } t_x]^s))$

The derived truth-conditions can be expressed in the following way:

truth relative to @ iff there is an instance x at @ of a Japanese mobile model z out of production at @ such that for all worlds w in which the wishes Claire has at @ is realized Alice uses x at w

These truth-conditions are the same as those associated with the previously described second reading of 1a.

Now I consider the interpretation of 1aB in which *$[_{NP}$ a Japanese mobile which is out of production$]_1$* is interpreted as kind level and t_1 is treated as a kind level trace:

1aB $[_S[_{NP}$ a J. mobile which is out of production$]_1[1\ [[_T$ must$]$ $[[$Alice$][[$uses$][t_1]]]]]]$

1aiii, derived from 1aB by interpreting $[_{NP}$ a Japanese mobile which is out of production$]_1$ as kind level and treating the trace t_1 as a kind designator:

$[\![[_{NP}$ a Japanese mobile which is out of production$]_1[[_T$ must$]$ $[[$Alice$][[$uses$][t_1]]]]]]\!]$

$$\{\lambda s'.\lambda P.\exists z({}_{k}[_{\langle e,t\rangle}J.]^{s'}(z)\&P(z)),\{1,\{\lambda s'.\lambda S.\forall s(R(s')(s)\supset S(s)),\{\lambda s'.[A]^{s'},\{\lambda s'.[u]^{s'},\lambda s'.{}_{k}[_{e}t_1]^{s',g}\}\}\}\}\}$$

$$\{\lambda s'.\lambda P.\exists z({}_{k}[_{\langle e,t\rangle}J.]^{s'}(z)\&P(z)),\{1,\{\lambda s'.\lambda S.\forall s(R(s')(s)\supset S(s)),\{\lambda s.[A]^{s'},\{DKP(\lambda s'.[u]^{s'}),\lambda s'.{}_{k}[_{e}t_1]^{s',g}\}\}\}\}\}$$

$$\{\lambda s'.\lambda P.\exists z({}_{k}[_{\langle e,t\rangle}J.]^{s'}(z)\&P(z)),\{1,\{\lambda s'.\lambda S.\forall s(R(s')(s)\supset S(s)),\lambda s'.\exists y(I(s')(y,[t_1]^{s',g})\&[u]^{s'}(y)([A]^{s'}))\}\}\}$$

$$\{\lambda s'.\lambda P.\exists z({}_{k}[_{\langle e,t\rangle}J.]^{s'}(z)\&P(z)),\{1,\lambda s'.\forall s(R(s')(s)\supset\exists y(I(s)(y,[t_1]^{s,g})\&[u.]^{s}(y)([A.]^{s})))\}\}$$

$$\{\lambda s'.\lambda P.\exists z({}_{k}[_{\langle e,t\rangle}J.]^{s'}(z)\&P(z)),\lambda s'.\lambda x.\forall s(R(s')(s)\supset\exists y(I(s)(y,x)\ \&\ [uses]^{s}(y)([Alice]^{s})))\}$$

$$\lambda s'.\exists z({}_{k}[_{\langle e,t\rangle}Jap\ldots]^{s'}(z)\&\ \forall s(R(s')(s)\supset\exists y(I(s)(y,z)\ \&\ [uses]^{s}(y)([Alice]^{s}))))$$

when evaluated relative to @:

$$\exists z({}_{k}[_{\langle e,t\rangle}\ Japanese\ldots]^{@}(z)\&\ \forall s(R(@)(s)\supset\exists y(I(s)(y,z)\ \&\ [uses]^{s}(y)([Alice]^{s}))))$$

The truth-conditions 1aiii derived above through the interpretation of 1aB where *$[1\ [[_T$ must$][_S$ Alice uses $t_1]]]$* is interpreted as a kind level constituent can be expressed in the following way:

truth relative to @ iff there is a Japanese mobile model z out of production at @ such that for all worlds w in which the wishes Claire has at @ is realized there is a token y of z at w and Alice uses y at w

These truth-conditions (1aiii) are the same as those associated with the third reading of 1a, previously described. And they are different from the truth conditions 1aii that resulted from the previous interpretation 1aB where the sortal discrepancy was resolved in another way –by reinterpreting *a Japanese* *mobile which is out of production* as a particular level indefinite phrase. To compare these two truth conditions I reproduce the formulas that represent their evaluation relative to @ together below:

1aB $[_S[_{NP}$ a Japanese mobile which is out of production$]_1[1\ [[_T$ must$][_S$ Alice uses $t_1]]]]$

1aii $\exists x \exists z((_k[_{<e,t>}$Japanese …$]^@(z) \& I(@)(x,z)) \ \& \ \forall s(R(@)(s) \supset [$Alice use $t_x]^s))$

1aiii $\exists z(_k[_{<e,t>}$ Japanese…$]^@(z) \ \& \ \forall s(R(@)(s) \supset \exists y(I(s)(y,z) \ \& \ [$uses$]^s(y)([$Alice$]^s))))$

1aii is true if and only if there is an actual token of an actually out of production Japanese mobile such that Alice uses that in all worlds that satisfy Claire's wishes. 1aii is responsible for the previously described second reading of 1a. 1aiii on the other hand is true if and only if there actually is an out of production Japanese mobile model such that in all worlds that satisfy Claire's wishes Alice uses a token of that model. According to 1aiii, differently from 1aii, there need not be a specific actual token which Alice must use. 1aiii, is responsible for the previously described third reading of 1a.

Implications of the Preceding Discussion on the Rigidity of Common Nouns

Remember that we wanted to compare the sets of readings that result for 1a and 1b when the common nouns *Japanese mobile which is out of production* and *Sharp SH903i* involved in them take wide scope or narrow scope relative to *must*. We wanted to see whether there is any dissimilarity in these sets, for example a reading among the readings of 1a which does not have any counterpart among the readings of 1b, which could then be explained by the non-rigidity of *Japanese mobile which is out of production* and the rigidity of *Sharp SH903i*. To this end we have considered the readings of 1a and 1b that result when the indefinite noun phrases *a Japanese mobile which is out of production* and *a Sharp SH903i* take wide scope or narrow scope relative to *must*. These indefinite phrases are formed by the common nouns *Japanese mobile which is out of production* and *Sharp SH903i*, and thus when they take narrow scope or wide scope relative to *must* these common nouns that form them as well take wide scope or narrow scope relative to *must* . We have seen that each of 1a and 1b have non-equivalent readings that result from the different ways *a Japanese mobile which is out of production* and *a Sharp SH903i* respectively takes scope relative to *must*. As a matter of fact we have discerned a dissimilarity between the readings of 1a and 1b. 1a had two non-equivalent readings in which the indefinite noun phrase *a Japanese mobile which is out of production* took wide scope, instead of one such reading in the case of 1b. But this difference was explainable by reference to the different available ways of resolving the sortal discrepancy that obtains between the kind level denotation of *a Japanese mobile which is out of production* and the particular level sentential context in which its trace t_1 occured. Apart from this difference there was no difference significant for us between the readings of 1a and 1b so far considered. Both indefinite noun phrases' taking wide scope or narrow scope relative to *must* produced non-equivalent readings. Thus, the comparison of these readings of 1a and 1b does not give us a reason to assume that one of *Japanese mobile which is out of production* and *Sharp SH903i* is rigid and the other is non-rigid.

Prima facie, the non-equivalent readings resulting from the different ways the noun phrases *a Japanese mobile which is out of production* and *a Sharp SH903i* take scope may nonetheless be taken to indicate that the common nouns forming these noun phrases should be non-rigid. However this is not the case. Even if we assume for example that *Sharp SH903i* is rigid, the reading of 1b when *a Sharp SH903i* takes wide scope will not be equivalent to its reading when it takes narrow scope. And this is so regardless whether we interpret *Sharp SH903i* according to the K-framework or the C-framework. To see this, let's first fix under the K-framework the denotation of *Sharp SH903i* to be the kind k for all possible worlds. Then the previously given interpretations of 1b corresponding to logical forms in which *a Sharp SH903i* takes wide scope and narrow scope will be thus:

1 b [to satisfy Claire's wish] Alice must use a Sharp SH903i.

1bA $[[_T \text{must}]\ [_S[_{NP}\text{a Sharp SH903i}]_1[1\ [_S\text{Alice use } t_1]]]]]$

$1bi_K$ $\lambda s'.\forall s(R(s')(s) \supset \exists x(I(s)(x,[\text{Sharp SH903i}]^s)\ \&\ [\text{Alice uses } t_x]^s))$

when evaluated relative to @:

$\forall s(R(@)(s) \supset \exists x(I(s)(x,[\text{Sharp SH903i}]^s)\ \&\ [\text{Alice use } t_x]^s))$

when evaluated relative to @ with k as the designatum of 'Sharp SH903i' for all possible worlds:

$\forall s(R(@)(s) \supset \exists x(I(s)(x,k)\ \&\ [\text{Alice use } t_x]^s))$

1bB $[_S[_{NP}\text{a Sharp SH903i}]_1[1\ [[_T\text{must}][_S\text{Alice uses } t_1]]]]$

$1bii_K$ $\lambda s'.\exists x(I(s')(x,[\text{Sharp SH903i}]^{s'})\&\ \forall s(R(s')(s)\supset [\text{Alice use } t_x]^s))$

when evaluated relative to @:

$\exists x(I(@)(x,[\text{Sharp SH903i}]^{@})\&\ \forall s(R(@)(s)\supset [\text{Alice use } t_x]^s))$

when evaluated relative to @ with k as the designatum of 'Sharp SH903i' for all possible worlds:

$\exists x(I(@)(x,k)\&\ \forall s(R(@)(s)\supset [\text{Alice use } t_x]^s))$

Note that when the meanings $1bi_K$ and $1bii_K$ are evaluated relative to @ and *Sharp SH903i* is taken to rigidly designate k the resulting evaluations are still non-equivalent:

$1bi_K$ $\forall s(R(@)(s) \supset \exists x(I(s)(x,k) \ \& \ [\text{Alice use } t_x]^s))$
$1bii_K$ $\exists x(I(@)(x,k) \& \forall s(R(@)(s) \supset [\text{Alice use } t_x]^s))$

$1bi_K$ will be true if and only if for all w in which Claire's wishes at @ are realized there is a token x of k at w which Alice uses at w. Note that the x's which Alice uses in the worlds w in which Claire is satisfied may be different. On the other hand $1bii_K$ will be true if and only if there is token x of k at @ such that for all worlds w in which Claire is satisfied Alice uses x at w. Note that for the truth of 1b under the interpretation $1bii_K$, in all the worlds w in which Claire is satisfied Alice must use the very same x.

Now, let's consider whether 1b will still have the non-equivalent readings $1bi_C$ and $1bii_C$ if we assume, *per impossible*, that *Sharp SH903i* is a rigid applier under the C-framework. Let's fix Q, a function of type <e,t>, to be denotation of *Sharp SH903i* for all possible worlds.

1 b [to satisfy Claire's wish] Alice must use a Sharp SH903i.

1bA $[[_T \text{must}]\ [_S[_{NP} \text{a Sharp SH903i}]_1[1\ [_S \text{Alice use } t_1]]]]]$
$1bi_C$ $\lambda s'.\forall s(R(s')(s) \supset \exists x({}_p[_{<e,t>}\text{Sharp SH903i}]^s(x) \& \ [\text{Alice use } t_x]^s))$
when evaluated relative to @:
$\forall s(R(@)(s) \supset \exists x({}_p[_{<e,t>}\text{Sharp SH903i}]^s(x) \ \& \ [\text{Alice use } t_x]^s))$
when evaluated relative to @ with Q as the denotation of 'Sharp SH903i' for all possible worlds:
$\forall s(R(@)(s) \supset \exists x(Q(x) \ \& \ [\text{Alice use } t_x]^s))$

1bB $[_S[_{NP} \text{a Sharp SH903i}]_1[1\ [[_T \text{must}][_S \text{Alice uses } t_1]]]]$
$1bii_C$ $\lambda s'.\exists x({}_p[_{<e,t>}\text{Sharp SH903i}]^{s'}(x) \& \forall s(R(s')(s) \supset [\text{Alice use } t_x]^s))$
when evaluated relative to @:
$\exists x({}_p[_{<e,t>}\text{Sharp SH903i}]^@(x) \& \forall s(R(@)(s) \supset [\text{Alice use } t_x]^s))$
when evaluated relative to @ with Q as the denotation of 'Sharp SH903i' for all possible worlds:
$\exists x(Q(x) \& \forall s(R(@)(s) \supset [\text{Alice use } t_x]^s))$

Again when $1bi_C$ and $1bii_C$ are evaluated relative to @ and with *Sharp SH903i* denoting Q at all possible worlds the results will not be equivalent.

1bi$_C$ $\forall s(R(@)(s) \supset \exists x(Q(x) \& [\text{Alice use } t_x]^s))$
1bii$_C$ $\exists x(Q(x) \& \forall s(R(@)(s) \supset [\text{Alice use } t_x]^s))$

1bi$_C$ is true if and only if for all worlds w in which Claire's wishes at @ are realized there is a member x of extQ which Alice uses at w. Note that this interpretation will be true even if in different worlds w in which Claire is satisfied Alice uses different x's.

1bii$_C$ is true if and only if there is a member x of ExtQ such that in all worlds w in which Claire's wishes at @ are realized Alice uses x at w. Note that this interpretation will be true only if in all worlds w in which Claire is satisfied Alice uses the same x in w.

So the rigidity or the non-rigidity of *Sharp SH903i* of 1b does not make any difference with regard to the non equivalence of the readings that result from the logical forms 1bA and 1bB; and this is so regardless whether *Sharp SH903i* is interpreted as an applier (Neo-Carlsonian) or kind designator (Krifka). Clearly the same will hold also for the readings that spawn from 1aA and 1aB and *Japanese mobile which is out of production*. When the indefinite noun phrases *a Japanese mobile which is out of production* and *a Sharp SH903i* take wide scope they yield readings which are not equivalent to the readings that result when they take narrow scope regardless the rigidity or the non-rigidity of the common nouns *Japanese mobile which is out of production* and *Sharp SH903i* that form them.

Thus, from a consideration of the readings of 1a and 1b which result from the indefinite phrases *a Japanese mobile which is out of production* and *a Sharp SH903i* taking wide scope or narrow scope we cannot obtain a reason to take the common nouns *Japanese mobile which is out of production* and *Sharp SH903i* to be rigid or non-rigid. This is so because in the logical forms of 1a and 1b which we have taken into account so far *Japanese mobile which is out of production* and *Sharp SH903i* takes wide scope or narrow scope together with the indefinite noun phrases they form. The non-equivalent readings that result from both 1aA and 1ab, and 1bA and 1bB are due to the different ways the existential operators involved in the interpretation of indefinite phrase arguments interact with *must* when the indefinite phrases take narrow scope or wide scope. And we have seen that the rigidity or non-rigidity of the common nouns that form the indefinite phrases has no effect on that interaction.

To get an evidence about the rigidity or non-rigidity of the common nouns themselves through a comparison of the readings of 1a and 1b we should rather look for and compare the readings that result from logical forms in which the common nouns themselves take wide scope independently of the indefinite noun phrases which they form. That is, we should compare the readings that result from the interpretations of such logical forms as the following:

1 a [to satisfy Claire's wish] Alice must use a Japanese mobile which is out of production.

1aA [[$_T$ must] [$_S$[$_{NP}$ a Japanese mobile which is out of production]$_1$[1 [$_S$ Alice use t_1]]]]]
1aC [$_S$[J. m. which is out of production]$_2$ [2 [[$_T$ must] [$_S$[$_{NP}$ a t_2]$_1$[1 [$_S$ Alice use t_1]]]]]]

1 b [to satisfy Claire's wish] Alice must use a Sharp SH903i.

1bA [[$_T$ must] [$_S$[$_{NP}$ a Sharp SH903i]$_1$[1 [$_S$ Alice use t_1]]]]]
1bC [$_S$[Sharp SH903i]$_2$ [2 [[$_T$ must] [$_S$[$_{NP}$ a t_2]$_1$[1 [$_S$ Alice use t_1]]]]]]

Yet the question is, are there such logical forms and readings corresponding to them? Count common nouns in English cannot constitute arguments by themselves. And scope taking (movement) is commonly thought to be a capability of arguments alone. If this is indeed the case then 1a and 1b cannot assume the indicated logical forms in which a common noun takes wide scope independently of the noun phrase which it forms. And thus we cannot have a chance to construe an evidence about the rigidity or non-rigidity of common nouns on the basis of a comparison of the different readings of modal sentences in which they figure. In the next section I will relate the evidence that modal sentences involving indefinite singular arguments indeed have readings which can be thought to result from logical forms in which the common nouns that form indefinite singular phrases take wide scope over the modal operator independently of the indefinite noun phrases that they form.

The Third Reading: Non-specific *de re*

There is plausible evidence that there are readings of modal sentences involving indefinite noun phrase arguments which can explained by logical forms in which the common nouns forming these indefinite noun phrases take wide scope over the modal operator independently of the noun phrases that they form.

In this vein Heim and Fintel (2011) cites and discuss examples similar to the one below:[122]

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[122] This sentence is combined from the different parts of two sentences which Heim and Fintel (2011) actually discuss in this vein ("A Problem: Additional Readings and Scope Paradoxes"). Namely, *Mary wants to buy a hat just like mine* and *Mary hopes that a friend of mine will win the race* . I could but I did not discuss these examples. Because *hat just like mine* can be taxonomically interpreted as well, thereby leading to unnecessary complications. And as regard

2 Mary wants to marry a friend of mine.

This sentence has three non-equivalent readings. First it can be used to state that what Mary wants is to marry a friend of mine, whoever my friends may be. This is the de dicto reading. According to this reading, if I had friends other than the ones I actually have, Mary would be satisfied only if she married one of these hypothetical friends rather than the ones I actually have. Second, 2 can be used to state that there actually is a specific friend of mine such that Mary wants to marry him. This is the familiar de re reading. According to this second reading, there is an actual friend of mine such that even if I had friends completely different than the ones I actually have, Mary would be satisfied only if she married that actual friend of mine.

In addition to these familiar *de re* and *de dicto* readings, one can discern a third reading of 2. It seems that 2 can also be used to state that what Mary wants is to marry one or another of my actual friends. According to this third reading there is not a specific actual friend of mine such that she would be satisfied only if she married him. Still, if my friends were completely different than the ones I actually have, Mary would still be satisfied only if she married one or another of my actual friends, rather than any of my hypothetical friends. This third reading is called non-specific *de re* reading. The reading is about my actual friends but it is not about any specific ones among them.

Assuming modal quantification analysis of *want* we can state the truth conditions of these readings in the following way.

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the second example by Heim & Fintel, it involves the verb *hope* and I did not want to get entangled in questions concerning its interpretation as a mere way modal quantification.

The *de dicto* reading is true relative to @ if and only if for all worlds w in which what Mary's desires at @ is realized Mary marries in w a person x who is a friend of mine at w.

The ordinary *de re* reading is true relative to @ if and only if there is a friend of mine x at @ such that for all worlds w in which Mary's desires at @ is realized Mary marries x at w.

The non-specific *de re* reading is true relative to @ if and only if for all worlds w at which Mary's desires are satisfied she marries at w one or another of my friends relative to @.

The existence of these non-equivalent readings of 2 can be ascertained by considering scenarios in which they will get different truth values. Suppose that Mary actually wants to marry the guy who actually is at the door with a glass of martini at his hand, and that that guy actually happens to be a friend of mine. Then, the second reading will be true, because there is an actual friend of mine x such that at all worlds w in which Mary is satisified she is married with x. However then the first reading will be false because there surely will be worlds w' such that Mary is satisfied in w' as she is married with x at w', but x is not a friend of mine at w'.

Now to distinguish between the second and third readings, and the first and the third readings of 2 consider the following scenario. Suppose Mary wants to marry one of the people who are actually in the next room, just anyone would do, and all of these people actually happen to be my friends. Then the third reading is true. At all worlds w in which Mary is satisified, she is married to one or another of my actual friends. But then the second reading is false: there surely are two worlds w' and w'' such that Mary is satisfied in both of w' and w'', and she is married to different actual friends of mine at w' and w''; so it is not the case that there is an actual friend of mine x such that at all worlds w in which Mary is satisfied she is married with x. The first reading will also be false: surely there is a world w'such that Mary is satisfied at w' and she is married at w' with x, one of my actual friends who actually happens to be in the next room, but x is not a friend of mine at w'; so it is not the case that at all worlds w in which Mary is satisified Mary is married with a person who is my friend at w.

There is nothing novel for us in accounting for the first and the second readings of 2. These respectively happen to be the readings that result from the narrow scope interpretation of *a friend of mine* and wide scope interpretation of *a friend of mine* relative to the modal *want*.[123]

2A $[_S [\text{Marry}]_2 [[\text{want}] [_S[_{NP}\,\text{a friend of mine}]_1[1 [_S\,\text{PRO}_2 [\text{ marry } t_1]]]]]]$

2i, derived from 2A:
$[\![[_S [\text{Marry}]_2 [[_T\,\text{want}] [_S[_{NP}\,\text{a friend of mine}]_1[1 [_S\,\text{PRO}_2 [\text{ marry } t_1]]]]]]]\!]$
$\{\lambda s'.[\text{M.}]^{s'},\{\lambda s'.\lambda S.\lambda z.\forall s(D(z)(s')(s)\supset S(s)),\{\lambda s'.\lambda P.\exists x(_p[_{<e,t>}f]^{s'}(x)\&P(x)),\lambda s'.\lambda y.[\text{M.m.}t_y]^{s'}\}\}\}$
$\{\lambda s'.[\text{M.}]^{s'},\{\lambda s'.\lambda S.\lambda z.\forall s(D(z)(s')(s)\supset S(s)),\ \lambda s'.\exists x(_p[_{<e,t>}f\ldots]^{s'}(x)\&\ \lambda y.[\text{ M. marry } t_y]^{s'}(x))\}\}$
$\{\lambda s'.[\text{Mary}]^{s'},\ \lambda s'.\lambda z.\forall s(D(z)(s')(s)\supset \exists x(_p[_{<e,t>}\text{friend }\ldots]^{s}(x)\&\ [\text{ Mary marry } t_x]^{s})\}$
$\lambda s'.\forall s(D([\text{Mary}]^{s'})(s')(s)\supset \exists x(_p[_{<e,t>}\text{friend }\ldots]^{s}(x)\ \&\ [\text{ Mary marry } t_x]^{s})$
when evaluated relative to @:
$\forall s(D([\text{Mary}]^{@})(@)(s)\supset \exists x(_p[_{<e,t>}\text{friend }\ldots]^{s}(x)\ \&\ [\text{ Mary marry } t_x]^{s})$

2B $[_S[_{NP}\,\text{a friend of mine}]_1 [1 [_S [\text{Marry}]_2 [[\text{want}] [_S\,\text{PRO}_2 [\text{ marry } t_1]]]]]]$

2ii, derived from 2B:
$\lambda s'.\ [_S[_{NP}\,\text{a friend of mine}]_1 [1 [_S [\text{Marry}]_2 [[\text{want}] [_S\,\text{PRO}_2 [\text{ marry } t_1]]]]]]$
$\{\lambda s'.\lambda P.\exists x(_p[_{<e,t>}\text{f.}]^{s'}(x)\&P(x))',\{1,\{\lambda s'.[\text{M.}]^{s},\{\lambda s'.\lambda S.\lambda z.\forall s(D(z)(s')(s)\supset S(s)),\lambda s'.[\text{M.m.}t_1]^{s'}\}\}\}\}$
$\{\lambda s'.\lambda P.\exists x(_p[_{<e,t>}\text{f.}]^{s'}(x)\&P(x))',\{1,\{\lambda s'.[\text{M.}]^{s},\ \lambda s'.\lambda z.\forall s(D(z)(s')(s)\supset [\text{Mary marry } t_1]^{s})\}\}\}$
$\{\ \lambda s'.\lambda P.\exists x(_p[_{<e,t>}\text{f.}]^{s'}(x)\&P(x))',\ \{1,\ \lambda s'.\forall s(D([\text{Mary}]^{s})(s')(s)\supset [\text{Mary marry } t_1]^{s})\}\}$
$\{\ \lambda s'.\lambda P.\exists x(_p[_{<e,t>}\text{friend }\ldots]^{s'}(x)\&P(x))',\ \ \lambda s'.\lambda y.\forall s(D([\text{Mary}]^{s})(s')(s)\supset [\text{Mary marry } t_y]^{s})\}$

[123] The purpose of the semantic analysis of 2 is to show that there may after all be logical forms in which common nouns like *friend of mine* takes the wide scope independently of its indefinite noun phrase casing. Whether common nouns are primarily kind designators or not is not relevant for the time being. For this reason in the analysis of 2 we simply assume that *friend of mine* is an applier. Later, in the next section when we return to the analysis of 1a and 1b, we will continue to take into account the view that the common nouns may primarily be kind designators.

$\lambda s'.\exists x({}_{p}[_{\langle e,t\rangle}\text{friend} \ldots]^{s'}(x) \& \lambda y.\forall s(D([\text{Mary}]^{s})(s')(s) \supset [\text{Mary marry } t_y]^{s})(x))$
$\lambda s'.\exists x({}_{p}[_{\langle e,t\rangle}\text{friend} \ldots]^{s'}(x) \& \forall s(D([\text{Mary}]^{s})(s')(s) \supset [\text{Mary marry } t_x]^{s}))$
when evaluated relative to @:
$\exists x({}_{p}[_{\langle e,t\rangle}\text{friend} \ldots]^{@}(x) \& \forall s(D([\text{Mary}]^{@})(@)(s) \supset [\text{Mary marry } t_x]^{s}))$

As for the third reading of 2, the non-specific *de re* reading, Heim and Fintel (2011) suggests that it can be derived if we allow the common noun *friend of mine* to be interpreted in the wide scope relative to *want*, whilst the indefinite singular it forms is interpreted in the narrow scope relative to *want*. Thus, they suggest that the desired reading can be derived if 2 can assume a third logical form like the following:[124]

2C $[[\text{friend of mine}]_3\ [3\ [_S\ [\text{Mary}]_2\ [[\text{want}]\ [_S[_{NP}\ a\ t_3\ ]_1[1\ [_S\ \text{PRO}_2\ [\ \text{marry}\ t_1]]]]]]]]$

2iii, derived from 2C:
$[\![[[\text{friend of mine}]_3\ [3\ [_S\ [\text{Mary}]_2\ [[\text{want}]\ [_S[_{NP}\ a\ t_3\ ]_1[1\ [_S\ \text{PRO}_2\ [\ \text{marry}\ t_1]]]]]]]]]\!]$
$\{\lambda s'.[\text{f.}]^{s'},\{3,\{\lambda s'.[\text{M.}]^{s'},\{\lambda s'.\lambda S.\lambda z.\forall s(D(z)(s')(s)\supset S(s)),\{\lambda s'.\lambda P.\exists x({}_{p}[_{\langle e,t\rangle}t_3]^{s'}(x)\&P(x)),\lambda s'.\lambda y.[\text{M.m.}t_y]^{s'}\}\}\}\}\}$
$\{\lambda s'.[\text{f.}]^{s'},\{3,\{\lambda s'.[\text{M.}]^{s'},\{\lambda s'.\lambda S.\lambda z.\forall s(D(z)(s')(s)\supset S(s)),\lambda s'.\exists x({}_{p}[_{\langle e,t\rangle}t_3]^{s'}(x)\&[\text{M.m.}t_x]^{s'})\}\}\}\}$
$\{\lambda s'.[\text{f.}]^{s'}, \{3, \{\lambda s'.[\text{Mary}]^{s'}, \lambda s'.\lambda z.\forall s(D(z)(s')(s)\supset \exists x({}_{p}[_{\langle e,t\rangle}t_3]^{s}(x) \& [\ \text{Mary marry } t_x]^{s})\}\}\}$
$\{\lambda s'.[\text{friend} \ldots]^{s'}, \{3, \lambda s'.\forall s(D([\text{Mary}]^{s'})(s')(s)\supset \exists x({}_{p}[_{\langle e,t\rangle}t_3]^{s}(x) \& [\ \text{Mary marry } t_x]^{s})\}\}$
$\{\lambda s'.[\text{friend} \ldots]^{s'}, \lambda s'.\lambda Q.\forall s(D([\text{Mary}]^{s'})(s')(s)\supset \exists x(Q(x) \& [\ \text{Mary marry } t_x]^{s})\}$
$\lambda s'.\forall s(D([\text{Mary}]^{s'})(s')(s)\supset \exists x([\text{friend} \ldots]^{s'}(x) \& [\ \text{Mary marry } t_x]^{s})$
when evaluated relative to @:
$\forall s(D([\text{Mary}]^{@})(@)(s)\supset \exists x([\text{friend} \ldots]^{@}(x) \& [\ \text{Mary marry } t_x]^{s})$

[124] Heim and Fintel (2011) presents also the standard account for the so called non-specific *de re* reading. According to this standard account common nouns do not move to the wide scope position whilst the noun phrases they form are interpreted in the narrow scope, but they are interpreted *in situ* by an evaluation index which is different than that of the noun phrase which they form, whilst the evaluation index of the noun phrase is bound by *want*. For our purposes, which is to construe an argument for a rigid/non-rigid division among common nouns, these different options to derive the non-specific *de re* reading do not present a difference. In both type of account the effect of the rigidity/non-rigidity of the common nouns to the readings of sentences will be the same.

Note that, provided that the common noun *friend of mine* is not a rigid applier, 2iii can yield a reading which is not equivalent to the *de dicto* reading 2i.[125]

Heim and Fintel (2011) gives a number of examples of modal sentences which have a non-specific *de re* reading besides the familiar *de dicto* and *de re* readings. And it is clear that one can produce many other such examples. In all these cases the non-specific *de re* reading can be derived if one allows for logical forms in which a common noun takes the wide scope relative to the modal predicate whilst the noun phrase which it forms in the surface form is interpreted in the narrow scope. To this account we should critically add that this explanation works if one assumes that the common nouns involved are not rigid appliers.

[125] Heim and Fintel do not explicitly reckon that both the scope based explanation of non-specific *de re* readings proposed by Heim and Fintel and the standard world-variable account they discuss will work only if the common nouns involved are assumed to be non-rigid appliers. They probably do not mention this requirement because they generally assign particular level predicative denotations to common nouns and such denotations are usually not constant across evaluation indexes. However, as we here are specifically interested in the rigidity or non-rigidity of common nouns, it is important for us to reveal this implicit assumption. Furthermore, we here do not take for granted that all common nouns have predicative denotations (the K-framework, which we here follow alongside the C-framework, assign kind designation to simple common nouns); and as we will see below, kind designating common nouns should rather be assumed to be rigid, since modal sentences involving such terms do not have a non-specific *de re* reading which they would be expected to have if they were non-rigid.

Readings in which Common Nouns Are Interpreted in the Wide Scope Independently of the Noun phrases They Form

Non-specific *de re* Readings of 1a

Now let's go back to the sentences in 1 to see that these too have non-specific *de re* readings in addition to the *de dicto* and *de re* readings which we have previously considered. Let's first consider 1a:

1 a [to satisfy Claire's wish] Alice must use a Japanese mobile which is out of production.

Previously we have singled out three non-equivalent readings of 1a. We explained the existence of these readings in the following way. The first one was the *de dicto* reading which resulted from the interpretation of the logical form 1aA where the indefinite singular noun phrase *a Japanese mobile which is out of production* was in the narrow scope relative to *must* (1ai). The second and third readings were *de re* readings which resulted from the logical form 1aB where the indefinite singular *a Japanese mobile which is out of production* was in the wide scope relative to *must*. We explained that 1aB gave rise to two distinct readings because the sortal discrepancy that obtained between the originally kind level indefinite singular *a Japanese mobile which is out of production* and the particular level sentential constituent with which it would semantically compose could be resolved in two different ways which lead to two non-equivalent interpretations. 1aA did not result in two distinct readings although the same discrepancy obtained there as well, because the two different ways of resolving that discrepancy lead exactly to the same interpretation in the case of

1aA. I reproduce below the formulas that represent evaluation of these readings relative to @ and the logical forms from which they were derived.

1aA $[_S[_T \text{must}]\ [_S[_{NP} \text{a J. mobile which is out of production}]_1[1\ [_S \text{Alice uses } t_1]]]]]$

1ai $\forall s(R(@)(s) \supset \exists x \exists z((_k[_{<e,t>} \text{Japanese}\ldots]^s(z)\ \&\ I(s)(x, z))\ \&\ [\text{uses}]^s(x)([\text{Alice}]^s)))$

1aB $[_S[_{NP} \text{a Japanese mobile which is out of production}]_1[1\ [[_T \text{must}][_S \text{Alice uses } t_1]]]]$

1aii $\exists x \exists z((_k[_{<e,t>}\text{Japanese}\ \ldots]^@(z)\&I(@)(x,z))\ \&\ \forall s(R(@)(s) \supset [\text{Alice use } t_x]^s))$

1aiii $\exists z(_k[_{<e,t>} \text{Japanese}\ldots]^@(z)\&\ \forall s(R(@)(s) \supset \exists x(I(s)(x,z)\ \&\ [\text{uses}]^s(x)([\text{Alice}]^s))))$

Now, in addition to these three readings, it seems that 1a has at least further two readings. Fourth, counting on from the previously considered three readings, 1a can be used to say that to satisfy Claire Alice must use one or another of the actual tokens of one or another of Japanese mobile models which are actually out of production. Adopting as before the universal modal quantification analysis of *must*, the truth conditions for this reading can be stated thus:

Fourth reading of 1a:
true relative to @ if and only if the tokens X at @ of Japanese mobile models K out of production at @ are such that for all worlds w in which Claire's wishes at @ are satisfied Alice uses one of X at w.

Note that according to this reading there need neither be a specific actual token nor a specific model of actually out of production Japanese mobiles which Alice must use. Still, again according to this reading, Alice must use one or another of actual tokens of one or another of actually out of production Japanese models.

To distinguish this fourth reading of 1a from the previously considered three readings consider the following scenario. Suppose Claire has actually asked Alice to use one or another of the mobiles actually kept in a certain drawer; and all of these mobiles actually happen to be tokens of actually out of production Japanese models. Then the fourth reading we have just considered will be true. The actual tokens of actually out of production Japanese mobile models are such that for all worlds w in which Claire's actual desires are satisfied Alice uses one of those tokens at w. However under this scenario 1ai, the *de dicto* reading, will be false.

1ai $\forall s(R(@)(s) \supset \exists x \exists y((_{k}[_{<e,t>}\ \text{Japanese}\ldots]^{s}(y)\ \&\ I(s)(x,y))\ \&\ [\text{Alice use}\ t_{x}]^{s}))$

Because, relative to our scenario there surely will be worlds w' such that,

Claire's actual desires are satisfied at w', as at w' Alice uses only x one of the mobiles which are actually in the said drawer. Thus, x was an actual token of an actually out of production Japanese model y. But y is not out of production at w'.

But then, contrary to what is asserted by 1ai, there is a world w' in which Claire's actual desires are satisfied, yet Alice is not using at w' a token at w' of a Japanese model which is out of production at w'.

Again under the same scenario the 1aii, the *de re* reading in which *a Japanese mobile which is out of production* was interpreted in the wide scope as a particular level phrase, will be false.

1aii $\exists x \exists y\ ((_{k}[_{<e,t>}\ \text{Japanese}\ldots]^{@}(y)\ \&\ I(@)(x,y))\&\ \forall s(R(@)(s) \supset [\text{Alice use}\ t_{x}]^{s}))$

Because relative to our scenario there surely are two worlds w' and w'' such that,

Claire's actual desires are satisfied both at w' and w'', as Alice uses only x in w', Alice uses only y in w'', x≠y, and both x and y are actually in the said drawer. Thus x and y are actual tokens of actually out of production Japanese mobile models.

But then, contrary to what is asserted by 1aii, it is not the case that there is an actual token z of an actually out of production Japanese mobile model such that for all worlds w in which Claire's actual desires are satisfied Alice uses z in w.

Finally, under our scenario 1aiii too, the *de re* reading of 1a in which *a Japanese mobile which is out of production* was interpreted in the wide scope as a kind level phrase, will be false.

1aiii $\exists z({}_k[_{<e,t>}\text{ Japanese…}]^{@}(z) \& \forall s(R(@)(s) \supset \exists x(I(s)(x,z) \ \& \ [\text{uses}]^{s}(x)([\text{Alice}]^{s}))))$

Because relative to our scenario there surely are two worlds w' and w'' such that,

Claire's actual desires are satisfied both at w' and w'', as Alice uses only x in w', Alice uses only y in w'', x is actually of model k, y is actually of model l, x≠y, k≠l, and both x and y are actually in the said drawer. Thus, x and y are actual tokens of two actually out of production Japanese mobile models k and l.

But then, contrary to what is asserted by 1aiii, it is not the case that there is an actually out of production Japanese mobile model m such that for all worlds w in which Claire's actual desires are satisfied Alice uses a token of m.

In addition to the previously considered three readings (1ai, 1aii, 1aiii) and to the fourth reading just considered, 1a can also be used in a fifth way. It can be used to say that to satisfy Claire Alice must use a token of one or another actually out of production Japanese mobile model.

Fifth reading of 1a:
1a will be true relative to @ if and only if the Japanese mobile models which are out of production at @ are such that for all worlds w in which Claire's desires at @ are satisfied Alice uses at w a token at w of one of those models.

Note that according to this fifth reading too there is neither a specific mobile token nor a specific out of production Japanese mobile model which Alice must use to satisfy Claire. Again, note that according to this fifth reading, unlike the fourth reading, Claire will be satisfied in a world w, even if Alice does not use at w an actual mobile token of an actually out of production Japanese model, provided that Alice uses at w a token of an actually out of production Japanese model.

In order to distinguish this fifth reading of 1a from the previously considered four readings let's consider this second scenario. Suppose Claire does not have any specific mobile token or tokens in mind but she cares only that Alice uses a token of one or another of the three mobile models listed in a certain document, say m_1,m_2, and m_3; unbeknownst to her, each of these happen to be Japanese models that actually are out of production. Then the fifth reading that has just been described will be true. The Japanese mobile models which are actually out of production are such that for any world w in which Claire's actual desires are realized Alice uses at w a token in w of one of these. However under this last scenario each of the previously considered four readings will be false. The 1aii and 1aiii, the usual *de re* readings will be false.

1aii $\exists x \exists y\ ((_k[_{<e,t>}\ \text{Japanese}\ldots]^{@}(y)\ \&\ I(@)(x,y))\&\ \forall s(R(@)(s) \supset [\text{Alice use } t_x]^s))$
1aiii $\exists x(_k[_{<e,t>}\ \text{Japanese}\ldots]^{@}(x)\&\ \forall s(R(@)(s) \supset \exists z([\text{Alice use } t_z]^s\ \&\ I(s)(z,x))))$

Because this second scenario allows that there be two worlds w' and w'' such that,

Claire's actual desires are satisfied both at w' and w'', as Alice uses only x at w, Alice uses only y at w'', x is a token of m_1 at w', y is a token of m_2 at w'', x≠y.

Then contrary to what is asserted by 1aii, it is not the case there is an actual token z of an actually out of production Japanese mobile model such that for all worlds w in which Claire's actual desires are satisified Alice uses z at w. And contrary to what is asserted by 1aiii it is not the case there is an actually out of production Japanese mobile model m such that for all worlds w in which Claire's actual desires are satisified Alice uses at w a token of m at w. Under the same scenario, 1ai the *de dicto* reading too will be false.

1ai $\forall s(R(@)(s) \supset \exists x \exists y(({}_{k}[_{<e,t>}\text{ Japanese}\ldots]^{s}(y) \;\&\; I(s)(x,y)) \;\&\; [\text{Alice use } t_x]^{s}))$

Because our second scenario allows that there be a world w' such that,

Claire's actual desires are satisfied at w', as Alice uses only x at w', x is a token of m_1 at w', but m_1 is not out of production at w'.

Then contrary to what is asserted by 1ai, it is not the case that for all worlds w in which Claire's actual desires are satisfied Alice uses at w a token z at w of a Japanese mobile model m out of production at w.

Finally, according to the scenario in question the recently introduced fourth reading of 1a is false too:

Fourth reading of 1a:
true relative to @ if and only if the tokens X at @ of Japanese mobile models K out of production at @ are such that for all worlds w in which Claire's wishes at @ are satisfied Alice uses one of X at w.

For according to our second scenario surely there is a world w' such that,

Claire's actual desires are satisfied at w', as Alice uses only x at w', x is a token of m_1 at w', but x is not actual token of m_1.

The existence of a world w' as described above also gainsays the fourth reading: it is not the case that the actual tokens of actually out of production Japanese mobile models are such that for all worlds w in which Claire's actual desires are satisfied Alice uses one of those at w.

The lastly described fourth and fifth readings of 1a can be accounted for as examples of non-specific *de re* readings the existence of which was discussed in the previous section.

The Derivation of the Non-specific *de re* Readings of 1a

The fourth and the fifth readings of 1a can be derived in the same way as such readings were derived in the case of 2. Namely from a logical form in which the common noun *Japanese mobile model which is out of production* takes the wide scope relative to *must*, while its indefinite noun phrase 'encasing' remains in the narrow scope.

1aC $[_S$[J. m. which is out of production$]_2$ [2 [$[_T$must] $[_S[_{NP}$a $t_2]_1$[1 $[_S$Alice use t_1]]]]]]

Remember that *Japanese mobile model which is out of production* is forced a native taxonomic interpretation due to the kind-level modifier *which is out of production*. Thus, originally *Japanese mobile model which is out of production* is a taxonomic common noun that applies to models of Japanese mobiles that are out of production. However in 1aC it has to semantically compose with a constituent which is particular level as it is formed around the particular level verb *use*:

[2 [$[_T$must] $[_S[_{NP}$a $t_2]_1$[1 $[_S$Alice use t_1]]]]]]

Previously in interpreting the logical forms 1aA and 1aB we had to deal with a similar type of discrepancy. There we noted that the theoretical machinery of both the C-framework and the K-framework enabled two different ways of resolving those discrepancies: one lowering the taxonomic constituent into particular level and another raising the particular level constituent to kind level. In the case of 1aA these two options lead to the same interpretation and thus to the same reading of 1a. However in the case of 1aB the first option gave 1aii, a different interpretation than the one obtained through the second option, 1aiii.

This was a welcome consequence though, because it was pre-theoretically ascertainable that 1a had distinct readings that corresponded to the interpretations 1aii and 1aiii.

In the case of 1aC too under the C-framework and the K-framework there are two options to resolve the discrepancy. And as in the case of 1aB these two options will lead to different interpretations. And again this result will be an auspicious one, because these different interpretations will respectively correspond to the non-specific *de re* fourth and fifth readings of 1a.

1aC $[_S[_N\text{J. m. which is out of production}]_2\ [2\ [[_T\text{must}]\ [_S[_{NP}\text{a } t_2]_1[1\ [_S\text{Alice use } t_1]]]]]]$

One way to resolve the discrepancy in 1aC will be the interpretation of the kind level taxonomic common noun *[$_N$Japanese mobile which is out of production]* as particular level common noun via the operator detax.

1aiv, derived from 1aC by interpreting [$_N$Japanese mobile which is out of production] as a particular level applier via detax:

$$[\![[_S[_N\text{J. mobile which is out of production}]_2\ [2\ [[_T\text{must}]\ [_S[_{NP}\text{a } t_2]_1[1\ [_S\text{Alice use } t_1]]]]]]]\!]$$

$$\{detax(\lambda s'.{}_k[_{\langle e,t\rangle}J.]^{s'}),\{2,\{\lambda s'.\lambda S.\forall s(R(s')(s)\supset S(s)),\{\lambda s'.\lambda P.\exists x({}_p[_{\langle e,t\rangle}t_2]^{s',g}(x)\&P(x)),\lambda s'.\lambda y.[A.u.t_y]^{s'}\}\}\}\}$$

$$\{\lambda s'.\lambda y.\exists z({}_k[_{\langle e,t\rangle}J.]^{s'}(z)\&I(s')(y,z)),\{2,\{\lambda s'.\lambda S.\forall s(R(s')(s)\supset S(s)),\{\lambda s'.\lambda P.\exists x({}_p[_{\langle e,t\rangle}t_2]^{s',g}(x)\&P(x)),\lambda s'.\lambda y.[A.u.t_y]^{s'}\}\}\}\}$$

$$\{\lambda s'.\lambda y.\exists z({}_k[_{\langle e,t\rangle}J.]^{s'}(z)\&I(s')(y,z))',\{2,\lambda s'.\forall s(R(s')(s)\supset\exists x({}_p[_{\langle e,t\rangle}t_2]^{s',g}(x)\&[A.\text{ use } t_x]^s))\}\}$$

$$\{\lambda s'.\lambda y.\exists z({}_k[_{\langle e,t\rangle}J.]^{s'}(z)\&I(s')(y,z))',\ \lambda s'.\lambda Q.\forall s(R(s')(s)\supset\exists x(Q(x)\ \&\ [\text{Alice use } t_x]^s))\}$$

$$\lambda s'.\forall s(R(s')(s)\supset\exists x(\exists z({}_k[_{\langle e,t\rangle}\text{Japanese}\ldots]^{s'}(z)\&I(s')(x,z))\ \&\ [\text{Alice use } t_x]^s))$$

when evaluated relative to @:

$$\forall s(R(@)(s)\supset\exists x(\exists z({}_k[_{\langle e,t\rangle}\text{Japanese}\ldots]^{@}(z)\&I(@)(x,z))\ \&\ [\text{Alice use } t_x]^s))$$

$$\forall s(R(@)(s)\supset\exists x\exists z(({}_k[_{\langle e,t\rangle}\text{Japanese}\ldots]^{@}(z)\&I(@)(x,z))\ \&\ [\text{Alice use } t_x]^s))$$

The other way to resolve the discrepancy in 1aC will be to keep the original kind level meaning of *[$_N$Japanese mobile which is out of production]* but to interpret *[2 [[$_T$must] [$_S$[$_{NP}$a t_2]$_1$[1 [$_S$Alice use t_1]]]]]]* as kind level. This can be done by interpreting the trace *t_2* as a kind level applier and using the operation detax in the narrow scope on *t_2*. Thereby, *[2 [[$_T$must] [$_S$[$_{NP}$a t_2]$_1$[1 [$_S$Alice use t_1]]]]]]* will get an interpretation that can sensibly semantically compose with the taxonomic applier *[$_N$ Japanese mobile which is out of production].*

1aC $[_S[_N J.\ m.\ \text{which is out of p.}]_2\ [2\ [[_T\ \text{must}]\ [_S[_{NP}\ [_D a][\ t_2]]_1[1\ [_S\ \text{Alice use}\ t_1]]]]]]$

1av, derived from 1aC by interpreting [$_N$Japanese mobile which is out of production] and t_2 as kind level appliers:
$[\![[_S[_N J.\ m.\ \text{which is out of production}]_2\ [2\ [[_T\ \text{must}]\ [_S[_{NP}\ [_D a][\ t_2]]_1[1\ [_S\ \text{Alice use}\ t_1]]]]]]]\!]$
$\{\lambda s'.{}_k[_{<e,t>}J.]^{s'},\{2,\{\lambda s'.\lambda S.\forall s(R(s')(s)\supset S(s)),\{\{\lambda s'.\lambda P.\lambda Q.\exists x(P(x)\&Q(x)),detax(\lambda s'.{}_k[_{<e,t>}t_2]^{s',g})\},\lambda s'.\lambda y.[A.u.\ t_y]^{s'}\}\}\}\}$
$\{\lambda s'.{}_k[_{<e,t>}J.]^{s'},\{2,\{\lambda s'.\lambda S.\forall s(R(s')(s)\supset S(s)),\{\{\lambda s'.\lambda P.\lambda Q.\exists x(P(x)\&Q(x)),\lambda s'.\lambda x.\exists z(I(s')(x,z)\&{}_k[_{<e,t>}t_2]^{s',g}(z))\},\lambda s'.\lambda y.[A.u.t_y]^{s'}\}\}\}\}$
$\{\lambda s'.{}_k[_{<e,t>}J.]^{s'},\{2,\{\lambda s'.\lambda S.\forall s(R(s')(s)\supset S(s)),\{\lambda s'.\lambda Q.\exists x(\exists z(I(s')(x,z)\&{}_k[_{<e,t>}t_2]^{s',g}(z))\&Q(x)),\ \lambda s'.\lambda y.[A.u.t_y]^{s'}\}\}\}\}$
$\{\lambda s'.{}_k[_{<e,t>}J.]^{s'},\{2,\{\lambda s'.\lambda S.\forall s(R(s')(s)\supset S(s)),\lambda s'.\exists x(\exists z(I(s')(x,z)\&{}_k[_{<e,t>}t_2]^{s',g}(z))\&[A.u.t_x]^{s'})\}\}\}$
$\{\lambda s'.{}_k[_{<e,t>}J.]^{s'},\{2,\ \lambda s'.\forall s(R(s')(s)\supset \exists x(\exists z(I(s)(x,z)\ \&\ {}_k[_{<e,t>}t_2]^{s,g}(z))\&\ [\text{Alice use}\ t_x]^s))\}\}$
$\{\lambda s'.{}_k[_{<e,t>}J.]^{s'},\ \lambda s'.\lambda Q.\forall s(R(s')(s)\supset \exists x(\exists z(I(s)(x,z)\ \&\ Q(z))\&\ [\text{Alice use}\ t_x]^s))\}$
$\lambda s'.\forall s(R(s')(s)\supset \exists x(\exists z(I(s)(x,z)\ \&\ {}_k[_{<e,t>}Jap...]^{s'}(z))\&\ [\text{Alice use}\ t_x]^s))$
when evaluated relative to @:
$\forall s(R(@)(s)\supset \exists x(\exists z(I(s)(x,z)\ \&\ {}_k[_{<e,t>}Jap...]^{@}(z))\&\ [\text{Alice use}\ t_x]^s))$
$\forall s(R(@)(s)\supset \exists x\exists z(([Jap\ldots]^{@}(z)\ \&\ I(s)(x,z))\&[\text{Alice use}\ t_x]^s))$

Now note that 1aiv and 1av, are not the same meaning. The former has been derived from 1aC by resolving the discrepancy by lowering *[$_N$ Japanese mobile which is out of production]* to particular level and the latter is derived by resolving the discrepancy by raising *[2 [[$_T$ must] [$_S$[$_{NP}$ a t_2]$_1$[1 [$_S$ Alice use t_1]]]]]* into kind level. Compare their evaluation relative to @:

1aiv $\forall s(R(@)(s)\supset \exists x\exists z(([Japanese\ldots]^{@}(z)\ \&\ I(@)(x,z))\ \&\ [\text{Alice use}\ t_x]^s))$
1av $\forall s(R(@)(s)\supset \exists x\exists z(([Japanese..]^{@}(z)\ \&\ I(s)(x,z))\ \&\ [\text{Alice use}\ t_x]^s))$

1iv and v accounts respectively for the fourth and the fifth readings of 1a. These readings were previously described in the following way:

Fourth reading of 1a:
true relative to @ if and only if tokens X at @ of Japanese mobile models K out of production at @ are such that for all worlds w in which Claire's wishes at @ are satisfied Alice uses one of X at w.

Fifth reading of 1a:
true relative to @ if and only if Japanese mobile models K which are out of production at @ are such that for all worlds w in which Claire's desires at @ are satisfied Alice uses at w a token at w of one of those models.

Nor has any of 1aiv and 1av the same meaning as any of 1ai-iii derived previously from the logical forms 1aA and 1aB:

1ai $\forall s(R(@)(s) \supset \exists x \exists z(({}_k[_{<e,t>}\text{Japanese} \ldots]^s(z) \& I(s)(x,z)) \& [\text{Alice use } t_x]^s))$
1aii $\exists x \exists z(({}_k[_{<e,t>}\text{Japanese} \ldots]^@(z) \& I(@)(x,z)) \& \forall s(R(@)(s) \supset [\text{Alice use } t_x]^s))$
1aiii $\exists z({}_k[_{<e,t>}\text{Japanese} \ldots]^@(z) \& \forall s(R(@)(s) \supset \exists x(I(s)(x,z) \& [\text{Alice uses } t_x]^s)))$
1aiv $\forall s(R(@)(s) \supset \exists x \exists z(({}_k[_{<e,t>}\text{Japanese} \ldots]^@(z) \& I(@)(x,z)) \& [\text{Alice use } t_x]^s))$
1av $\forall s(R(@)(s) \supset \exists x \exists z(({}_k[_{<e,t>}\text{Japanese..}]^@(z) \& I(s)(x,z)) \& [\text{Alice use } t_x]^s))$

There is one caveat though. Note that if *Japanese mobile which is out of production* is a kind level rigid applier, that is if $\lambda s'.{}_{sg_k}[_{<e,t>}$Japanese mobile which…$]^{s'}$ is a constant function, then 1av will be the same meaning as 1ai, the *de dicto* reading of 1a. This indicates at least that *Japanese mobile which is out of production* cannot be a *de jure* rigid applier. If it were we would not pre-theoretically be able to distinguish a fifth reading for 1a.

The Implications of the Derivation of the Non-specific *de re* Readings of 1a Regarding Rigidity

Let's recap what went on so far in the present section. Remember that in the previous section we set out to discuss non-specific *de re* readings of modal sentences to see that modal sentences indeed have logical forms, and corresponding readings, in which common nouns are interpreted in the wide scope independently of the noun phrases in which they figure in the surface form of the sentences. And the existence of such logical forms and corresponding readings were important for us because only on the basis of such logical forms we have a chance to get an evidence about the rigidity or non-rigidity of the common nouns involved by comparing the readings that result from their interpretation in the wide scope and their interpretation in the narrow scope.

In the case of 1a we have found out that that sentence has not just one but two non-specific *de re* readings. As is generally the case with non-specific *de re* readings, these readings can be explained as the result of the interpretation of the common noun *Japanese mobile which is out of production* in the wide scope, independently of the noun phrase it forms (logical form 1aC). We explained the existence of two such readings for 1a in place of one by reference to the special nature of the common noun *Japanese mobile which is out of production*. It is a taxonomic common noun but the sentential context in which it figures is particular level. There are two available ways to resolve such a sortal discrepancy. These two ways when adopted in interpreting 1aC lead to two non-equivalent interpretations: 1aiv and 1av which corresponded to the two non-specific *de re* readings we sought to explain.

Have we got any evidence regarding the rigidity or the non-rigidity of the common noun *Japanese mobile which is out of production* in the process? Yes we did. The fifth reading of 1a that was pre-theoretically distinguished from the other four readings, is explained by the existence of the logical form 1aC and its interpretation by resolving the sortal discrepancy in 1aC in one of the available two ways. That gave the interpretation 1av. But we noted that 1av will be the same meaning as 1ai that corresponded to the *de dicto* reading of 1a, if *Japanese mobile which is out of production* is a rigid applier. So, provided that the fifth reading exists and that the 1av explains it, then our analyses indicates that it cannot be the case that *Japanese mobile which is out of production* is a *de jure* rigid applier. For, otherwise the interpretations 1ai and 1av would be the same meaning, and then our analysis would predict that we would not be pre-theoretically able to distinguish the fifth reading. Given that we can distinguish the fifth reading, 1ai and 1av should at least have the linguistic-semantic potential to be different meanings. And this is possible only if *Japanese mobile which is out of production* is not a *de jure* rigid applier.

The Non-specific *de re* Reading of 1b

Now, let's return to 1b to see whether it too has non-specific *de re* readings that are non-equivalent to its *de dicto* reading.

1 b [to satisfy Claire's wish] Alice must use a Sharp SH903i.

Prima facie the stakes appear to be as follows. If 1b has non-specific *de re* readings that are non-equivalent to its *de dicto* reading, then these readings will be explainable by the wide scope interpretation of the common noun *Sharp SH903i*. That is by the interpretation of the following logical form:

1bC $[_S[\text{Sharp SH903i}]_2\ [2\ [[_T\ \text{must}]\ [_S[_{NP}\ \text{a}\ t_2]_1[1\ [_S\ \text{Alice use}\ t_1]]]]]]$

And possibly such an explanation will provide evidence that *Sharp SH903i* is not *de jure* rigid. However if it turns out that 1b does not have any non-specific *de re* readings distinguishable from its *de dicto* reading, this will indicate that *Sharp SH903i* is *de jure* rigid. Because to explain cases of non-specific *de re* readings, following Heim and Fintel (2011), we have been assuming that wide scope interpretation of common nouns relative to modal expressions are generally available. So, if 1b does not have non-specific *de re* readings distinguishable from its *de dicto* reading, this will be the case despite the existence of 1bC according to which *Sharp SH903i* should be interpreted in the wide scope. This then is possible only if the interpretation of *Sharp SH903i* in the wide scope relative to *must* yields an interpretation of 1b which is by linguistic-semantic design equivalent to the *de dicto* reading resulting from its interpretation in the narrow scope relative to *must*. This last circumstance in turn can obtain only if *Sharp SH903i* has by linguistic-semantic design the same denotation relative to possible worlds, that is, only if it is *de jure* rigid.

Now, it appears that indeed 1b has a third, non-specific *de re*, reading that is not equivalent to its previously considered *de dicto* reading. Apparently 1b can be used to say that to satisfy Claire Alice must use one or another actual token of Sharp SH903i. According to this third reading to satisfy Claire Alice must use an actual token of Sharp SH903i but there is not any specific actual token which she must use, any will do. For example, if Claire asks Alice to use one or another of the mobiles kept in a certain drawer, all of which happen to be tokens of Sharp SH903i, then 1b can truly and adequately be used under this third reading. The truth-conditions for this reading can be stated thus:

Third reading of 1b:
true relative to @ if and only if the tokens of Sharp SH903i at @ are such that for all worlds w in which Claire's desires at @ are satisfied Alice uses at w one of those.

To distinguish this third, non-specific *de re* reading from the previously considered *de dicto* reading, derived as 1bi, consider the following scenario. Suppose Claire desires that Alice uses some or other token of Sharp SH903i, and it does not matter for her which token she uses provided that it is a token of Sharp SH903i. If there were a Sharp SH903i token which is different from all actual tokens, and Alice had used it, Claire would still be satisfied. Then the *de dicto* reading of 1b will be true:

First reading of 1b (the de dicto reading):
true relative to @ if and only if for all worlds w in which Claire's desires at @ are satisfied there is a token at w of Sharp SH903i which is used by Alice in w.

The representations of the first reading of 1b according to the K and C-frameworks:
$1bi_K \quad \forall s(R(@)(s) \supset \exists x(pred_{sg\_p}(s)({}_k[{}_e\text{Sharp SH903i}]^s)(x)\ \&\ [\text{Alice use } t_x]^s))$
$1bi_C \quad \forall s(R(@)(s) \supset \exists x({}_p[{}_{<e,t>}\text{Sharp SH903i}]^s(x)\ \&\ [\text{Alice use } t_x]^s))$

But the third reading of 1b, the non-specific *de re* reading, will be false under such a scenario. For according to our scenario there are worlds w' such that:

Claire's actual desires are satisfied at w', as Alice uses at w' a token x at w' of Sharp SH903i but x is not an actual token of Sharp SH903i.

Then contrary to what is asserted by the third reading of 1b it is not the case that the actual tokens of Sharp SH903i are such that for all worlds w in which Claire's actual desires are satisfied Alice uses at w one of those.

To distinguish this third, non-specific *de re* reading from the previously considered specific *de re* reading, 1bii, consider the following scenario. Suppose Claire has asked Alice to use either one of the mobiles actually kept in a certain drawer, and each of these mobiles happen to be tokens of Sharp SH903i. Then the third reading of 1b will be true: according to this second scenario for all worlds w in which Claire's actual desires are satisfied Alice uses at w one of the mobiles which are actually kept in the said drawer; as each one of these mobiles is an actual token of Sharp SH903i, the actual tokens of Sharp SH903i will be such that for all worlds w in which Claire's actual desires are satisfied Alice uses at w one of those. However then the specific *de re* reading of 1b, 1bii, will be false:

Second reading of 1b (the specific de re reading):
true relative @ if and only if there is token of Sharp SH903i at @ such that for all worlds w in which Claire's desires at @ are satisfied Alice uses at w that token.

The representations of the second reading of 1b according to the K and C-frameworks:
$1bii_K$ $\exists x(pred_{sg\_p}(@)(_{sg\_k}[_e \text{Sharp SH903i}]^{@})(x) \& \forall s(R(@)(s) \supset [\text{Alice use } t_x]^s)$
$1bii_C$ $\exists x(_{sg\_p}[_{<e,t>} \text{Sharp SH903i}]^{@} (x) \& \forall s(R(@)(s) \supset [\text{Alice use } t_x]^s))$

For, according to this second scenario there surely will be two worlds w' and w'' such that,

Claire's actual desires are satisifed both in w' and w'' as Alice uses only x in w' and only y in w'', x≠y and both x and y are actually in the drawer in question. Thus x and y are actual tokens of Sharp SH903i.

But then, contrary to what is asserted by 1bii, it is not the case that there is an actual token z of Sharp SH903i such that for all worlds w in which Claire's actual desires are satisfied Alice uses z at w.

Is There a Second Non-specific *de re* Reading for 1b?

Remember that 1a had two non-specific *de re* readings. One of them pertained only to the actual tokens of actually out of production Japanese mobile models, and the other pertained only to the actual Japanese mobile models, and but not just to the actual tokens of these models:

1 a [to satisfy Claire's wish] Alice must use a Japanese mobile which is out of production.

Fourth reading of 1a:
true relative to @ if and only if tokens X at @ of Japanese mobile models K out of production at @ are such that for all worlds w in which Claire's wishes at @ are satisfied Alice uses one of X at w.

Fifth reading of 1a:
true relative to @ if and only if Japanese mobile models K which are out of production at @ are such that for all worlds w in which Claire's desires at @ are satisfied Alice uses at w a token at w of one of those models.

One may think that the same may be the case for 1b. Given the similarity of the sentences 1a and 1b, we may expect that 1b too will have two non-specific *de re* readings; one which pertains only to the actual tokens of the actual Sharp SH903i model and another pertaining only to the actual Sharp SH903i model but *not* just to its actual tokens. This is so, especially when 1b is considered from the standpoint of the K-framework according to which such semantically simple common nouns as *Sharp SH903i* are primarily kind designators:

1 b [to satisfy Claire's wish] Alice must use a Sharp SH903i.

third reading of 1b:
true relative to @ if and only if tokens X at @ of the Sharp SH903i model at @ are such that for all worlds w in which Claire's wishes at @ are satisfied Alice uses one of X at w.

presumed fourth reading of 1b:
true relative to @ if and only if the Sharp SH903i model at @ is such that for all worlds w in which Claire's desires at @ are satisfied Alice uses at w a token at w of that model.

The first reading given above is the already distinguished third reading of 1b. As for the latter reading, the presumed fourth reading, it does not seem to say anything different than the *de dicto* reading of 1b, already accounted for by the interpretations $1bi_C$ and $1bi_k$ of the logical form 1bA.

1bA $[_S[_T \text{must}]\ [_S[_{NP} \text{a}\ [_N \text{Sharp SH903i}]]_1[1\ [_S \text{Alice use } t_1]]]]]$
$1bi_C$ $\forall s(R(@)(s) \supset \exists x_{sg\_p}[_{<e,t>}\text{Sharp SH903i}]^s(x)\ \&\ [\text{Alice use } t_x]^s))$
$1bi_K$ $\forall s(R(@)(s) \supset \exists x(I(s)(x,[\text{Sharp SH903i}]^s)\ \&\ [\text{Alice use } t_x]^s))$

First reading of 1b (the de dicto reading):
true relative to @ if and only if for all worlds w in which Claire's desires at @ are satisfied there is a token x at w of the Sharp SH903i model at w such that x is used by Alice in w.

It seems both the de dicto reading and the presumed fourth reading of 1b pertain to the same model of mobile phone, namely the Sharp SH903i. Now this difference between 1a and 1b as regards the number of their non-specific de re readings will be of crucial importance from the perspective of the K-framework regarding the de jure rigidity of the common noun *Sharp SH903i*. According to the K-framework both *Japanese mobile which is out of production* and *Sharp SH903i* are kind denoting common nouns (though one is an applier and the other is a designator). For this reason the logical forms in which they take wide scope should equally be capable of giving rise to two distinguishable non-specific de re readings: one pertaining only to the kind(s) denoted relative to the actual world; and another pertaining only to the actual instances of the kind(s) denoted relative to the actual world. Unless of course, unlike *Japanese mobile which is out of production*, the denotation of *Sharp SH903i* is not variable across possible worlds.

The Derivation of the Non-specific *de re* Reading of 1b under the C-framework

The only pre-theoretically distinguishable non-specific *de re* reading of 1b can be derived, in the same way as the other cases of non-specific *de re* readings we have considered so far. There has to be a logical form in which the common noun *Sharp SH903i* takes wide scope relative to *must* but leaves the indefinite phrase in the narrow scope.

1bC $[_S[\text{Sharp SH903i}]_2\ [2\ [[_T\ \text{must}]\ [_S[_{NP}\ \text{a}\ t_2]_1[1\ [_S\ \text{Alice use}\ t_1]]]]]]$

Sharp SH903i is a semantically simple non-taxonomic common noun. So, the interpretation of the logical form above will be different under the K-framework and the C-framework. Under the C-framework relative to a possible world w *Sharp SH903i* will be taken to apply to tokens of Sharp SH903i at w. But under the K-framework relative to a possible world w, *Sharp SH903i* will be taken to designate a kind. Let's first consider the interpretation of the logical form 1bC under the C-framework:

1biii$_C$ derived from 1bC under the C-framework:

$$[\![{}_{S}[\text{Sharp SH903i}]_2\ [2\ [[_T\ \text{must}]\ [_S[_{NP}\ \text{a}\ [t_2]]_1[1\ [_S\ \text{Alice use}\ t_1]]]]]]]\!]$$

$$\{\lambda s'.{}_{sg\_p}[_{<e,t>}S.]^{s'},\{2,\{\lambda s'.\lambda S.\forall s(R(s')(s)\supset S(s)),\{\lambda s'.\lambda P.\exists x({}_p[_{<e,t>}t_2]^{s',g}(x)\&P(x)),\lambda s'.\lambda y.[A.u.t_y]^{s'}\}\}\}\}$$

$$\{\lambda s'.{}_{sg\_p}[_{<e,t>}S.]^{s'}, \{2, \{\lambda s'.\lambda S.\forall s(R(s')(s)\supset S(s)), \lambda s'.\exists x({}_p[_{<e,t>}t_2]^{s',g}(x)\ \&\ [\text{Alice use}\ t_x]^{s'})\}\}\}$$

$$\{\lambda s'.{}_{sg\_p}[_{<e,t>}\text{Sharp SH903i}]^{s'}, \{2, \lambda s'.\forall s(R(s')(s)\supset \exists x({}_p[_{<e,t>}t_2]^{s',g}(x)\ \&\ [\text{Alice use}\ t_x]^{s}))\}\}$$

$$\{\lambda s'.{}_{sg\_p}[_{<e,t>}\text{Sharp SH903i}]^{s'},\ \lambda s'.\lambda Q.\forall s(R(s')(s)\supset \exists x(Q(x)\ \&\ [\text{Alice use}\ t_x]^{s}))\}$$

$$\lambda s'.\forall s(R(s')(s)\supset \exists x\, {}_{sg\_p}[_{<e,t>}\text{Sharp SH903i}]^{s'}(x)\ \&\ [\text{Alice use}\ t_x]^{s}))$$

when evaluated relative to @:

$$\forall s(R(@)(s)\supset \exists x\, {}_{sg\_p}[_{<e,t>}\text{Sharp SH903i}]^{@}(x)\ \&\ [\text{Alice use}\ t_x]^{s}))$$

This interpretation yields the truth-conditions that were associated with the non-specific *de re* reading of 1b:

Third reading of 1b:
true relative to @ if and only if the tokens of Sharp SH903i at @ are such that for all worlds w in which Claire's desires at @ are satisfied Alice uses at w one of those

Note that 1biii$_C$ will be the same meaning as the *de dicto* 1bi$_C$ if *Sharp SH903i* were a rigid applier.

1bi$_C$ $\forall s(R(@)(s)\supset \exists x\, {}_{sg\_p}[_{<e,t>}\text{Sharp SH903i}]^{s}(x)\ \&\ [\text{Alice use}\ t_x]^{s}))$
1biii$_C$ $\forall s(R(@)(s)\supset \exists x\, {}_{sg\_p}[_{<e,t>}\text{Sharp SH903i}]^{@}(x)\ \&\ [\text{Alice use}\ t_x]^{s}))$

So, when under the C-framework *Sharp SH903i* is interpreted as an applier it cannot be taken to be a *de jure* rigid applier. For otherwise, assuming that our analyses are accurate, although such a logical form as 1bC existed, it would lead to a reading that is equivalent to the *de dicto* reading, and thus there would not exist a pre-theoretically distinguishable non-specific *de re* reading such as the third reading of 1b.

Above we have indicated that unlike 1a, 1b does not seem to have a further non-specific *de re* reading other than the one that has just been considered: a fourth reading that pertains only to the actual *Sharp SH903i* model but not only to the actual tokens of that model. This difference between 1a and 1b is easily accounted for under the C-framework. According to this framework, unlike the taxonomic common noun *Japanese mobile which is out of production*, the common noun *Sharp SH903i* is a particular level applier for tokens; it does not denote any model or models. For this reason, the logical forms of 1b in which *Sharp SH903i* occurs in the wide scope can pertain only to the actual tokens of Sharp SH903i, and only through them to the actual Sharp SH903i model.

<u>The Derivation of the Non-specific *de re* Reading of 1b under the K-framework</u>

We will now consider the interpretation of 1bC under the K-framework.

1bC $[_S[_N\text{Sharp SH903i}]_2\ [2\ [[_T\text{must}]\ [_S[_{NP}\text{a}\ [t_2]\ ]_1[1\ [_S\text{Alice use}\ t_1]]]]]]$

Under the K-framework $[_N\textit{Sharp SH903i}]$ is originally interpreted as a kind designator. But in 1bC it has to semantically compose with $[2\ [[_T\textit{must}]\ [_S[_{NP}\textit{a}\ [t_2]\ ]_1[1\ [_S\textit{Alice use}\ t_1]]]]]$. Now this latter in turn ought normally be interpreted as a particular level sentence abstract due to the presence of the particular level verb *use*. Then it will have a particular level GQ meaning (type $<s,<<e_p,t>,t>>$) and therefore can compose only with particular level applier meanings.

We have dealt with a similar discrepancy in the case of the logical form of 1aC which lead to the non-specific *de re* fourth and fifth readings of 1a:

1 a [to satisfy Claire's wish] Alice must use a Japanese mobile which is out of production.

1aC $[_S[_N$J. m. which is out of production$]_2$ [2 $[[_T$must] $[_S[_{NP}$a $t_2]_1$[1 $[_S$Alice use t_1]]]]]]

That discrepancy could be resolved either by interpreting the originally kind level taxonomic common noun *$[_N$Japanese mobile which is out of production]* as a particular level common noun via the use of the operator detax; or by keeping it taxonomic but instead by interpreting the originally particular level *[2 $[[_T$ must] $[_S[_{NP}$ a $t_2]_1$[1 $[_S$Alice use t_1]]]]]* as kind level, by interpreting t_2 as a kind level applier and by using detax on it inside the scope of *must*.

Now, unlike the case of 1aC, the discrepancy that initially obtains in the interpretation of 1bC under the K-framework is not just a discrepancy of sorts (particular/kind) but also a discrepancy of semantic type (designator/quantifier). *$[_N$Sharp SH903i]* is kind level and as a designator has the semantic type $<s,e_k>$, but *[2 $[[_T$must] $[_S[_{NP}$a $t_2]_1$[1 $[_S$Alice use t_1]]]]]* is particular level and has the quantifier semantic type $<s,<<e_p,t>,t>>$. And designators cannot semantically compose with quantifiers. Yet still under the K-framework, which has the operation pred, there still are two ways to resolve this discrepancy by adjusting one or the other of the semantically incongruent constituents to the semantic type of the other, which parallel the resolution of the discrepancy that obtained in the interpretation of 1aC. Either by interpreting *[$_N$Sharp SH903i]* as a particular level applier (semantic type $<s,<e_p,t>>$) by the application of pred to its meaning in the wide scope; or by interpreting *[2 [[$_T$ must] [$_S$[$_{NP}$ a t_2]$_1$[1 [$_S$ Alice use t_1]]]]]* as a kind level applier (semantic type $<s,<e_k,t>>$) by interpreting t_2 as a kind designator and applying pred to it in the narrow scope so that can compose with the indefinite determiner *a*.

We indicated that the first way of resolving the discrepancy will go through via the application of the operator pred on the meaning of *[$_N$Sharp SH903i]* to yield a meaning of type $<s,<e,t>>$:

Let α be a partial function of type $<s,e>$, $\text{Pred}(\alpha)=\lambda s'.\lambda x.I(s')(x,\alpha(s'))$
$\text{pred}(\lambda s'.[\text{Sharp SH903i}]^{s'})= \lambda s'.\lambda y.I(s')(y,[\text{Sharp SH903i}]^{s'})$

Then under the K-framework 1bC will get the following interpretation:

1biii$_K$, derived from 1bC under the K-framework by interpreting [$_N$Sharp SH903i] as a particular level applier via Pred:

$$[\![[_S[_N\text{Sharp SH903i}]_2\ [2\ [[_T\text{must}]\ [_S[_{NP}\text{a}\ [t_2]\ ]_1[1\ [_S\text{Alice use } t_1]]]]]]]\!]$$
$$\{\text{pred}(\lambda s'.{}_k[_eS.]^{s'}),\{2,\{\lambda s'.\lambda S.\forall s(R(s')(s)\supset S(s)),\{\lambda s'.\lambda P.\exists x({}_p[_{<e,t>}t_2]^{s',g}(x)\&P(x)),\lambda s'.\lambda y.[\text{A.u.}t_y]^{s'}\}\}\}\}$$
$$\{\lambda s'.\lambda y.I(s')(y,{}_k[_eS]^{s'}),\{2,\{\lambda s'.\lambda S.\forall s(R(s')(s)\supset S(s)),\{\lambda s'.\lambda P.\exists x({}_p[_{<e,t>}t_2]^{s',g}(x)\&P(x)),\lambda s'.\lambda y.[\text{A.u.}t_y]^{s'}\}\}\}\}$$
$$\{\lambda s'.\lambda y.I(s')(y,{}_k[_eS.]^{s'}),\{2,\{\lambda s'.\lambda S.\forall s(R(s')(s)\supset S(s)),\lambda s'.\exists x({}_p[_{<e,t>}t_2]^{s',g}(x)\&[\text{Alice use } t_x]^{s'})\}\}\}$$
$$\{\lambda s'.\lambda y.I(s')(y,{}_k[_e S.]^{s'}),\ \{2,\ \lambda s'.\forall s(R(s')(s)\supset \exists x({}_p[_{<e,t>}t_2]^{s',g}(x)\ \&\ [\text{Alice use } t_x]^{s}))\}\}$$
$$\{\lambda s'.\lambda y.I(s')(y,{}_k[_e\text{Sharp SH903i}]^{s'}),\ \lambda s'.\lambda Q.\forall s(R(s')(s)\supset \exists x(Q(x)\ \&\ [\text{Alice use } t_x]^{s}))\}$$
$$\lambda s'.\forall s(R(s')(s)\supset \exists x(\lambda y.I(s')(y,{}_k[_e\text{Sharp SH903i}]^{s'})(x)\ \&\ [\text{Alice use } t_x]^{s}))$$
$$\lambda s'.\forall s(R(s')(s)\supset \exists x(I(s')(x,{}_k[_e\text{Sharp SH903i}]^{s'})\ \&\ [\text{Alice use } t_x]^{s}))$$

when evaluated relative to @:

$$\forall s(R(@)(s)\supset \exists x(I(@)(x,{}_k[_e\text{Sharp SH903i}]^{@})\ \&\ [\text{Alice use } t_x]^{s}))$$

The second way of resolving the discrepancy that obtains in 1bC under the K-framework will be the reinterpretation of *[2 [[$_T$ must] [$_S$[$_{NP}$ a t_2]$_1$[1 [$_S$ Alice use t_1]]]]]* as kind level applier so that it can semantically compose with the kind level designator *[$_N$Sharp SH903i]*. This can be accomplished by interpreting t_2 as a kind level designator in *[2 [[$_T$ must] [$_S$[$_{NP}$ a t_2]$_1$[1 [$_S$ Alice use t_1]]]]]*. Then however there will arise a semantic misfit inside $[_{NP}\ a\ t_2]$, with t_2 interpreted as a kind designator (type <s,e>) and the indefinite article *a* which demands for arguments of type <s,<e,t>>. This latter discrepancy can be resolved again via pred. Then, the interpretation of 1bC under the K-framework by way of interpreting $[2\ [[_T\ must]\ [_S[_{NP}\ a\ t_2]_1[1\ [_S\ Alice\ use\ t_1]]]]]$ as a kind level applier by interpreting the trace t_2 as a kind designatorr will go as follows:

1bC $[_S[_N\text{Sharp SH903i}]_2\ [2\ [[_T\text{must}]\ [_S[_{NP}\text{a}\ [t_2]\ ]_1[1\ [_S\text{Alice use } t_1]]]]]]$

1biv, derived from 1bC under the K-framework by interpreting both t_2 and $[_N$Sharp SH903i] as kind designators:
$\{\lambda s'.{}_k[{}_eS.]^{s'},\{2,\{\lambda s'.\lambda S.\forall s(R(s')(s)\supset S(s)),\{\{\lambda s'.\lambda P.\lambda Q.\exists x(P(x)\&Q(x)),pred(\lambda s'.{}_k[{}_et_2]^{s',g})\},\lambda s'.\lambda y.[A.u.\ t_y]^{s'}\}\}\}\}$
$\{\lambda s'.{}_k[{}_eS.]^{s'},\{2,\{\lambda s'.\lambda S.\forall s(R(s')(s)\supset S(s)),\{\{\lambda s'.\lambda P.\lambda Q.\exists x(P(x)\&Q(x)),\lambda s'.\lambda y.I(s')(y,{}_k[{}_et_2]^{s',g})\},\lambda s'.\lambda y.[A.u.t_y]^{s'}\}\}\}\}$
$\{\lambda s'.{}_k[{}_eS.]^{s'},\{2,\{\lambda s'.\lambda S.\forall s(R(s')(s)\supset S(s)),\{\lambda s'.\lambda Q.\exists x(I(s')(x,{}_k[{}_et_2]^{s',g})\&Q(x)),\lambda s'.\lambda y.[A.u.t_y]^{s'}\}\}\}\}$
$\{\lambda s'.{}_k[{}_e\ S.]^{s'},\ \{2,\ \{\lambda s'.\lambda S.\forall s(R(s')(s)\supset S(s)),\ \lambda s'.\exists x(I(s')(x,\ {}_k[{}_et_2]^{s',g})\&\ [\text{Alice uses } t_x]^{s'})\}\}\}$
$\{\lambda s'.{}_k[{}_e\ \text{SharpSH903i}]^{s'},\ \{2,\ \lambda s'.\forall s(R(s')(s)\supset \exists x(I(s)(x,\ {}_k[{}_et_2]^{s,g})\&\ [\text{Alice uses } t_x]^{s}))\}\}$
$\{\lambda s'.{}_k[{}_e\ \text{SharpSH903i}]^{s'},\ \lambda s'.\lambda z.\forall s(R(s')(s)\supset \exists x(I(s)(x,z)\&\ [\text{Alice uses } t_x]^{s}))\}$
$\lambda s'.\forall s(R(s')(s)\supset \exists x(I(s)(x,{}_k[{}_e\ \text{SharpSH903i}]^{s'})\&\ [\text{Alice uses } t_x]^{s}))$
when evaluated relative to @:
$\forall s(R(@)(s)\supset \exists x(I(s)(x,[\text{Sharp SH903i}]^{@})\&\ [\text{Alice uses } t_x]^{s}))$

Note that $1biv_K$ is not equivalent to $1biii_K$; thus the two available ways of interpreting 1bC under the K-framework do not yield the same truth conditions:

$1biii_K$ $\forall s(R(@)(s)\supset \exists x(I(@)(x,{}_{sg\_k}[{}_e\ \text{Sharp SH903i}]^{@})\ \&\ [\text{Alice use } t_x]^{s}))$
$1biv_K$ $\forall s(R(@)(s)\supset \exists x(I(s)(x,{}_{sg\_k}[{}_e\ \text{Sharp SH903i}]^{@})\&\ [\text{Alice use } t_x]^{s}))$

$1biii_K$ is true relative to @ iff for all worlds w which are accessible from @ there is a token x at @ of the designatum of *Sharp SH903i* at @ such that Alice uses x at w

$1biv_K$ is true relative to @ iff for all worlds w which are accessible from @ there is a token x at w of the designatum of *Sharp SH903i* at @ such that Alice uses x at w

$1biii_K$ precludes but $1biv_K$ does not preclude the existence of a world w' accessible from @ such that,

Alice uses at w' only y, y is a token at w' of the designatum of *Sharp SH903i* at @ but y is not a token at @ of the designatum of *Sharp SH903i* at @

Note that $1biii_K$ represents the same truth-conditions as $1biii_C$, the Neo-Carlsonian interpretation of the logical form 1bC:

$1biii_C$ $\forall s(R(@)(s)\supset \exists x_{sg\_p}[_{<e,t>}\text{Sharp SH903i}]^{@}(x)$ & $[\text{Alice use } t_x]^{s}))$
$1biii_K$ $\forall s(R(@)(s)\supset \exists x(I(@)(x, _{sg\_k}[_{e}\text{Sharp SH903i}]^{@})$ & $[\text{Alice use } t_x]^{s}))$

Thus $1biii_K$ is the interpretation of 1bC under the K-framework that accounts for the truth-conditions of the non-specific *de re* reading of 1b singled out above as the third reading of 1b:

true relative to @ if and only if the tokens of Sharp SH903i at @ are such that for all worlds w in which Claire's desires at @ are satisfied Alice uses at w one of those

But then what about $1biv_K$, which is not equivalent to $1biii_K$?

$1biv_K$ $\forall s(R(@)(s)\supset \exists x(I(s)(x,_{k}[_{e}\text{Sharp SH903i}]^{@})$& $[\text{Alice use } t_x]^{s}))$

$1biv_K$ does not yield the truth conditions associated with the pre-theoretically distinguished non-specific *de re* reading of 1b. And we have argued that unlike 1a, 1b does not seem to have another non-specific *de re* reading which pertains only to the actual Sharp SH903i model without pertaining only to the actual tokens thereof. Yet, it is clear that if it existed such a reading would be accounted by $1biv_K$.

The Significance of $1biv_K$ Regarding the Question Whether *Sharp SH903i* is *de jure* Rigid under the K-framework

First note that the interpretation $1biv_K$ of the logical form 1bC is simply the counterpart of interpretation 1av of the logical form 1aC.

1aC $[_S[_N\text{J. m. which is out of production}]_2\ [2\ [[_T\text{must}]\ [_S[_{NP}\text{a } t_2]_1[1\ [_S\text{Alice use } t_1]]]]]]$

1av, derived from 1aC by interpreting [$_N$Japanese mobile which is out of production] and t_2 as kind level appliers:
$\forall s(R(@)(s) \supset \exists x(\exists z([\text{Japanese..}]^{@}(z) \& I(s)(x,z)) \& [\text{A. use } t_x]^{s}))$

1bC $[_S[_N\text{Sharp SH903i}]_2\ [2\ [[_T\text{must}]\ [_S[_{NP}\text{a } [t_2]\ ]_1[1\ [_S\text{Alice use } t_1]]]]]]$

1biv$_K$, derived from 1bC under the K-framework by interpreting both t_2 and [$_N$Sharp SH903i] as kind designators:
$\forall s(R(@)(s) \supset \exists x(I(s)(x,[\text{Sharp SH903i}]^{@}) \& [\text{Alice use } t_x]^{s}))$

Both 1aC and 1bC are logical forms in which the common nouns take wide scope relative to *must* while leaving their indefinite singular 'encasing' in the narrow scope. Following the suggestion of Heim and Fintel (2011), the postulation of such logical forms has been motivated in the previous section to explain the general phenomenon of non-specific *de re* readings. Furthermore, from the perspective of the K-framework these logical forms manifest a similar semantic discrepancy: The common nouns that take wide scope are kind level whereas the sentence abstracts with which they are to semantically compose are particular level. Under the K-framework such discrepancies can be resolved in two ways, each of which adjusts the meaning of one or the other of the semantically incongruent constituents. Both 1av and 1biv$_K$ are the interpretations of their respective logical forms, 1aC and 1bC, in which the adjustment took place through the reinterpretation of the sentence abstract *[2 [[$_T$ must] [$_S$[$_{NP}$ a t_2]$_1$[1 [$_S$ Alice use t_1]]]]]* as kind level.

Previously we have noted that on the assumption that *[$_N$Japanese mobile which is out of production]* is not *de jure* rigid 1av accounts for one of the two pre-theoretically distinguishable non-specific *de re* readings of 1a. But if *[$_N$Japanese mobile which is out of production]* is *de jure* rigid 1av will be equivalent to the interpretation 1ai which accounted for the *de dicto* reading of 1a:

1aA $[_S[_T \text{must}]\ [_S[_{NP} \text{a J. mobile which is out of production}]_1[1\ [_S \text{Alice uses } t_1]]]]]$
1ai $\forall s(R(@)(s)\supset \exists x\exists z((_k[_{<e,t>}\text{Japanese …}]^s(z)\&I(s)(x,z))\ \&\ [\text{Alice use } t_x]^s))$

1aC $[_S[_N \text{J. m. which is out of production}]_2\ [2\ [[_T \text{must}]\ [_S[_{NP} \text{a } t_2]_1[1\ [_S \text{Alice use } t_1]]]]]]$
1av $\forall s(R(@)(s)\supset \exists x\exists z((_k[_{<e,t>}\text{Japanese..}]^@(z)\ \&\ I(s)(x,z))\ \&\ [\text{Alice use } t_x]^s))$

Since the non-specific *de re* reading in question was pre-theoretically distinguishable as the fifth reading of 1a. We had concluded that *[$_N$Japanese mobile which is out of production]* cannot be a *de jure* rigid applier.

Now likewise, the K-framework, in which 1biv$_K$ is derivable from 1bC, predicts the existence of a certain non-specific *de re* reading for 1b on the assumption that *Sharp SH903i* is not a *de jure* rigid designator. But if *Sharp SH903i* is a *de jure* rigid designator then 1biv$_K$ will be equivalent to the interpretation 1bi$_K$ which accounted for the *de dicto* reading of 1b, and the K-framework will thus not predict any new reading that is pre-theoretically distinguishable from the *de dicto* reading of 1b.

1bA $[_S[_T \text{must}]\ [_S[_{NP} \text{a } [_N \text{Sharp SH903i}]]_1[1\ [_S \text{Alice uses } t_1]]]]]$
1bi$_K$ $\forall s(R(@)(s) \supset \exists x(I(s)(x,[\text{Sharp SH903i}]^s)\ \&\ [\text{Alice use } t_x]^s))$

1bC $[_S[_N \text{Sharp SH903i}]_2\ [2\ [[_T \text{must}]\ [_S[_{NP} \text{a } [t_2]\ ]_1[1\ [_S \text{Alice use } t_1]]]]]]$
1biv$_K$ $\forall s(R(@)(s)\supset \exists x(I(s)(x,[\text{Sharp SH903i}]^@)\&\ [\text{Alice use } t_x]^s))$

Above we were able to pre-theoretically distinguish a non-specific *de re* reading for 1b (the third reading of 1b). And we have seen that under the K-framework that reading was accounted for by the interpretation 1biii$_K$ derived from 1bC.

1bC $[_S[_N \text{Sharp SH903i}]_2\ [2\ [[_T \text{must}]\ [_S[_{NP} \text{a } [t_2]\ ]_1[1\ [_S \text{Alice use } t_1]]]]]]$
1biii$_K$ $\forall s(R(@)(s)\supset \exists x(I(@)(x,\ _{sg\_k}[_e \text{Sharp SH903i}]^@)\ \&\ [\text{Alice use } t_x]^s))$

the third reading of 1b:

true relative to @ if and only if tokens of Sharp SH903i at @ are such that for all worlds w in which Claire's desires at @ are satisfied Alice uses at w one of those

But that one is not a non-specific *de re* reading that can be accounted by the interpretation $1biv_K$ in question here:

1bC $[_S[_N\text{Sharp SH903i}]_2\ [2\ [[_T\text{must}]\ [_S[_{NP}\text{a}\ [t_2]\ ]_1[1\ [_S\text{Alice use}\ t_1]]]]]]$
$1biv_K$ $\forall s(R(@)(s) \supset \exists x(I(s)(x,{}_{sg\_k}[_e\text{Sharp SH903i}]^{@}) \& [\text{Alice use}\ t_x]^s))$

The reading predicted by the derivability of $1biv_K$ from 1bC under the K-framework and under the assumption that the common noun *Sharp SH903i* is not a *de jure* rigid designator can rather be paraphrased in the following way.

A fourth reading for 1b according to K-framework under the assumption that Sharp SH903i is not de jure rigid:
true relative to @ if and only if the model Sharp SH903i at @ is such that for all worlds w in which Claire's desires at @ are satisfied Alice uses at w a token at w of that model.

If *Sharp SH903i* is not *de jure* rigid, then this reading has to be pre-theoretically distinguishable from the usual *de dicto* reading of 1b which was accounted by $1bi_K$:

1bA $[_S[_T\text{must}]\ [_S[_{NP}\text{a}\ [_N\text{Sharp SH903i}]]_1[1\ [_S\text{Alice uses}\ t_1]]]]]$
$1bi_K$ $\forall s(R(@)(s) \supset \exists x(I(s)(x,[\text{Sharp SH903i}]^s)\ \&\ [\text{Alice use}\ t_x]^s))$

the first reading of 1b (the de dicto reading):
true relative to @ if and only if for all worlds w in which Claire's desires at @ are satisfied there is a token at w of Sharp SH903i which is used by Alice in w.

That is, if *Sharp SH903i* is not a *de jure* rigid designator, the analysis of 1b under the K-framework predicts that 1b will have two non-equivalent readings that could be more plainly paraphrased thus:

the reading predicted by the K-framework's derivation of $1biv_K$ under the assumption that Sharp SH903i is not de jure rigid:
the actual Sharp SH903i model is such that to satisfy Claire it is necessary that Alice uses a token of it

the first reading of 1b (the de dicto reading):
to satisfy Claire it is necessary that Alice uses a token of Sharp SH903i

However, 1b does not seem to have two such non-equivalent readings. The *de dicto* reading of 1b was accounted by the interpretation $1bi_K$. And we've already indicated that $1bi_K$ will be equivalent to $1biv_K$ provided that *Sharp SH903i* is a rigid designator. So, given the absence of a reading that has the content of $1biv_K$ and that is pre-theoretically distinguishable from the *de dicto* reading of 1b we conclude that under the K-framework *Sharp SH903i* should be a *de jure* rigid designator.

Summary and Assesssment of the Foregone Discussion on the Behavior of Common Nouns in Modal Contexts

Recall that our overall objective is to see whether there are any significant reasons to maintain that a certain class of common nouns are *de jure* rigid. To this end we sought to follow the model of an argument given to establish the *de jure* rigidity of proper names. That argument compared the readings of pairs of modal sentences that are identical except that one had a definite description in an argument position where the other had a proper name. Usually in such pairs, the sentences which involve the definite descriptions have a *de re* and a *de dicto* reading that are truth-conditionally distinguishable from one another, whereas the sentences which involve the proper name arguments never have two such distinguishable readings. The multiplicity of the readings in the former case is explained by the possibility of the definite description to take wide scope or narrow scope relative to the modal operator and the non-rigidity of the definite description. The exceptionless absence of multiple readings in the latter case, despite the fact that just like a definite description a proper name too should presumably be able to take wide scope or narrow scope, is explained by the *de jure* rigidity of the proper names in general.

We thus set out to consider the truth-conditionally distinguishable readings of 1a and 1b reproduced below to seek a similar argument for the case that some common nouns are *de jure* rigid.

1 a [to satisfy Claire's wish] Alice must use a Japanese mobile which is out of production.
  b [to satisfy Claire's wish] Alice must use a Sharp SH903i.

We have seen that each of 1a and 1b had an ordinary *de re* reading and a *dicto* reading, truth conditionally distinguishable from one another. The existence of these readings can be explained by the capacity of these sentences assuming such logical forms as the following,

1 a [to satisfy Claire's wish] Alice must use a Japanese mobile which is out of production.
1aA [$_S$[$_T$ must] [$_S$[$_{NP}$ a J. mobile which is out of production]$_1$[1 [$_S$ Alice uses t_1]]]]]
1aB [$_S$[$_{NP}$ a Japanese mobile which is out of production]$_1$[1 [[$_T$ must][$_S$ Alice uses t_1]]]]

1 b [to satisfy Claire's wish] Alice must use a Sharp SH903i
1bA [$_S$[$_T$ must] [$_S$[$_{NP}$ a [$_N$ Sharp SH903i]]$_1$[1 [$_S$ Alice uses t_1]]]]]
1bB [$_S$[$_{NP}$ a [$_N$ Sharp SH903i]]$_1$[1 [[$_T$ must][$_S$ Alice uses t_1]]]]

Logical forms in which the noun phrases formed by common nouns take wide scope relative to *must* lead to different readings than those in which they remain in the narrow scope. However we noted that distinguishable *de re* and *de dicto* readings result regardless whether the common nouns that form the noun phrases in question are *de jure* rigid or not. Thus the consideration of the ordinary *de re* readings and of their truth-conditional distinguishability from the *de dicto* readings did not have any implication about the rigidity or non-rigidity of the common nouns involved.

To get implications about the rigidity or non-rigidity of the common nouns involved what we needed to look for were rather readings that would be explained by the wide scope interpretation of the common nouns independently of the noun phrases they form. That is, we needed readings which would be accounted for by such logical forms as those below:

1aC $[_S$[J. m. which is out of production$]_2$ [2 $[[_T$must$]$ $[_S[_{NP}$a $[t_2]]_1$[1 $[_S$Alice use $t_1]]]]]]$

1bC $[_S$[Sharp SH903i$]_2$ [2 $[[_T$must$]$ $[_S[_{NP}$a $[t_2]]_1$[1 $[_S$Alice use $t_1]]]]]]$

The existence of such readings will indicate that the wide-scope interpretation of the common noun does not yield the same sentential truth-conditions as its narrow scope interpretation, which in turn will be possible only if the common noun were not rigid.

The sort of readings we sought were the readings that have been recognized as non-specific *de re* readings in the literature. Such readings were manifested by modal sentences involving noun phrases formed by common nouns and they could in general be explained by wide scope interpretation of the common nouns whilst the noun phrases they formed were interpreted in the narrow scope (Heim and Fintel, 2011).

Therefore we then looked into whether any of 1a and 1b had non-specific *de re* readings. We found out that 1a had not one but two such readings (the fourth and fifth readings of 1a):

1 a [to satisfy Claire's wish] Alice must use a Japanese mobile which is out of production.

Fourth reading of 1a:
true relative to @ if and only if tokens X at @ of Japanese mobile models K out of production at @ are such that for all worlds w in which Claire's wishes at @ are satisfied Alice uses one of X at w.

Fifth reading of 1a:
true relative to @ if and only if Japanese mobile models K which are out of production at @ are such that for all worlds w in which Claire's desires at @ are satisfied Alice uses at w a token at w of one of those models.

For the existence of two such readings we gave the following explanation. The common noun *Japanese mobile which is out of production* in the wide scope is a kind level applier but the sentence abstract with which it semantically composes with in the logical form 1aC requires particular level appliers. Under the C-framework and the K-framework motivated in the previous chapter this misfit can be resolved either by adjusting the denotation of the common noun or that of the sentence abstract. And these different paths lead to non-equivalent interpretations of the logical form 1aC.

1aC [$_S$[$_N$J. m. which is out of production]$_2$ [2 [[$_T$must] [$_S$[$_{NP}$a t_2]$_1$[1 [$_S$Alice use t_1]]]]]]

1aiv, derived from 1aC by interpreting [$_N$Japanese mobile which is out of production] as a particular level applier via detax:

⟦[$_S$[$_N$J. m. which is out of production]$_2$ [2 [[$_T$must] [$_S$[$_{NP}$a t_2]$_1$[1 [$_S$Alice use t_1]]]]]]^s⟧

{detax(λs’.$_k$[$_{<e,t>}$J.]$^{s'}$),{2,{λs’.λS.∀s(R(s’)(s)⊃S(s)),{λs’.λP.∃x($_p$[$_{<e,t>}$$t_2$]$^{s',g}$(x)&P(x)),λs’.λy.[A.u.$t_y$]$^{s'}$}}}}

{λs’.λy.∃z($_k$[$_{<e,t>}$J.]$^{s'}$(z)&I(s’)(y,z)),{2,{λs’.λS.∀s(R(s’)(s)⊃S(s)),{λs’.λP.∃x($_p$[$_{<e,t>}$$t_2$]$^{s',g}$(x)&P(x)),λs’.λy.[A.u.$t_y$]$^{s'}$}}}}

{λs’.λy.∃z($_k$[$_{<e,t>}$J.]$^{s'}$(z)&I(s’)(y,z))$'$,{2,λs’.∀s(R(s’)(s)⊃∃x($_p$[$_{<e,t>}$$t_2$]$^{s',g}$(x)&[A.u.$t_x$]^s))}}

{λs’.λy.∃z($_k$[$_{<e,t>}$J.]$^{s'}$(z)&I(s’)(y,z))$'$, λs’.λQ.∀s(R(s’)(s)⊃ ∃x(Q(x) & [Alice use t_x]^s))}

λs’.∀s(R(s’)(s)⊃ ∃x(∃z($_k$[$_{<e,t>}$Japanese…]$^{s'}$(z)&I(s’)(x,z)) & [Alice use t_x]^s))

when evaluated relative to @:

∀s(R(@)(s)⊃ ∃x(∃z($_k$[$_{<e,t>}$Japanese…]$^@$(z)&I(@)(x,z)) & [Alice use t_x]^s))

∀s(R(@)(s)⊃ ∃x∃z(($_k$[$_{<e,t>}$Japanese…]$^@$(z)&I(@)(x,z)) & [Alice use t_x]^s))

1av, derived from 1aC by interpreting [$_N$Japanese mobile which is out of production] and t_2 as kind level appliers:

⟦[$_S$[$_N$J. m. which is out of production]$_2$ [2 [[$_T$must] [$_S$[$_{NP}$ [$_D$a][t_2]]$_1$[1 [$_S$Alice use t_1]]]]]]$^{s'}$⟧

{λs’.$_k$[$_{<e,t>}$J.]$^{s'}$,{2,{λs’.λS.∀s(R(s’)(s)⊃S(s)),{{λs’.λP.λQ.∃x(P(x)&Q(x)),detax(λs’.$_k$[$_{<e,t>}$$t_2$]$^{s',g}$)}, λs’.λy.[A.u.$t_y$]$^{s'}$}}}}

{λs’.$_k$[$_{<e,t>}$J.]$^{s'}$,{2,{λs’.λS.∀s(R(s’)(s)⊃S(s)),{{λs’.λP.λQ.∃x(P(x)&Q(x)),λs’.λx.∃z(I(s’)(x,z)& $_k$[$_{<e,t>}$$t_2$]$^{s',g}$(z))},λs’.λy.[A.u.$t_y$]$^{s'}$}}}}

{λs’.$_k$[$_{<e,t>}$J.]$^{s'}$,{2,{λs’.λS.∀s(R(s’)(s)⊃S(s)),{λs’.λQ.∃x(∃z(I(s’)(x,z)&$_k$[$_{<e,t>}$$t_2$]$^{s',g}$(z))&Q(x)),λs’.λy.[A.use t_y]$^{s'}$}}}}

{λs’.$_k$[$_{<e,t>}$J.]$^{s'}$,{2,{λs’.λS.∀s(R(s’)(s)⊃S(s)),λs’.∃x(∃z(I(s’)(x,z)&$_k$[$_{<e,t>}$$t_2$]$^{s',g}$(z))&[A.u.$t_x$]$^{s'}$)}}}

{λs’.$_k$[$_{<e,t>}$Jap...]$^{s'}$,{2, λs’.∀s(R(s’)(s)⊃ ∃x(∃z(I(s)(x, z) & $_k$[$_{<e,t>}$$t_2$]^{s,g}(z))& [Alice use t_x]^s))}}

{λs’.$_k$[$_{<e,t>}$Jap...]$^{s'}$, λs’.λQ.∀s(R(s’)(s)⊃ ∃x(∃z(I(s)(x, z) & Q(z))& [Alice use t_x]^s))}

λs’.∀s(R(s’)(s)⊃ ∃x(∃z(I(s)(x, z) & $_k$[$_{<e,t>}$Jap...]$^{s'}$(z))& [Alice use t_x]^s))

when evaluated relative to @:

λs’.∀s(R(@)(s)⊃ ∃x(∃z(I(s)(x, z) & $_k$[$_{<e,t>}$Jap...]$^@$(z))& [Alice use t_x]^s))

∀s(R(@)(s)⊃ ∃x∃z(([Japanese…]$^@$(z) & I(s)(x,z))&[Alice use t_x]^s))

The interpretation 1aiv of 1aC accounted for the fourth reading of 1a. And the interpretation 1av accounted for the fifth reading of 1a, provided that *Japanese mobile which is out of production* was not *de jure* rigid. Thus we concluded that it is not.

When we considered 1b we found out that it too had a non-specific *de re* reading (the third reading of 1b), albeit only one:

1 b [to satisfy Claire’s wish] Alice must use a Sharp SH903i.

third reading of 1b:
true relative to @ if and only if tokens of Sharp SH903i at @ are such that for all worlds w in which Claire’s desires at @ are satisfied Alice uses at w one of those.

The K-framework and the C-framework did not differ about the interpretation of taxonomic common nouns such as the *Japanese mobile which is out of production* involved in 1a, but they differed about the interpretation of the semantically simple and non-taxonomic common nouns such as the *Sharp SH903i* involved in 1b. According to the Neo-Carlsonian framework such common nouns had predicative denotations that applied to particular tokens. According to the K-framework these rather originally designated kinds. Thus we had to consider the derivation of the non-specific *de re* reading of 1b from the standpoints of these two frameworks separately.

When considered from the standpoint of the C-framework, the derivation was straightforward as it did not involve any semantic discrepancy. The interpretation $1biii_C$ derived from the logical form 1bC in accordance with the C-framework accounted for the pre-theoretically distinguishable non-specific *de re* reading of 1b provided that *Sharp SH903i* was assumed to be a non-rigid applier.

1bC $[_S[\text{Sharp SH903i}]_2\ [2\ [[_T\,\text{must}]\ [_S[_{NP}\,\text{a}\ [t_2]]_1[1\ [_S\,\text{Alice use}\ t_1]]]]]]$

$1biii_C$ derived from 1bC under the C-framework:

$[\![[_S[\text{Sharp SH903i}]_2\ [2\ [[_T\,\text{must}]\ [_S[_{NP}\,\text{a}\ [t_2]]_1[1\ [_S\,\text{Alice use}\ t_1]]]]]]]\!]$

$\{\lambda s'.{}_{sg\_p}[_{\langle e,t\rangle}S.]^{s'},\{2,\{\lambda s'.\lambda S.\forall s(R(s')(s)\supset S(s)),\{\lambda s'.\lambda P.\exists x(_p[_{\langle e,t\rangle}t_2]^{s',g}(x)\&P(x)),\lambda s'.\lambda y.[A.u.t_y]^{s'}\}\}\}\}$

$\{\lambda s'.{}_{sg\_p}[_{\langle e,t\rangle}S.]^{s'},\{2,\{\lambda s'.\lambda S.\forall s(R(s')(s)\supset S(s)),\lambda s'.\exists x(_p[_{\langle e,t\rangle}t_2]^{s',g}(x)\ \&\ [A.u.\ t_x]^{s'})\}\}\}$

$\{\lambda s'.{}_{sg\_p}[_{\langle e,t\rangle}\text{Sharp SH903i}]^{s'},\{2,\ \lambda s'.\forall s(R(s')(s)\supset\exists x(_p[_{\langle e,t\rangle}t_2]^{s',g}(x)\ \&\ [\text{Alice use}\ t_x]^{s}))\}\}$

$\{\lambda s'.{}_{sg\_p}[_{\langle e,t\rangle}\text{Sharp SH903i}]^{s'},\lambda s'.\lambda Q.\forall s(R(s')(s)\supset\exists x(Q(x)\ \&\ [\text{Alice use}\ t_x]^{s}))\}$

$\lambda s'.\forall s(R(s')(s)\supset \exists x\,{}_{sg\_p}[_{\langle e,t\rangle}\text{Sharp SH903i}]^{s'}(x)\ \&\ [\text{Alice use}\ t_x]^{s}))$

when evaluated relative to @:

$\forall s(R(@)(s)\supset \exists x\,{}_{sg\_p}[_{\langle e,t\rangle}\text{Sharp SH903i}]^{@}(x)\ \&\ [\text{Alice use}\ t_x]^{s}))$

That 1b had only one non-specific *de re* reading instead of two like 1a, could be explained under the C-framework simply by reference to the native particular level denotation of *Sharp SH903i*. Given its native particular level denotation there arose no semantic discrepancy in the interpretation of 1bC, which could then be dealt with in two non-equivalent ways.

However *Sharp SH903i* is a kind designator according to the K-framework. For this reason from the perspective of that framework the logical form 1bC was like 1aC in that it inhered a semantic discrepancy that obtained between its immediate constituents. Thus, like 1aC, 1bC too was interpretable in two ways under the K-framework: one interpretation proceeding by way of adjusting the denotation of the kind designator *Sharp SH903i*, and another that proceeds rather by way of adjusting the denotation of the sentence abstract *[2 [[$_T$ must] [$_S$[$_{NP}$ a [t_2]]$_1$[1 [$_S$ Alice use t_1]]]]]]*.

1bC $[_S[_N\text{Sharp SH903i}]_2\ [2\ [[_T\text{must}]\ [_S[_{NP}\text{a}\ [t_2]\ ]_1[1\ [_S\text{Alice use } t_1]]]]]]$

1biii$_K$, derived from 1bC under the K-framework by interpreting [$_N$Sharp SH903i] as a particular level applier via Pred:

$\{pred(\lambda s'.{}_k[_eS.]^{s'}),\{2,\{\lambda s'.\lambda S.\forall s(R(s')(s)\supset S(s)),\{\lambda s'.\lambda P.\exists x({}_p[_{<e,t>}t_2]^{s',g}(x)\&P(x)),\lambda s'.\lambda y.[A.u.t_y]^{s'}\}\}\}\}$

$\{\lambda s'.\lambda y.I(s')(y,{}_k[_eS.]^{s'}),\{2,\{\lambda s'.\lambda S.\forall s(R(s')(s)\supset S(s)),\{\lambda s'.\lambda P.\exists x({}_p[_{<e,t>}t_2]^{s',g}(x)\&P(x)),\lambda s'.\lambda y.[A.u.t_y]^{s'}\}\}\}\}$

$\{\lambda s'.\lambda y.I(s')(y,{}_k[_eS.]^{s'}),\{2,\{\lambda s'.\lambda S.\forall s(R(s')(s)\supset S(s)),\lambda s'.\exists x({}_p[_{<e,t>}t_2]^{s',g}(x)\&[A.u.t_x]^{s'})\}\}\}$

$\{\lambda s'.\lambda y.I(s')(y,{}_k[_e S.]^{s'}),\ \{2,\ \lambda s'.\forall s(R(s')(s)\supset \exists x({}_p[_{<e,t>}t_2]^{s',g}(x)\ \&\ [\text{Alice use } t_x]^{s}))\}\}$

$\{\lambda s'.\lambda y.I(s')(y,{}_k[_e \text{Sharp SH903i}]^{s'}),\ \lambda s'.\lambda Q.\forall s(R(s')(s)\supset \exists x(Q(x)\ \&\ [\text{Alice use } t_x]^{s}))\}$

$\lambda s'.\forall s(R(s')(s)\supset \exists x(\lambda y.I(s')(y,{}_k[_e \text{Sharp SH903i}]^{s'})(x)\ \&\ [\text{Alice use } t_x]^{s}))$

$\lambda s'.\forall s(R(s')(s)\supset \exists x(I(s')(x,{}_k[_e \text{Sharp SH903i}]^{s'})\ \&\ [\text{Alice use } t_x]^{s}))$

when evaluated relative to @:

$\forall s(R(@)(s)\supset \exists x(I(@)(x,{}_k[_e \text{Sharp SH903i}]^{@})\ \&\ [\text{Alice use } t_x]^{s}))$

1biv$_k$, derived from 1bC under the K-framework by interpreting both t_2 and [$_N$Sharp SH903i] as kind designators:

$\{\lambda s'.{}_k[_eS.]^{s'},\{2,\{\lambda s'.\lambda S.\forall s(R(s')(s)\supset S(s)),\{\{\lambda s'.\lambda P.\lambda Q.\exists x(P(x)\&Q(x)),pred(\lambda s'.{}_k[_et_2]^{s',g})\},\lambda s'.\lambda y.[A.u.t_y]^{s'}\}\}\}\}$

$\{\lambda s'.{}_k[_eS.]^{s'},\{2,\{\lambda s'.\lambda S.\forall s(R(s')(s)\supset S(s)),\{\{\lambda s'.\lambda P.\lambda Q.\exists x(P(x)\&Q(x)),\lambda s'.\lambda y.I(s')(y,{}_k[_et_2]^{s',g})\},\ \lambda s'.\lambda y.[A.u.t_y]^{s'}\}\}\}\}$

$\{\lambda s'.{}_k[_eS.]^{s'},\{2,\{\lambda s'.\lambda S.\forall s(R(s')(s)\supset S(s)),\{\lambda s'.\lambda Q.\exists x(I(s')(x,{}_k[_et_2]^{s',g})\&Q(x)),\lambda s'.\lambda y.[A.u.t_y]^{s'}\}\}\}\}$

$\{\lambda s'.{}_k[_e S.]^{s'},\ \{2,\ \{\lambda s'.\lambda S.\forall s(R(s')(s)\supset S(s)),\ \lambda s'.\exists x(I(s')(x,\ {}_k[_et_2]^{s',g})\&\ [\text{Alice uses } t_x]^{s'})\}\}\}$

$\{\lambda s'.{}_k[_e \text{SharpSH903i}]^{s'},\ \{2,\ \lambda s'.\forall s(R(s')(s)\supset \exists x(I(s)(x,\ {}_k[_et_2]^{s,g})\&\ [\text{Alice uses } t_x]^{s}))\}\}$

$\{\lambda s'.{}_k[_e \text{SharpSH903i}]^{s'},\ \lambda s'.\lambda z.\forall s(R(s')(s)\supset \exists x(I(s)(x,z)\&\ [\text{Alice uses } t_x]^{s}))\}$

$\lambda s'.\forall s(R(s')(s)\supset \exists x(I(s)(x,{}_k[_e \text{SharpSH903i}]^{s'})\&\ [\text{Alice uses } t_x]^{s}))$

when evaluated relative to @:

$\forall s(R(@)(s)\supset \exists x(I(s)(x,[\text{Sharp SH903i}]^{@})\&\ [\text{Alice uses } t_x]^{s}))$

The interpretation $1biii_K$ accounted for the pre-theoretically distinguished non-specific *de re* reading of 1b (the third reading). What however the derivability of the interpretation $1biv_K$ under the K-framework meant depended on the rigidity or non-rigidity of the noun *SharpSH903i*. On the assumption that *SharpSH903i* was not a *de jure* rigid designator, the interpretation $1biv_K$ implied the existence of a second non-specific *de re* reading for 1b. However on the assumption that *SharpSH903i* was a *de jure* rigid designator, the meaning described by $1biv_K$ would simply correspond to the *dicto* reading of 1b, and no further reading for 1b would have been implied. Since in fact no pre-theoretically distinguishable non-specific *de re* reading other than the third reading accounted for by $1biii_K$ existed, we had to conclude that *SharpSH903i* should be a *de jure* rigid designator according to the K-framework.

1b had only one non-specific *de re* reading whilst 1a had two of them. They differed in that they involved two different common nouns occurring in the same sentential context. From the perspective of the K-framework both of these common nouns denoted kinds, albeit under different modes: 1b had the kind designator *SharpSH903i* where 1a had the kind applier *Japanese mobile which is out of production*. The K-framework can account for the existence of two non-specific *de re* readings for 1a provided that *Japanese mobile which is out of production* is a non-rigid applier. And the K-framework can account for the existence of *only one* non-specific *de re* reading for 1b provided that *SharpSH903i* is a *de jure* rigid designator.

From the perspective of the C-framework *Japanese mobile which is out of production* is a kind level applier and *SharpSH903i* is a token level applier. Like the K-framework, the C-framework can account for the existence of two non-specific *de re* readings of 1a provided that *Japanese mobile which is out of production* is a non-rigid applier. And it can account for the existence of one non-specific *de re* reading for 1b provided that considered as a native applier *SharpSH903i* is non-rigid.

So a consideration of the non-specific *de re* readings 1a and 1b from the standpoints of the C-framework and the K-framework gave the following results about the rigidity/non-rigidity of the common nouns *Japanese mobile which is out of production* and *Sharp SH903i* involved in 1a and 1b. The taxonomic common noun *Japanese mobile which is out of production* cannot be a *de jure* rigid applier according to both these frameworks. For otherwise, contrary to the pre-theoretical semantic judgments about the matter, 1a would have only one non-specific *de re* reading, instead of two. As for the rigidity of the semantically simple common noun *Sharp SH903i* however these frameworks yielded different conclusions. According to the C-framework which takes such nouns to be token-level appliers, *Sharp SH903i* too cannot be a *de jure* rigid applier. It should be able to denote different functions of type <e,t> at different evaluation indexes. Otherwise 1b would not have a pre-theoretically distinguishable non-specific *de re* reading, but it does have one such reading. According to the K-framework which took such terms as *Sharp SH903i* to primarily designate kinds, *Sharp SH903i* should however be a *de jure* rigid designator: it should designate the same model at every evaluation index by linguistic-semantic design. Otherwise, the K-framework predicts that like 1a, 1b too would have not just one but two pre-theoretically distinguishable non-specific *de re* readings. But it actually has only one such reading.

Now the points of the foregone discussion and its results can be generalized to cover other taxonomic common nouns and semantically simple non-taxonomic common nouns. Consider the following pairs of sentences that are similar to the pair 1a and 1b in all the respects relevant here:

3 a No one can speed up to 150 km/h on a car designed by Damon.
  b No one can speed up to 150 km/h on a Kia Picanto 1.0.1.
4 a Alice does not want to drive a car designed by Damon.
  b Alice does not want to drive a Kia Picanto 1.0.1.
5 a Alice cannot shoot at any bird held sacred by the natives.
  b Alice cannot shoot at any Red crowned crane.
6 a Alice does not want to shoot at any bird held sacred by the natives.
  b Alice does not want to shoot at any red crowned crane.

Each sentence in the pairs 3-6 have non-specific *de re* readings. The a-sentences involve taxonomic common nouns, they thus have two different non-specific *de re* readings. The b-sentences have only one non-specific *de re* reading.

According to the C-framework both the taxonomic common nouns in the a-sentences and semantically simple non-taxonomic common nouns in the b-sentences cannot be rigid appliers. The b-sentences' having only one non-specific *de re* reading is explained by the simple non-taxonomic common nouns' being token level appliers, and thus not generating any sortal discrepancy that can be resolved in two different ways.

The K-framework will be in agreement with the C-framework as regards the taxonomic common nouns in the a-sentences. They are appliers but cannot be rigid appliers. But as regards the non-taxonomic semantically simple common nouns of the b-sentences the K-framework will differ from the C-framework. According to the K-framework these latter are rather kind designators, and they should be *de jure* rigid as designators. For, if they were not *de jure* rigid, the b-sentences would have two non-specific *de re* readings instead of one; but they only have one such pre-theoretically distinguishable reading.

Clearly it is possible to produce many pairs of sentences like 1 and 3-6. And the same points will equally apply to them. Thus, on the basis of the foregone discussion we can make the following generalizations. Taxonomic common nouns cannot be *de jure* rigid appliers both from the standpoint of the C-framework and the K-framework. Non-taxonomic semantically simple common nouns are token-level appliers according to the C-framework, and as such they too cannot be *de jure* rigid appliers; however according to the K-framework non-taxonomic semantically simple common nouns are kind designators and as such they should be *de jure* rigid designators.

So, with regard to the *de jure* rigidity of one important family of common nouns, namely semantically simple non-taxonomic common nouns, we reach divergent conclusions depending on whether we adopt the C-framework or the K-framework with regard to the general semantics of common nouns.

This is not a surprising difference however. According to the C-framework non-taxonomic common nouns do not designate kinds but have predicative denotations that apply to particulars. If such common nouns contribute nothing but predicative denotations then for most of the ordinary common nouns, it is natural that they be non-rigid, that they have different predicative denotations at different evaluation indexes. According to the K-framework however simple non-taxonomic common nouns primarily designate kinds, but they can also contribute predicative denotations in particular level sentential contexts, which are derived through the application of the operator pred. The particulars which satisfy the predicative denotations derived through pred from the meaning of the simple common noun are different across possible worlds. However, all of these different particulars which satisfy these denotations are united in being the instances of the single kind constantly designated by the common noun relative to all possible worlds.

We had set out to consider the behavior of common nouns in modal sentences to find a support for the view that one class of common nouns are distinctively *de jure* rigid. Whether we have been able to find such a support depend on whether we adopt the C-framework which assigns particular level predicative denotations to simple non-taxonomic common nouns or the K-framework which take them to designate kinds. If we adopt the latter framework then the consideration of the behavior of common nouns in modal sentences gives us a linguistic-semantic reason to hold that simple non-taxonomic common nouns are *de jure* rigid. Under C-framework however the consideration of the behavior of common nouns in modal sentences gives us no reason to single out some common nouns as *de jure* rigid.

The choice between the K-framework and the C-framework relative to the interpretation of common nouns however depend on various issues left open in the previous chapter, and which cannot be further followed in the present work.

Now, I pass to the consideration of identity sentences with kind designating arguments which too *prima facie* have the potential to give linguistic-semantic reasons to single out some common nouns as *de jure* rigid.

Identity Sentences

One argument for the *de jure* rigidity of proper names and the non-rigidity of the definite descriptions was based on the identity sentences. Identity sentences whose arguments were proper names were found to be non-contingent. But this was not case for most of the strict identity sentences which had at least one ordinary definite description as an argument. The former type of sentences' being non-contingent could be explained by the rigidity of proper names; the latter type of sentences' capacity to be contingent could be explained by the non-rigidity of definite descriptions. Now I will consider whether a similar argument can be raised for a rigid/non-rigid distinction among common nouns.

In English sentences singular count common nouns cannot figure as bare arguments, they should rather combine with determiners or get pluralized to form noun phrases that can occur as arguments. *A fortiori* count common nouns cannot figure as bare arguments of strict identity sentences. Therefore in the case of count common nouns it is not possible to give an argument based on identity sentences which is strictly similar to the one used in the case of proper names. Still, noun phrases formed by count common nouns can be arguments of identity sentences, and a consideration of some such sentences can be used to argue for a rigidity/non-rigidity distinction among count common nouns, depending how we propose to analyze such noun phrases.

It appears that the contingency/non-contingency divergence among identity sentences extend to the identities whose arguments are formed by noun phrases that designate kinds. Consider the following pair of sentences:

7 a The groundhog is the rodent that has its own holiday.
b The groundhog is the woodchuck.

7a sounds contingent but 7b does not. This contrast is better discerned when these sentences are conjoined with clauses that express the relevant counterfactual possibilities:

The groundhog is the rodent that has its own holiday but it might not have been so.
The groundhog is the woodchuck but it might not have been so.

The first one does not sound inconsistent but the second does. The non-contingency of 7b can be explained by the rigidity of the noun phrases that constitute its arguments. If *the groundhog* has the same denotation at every evaluation index s and if the same is the case for *the woodchuck*, and moreover if both phrases have the same denotations at some index @, then their denotations should be identical at every other index as well. The contingency on the other hand of 7a can be explained by the non-rigidity of one its arguments. Namely, if the phrase *the rodent that has its own holiday* does not have the same denotation at every evaluation index s, then even if its denotation at one evaluation index @ is identical to that of *the groundhog*, there will be evaluation indexes s' at which its denotation at s' will be different than that of *the groundhog* at s'.

7aA [the groundhog][[is][the rodent that has its own holiday]]

7ai derived from 7aA:
{λs.[the groundhog]^s, {λs.λy.λx.x=y, λs.[the rodent that has its own holiday]^s}}
{λs.[the groundhog]^s, λs.λx.x=[the rodent that has its own holiday]^s}
λs.[the groundhog]^s=[the rodent that has its own holiday]^s

7bA [the groundhog][[is][the woodchuck]]

7bi derived from 7bA:
{λs.[the groundhog]^s, {λs.λy.λx.x=y, λs.[the woodchuck]^s}}
{λs.[the groundhog]^s, λs.λx.x=[the woodchuck]^s}
λs.[the groundhog]^s=[the woodchuck]^s

Thus the contingency/non-contingency difference between the two sentences can be explained by the rigidity of the noun phrases *the woodchuck* and *the groundhog*, and the non-rigidity of the noun-phrase *the rodent that has its own holiday.* These rigidity/non-rigidity assumptions involved in these explanations can be further corroborated by considering the divergent behavior in modal sentential contexts of *the woodchuck* and *the groundhog* on the one hand and of *the rodent that has its own holiday* on the other.

The consideration of this pair of sentences and similar such pairs support a rigid/non-rigid distinction among definite noun-phrases. But it is not clear whether it also gives us any reason to hold that the common nouns that form the rigid definite phrases should be rigid and those that form non-rigid definite phrases are non-rigid. This depends on the analysis of definite phrases, on how they are taken to derive their meanings from the meanings of the common nouns that form them. Recall from the previous chapter that the C-framework and the K-framework provided different analysis of an important category of kind designating definite phrases, namely the definite generics; and such definite phrases as *the groundhog* and *the woodchuck* are definite generics.

Now, if according to any of these analyses it turns out that the rigidity of definite generics depended on the rigidity of the common nouns that formed them, then 7a and 7b and similar such pairs can also be used to mount an argument for a rigid/non-rigid distinction among common nouns as well.

Examination of the Kind-level Identity Sentences According to the K-framework

Indeed relative to the K-framework the rigidity of definite generics depends on the rigidity of the common nouns that form them. In the previous chapter we have seen that such definite noun phrases as *the groundhog* and *the woodchuck* are kind designating definite generics. Under the K-framework non-taxonomic simple common nouns have kind designator meanings and the definite generics formed by such common nouns have the same meanings as the common nouns that form them. Thus under the K-framework we have,

$\lambda s._k[\text{the groundhog}]^s = \lambda s._k[\text{groundhog}]^s$
$\lambda s._k[\text{the woodchuck}]^s = \lambda s._k[\text{woodchuck}]^s$

Thus for the definite generics to be rigid, the underlying common nouns have to be rigid. On the other hand the singular definite noun phrase *the rodent that has its own holiday* is not a definite generic. It is a taxonomic definite singular phrase formed by the taxonomic common noun *rodent that has its own holiday*. Under the K-framework taxonomic common nouns were assigned predicative meanings that applied to kinds, and the article *the* in definite phrases other than definite generics were interpreted in the following manner:

Let α of type $<e,t>$
$i(\alpha)$=the largest individual x (under $\ll$) such that $\alpha(x)=1$
$[\![\text{the}]\!]=\lambda s.\lambda P.i(P)$

Thus under the K-framework,

$[_{NP}\text{ the rodent that has its own holiday}]=[_{NP}[_{D}\text{the}][_{N}\text{rodent that has its own holiday}]]$

receives the following interpretation,

$\{\lambda s.\lambda P.i(P),\ \lambda s._{k}[_{<e,t>}\text{ rodent that has its own holiday}]^{s}\}$
$\lambda s.i(_{k}[_{<e,t>}\text{ rodent that has its own holiday}]^{s})$
$\lambda s.a_{s}$, where for a given s, a_{s} is the largest individual x (under $\ll$) such that $_{k}[_{<e,t>}$ rodent that has its own holiday$]^{s}(x)=1$
$\lambda s.a_{s}$, where for a given s, a_{s} is the unique individual x such that $_{k}[_{<e,t>}$ rodent that has its own holiday$]^{s}(x)=1$, since $_{k}[_{<e,t>}$ rodent that has its own holiday$]^{s}$ can only be satisfied by atoms and no atom can be larger than any other atom

Assuming these analyses for the definite phrases involved in 7a and 7b, lets reconsider the interpretation of these sentences from the perspective of the K-framework.

7aA $[_{NP}[_{D}\text{the}][_{N}\text{groundhog}]][_{VP}[_{V}\text{is}][_{NP}[_{D}\text{the}][_{N}\text{rodent that has its own holiday}]]]$

7ai$_{K}$ derived from 7aA under the K-framework:
$\{\{\lambda s.\lambda x.x,\ \lambda s._{k}[_{e}\text{groundhog}]^{s}\},\{\lambda s.\lambda y.\lambda x.x=y,\{\lambda s.\lambda P.i(P),\ \lambda s._{k}[_{<e,t>}\text{ r. that has its own h.}]^{s}\}\}\}$
$\{\lambda s._{k}[_{e}\text{groundhog}]^{s},\ \{\lambda s.\lambda y.\lambda x.x=y,\ \{\lambda s.i(_{k}[_{<e,t>}\text{ rodent that has its own holiday}]^{s})\}\}$
$\{\lambda s._{k}[_{e}\text{groundhog}]^{s},\ \lambda s.\lambda x.x=i(_{k}[_{<e,t>}\text{ rodent that has its own holiday}]^{s})\}$
$\lambda s._{k}[_{e}\text{groundhog}]^{s}=i(_{k}[_{<e,t>}\text{ rodent that has its own holiday}]^{s})$
when evaluated relative to @:
$_{k}[_{e}\text{groundhog}]^{@}=i(_{k}[_{<e,t>}\text{ rodent that has its own holiday}]^{@})$

7bA $[_{NP}[_{D}\text{the}][_{N}\text{groundhog}]][_{VP}[_{V}\text{is}][_{NP}[_{D}\text{the}][_{N}\text{woodchuck}]]]$

$7bi_K$ derived from 7bA under the K-framework:

$\{\{\lambda s.\lambda x.x, \lambda s._k[_e\text{groundhog}]^s\}, \{\lambda s.\lambda y.\lambda x.x=y, \{\lambda s.\lambda x.x, \lambda s._k[_e\text{woodchuck}]^s\}\}\}$

$\{\lambda s._k[_e\text{groundhog}]^s, \{\lambda s.\lambda y.\lambda x.x=y, \lambda s._k[_e\text{woodchuck}]^s\}\}$

$\{\lambda s._k[_e\text{groundhog}]^s, \lambda s.\lambda x.x={}_k[_e\text{woodchuck}]^s\}$

$\lambda s._k[_e\text{groundhog}]^s={}_k[_e\text{woodchuck}]^s$

when evaluated relative to @:

$_k[_e\text{groundhog}]^@={}_k[_e\text{woodchuck}]^@$

Under this more detailed analysis of 7b according to the K-framework, it is seen that under the K-framework the non-contingency of 7b depends on the rigidity of the common nouns *groundhog* and *woodchuck.* On the other hand the contingency of 7a requires that *the rodent that has its own holiday* is non-rigid. Under the K-framework the non-rigidity of *the rodent that has its own holiday* is made plausible by the fact that the K-framework analyses it as an ordinary definite phrase formed by a taxonomic applier *rodent that has its own holiday*.

Clearly the points made above in relation with 7a and 7b and the common nouns involved in them will apply also to many other similar sentence pairs. Thus under the K-framework consideration of the modal properties of identity sentences with kind level definite singular arguments gives a result that corroborates our previous result: according to K-framework non-taxonomic simple common nouns should be rigid designators.

Examination of the Kind-level Identity Sentences According to the C-framework

Remember that the C-framework adopted an analysis of definite generics such as *the woodchuck*, *the groundhog* which is different than that of the K-framework. It followed Dayal (2004), according to which definite generics were just a special sort of taxonomic definite singular noun-phrases.

I will now consider the contrasting pair 7a and 7b from the standpoint of the C-framework. I will examine whether explanation of the contrast between 7a and 7b in terms of the rigidity/non-rigidity of the definite phrase arguments of the identity clauses works under the C-framework as well, and if it works whether it requires also to assume a rigid/non-rigid distinction among common nouns that form these definite phrases.

C-framework analyses definite generics as ordinary definite taxonomic phrases. Let's recall that analysis by considering the case of *the groundhog*. Here the common noun *groundhog* forming the definite phrase is assumed to be taxonomic. That is, it is assigned a kind level predicative meaning (type $<s,<e_k,t>>$). According to this analysis it is assumed that the denotation of the taxonomic *groundhog* truly applied to the groundhog itself (Marmota monaxis), as well as its sub-species (*Marmota monax candensis*, *Marmota monax ignava, Marmota monax rufescens*) . That is, both *Marmota monaxis is a groundhog* and *The groundhog is a groundhog* are acceptable and true as well as *Marmota monax rufescens is a groundhog* . The article *the* in the definite generic *the groundhog* is assigned its standard interpretation, namely:

Let α of type $<e,t>$
$i(\alpha)$=the largest individual x (under $\ll$) such that $\alpha(x)=1$
$[\![\text{the}]\!]=\lambda s.\lambda P.i(P)$

We have indicated that usually definite phrases manage to designate a unique individual although the common nouns they involve are in fact satisfied by many individuals. This had been accounted for by supposing that an implicit predicate d_c (type <s,<e,t>>) which is only true of the entities which are salient relative to the context utterance is implicitly involved in such definite phrases.

Bearing on this contextual sensitivity of definite phrases, the C-framework supposes that the definite phrase *the groundhog* is used as a definite generic when such contextually determined constraints rule out the sub-species of the species corresponding to the common noun *groundhog*. Thus, when this happens *the groundhog* comes to designate the super-species *Marmota monax*, which becomes the only kind that satisfies both the taxonomic common noun *groundhog* and the contextual constraints. According to the C-framework the analysis of the definite generic use of *the groundhog* will be thus:

$[_{NP}[_{D}\text{the}][_{N}\text{groundhog}]]$

$\{\lambda s.\lambda P.i(P), \{\lambda s._{k}[_{<e,t>}\text{groundhog}]^{s}, \lambda s.d_c\}\}$ $\{\lambda s.\lambda P.i(P), \lambda s.\lambda x.(_{k}[_{<e,t>}\text{groundhog}]^{s}(x) \,\&\, d_c(x))\}$ $\lambda s.i(\lambda x.(_{k}[_{<e,t>}\text{groundhog}]^{s}(x) \,\&\, d_c(x)))$ $\lambda s.a_s$, where for a given s, a_s is the largest individual x (under $\ll$) such that $(_{k}[_{<e,t>}\text{groundhog}]^{s}(x) \,\&\, d_c(x))=1$ $\lambda s.a_s$, where for a given s, a_s is the unique individual x such that $(_{k}[_{<e,t>}\text{groundhog}]^{s}(x) \,\&\, d_c(x))=1$, since $_{k}[_{<e,t>}\text{groundhog}]^{s}$ can only be satisfied by atoms and no atom can be larger than any other atom

The assumption that in the definite generic use the contextually determined constraints rule out the sub-species of the groundhog amounts to the supposition that in the definite generic use for every possible world w, d_c and $_{k}[_{<e,t>}\text{groundhog}]^{w}$ can be satisfied only by the super-species *Marmota monax*, the groundhog. This in turn implies that regardless whether the underlying taxonomic common noun *groundhog* is a rigid applier or not, the definite phrase *the groundhog* used as a definite generic will be a rigid designator.

These same considerations will clearly apply to *the woodchuck* as well. Let's now consider the contrast between 7a and 7b in accordance with Dayal's theory of definite generics.

Given the contextually induced rigidity of the definite phrases used as definite generics the C-framework can adopt an explanation of the contingency/non-contingency contrast between 7a and 7b in terms of rigidity/non-rigidity difference of the definite phrases that constitute the arguments in these sentences. That is, like the K-framework it too can explain the non-contingency of 7b in terms of the rigidity of *the groundhog* and *the woodchuck* which are the arguments of the identity clauses in 7b; and it can explain the consistency of 7a in terms of the non-rigidity of *the rodent that has its own holiday*. However under the C-framework's analysis of definite generics there is no need to assume that the common nouns *groundhog* and *woodchuck* be rigid so as to ensure that the definite generics they form be rigid. According to the C-frameworks' account the rigidity of definite generics is induced *pragmatically*.

The idea of *pragmatically* induced rigidity may look implausible. But its validity can be confirmed, independently of the controversial case of the analysis definite generics, in relation with non-kind designating ordinary definite phrases. Consider the following examples:

8 a [to accomplish her assignment] Alice must interview Bob.
b [to accomplish her assignment] Alice must interview the Google shareholder.
c [to accomplish her assignment] Alice must interview the youngest Google shareholder.

8c is ambiguous. Its ambiguity can be explained due to its capacity to assume logical forms in which the definite phrase *the youngest Google shareholder* takes narrow scope or the wide scope relative to *must* and the non-rigidity of that definite phrase. In contrast 8a and 8b are not ambiguous, although they too should be able to assume similar logical forms. In the case of 8a this is explained by the fact that the proper name *Bob* is a *de jure* rigid designator. The same explanation can be extended to 8b as well, if *the Google shareholder* is rigid. That *the Google shareholder* can be rigid despite being a definite phrase can in turn be explained by reference to contextual constraints that induces rigid designation. Although the common noun *Google shareholder* is not a rigid applier and it can truly apply to more than one individual, it may be thought that in a certain use of *the Google shareholder*, the contextual constraints rule out any one which is not actually at a certain room next to the place of utterance, where it happens to be the case that there is only one Google shareholder.

Conclusion of the Examination of Kind Level Identity Sentences

In this section we have considered differences in the modal properties of identity sentences formed by kind level definite phrases; specifically we examined whether the explanation of these differences in terms of the rigidity/non-rigidity difference of the definite phrases required us to assume a rigidity/non-rigidity difference among the common nouns that formed these definite phrases. It turned out that if the K-framework is adopted, the explanation in question required such an assumption. Because, according to the

K-framework definite generics (*the groundhog, the woodchuck*) were formed by simple non-taxonomic common nouns that had kind designator meanings and they had the same meanings as the common nouns that form them. However under the C-framework such an assumption was not required. Under C-framework's analysis, definite generics are merely taxonomic definite phrases formed by taxonomic common nouns, and they are rigid for pragmatic reasons, regardless whether the taxonomic common nouns that formed them are rigid or not.

So, in conformity with the previous results gathered from the examination of the behavior of common nouns in modal sentential contexts, provided that a framework like the K-framework is adopted, an argument for a rigidity/non-rigidity distinction among common nouns can be mounted on the basis of the differences in the modal properties of strict identity sentences whose arguments are definite phrases that designate kinds. Such an argument however cannot be obtained if the C-framework is adopted. So, to use the differences in the modal properties of identity sentences to support a rigid/non-rigid distinction among common nouns we have to find independent reasons that favor the K-framework over the C-framework.

Conclusion of the Chapter

The result reached at the seventh chapter about the rigidity of common nouns is unfortunately not a strong one. At the end of the sixth chapter we singled out two plausible ways to account for the semantics of noun phrases formed by common nouns. The C-framework which assigned applier meanings to all common nouns and the K-framework which did the same to all common nouns but the semantically simple ones. Then when we tested these frameworks relative to sentence types which in the case of particular level noun phrases supported the claim that proper names are *de jure* rigid designators. Namely, modal sentences and identity sentences. The result has not been unequivocal. The K-framework supported a rigidity division among common nouns which lined along the applier/designator division adopted in that framework. But the C-framework could as well account for the semantics feautures of the same types of sententces without invoking rigidity.

So, it indeed seems a rigidity division among common nouns sinks or floats depending on whether common nouns are primarily divided among themselves as appliers and designators. Yet, albeit inconclusive, there are reasons to hold the view that simple non-taxonomic common nouns and only them are kind designators. At the end of the sixth chapter I had indicated these reasons.

CHAPTER VIII

GENERAL CONCLUSION

The present work sought to investigate whether there is a linguistically relevant rigid/non-rigid division among common nouns. As such this investigation is closely related with the philosophical literature on the extension of the notion of rigidity to the case of general terms, in so far as common nouns are usually regarded as general terms. In the first two chapters I have described that literature and identified certain shortcomings and confusions. In the remaining chapters I pursued the goal of setting linguistic semantic arguments to justify ascription of *de jure* rigidity to some common nouns. Such arguments were finally set up in the seventh chapter. The discussion of the chapters from the third to the sixth were indispensable preliminaries to this end, but they also gave me occasion to improve upon the shortcomings and correct the confusions I previously identified in the literature.

The main motivation behind this work has been the literature on the rigidity of general terms: the third lecture in *Naming and Necessity* and the subsequent literature on it. Among singular terms proper names are *de jure* rigid designators, and in that they differed from definite phrases that designated particulars. I wondered, like many others who contributed to that literature, whether among the so called general terms as well there is a similar difference, especially among common nouns which were at the center of *Naming and Necessity*'s third lecture. Yet, I was not convinced by any of the views defended in the literature due to certain issues in the way they defended and presented these views. For this reason I myself undertook the task of determining, to my satisfation at least, whether the notion of *de jure* rigidity has any relevance with regard to count common nouns –an important family of terms included in the category of general terms.

The literature in question focused on the issue of the rigidity of general terms. A semantic question about what presumably is considered as a syntactic category –given that whether general terms are appliers or designators was as well at issue. Besides common nouns and adjectives, some works have included nominal verb phrases (*is a tiger*) into the general terms and some other works included noun phrases (*the honeybee, the color of the sky*). Now the problem was that the category of general terms as is understood in the literature did not correspond to any acknowledged linguistic-syntactic category. But the puzzlement generated by *Naming and Necessity*'s third lecture, and which motivated the controversy on the rigidity of general terms, was a real one. I believe that this puzzlement primarily pertained to Kripke's ascription of rigidity to some common nouns (mainly natural kind common nouns) and his implicit suggestion that not all common nouns were like these. In the present work of the different types of terms included to the category of general terms, I focused on the syntactic category of common nouns (or to be more precise the class N-bar), I carefully and clearly distinguished them from noun phrases and nominal verb phrases, both syntactically and semantically.

The literature sought to find a notion of general term rigidity which can be claimed to divide general terms into rigid and non-rigid parts. Most desirably one which will correspond the notion of natural kind term. The details of the representative works of this literature was discussed in the second chapters.

Here is a reminder of the outlooks of the three principal camps of the literature on general term rigidity:

> Neither rigid application, nor rigid*-application (Devitt's concept), nor rigid designation can distinguish natural kind terms among general terms in the appropriate way. Therefore, there is no notion of rigidity which is significant for general terms.
>
> If general terms are taken to include noun phrases like *the color of the sky*, *the insect species typically farmed for honey* then rigid designation will be a suitable notion of rigidity for general terms as even if all count nouns are rigid there will be such general terms as *the color of the sky* and *the insect species typically farmed for honey* which are not rigid.
>
> If the notion of rigidity which is applicable to appliers is tweaked a little bit from constancy of extension to constancy of application to an individual, then the resulting notion –Devitt's rigid*-application- will be a suitable notion of rigidity for general terms as it more or less covers all terms considered as natural kind terms, and excludes nominal kind terms like *bachelor*, *hunter* etc.

The literature appears to have set finding a notion of rigidity which will divide general terms in some significant manner as its primary objective. The principal arguments were given for or against different notions of rigidity according to whether they divide general terms in some significant way. Yet the contributors have not worked as hard to justify their anwers to the questions *which mode of denotation should be ascribed to general terms* and *whether some are indeed rigid relative to that mode of denotation* (in the plain sense of constancy of denotation relative to different indexes of evaluation). Either the answers given to these questions were not justified at all; or they were justified on an intuive ground in a way that considered general terms in abstraction from the different types of sentential contexts in which they may occur. However, without investigating these latter questions first, how can one know that a notion of rigidity which is intuitively judged to divide general terms in some significant way is semantically relevant at all? It might turn out that, although rigid designation gives a division of general terms, wider consideration of the compositional semantics of sentences rule out the presupposition that general terms are designators. Or it might turn out that, although rigid*-application gives a significant division of general terms, there is no reason to ascribe rigid*-application to any term to account for the truth-conditions of any sentence.

In the present work rather than defending one or another notion of rigidity according to whether it divides general terms or not, I wanted to focus on the indicated principal questions. I did this in relation solely with common nouns. The fifth and the sixth chapters of the present work were concerned with the question which mode of denotation should be ascribed to common nouns. Although I have't been able to reach a conclusive answer I have described two potential answers in detail, the C-framework and the K-framework; and I have indicated the pros and cons for these frameworks. The details pertained to the semantics of noun phrases formed by common nouns and they were inevitable. For common nouns' contribution to the determination of truth condition is effected via different types of noun phrases which they headed. When a mode of denotation is assigned to common nouns one needs to show that this can support in a plausible way the types of denotations assigned to the noun phrases they head – a matter which was not raised at all in the literature on general terms' rigidity. The seventh chapter of the present work focused in turn on the question whether some common nouns should be ascribed rigidity relative to the modes of denotation they have been assigned under the C-framework and the K-framework which had been described in the sixth chapter.

In proposing different notions of rigidity as the sought for general term rigidity, or in rejecting such proposals, the contributors to the literature inevitably made claims of rigidity or non-rigidity relative to different notions of rigidity. These claims have been justified merely on intuitive grounds. By focusing on the target term itself, in abstraction from the different types of sentential contexts in which the term may occur. I am not sure whether any claims about a supposed sub-sentence level syntactic class regarding the rigidity of its members can yield properly justified results by eschewing compositional semantic analyses grounded on syntactic theory. In relation with sub-sentential constituents whether rigidity obtains or not is hardly a matter that can be decided on intuitive grounds. For one thing how to divide different types of sentences into classess of recurrent syntactic constitutents is a theoretical matter. For another while judgements about the sentence level semantic features truth/falsity, ambiguity, entailement, contingency constitute the pre-theoretical data, judgments about the semantic features of different types of constituents are theoretical judgments to be tested against the sentential semantic data.

These matters pertaining to the justification of semantic claims about subsentential elements were covered in the third chapter of the present work. There I described how in formal semantics in the Montague tradition semantic claims are justified. These justifications proceed by way of *induction to the best explanation*. The ultimate explananda are the truth-conditions of sentences and the semantic claims are considered to be justified to the extent that they can explain truth-conditions related matters better than their alternatives. In that same chapter I also described the basics of a general formal semantic framework based on transformational generative syntax (that of Heim and Kratzer (1998) and Heim and Fintel (2011)). In the rest of the present work I adopted that framework and the methodology of formal semantic literature in investigating ways to justify certain semantic claims. In constructing such arguments I have ascribed explicit syntactic analyses to sentences, and semantic intepretations followed the syntactic structure in accordance with the compositionality principle. On the matter of these syntactic analyses I deferred to Heim & Kratzer (1998) and Heim & Fintel (2011), who themselves as far as possible aimed to follow the transformational syntax tradition. In this way, in the fourth chapter, I gave proper linguistic-semantic arguments to justify the commonly held view that proper names are *de jure* rigid designators – in relation with proper names I had not ever seen such arguments being given in the literature before. The arguments consisted of showing that assigning *de jure* rigidity to proper names explains an ambiguity divergence that obtains among modal sentences and a contingency divergence that obtains between identity sentences. The principal objective of the rest of the present work was to investigate the prospects of raising similar arguments in the case of common nouns. This has been done in the seventh chapter; again we considered whether some common nouns should be assigned *de jure* rigidity to explain an ambiguity divergence that obtains between modal sentences and a contingency divergence that obtains between identity sentences. Yet, the case of common nouns presented difficulties which did not have any counterpart in the case of proper names. Common nouns did not contribute to the determination of the truth-conditions of sentences directly but by forming different types of noun phrases which themselves had quite variety of different types of semantic outputs. Hence it was not straightforward to determine neither the mode of denotation that should be ascribed to common nouns nor whether under that mode some can be claimed to be *de jure* rigid. After considering the variety in the semantics of noun phrases formed by common nouns in the fifth chapter, in the sixth chapter I described two ways to accommodate variety and presented arguments for and against them: the C-framework and the K-framework.

Now, in concluding this work, what have I learned? I have not been able to determine in absolute terms that rigidity makes a difference among common nouns. I have reached a conditional result. In the sixth chapter I have promoted the K-framework which assigns designator meanings to simple non-taxonomic common nouns but applier meanings to taxonomic common nouns and modified common noun. In the seventh chapter I have shown that if the semantics of noun phrases formed by common nouns are best explained by the K-framework or something like it, then the simple common nouns should be *de jure* rigid designators. Yet, I have not been able to establish that the K-framework is the best game in town. The C-framework which assigns applier meaning to all common nouns can as well explain the semantics of noun phrases formed by common nouns; moreover in doing this the C-framework need not assign *de jure* rigidity to any common noun. I have shown that these frameworks have certain advantages over one another, but I don't think that these should lead to a conclusive vindication of the one over the other.

Still this result, is not uninformative with regard to the question that motivated this work. The result suggests that either all common nouns should be treated appliers and rigidity does not make a difference among them; or among common nouns only simple common nouns should treated as designators and as such only them are *de jure* rigid; and both treatments of the common nouns are reasonably well supported in equal extent. And I think we can be confident in this result. In working out the semantics of noun phrases formed by common nouns using the acknowledged general approach of formal semantics one will have to ascribe either kind designator meanings or applier meanings to common nouns. The C-framework and the K-framework are considerably worked out and reasonably supported ways to this. And the consideration of modal sentences' ambiguity divergence and identity sentences' contingency divergence appear to be the sure ways to determine whether rigidity makes a difference among terms of any syntactic class.

The reader who is versed in the relevant literature may yet question the value of this conclusion. All parties of the controversy on the rigidity of general terms were already considering a similar view and reacting to it. In the second chapter I have reported that almost every work contributing to the controversy begun by stating the following: either general terms are designators and as such they are all rigid, or they are appliers and as such virtually none are rigid (I mean, in the sense of rigid application, and not in the sense of Devitt's rigid*-application). Yet this view, the way it is defended or rejected in the literature inheres the important problems stated in the introduction and in the second chapter, and again briefly recounted above. And relative to that literature which motivated it, I believe that the present work represents a clear improvement for the reasons stated above.

APPENDIX

DETAILED CRITICAL PRESENTATION OF PAPERS REPRESENTATIVE OF THE PRINCIPAL VIEWS DEFENDED IN THE CONTROVERSY ON GENERAL TERM RIGIDITY

In this appendix I will give detailed discussions of five much cited papers representing the three main positions in the controversy on general terms. These are Schwartz (1980), LaPorte (2002), Salmon (2005), Devitt (2005) and Schwartz (2002). Each discussion will touch some of the critical points already raised in the second chapter. But now I will argue for these points in a more detailed manner.

In my discussion of Schwartz (1980) I will consider the issue whether the rigidity property to be extended to the case of common nouns should distinguish natural kind common nouns from the rest as is commonly expected. I will claim that this expectation requires us to take being a natural kind noun to be a linguistic semantic property which is determined by language itself. But if this is the case then we should be ready to acknowledge the possibility of there being natural kind nouns which do not referentially correspond to genuine natural kinds.

In my discussion of LaPorte (2000) I will argue that from rigidity/non-rigidity of such noun phrases as *the honeybee/the insect species typically farmed for honey* one cannot directly derive any conclusions as to the rigidity/non-rigidity of the common nouns that form them *honeybee/insect species typically farmed for honey*.

In discussing Salmon (2005) I will consider the question whether such noun phrases as *the color of the sky* can be considered to be general terms. In relation with this question I will problematize the dichotomy general term/singular term, and suggest that we will be better off without it.

In discussing Devitt (2005) I will argue that rigid* application that is instantiated due to the metaphysical profiles of the entities an applier denotes (*de facto* rigid* application) is not of interest in relation with the controversy on the rigidity of general terms. I will consider the question whether there are *de jure* rigid* appliers. I will argue that this is in principle possible, but that it is unlikely that we have any in natural languages.

Finally in my discussion on Schwartz (2002) I will have occasion to argue against Schwartz' criticisms that kinds as designata have no place in semantic theorizing and that those who, like Salmon (2005) and LaPorte (2002), take common nouns to be kind designators and ascribe rigidity to them are mistaking constancy of meaning across evaluation indexes for rigid designation.

Natural Kind Nouns and Rigidity: Schwartz (1980)

We have above related that in the third lecture of *Naming and Necessity* Kripke claimed that common nouns for natural kinds are like proper names, and also that he explicitly assigned the property of rigid designation to the common nouns *light*, *heat* and *gold*. Given the overall discussion in which these explicit claims were laid, Kripke has been taken to imply to claim the existence of a semantic difference between common nouns for natural kinds such as *tiger*, *water*, *heat* and other common nouns such as *bachelor*, *sailor*, and to take rigid designation to be a part of this difference. In fact, the paper we are about to present, Schwartz (1980), go as far as to suggest that according to Kripke the difference between natural kind common nouns and other common nouns amounts to nothing but a linguistic-semantic difference (195-196).

Schwartz (1980) is a criticism of an earlier paper by Fabrizio Mondadori (1978), which discusses and formally attempts to capture two common ways in which the alleged semantic difference between common nouns for natural kinds and other common nouns has been conceived.

One of these ways is to take natural kind common nouns to be rigid designators. The other way is to take natural kind common nouns to be rigid*-appliers. (A rigid*-applier is to be understood as a term T such that if T applies truly (falsely) to x relative to a possible world w then T truly applies to x relative to any possible world w' relative to which x exists. Count common nouns for natural kinds such as *tiger*, *cow*, *cat* appear to be rigid*-appliers, in contrast with other common nouns such as *bachelor*, *sailor*, *conductor* etc.)[126]

Mondadori seeks to formally capture these two alleged distinctive properties of natural kind common nouns simultaneously. He describes a formal way couched in possible world semantics to interpret natural kind common nouns both as *de jure* rigid designators and as *de jure* rigid*-appliers.

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[126] By referring to a footnote in *Naming and Necessity* Schwartz (1980) suggests that Kripke might as well have entertained such a difference alongside rigid designation. Later, the property of rigid*-application has been adopted by Cook (1980) and Devitt (2005) as the property of rigidity that is applicable in the case of general terms in place of rigid designation.

First, Mondadori proposes to associate with common nouns for natural kinds constant semantic intensions of type <s,<s,<e,t>>> and to identify kinds with intensions of type <s,<e,t>>. Given these assumptions, the semantic intension of a natural kind common noun like *tiger* will yield as its denotation the same kind relative to each possible world (and that kind will be an intension of type <s,<e,t>>). Thus, natural kind nouns will be rigid designators.[127]

Note that according to Mondadori's proposal, in the interpretation of a natural kind common noun relative to an evaluation index s, the index s will function as an argument twice. Let's illustrate this relative to the case of the noun *tiger*. First, s will be an argument for the intension of *tiger* to yield *tigers*'s designatum relative to s, which will be an intension of type <s,<e,t>>. Second, s will be an argument for the designatum of *tiger* relative to s, to yield a predicative function of type <e,t> which determines which tokens *tiger* is true of relative to s.

Second, to get the result that natural kind common nouns also be rigid*-appliers, Mondadori assigns a peculiar property to the intensions of type <s,<e,t>> identified with natural kind: for each such intension N of type <s,<e,t>>, there is a set Ω_N such that that relative to any evaluation index s, N yields a predicative function of type <e,t> which maps to truth only the entitites which are in the $\Omega_N \cap D(s)$ (D(s) is the quantification domain for the

[127] Although I have resolved to use *designate* for denotations of type e, and according to Mondadori's proposal natural kind common nouns' denotations are of of type <s,<e,t>>, to keep my terminology in line with that used by Mondadori and Schwartz in this section I will use *designate* to express the denotation relation that holds between a Mondadori-kind and a natural kind common nouns.

evaluation index s). To see what will be the upshot of assigning this property to natural kinds taken as intensions, let's consider the case of the kind panthera tigris (assuming it that it is a natural kind). According to Mondadori's proposal x is an instance of panthera tigris relative to s if and only if relative to s panthera tigris yields a predicative function that maps x to truth. If relative to s panthera tigris yields a predicative function that maps x to truth, then $x \in (\Omega_{pantheratigris} \cap D(s))$ and a fortiori $x \in \Omega_{pantheratigris}$. Now, let s' be another evaluation index such that $x \in D(s')$. Then, if x is an instance of panthera tigris relative to s, then it follows that x is an instance of panthera tigris relative to s' as well. So, if something might be an instance of panthera tigris, then it cannot fail to be an instance of panther tigris so long as it exists.

Now, given that according to Mondadori *tiger* rigidly designates the kind panthera tigris it follows that if *tiger* truly applies to a thing x relative to an evaluation index s, then it will as well truly apply to x relative to any other evaluation index s' in which x exists (i.e. $x \in D(s')$); and thus *tiger* will be a rigid*-applier. For, *tiger* truly applies to a thing x relative to an evaluation index s if and only if x is an instance of panthera tigris relative to s; and given Mondadori's assumption about natural kinds, an instance of panthera tigris relative to an evaluation index s cannot fail to be panthera tigris relative to another evaluation index s' so long as it exists at s'.

What Schwartz finds fault with Mondadori (1978) is not as much Mondadori's formalization attempt targeting natural kind common nouns that are both rigid designators and rigid*-appliers as Mondadori's supposition that natural kind common nouns are different from other common nouns in these two respects. Accordingly, Schwartz gives separate criticisms of the suppositions that natural kind common nouns are distinctively rigid designators and that natural kind common nouns are distinctively rigid*-appliers.

First let's consider Schwartz' objection to distinguish between natural kind common nouns and other common nouns in terms of rigid designation. Schwartz questions whether there is any semantic-theoretic reason for stipulating a difference with respect to rigid designation between natural kind common nouns and other common nouns. If rigid designation is to be a distinctive feature of natural kind common nouns among common nouns then other common nouns should not be rigid designators. Mondadori himself rightly points out that the valid theoretic reason to stipulatively assign to a category of terms the property of rigid designation should be the need to make such a stipulation to give a satisfactory explanation of the way we evaluate talk about possible state of affairs (specifically, the counter factual talk). But Schwartz argues that that both natural kind common nouns and other common nouns can be taken to be rigid designators without thereby failing to explain anything about the way we evaluate counterfactual talk.

In line with what we have already pointed in previous section on Kripke, Schwartz indicates that if all common nouns are taken to designate kinds, then there seems to be no semantic reason to assign non-natural kind common nouns variable intensions. There seems to be no counterfactual sentential contexts which will require us to say for example that the non-natural kind common noun *bachelor* should be taken to denote a kind which is different than the kind it is supposedly taken to denote relative to the actual states of affairs; it seems that in any description of a counterfactual situation *bachelor* will designate the same kind as it does relative to the actual states of affairs. Schwartz' argument for rigid designation's failure to distinguishing natural kind common nouns from other common nouns consist of the consideration of such examples as *If I have been a lawyer I would be richer*; he points that in such sentences the non-natural kind common noun *lawyer* should be taken to designate the same kind as in sentences that pertains to the actual states of affairs.

Now let's consider Schwartz' objection to distinguishing between natural kind common nouns and other common nouns in terms of rigdi*-application. If there is such a distinction then non-natural kind common nouns such as *lawyer* should not be rigid*-appliers. As Schwartz notes which type of intension is to be assigned to non-natural kind common nouns such as *lawyer* is left unspecified by Mondadori; but however this is done, it should be stipulatively ensured that there is not a set Ω_{lawyer} associated with *lawyer* such that *lawyer* is true of some x relative to an evaluation index s, if and only if $x \in \Omega_{\text{lawyer}} \cap D(s)$. Clearly whether a noun α is a rigid*-applier or not crucially depends on the existence of such a set Ω_α. Under Mondadori's proposal, the existence of such a set associated with each natural kind common noun is a consequence of Mondadori's assumptions that such common nouns are rigid designators for natural kinds and that natural kinds each have such sets associated with them which determines their extensions relative to possible worlds. This last assumption is a strong metaphysical thesis that entails that any instance of a natural kind is necessarily so, and is the main target of Schwartz' criticism.

First, Schwartz indicates that it might be plausibly argued that that assumption is trumped by the kinds corresponding to such nouns as *frog* and *butterfly*. Neither a frog nor a butterfly are necessarily so, as it is possible that they perish before turning into a frog or butterfly. This criticism can however be responded by denying that *frog* and *butterfly* are natural kind terms when they are used to refer to the mature stage in the lives of the corresponding species, rather than the species themselves.

The second criticism of Schwartz targeting the metaphysical assumption in question is that granting it would make whether a kind is a natural kind and *a fortiori* whether a noun is a natural kind noun matters dependent on non-linguistic facts. To decide whether K is a natural kind or not we have to ascertain whether it is possible for instances of K not to be K. According to Schwartz this is objectionable because he thinks that whether a common noun is a natural kind noun or not should solely be a linguistic matter (195-196).

This last criticism by Schwartz appears on the face of it an implausible one. It seems that whether a kind we pre-theoretically identify on the basis of phenomenal properties is a natural kind or merely a nominal kind that consists of *prima facie* similar instances of disparate natural kinds is of course an empirical matter. *A fortiori* whether a noun designates a natural kind, and thus is a natural kind noun, clearly depends on empirical facts –a case in point would be the noun *jade* which turned out to be used in relation with two distinct minerals, and is still used in this way.

However Schwartz appears to attack the right bush, if not exactly from the right spot. If whether a noun is rigid*-applier or not depends on whether the kind it corresponds to is a natural kind or not, and if whether a kind is a natural kind or not depends on non-linguistic facts then whether a noun is a rigid*-applier or not cannot be a matter that is of interest for semantic theorizing. Rigid*-application that depends on non-linguistic facts would be *de facto* rigid*-application, whereas semantic theorizing is primarily interested in *de jure* semantic properties. *De jure* semantic properties, like the rigid designation for proper names, are instantiated by a category of terms solely due to the general design of the language: proper names are not rigid designators because of the nature of the entities they designate; the instantiation of *de facto* linguistic properties like the rigidity of *the even prime number* on the other hand does not solely depend on the design of the language: that definite phrase is a rigid designator because the entity it designates, the integer 2, is necessarily even and prime.

This should suffice as a critical presentation of what Schwartz (1980)'s discussion of Mondadori (1978). Mondadori's paper was an interesting attempt to formulate how natural kind common nouns can simultanously bear two semantic properties that were commonly attributed to them and thought to distinguish them from other common nouns. Mondadori simply assumed these commonly held views and did not endeavor to argue that natural kind common nouns indeed had these properties and had them distinctively. Schwartz (1980)'s criticism rather aims what has been simply assumed by Mondadori, namely the view that natural kind common nouns are distinctively rigid designators and the view that natural kind nouns are distinctively rigid*-appliers.

Schwartz's discussion of Mondadori's paper does not show that rigidity, understood as rigid designation or rigid*-application or as the conjunction of both is theoretically significant from a linguistic point of view. It only shows that these properties fail to determine the putative class of natural kind nouns. Perhaps, from a linguistic semantic point of view there is no difference between nouns that are categorized as natural kind nouns and those which are not categorized as such. Or perhaps, as Schwartz holds there is such a difference but it is not one that can be captured by means of the formal semantics. It may still very well be the case that rigidity under one formulation or another may be a semantically significant property. A more extensive investigation of the semantics of common nouns may reveal that a certain class of nouns which does not just include natural kind nouns should be assumed to be *de jure* rigid so that we can explain certain aspects of the truth-conditions assigned to modal sentences. Even if it turns out that *all* nouns have to be attributed *de jure* rigidity to account for the truth-conditions patterns that obtain, rigidity will not be completely devoid of semantic significance, in so far as it will still be relevant in the explanation of the way we evaluate modal sentences.

Surprisingly however, Schwartz (1980) thinks that his discussion on Mondadori (1978) which demonstrates that rigid designation and rigid*-application fail to capture the category of natural kind nouns discredits also the ascriptions of these properties to common nouns.

Schwartz' negative verdict concerning the relevance of rigid designation and rigid*-application in relation with the semantics of common nouns depends on a supposition of his. It is related with the common impression deriving from

Kripke's discussion in *Naming and Necessity* that just as in the realm of singular terms *de jure* rigid designation distinguishes proper names from definite description, in the realm of general terms some sort of rigidity distinguishes natural kind nouns from nominal kind nouns. This impression strengthened by the authority of Kripke is responsible for the supposition that any proposal of a rigidity property applicable to general terms, and specifically to common nouns should be able to distinguish natural kind nouns from nominal kind nouns, and otherwise it will not be warranted.

This supposition has the following interesting corollary. If some sort of *de jure* rigidity determines the category of natural kind terms, then being a natural kind term should be linguistic semantic property that can be ascertained *a priori* on linguistic grounds. Schwartz explicitly accepts this corollary. We have seen that interestingly Schwartz (1980) assumes that being a natural kind common noun is a *de jure* linguistic property and for this reason rejects Mondadori's proposal to identify that property as rigid*-application; because Mondadori makes the instantiation of that last property by a noun dependent on the non-linguistic question whether the kind it designates can be contingently instantiated.

Often proposals of rigidity properties are assesssed as to whether they can distinguish the so called natural kind nouns such as *tiger*, *gold* from such nouns as *bachelor*, *hunter* due to the commonly held opinion that *de jure* rigidity is the distinctive feature of natural kind nouns that separates them from other common nouns.[128] As a result proposals for general term rigidity are being rejected without any regard to as to whether the rejected proposals present a theoretical value in the explanation of the way we evaluate sentences.

To problematize this opinion let's now briefly consider its corollary that being a natural kind noun should be a linguistic-semantic property ascertainable on linguistic grounds.

It seems that each natural kind common noun should have a unique corresponding genuine natural kind with which it is referentially related. Such a correspondence can be formulated in different ways depending on the mode of denotation we ascribe to common nouns. If common nouns are designators then we can take a common noun to correspond to a natural kind if and only it rigidly designates it. Or if common nouns are appliers we can take a common noun to correspond to a natural kind if and only if its intension is the same as the metaphysical intension of a natural kind (setting the metaphysical intension of a natural kind to be the actual and possible tokens of that kind). Yet it appears that to maintain, like Schwartz does, the view that being a natural kind noun is a linguistic semantic property, we have to forego to require that natural kind common nouns have corresponding natural kind. For, whether a common noun has a corresponding natural kind does not seem to be a merely linguistic-semantic matter; and many nouns which Schwartz, and many philosophers of language are prone to label as natural kind nouns may be argued on non-linguistic grounds to lack corresponding natural kinds.

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[128] Schwartz (2002), Cordry (2004).

Nouns for kinds of living beings are typically regarded as natural kind nouns. For example, the noun *tiger* is a stable fixture in discussions about natural kind nouns and rigidity. Apparently the noun *tiger* has a corresponding natural kind, namely the species Panthera tigris. Yet, there are plausible reasons not to regard biological taxa as natural kinds.[129] Moreover even if we take scientific taxa to be genuine natural kinds no matter what, then whether a noun has a natural kind that referentially corresponds to it becomes a matter of hard science. For example, from a linguistic perspective the noun *hawk* does not look much different that the noun *tiger*. Yet there is not a biologically acknowledged taxon that corresponds to it. The noun *hawk* happens to apply to tokens of species that fall under different genera. And there are many nouns like *hawk* which *look like* a natural kind noun but fails to correspond to a scientifically recognized taxon.

If being natural kind noun is a linguistic semantic property, then whether a noun instantiates that property or not should be determined on the basis of linguistic semantic judgments deriving from linguistic competence, and metaphysical or scientific issues about natural kinds should be irrelevant. But then in so far as whether a noun referentially corresponds to a natural kind is not a matter that can be resolved by reference to judgments deriving from linguistic competence, we cannot simultaneously hold that being a natural kind noun is a linguistic semantic property and that each natural kind noun has to have a natural kind that referentially corresponds to it.

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[129] On this matter the reader can check the SEP entry, 'Species' (Ereshefsky 2010) and the works cited there.

If, due to regarding being a natural kind noun a linguistic semantic property, we cannot require a natural kind noun to referentially correspond to a natural kind we should be ready to acknowledge that some natural kind nouns may not have corresponding natural kinds. So be it one may think. But then what we will have to include under the category of natural kind nouns may not be limited with such nouns as *hawk* and *jade*. We should be open to the possibility that such nouns as *Iphone4s, wine, kykeon*[130] and more controversially even such nouns as *bachelor, pallbearer, hunter* may have to be included. If being a natural kind noun is a linguistic semantic property the arbiter will be whether nouns like the latter examples manifest the same linguistic semantic profile as the one common to nouns like *gold*, *tiger*, *electron*, *frog*, *butterfly* and one cannot appeal to considerations regarding whether the noun referentially corresponds to a natural kind.

We indicated that the expectation that the property of *de jure* rigidity should underlie the determination of the class of natural kind nouns obliges one to accept that that class is determined solely on linguistic semantic grounds. Once this is accepted however one cannot require that natural kind nouns referentially correspond to genuine natural kinds. Then, the criticism raised against the rigid designation proposal for general term rigidity[131] by pointing that it fails to determine the putative class of natural kind nouns is weaker than it appears to be. That criticism cannot proceed for example by indicating that

[130] An ancient Greek beverage the exact recipe of which is not clearly known.

[131] The proposal defended by Salmon (1981), LaPorte (2000) and Salmon (2005) besides Mondadori (1978) which Schwartz (1980) addresses.

that proposal attributes rigidity to such a noun as *bachelor* but that noun is not a natural kind noun because it does not referentially correspond to a natural kind. It has to show that such a noun as *bachelor*, regardless whether it referentially corresponds to a natural kind or not, have a different semantic profile than the putatively clear examples of natural kind nouns such as *tiger*, *gold*, *electron*.

Returning to Schwartz (1980), let me conclude with the following remarks. That paper aimed to show that neither rigid designation nor rigid*-application nor their conjunction can be the *de jure* semantic property that allegedly distinguished natural kind common nouns from other common nouns; but other authors whose works we will present below do not all share or at least are not primarily motivated by the view that that there is linguistic-semantic difference between natural kind nouns and other nouns; they rather simply seek to find a theoretically significant *de jure* semantic difference among general terms that is analogous to the one generated by rigid designation among the so called singular terms –names, definite phrases and pronouns.

Still as natural kind common nouns are generally regarded as general terms Schwartz (1980) belongs to the controversy on the rigidity of general terms, and has often been cited in other works that belonged to that controversy. Moreover the property of rigid designation or the property of rigid*-application with which Schwarz' paper was concerned continued to be proposed by other authors as the rigidity property that gives a theoretically significant linguistic-semantic division of the category of general terms, regardless whether that division corresponded also to the alleged division between natural kind common nouns and other common nouns.

General Terms Are Designators, Some Are Rigid, Some Are Not: LaPorte (2000)

Joseph LaPorte (2000) appears to be motivated by the issues raised by Kripke's extension of the application of the property of rigid designation to the cases of common nouns and adjectives. LaPorte (2000) seems to give a defense of the view that nouns such as *honeybee*, *bumblebee, water* are rigid designators, against the criticism that under this view rigidity ceases to be a semantically significant property for common nouns. Remember that according to that criticism if we take such terms as *honeybee*, *bumblebee, water* to be designators for kinds, we should do the same for any common noun including such nouns as *bachelor*, *unmarried male* etc., and if we do so, any common noun will have to be admitted as rigid designators, as they do not seem to designate different kinds when they are used to talk about possible states of affairs than those they designate relative to the actual states of affairs.

LaPorte formulates the criticism he argues against and his own position not exactly in the terms we did here however. Strikingly, he does not use the semantically neutral labels such as *general term*, *general noun*, *common noun* at all to refer to such terms as *honeybee*, *bumblebee, water*. Instead he lays out the position he argues against and his own position by using the label *kind designator* to refer to such terms. According to his formulation, the position he argues against is the view that taking kind designators to designate kinds trivializes the property of rigidity in relation with kind designators. He cites the Schwartz (1980) as a proponent of that position.[132] LaPorte's own position is that rigidity is not trivialized thereby, because there are kind designators which are not rigid.

LaPorte admits that rigid kind designators do not only include natural kind nouns but also such nouns as *bachelor, soda* which rigidly designate nominal kinds. Still he argues that there are non-rigid kind designators as well. In this vein, by way of example, he contrasts *the honeybee* and with *the insect species that is typically farmed for honey*. He argues, on intuitive grounds, that latter term is not a rigid designator: relative to the actual states of affairs the honeybee is the insect species that is typically farmed for honey; thus, relative to the actual states of affairs *the insect species that is typically farmed for honey* designates the honeybee; but it might have been the case that the insect species that is typically farmed for honey was not the honeybee, but the bumblebee; relative to such a possible state of affairs, *the insect species that is typically farmed for honey* will designate the bumblebee. Another pair of kind

[132] Strictly speaking Schwartz (1980)'s position was that there is a linguistic-semantic distinction between natural kind nouns and other nouns and that rigid designation does not capture that difference. The way LaPorte presents Schwartz (1980)'s position it sounds as if Schwartz (1980) held that there was a notion of rigidity, different from rigid designation, and which corresponded to the alleged semantic difference between natural kind nouns and other nouns; and that Schwartz argued against taking natural kind nouns to be rigid designators because rigid designation cannot be the appropriate rigidity and thus is theoretically insignificant. In fact Schwartz (1980) considers the possible view that that rigid designation be considered as the property that distinguishes common nouns (natural kind or not) from other general terms; Schwartz (1980) dismisses this view because he thinks that common nouns seem to form a heterogenous category, and that further arguments dealing with different types of common nouns are needed to extend rigid designation beyond the case of natural kind common nouns to other nouns, as "until such arguments are given we have no reason to suppose that since it is helpful to think some nouns as rigid designators that it is illuminating to see all nouns in this way" (197). Note that the stated reason for the dismissal is not that under the dismissed proposal non-natural kind nouns will come out as rigid designators.

designators he contrasts in this vein are *soda* and *the beverage my uncle requests at Superbowl parties*.

LaPorte also notes that the rigid/non-rigid division among kind designators has the same level of theoretical interest as the rigidity of proper names and the non-rigidity of definite descriptions for particulars. Given that such kind designators as *the honeybee* and *Apis mellifera* are rigid, we can argue that the identity sentence *Apis mellifera is the honeybee* is necessary, given that it is true. But the same is not case for the none the less true *Apis mellifera is the insect species that is typically farmed for honey*.

In relation with LaPorte (2000) I will here consider two objections. One is an objection which was in fact anticipated and responded to by LaPorte, and which due its recurrence in the literature I cannot ignore here, although as I will argue below it is completely ineffective. The other objection is one which I curiously have not seen raised in the relevant literature concerns the very relevance of LaPorte (2000)'s discussion to the issues raised by Kripke extension of the property of rigidity to the case of common nouns and adjectives.

LaPorte formulates the following objection against his position, which later have been taken up by its opponents. In formulating it he uses the term *the beverage my uncle requests at Superbowl parties* which he argues to be non-rigid. This objection begins by supposing there that is a kind which is instantiated in any world w exactly by the beverage my uncle requests at superbowl parties at w. This kind is termed as *BMURASP*. More specifically, BMURASP is the kind such that for any world w and for any x, BMURASP is instantiated by x at w iff x is requested at Superbowl parties by my uncle at w. Then, it is asserted that *the beverage my uncle requests at Superbowl parties* mat be taken to designate BMURASP and to do so rigidly. Since the same can be said of other kind designators which LaPorte claims to be non-rigid, it is argued that LaPorte's claim that rigidity is not a trivial property in relation with kind designators is untenable, unless LaPorte shows that there are not such kinds as BMURASP.

LaPorte response to this argument is two-tiered. First he notes that a similar argument can be raised against the rigid/non-rigid division among concrete object designators –i.e. against the rigidity/non-rigidity difference between proper names and definite descriptions for particulars. In this vein, he refers to Sidel (1992)'s suggestion that there might be an entity, named *Prez* which at any time t is constituted by the temporal part at t of the person who is the president of US during t. Then LaPorte indicates that given such an entity, *the president of US* can be taken to rigidly designate it. The point LaPorte intends to mark with this example is that if metaphysical oddities are to be allowed, it is not just the rigid/non-rigid division among kind designators that becomes objectionable, but also the more intuitively compelling difference in that respect between the proper names and definite descriptions.

In the second part of his response, LaPorte notes that it is evident that we can use such terms as *the beverage my uncle requests at superbowl parties* to designate a specific kind of beverage such as coke or soda or coffee, instead of BMURASP; thus if it is accepted there are such kinds as BMURASP, then such terms as *the beverage my uncle requests at superbowl parties* may at best be taken to be ambiguous. So, even if BMURASP is accepted to exist, LaPorte would have shown that there are some kind designators which under one established way of using them are not rigid designators.

I think that this objection is responded very concisely, effectively and even granting that such kinds as BMURASP exists, by pointing at how we evaluate sentences which involve the term *the beverage my uncle requests at superbowl parties*:

1 a The beverage my uncle requests at superbowl parties is coffee.

Evidently 1a can be used to produce a true utterance. In the mouth of someone whose uncle prefers to drink coffee at superbowl parties 1a will be true. But if, as the hypothetical objector against LaPorte's position holds, *the beverage my uncle requests at superbowl parties* designated BMURASP there would not be such a reading; coffee is clearly a different kind than the abstruse BMURASP. So, as LaPorte points out in the second part of its response it is beyond doubt that *the beverage my uncle requests at superbowl parties* is not always used to designate BMURASP. Now, is it ever used to designate BMURASP? At this point the ball is back at the objector. She has to give us examples the truth-conditions of which cannot be accounted for unless *the beverage my uncle requests at superbowl parties* designates such a kind as BMURASP. None of the objectors who later have taken up this objection which LaPorte has raised against himself has ever given such an example. I don't know of any such examples myself, apart from the sentences which these objectors use to formulate this very objection. But as Inan (2008) points out, in these formulations these objectors do not use *the beverage my uncle requests at superbowl parties* straightforwardly, but rather resort to italicized or hypheaneated forms of it so that the reader can figure out that something other than the usual designatum is intended. So, arguably, even in their formulation of the objection the usual English definite phrase *the beverage my uncle requests at superbowl parties* is not ever used to designate BMURASP.

So, LaPorte is certainly right as regards the definite phrase *the beverage my uncle requests at superbowl parties*. Even if such an abstruse kind as BMURASP is accepted to exist *the beverage my uncle requests at superbowl parties* will rarely, and I dare say never, be used to designate it. However, note that the same cannot be said of the modified common noun *beverage my uncle requests at superbowl parties* drawing on the arguments LaPorte deploys. LaPorte is committed to the thesis that any common noun, including natural kind common nouns such as *tiger*, *water* as well as nominal kind common nouns such *bachelor*, *hunter* are kind designators. Moreover he is ready to acknowledge that all common nouns are rigid designators. He does not say anything explicit about modified common nouns such as *unmarried adult male*. However, unless he finds cogent reasons to semantically distinguish between the denotation types of simple common nouns and modified common nouns, it will apparently be more consistent for him treat *bachelor* and *unmarried adult male* alike and thus take both to be rigid designators. But then he apparently has to do the same about the common noun *beverage my uncle requests at superbowl parties*; and what else will this common noun rigidly designate other than the notorious BMURASP?

This may be thought to be a non-problem for LaPorte. He anyway did not ever claim that there were non-rigid common nouns. He only has contended that some kind designators are non-rigid, and on this point he is definitely right, *the beverage my uncle requests at superbowl parties* is certainly a non-rigid kind designator. However, is not there supposed to be a relation between the denotation of *the beverage my uncle requests at superbowl parties* under its non-rigid use and the denotation of the modified common noun *beverage my uncle requests at superbowl parties* that forms it? What is this relation exactly? Obviously LaPorte cannot claim that they will have the same denotation –i.e. designate the same entity- if the latter designates BMURASP. But the pair *honeybee* and *the honeybee* are readily taken by LaPorte to designate the same kind. LaPorte's account runs here into issues the resolution of which will require a deeper and more extensive consideration of the semantics of common nouns and the noun phrases formed by them than he deploys in his article

Now, I return to my main objection against LaPorte (2000) which concerns the extent of its relevance with regard to the intriguing issues raised by Kripke's extension of the property of rigidity to cases adjectives and common nouns. Let's first remember these issues. Kripke apparently hold the view that natural kind nouns such as *tiger*, *cat*, *lightning*, *light*, *gold*, *cow* ,*heat* and some related adjectives such as *hot* are rigid designators. He did not however make any explicit claim to that effect. He ascribed rigid designation explicitly only to the nouns *heat*, *light* and *gold*. But he claimed that natural kind common nouns and some corresponding adjectives were name like. This claim has been, plausibly enough, taken to imply that nouns and adjectives such as the ones he highlighted in his discussion were semantically different from other nouns and adjectives, and that difference was de jure rigid designation. Setting aside the absence of a clear proper justification for it, this implied claim seemed problematic in itself. If such nouns and adjectives were taken to be rigid designators for the appropriate type of kinds/properties then there does not seem to be any reason to avoid to make the same stiplulation with regard to all nouns and adjectives, and not just those for natural kinds and properties (in talk about possible states of affairs any adjective or common noun *prima facie* appear to pertain to the same kinds or properties they supposedly pertain to in talk about the actual states of affairs). If on the other hand natural kind common nouns were taken to be appliers then apparently none of the natural kind nouns singled out as rigid by Kripke would be rigid appliers (remember, *There might have been a tiger different than every tiger*).

On this background let's reconsider what LaPorte has argued for? He argued that such noun phrases as *the Honeybee* and *Soda* are rigid designators whereas such definite noun phrases as *the insect species typically harmed for honey* and *the beverage my uncle requests at superbowl parties* are not. He concluded that the property of rigidity is therefore not without significance in relation with kind designators as there are rigid ones as well as non-rigid ones.

Now, it seems that LaPorte discussion does not target the right sort of terms to be relevant with regard to the issues raised by Kripke's implied claim in question. That claim is about a semantic difference among *common nouns* and among *adjectives*, and identifies that semantic difference as *de jure* rigid designation. Both common nouns and adjectives are terms which can form syntactic predicates but cannot form syntactic arguments. Whereas what LaPorte argues for is a semantic difference among *noun phrases*; that is terms that can form syntactic arguments but, usually cannot form syntactic predicates.

LaPorte would have relieved us of what primarily intrigued us about Kripke's implied claim, if he had shown a rigidity/non-rigidity contrast between the common noun *honeybee* and the modified noun *insect species typically farmed for honey* or the common noun *soda* and the modified common noun *beverage my uncle requests at superbowl parties* but he instead set out to contrast the noun phrases *the honeybee* and *the insect species typically farmed for honey*, and *soda* and *the beverage my uncle requests at superbowl parties*.

He would have relieved us also, if the distinction between common nouns and the noun phrases formed by them was only a syntactic matter with no semantic dimension; then what LaPorte (2000) accomplished would directly have relevance about what primarily interested us. But as I have already indicated that syntactic distinction is not devoid of semantic dimension. This is more blatantly so in relation with definite noun phrases such as *the honeybee* and the common nouns that form them such as *honeybee*. For example, the definite noun phrase *the honeybee* can be used to designate the contextually salient honeybee token. But the common noun *honeybee* whether it be taken to be a designator or an applier cannot be used to designate contextually salient honeybee tokens. Of course, LaPorte focuses on a different established way of using the definite noun phrase *the honeybee*: its so called definite generic use to designate a kind. Yet still, from the fact that the definite generic *the honeybee* rigidly designates a kind it does not follow that the common noun that forms it designates the same kind. It is possible to maintain that *honeybee* is an applier with unsaturated predicative denotations of type <e,t>, while taking the definite generic *the honeybee* to be a rigid kind designator. In the literature on the semantics of noun phrases formed by common nouns, there are several different accounts of definite generic phrases that exactly do this.[133] For example, it can be argued that besides the *the* occurring in ordinary definite phrases, there is another *the* occurring in definite generics. This latter *the* can be taken to be an operator on the intensions of appliers, that is on intensions P^ of type <s,<e,t>>:

the(P^)= the kind k such that $\forall s \forall x$(x instantiates k at s $\equiv$P^(s)(x))
the(λs.[honeybee]^{s})= the kind k such that $\forall s' \forall x$(x instantiates k at s' $\equiv$[honeybee]$^{s'}$(x))

That is, *the* can be taken to be an operator that maps the predicative intension of a common noun to the kind the metaphysical intension of which coincides with that predicative intension. Note that under such a treatment, definite generic phrases will still be rigid designators, as what they designate will solely depend on the intension of the common nouns that form them, and the intensions of nouns do not vary relative to evaluation indexes (they rather encapsulate how the denotations vary relative to these indexes). So, to return to LaPorte, *the honeybee*'s being a rigid designator, does not by itself entail that the common noun that forms it is a rigid designator too.

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[133]Chierchia (1998) proceeds in the way described above in the main text. In the sixth chapter we have described another such account, Dayal (2004).

Nor does *the insect species that is typically farmed for honey* ‘s being a non-rigid designator entail that the modified noun *insect species that is typically farmed for honey* is not a rigid designator. Here is the reason. I have above noted that besides the definite generic use of *the honeybee* to designate a kind, it can be used to designate the unique contextually salient honeybee token. So, even if we take *honeybee* to be a rigid kind designator we also have to be able to account for this use of *the honeybee* to designate a salient token. That is, one way or another we have to describe a way of deriving a token level designation for *the honeybee* from the purported kind level designation of *honeybee*. Now, having such a way at hand, we can also claim that *insect species that is typically farmed for honey* rigidly designates a second-order kind whose instances are themselves insect species, and that *the insect species that is typically farmed for honey* non-rigidly designates relative to an evaluation index w, the unique first-order kind instance of that second-order kind at w, if there is such a unique first-order kind instance at w.

Of course the gimmicks described above, to derive a rigid kind designating definite noun-phrase from a non-rigid applier common noun and to derive a non-rigid kind designating noun phrase from a rigid designator common noun, cannot be simultaneously adopted. But, there is nothing in LaPorte’s discussion that shows that neither can be adopted, and the apparent possibility to adopt any of these ways cuts the relevance of LaPorte’s discussion to the primarily intriguing aspect of Kripke’s discussion, namely ascription of *de jure* rigidity to common nouns.

Let me also note that I do not think that the approaches that adopt anyone of the gimmicks described above or equivalent gimmicks are unobjectionable. But their criticism requires a broader perspective. Because as I will later illustrate, formulating one or another such gimmick, or as they are called in the semantic literature *type-shifting operations*, is unavoidable when one sets out to account for the semantics of common nouns and the noun phrases formed by them, notwithstanding whether we take common nouns to be designators or appliers.

It may be objected to my questioning of LaPorte (2000)'s relevance to the issues raised by Kripke's ascription or rigid designation to certain common nouns and adjectives in the following way. Kripke's discussion in the third lecture of *Naming and Necessity* raises the question whether there is a semantically significant rigid/non-rigid division among *general terms*; this question is what the so called controversy on the rigidity of general terms is really about; such noun phrases as *the honeybee, the insect species that is typically farmed for honey* which LaPorte focused on are arguably general terms; thus LaPorte (2000) is commonly and rightly regarded as a contribution to this controversy.

First let me note that that such definite phrases as *the honeybee*, *the insect species that is typically farmed for honey*, *the beverage my uncle requests at superbowl parties* can be regarded as general terms alongside common nouns and adjectives appears to be a very tenuous assumption. Now there does not seem to be an established definition of what a general term is. But it seems that philosophers have been using the label *general term* to refer to terms which are capable of forming syntactic predicates, and thus have the potential to be semantically related, in one way or another, with many individuals simultaneously; these terms also appear to be regarded as the terms whose semantic contribution can be rendered in formal languages by formal predicates. Judging from these desiderata it is not clear what the verdict on LaPorte's kind designating noun phrases should be, especially the definite ones. As kind designators they can be regarded to be semantically related only with one individual, the kind they designate, but through it they are also related with many individuals as well. Some of them apparently cannot function as syntactic predicates (?*This crushed insect on the table is the insect species typically hunted for honey*), but some apparently can (*The lukewarm brown liquid in this container is the beverage my uncle requests at superbowl parties*). Still, it remains true that generally adjectives and common nouns can form syntactic predicates but cannot form syntactic arguments; in contrast, generally definite noun phrases cannot form syntactic predicates but can always form syntactic arguments; and these differences in syntactic distribution arguably correspond to semantic differences. Thus, it seems best we did not gather such semantically and syntactically disparate categories under the label *general term*; unless of course there is a clear theoretical (syntactic or semantic) benefit to do so. But is there?[134] I will retake this issue below when I present Salmon (2005) where Salmon argues at length that the definite noun phrase *the color of the sky*

[134] Most linguistic syntactic and semantic literature completely eschews the use the label *general term.*

should be regarded as a general term in so far as it can function as a syntactic predicate in such a sentence as *The eyes of my beloved are the color of the sky*.

In fact the issue whether the definite noun phrases examined by LaPorte (2000) are general terms, is not relevant with regard to my questioning of LaPorte (2000)'s relevance to the issues raised by Kripke's singling out *some* common nouns and adjectives as rigid designators. Now, admittedly if we are intent to include such noun phrases as *the honeybee*, *the insect species that are typically farmed for honey*, *soda*, *the beverage my uncle requests at superbowl parties* as general terms then LaPorte (2000) can be taken to have indeed shown that some general terms are rigid and some are not, and that rigidity is thus not a property that makes no difference among general terms, so understood. If there really were unclear issues about the rigidity/non-rigidity of kind designating definite noun phrases and if the so called controversy on the rigidity of general terms did really pertain to these issues, then LaPorte (2000) has undeniably contributed to that controversy. However, LaPorte's points are then relevant only for an isolated and rather queer subset of general terms, the general terms that are noun phrases. After reading LaPorte we still do not know whether there is a rigid/non-rigid division among general terms that are common nouns or adjectives –as we have shown the rigidity/non-rigidity of the definite nouns phrases does not entail the rigidity/non-rigidity of the common nouns that form them. And I think what primarily intrigued people about Kripke's singling out some common nouns and adjectives as rigid designators was that last point; and not whether there is a rigid/non-rigid division among noun phrases that are precariously included into the category of general terms.

Moreover I do not think there ever was any question whether there is a rigid/non-rigid division among noun phrases that designated kinds, as their case was very similar to the case of proper names and definite descriptions which was compellingly dealt with by Kripke on intuitive grounds.

General Terms Are Designators, Some Are Rigid, Some Are Not: Salmon (2005)

Salmon (2005) too is motivated by the issues raised by Kripke's singling out certain common nouns and adjectives, specifically those that correspond to natural kinds and types of natural phenomena, as rigid designators. He reckons that if common nouns and adjectives are attributed designation then all will be rigid designators, and that if they are attributed application then virtually none will be rigid appliers. Notwithstanding these points Salmon (2005) holds that general terms are designators, and that some are rigid designators whilst some are not.

Basically, Salmon contrasts the definite noun phrase *the color of the sky* with *blue* (equivocating *blue*'s use as a noun, as an adjective and its use as a noun phrase) on the basis of their occurences in the following sentences:

2 a My true love's eyes are blue.
b Blue is the color of the sky.
c My true loves's eyes are the color of the sky.

He claims that *the color of the sky* is non-rigid designator whereas *blue* is a rigid designator; he also crucially claims that both *blue* and *the color of the sky* are general terms. If these claims are granted, it thus follows that there are some general terms that are rigid as well as some general terms that are not rigid, and that rigid designation is not a property that makes no difference among general terms.

Salmon (2005)'s argumentation mainly focuses on establishing that in all their occurrences in the sentences in 2 the terms *blue* and *the color of the sky* function as designators and that both of these terms are general terms. He does not give an argument for the point that as designators *blue* is rigid but *the color of the sky* is not; nor does he give any argument for the points that all common nouns be they simple or modified are designators and that they are rigidly so.

Salmon's main argument for holding that in all their occurrences in the sentences in 2 the terms *blue* and *the color of the sky* function as designators is that then we can get a simple explanation of the fact that 2a and 2b together entail 2c. Salmon proposes to analyze the predicative *is* as a semantic predicate forming operator that maps a kind level designatum k (type e) into a predicative denotation of type <e,t> that truly applies only to the instances of k.

is(k)=λx.{x is an instance of k}

Given this analysis of the predicative *is*, he goes on to analyze the sentences in 2 in the following way:

2 a My true love's eyes are blue.
are([blue])([My true love's eyes])
λx.{x is an instance of [blue]}([My true love's eyes])

b Blue is the color of the sky.
[blue]=[the color of the sky]

c My true loves's eyes are the color of the sky.
are([the color of the sky])([My true love's eyes])
λx.{x is an instance of [the color of the sky]}([My true love's eyes])[135]

Indeed when these sentences are analyzed in this way we obtain a rather neat explanation of the entailment relation that holds between 2a and 2b, and 2c.

And Salmon's main reason for holding that not just *blue* but also the definite noun phrase *the color of the sky* should be counted as a general term is that, as illustrated in 2a and 2c it can combine with the predicative *is* to form a syntactic predicate.

Now I will first briefly assess Salmon's defense for the claim that *blue*, *the color of the sky* and his claim that in general all adjectives and common nouns are designators. Then, I will explore the complications generated by Salmon's analysis of the predicative *is* as a semantic predicate forming operator. This analysis plays a crucial role in his argument that *the color of the sky* should be counted as a general term in so far as it can combine with *is* interpreted as a predicativizing operator. Third, I will assesss his claim that *the color of the sky* should be counted among general terms. Finally, I will question whether it is beneficial to discuss the questions generated by Kripke's ascription of rigid designation to some common nouns and adjectives in terms of the category of general terms, and more generally whether it is beneficial at all to keep the

[135] Given a denoting expression α, I here take [α] to be the denotation of α. Here, apart from innocuous notational differences, I faithfully render Salmon's analysis of these sentences. That analysis is extensional. That is, the semantic representations he gives do not have the capability to represent the variability of denotations relative to different possible worlds. Below, while preserving the essence of Salmon's analysis I will improve it by introducing possible world variables.

categorization singular term/general term or we will be better off by dropping the *general term/singular term* terminology all together.

Salmon's Reasons for Taking Common Nouns and Adjectives to be Designators

Salmon does not give much by way of argument for the claims that adjectives and common nouns are designators. This can be condoned as the main thrust of that paper is that if general terms are designators, there will be some general terms that are rigid designators like adjectives and common nouns, and some like *the color of the sky* which are not rigid designators. But the decision whether common nouns and/or adjectives are designators or not is not one that can be made solely on an intuitive basis, disregarding the theoretical advantages one view may have over the other. A comparison between possible views regarding the interpretation of adjectives and common nouns has to take into consideration the numerous syntactic environments they can occur and the various aspects of the ways in which these environments contribute to the truth conditions of sentences. The theoretical advantages to hold that common nouns are appliers were briefly touched in the section on Kripke's *Naming and Necessity* and will be more amply illustrated in the sixth chapter of the present work. The alternative view that common nouns are designators has also certain apparent theoretical advantages to be discussed later again in the sixth chapter of the present work (as regards the interpretation of adjectives however not much will be said in the present work).

Notwithstanding the wide extent of the critical comparison required to decide between the alternatives, the relevance of such a comparison and of its result to the controversy about the rigidity of general terms and in particular to the case defended by Salmon (2005) should be obvious. If all the semantic and syntactic phenomena that can be explained by treating common nouns and adjectives as designators, and then some more can be explained for example by assigning common nouns and adjectives applier denotations of type <e,t>, we will have to conclude that common nouns and adjectives are not designators. In this case however there will be no point in asking whether they will be rigid designators, if they are designators.

Anyway as previously indicated there is some argument in Salmon (2005) at least in support of the view that adjectives are designators. Salmon's explanation of the entailment relation in 2 presupposes that the adjective *blue* is a designator. If an alternative view with regard to the interpretation of *blue* cannot give any explanation for this entailment or cannot give an explanation as neat as Salmon's, this will be a positive point for the view that the adjective *blue* is a designator. Of course this positive point can be weighed down by the complications generated elsewhere, or by the advantages presented elsewhere by the alternative view.

Here I will limit my self with briefly exploring the possible complications generated by Salmon's taking the adjective *blue* to be a designator, and considering whether the entailment relation in 2 can be explained by taking the adjective *blue* to be an applier.

I begin by reformulating Salmon's analysis of the sentences in 2 using the predicativizing operator Pred defined thus,

Let α be an designator intension of type <s,e>, the values of which are properties or kinds, let $I(s)(x,y)$=Truth iff x instantiates y relative to s.
Then, $Pred(s)(\alpha)=\lambda x.I(x,\alpha(s))$

Note that this reformulation does not affect the essence of Salmon's original analysis, it only improves it by introducing an evaluation index variable s to make the probable sensitivity of the denotations of the denoting elements to the evaluation indexes.[136] As indicated Salmon believes that the operator Pred is just the predicative *is*; further below we will see that it is a better idea to rather take Pred to be an implicit operator and not to identify it with the predicative *is*. Anyway, here is Salmon's analysis of the sentences in 2 reformulated using Pred:

2 a My true love's eyes are blue
$(Pred(s)([blue]^s))([My\ true\ love's\ eyes]^s)$

b Blue is the color of the sky
$[blue]^s=[the\ color\ of\ the\ sky]^s$

c My true loves's eyes are the color of the sky
$(Pred(s)([the\ color\ of\ the\ sky]^s))([My\ true\ love's\ eyes]^s)$[137]

[136] This improvement is needed because I will below consider how Salmon explains the entailment in 2 and how else it can be explained. The alternative way will require a meaning postulate and such postulates cannot be formulated in extensional term. Also, I will indicate that Salmon too has to have recourse to similar meaning postulates, if not to account for the entailment in 2, for quite similar entailments.

[137] For en expression α, $[\alpha]^s$ is the denotation of α relative to the evaluation index s (a possible world). I will in general use *s*, *s',s'',s'''*…as variables ranging over possible worlds. I will use *@* to refer to index of utterance (the actual world relative to the speaker).

According to this analysis the term *blue* that occurs in 2a receives the same semantic interpretation as the term *blue* that occurs in 2b. Namely both are interpreted as property designators. There however are reasons to think that these two occurrences are occurrences of distinct syntactic elements. The noun *blue* is standardly distinguished from the adjective *blue*. The occurence in 2a is an occurrence of the adjective *blue* in an adjective phrase that in turn forms the syntactic predicate. The occurrence in 2b is an occurrence of the noun *blue* in a noun phrase that in turn forms a syntactic argument. And if they are occurrences of distinct syntactic elements then it is not evident that they will receive the same semantic interpretation and that we will have the identity, $\lambda s.[\text{blue}_A]^s=\lambda s.[\text{blue}_N]^s$. And in this case, we cannot account for the entailment without some extra assumptions linking the interpretation of *blue*$_N$ with that of the *blue*$_A$.

Why would we like to distinguish the *blue*$_N$ from *blue*$_A$? A comparison of general syntactic distribution of adjective nominalizations and adjectives lead to the following generalizations. Adjective nominalizations (with or without determiners) can form noun phrases that in turn function as syntactic arguments, adjectives cannot; adjectives can combine with nouns as their modifiers, but adjective nominalizations cannot. Adjectives can form syntactic predicates but adjective nominalizations cannot.

3 Alice manifested no alertness that morning.
Her alertness was palpable that morning.
Alertness is the primordial quality required in this line of work.
*Alice manifested no alert that morning.
*Her alert was palpable that morning.
*Alert is the primordial quality in this line of work.
That morning Alice was alert.

That morning in the work station an alert woman sat.
*That morning Alice was alertness.
*That morning in the work station an alertness woman sat.

When it comes to *blue* and other color terms we see that they apparently behave both as mass nouns and adjectives; they can apparently occur both in environments that typically ask for nouns and in environments that typically ask for adjectives.

4 There was no blue on that carpet.
Alice used some blue to show the reflection of the sea on the wall.
Its blue did not go well with the color of the walls.
No part of that carpet was blue.
The blue carpet did not look good on the stone floor.

So, to preserve the stated generalizations that are in fact held to be definitional of for the categories adjective and noun, $blue_N$ is best distinguished from $blue_A$.

Salmon is aware of these matters and points that this distinction neither implies that $blue_N$ and $blue_A$ are two distinct words nor that they will have different semantic interpretations. He presumably thinks that occurrences of $blue_N$ and $blue_A$ can be regarded as occurrences of the same word under different syntactic functions, and that it need not be the case that the semantic interpretation will change with the change in syntactic function.

Surely we can hold like Salmon that the adjective *blue* receives the same semantic interpretation as the mass noun *blue* and take both to designate the color blue. This move will however require us to postulate appropriate semantic operators to account for *blue*'s capability to function as a syntactic predicate and as a noun modifier.

But we can as well take only the $blue_N$ to designate the color blue. As regards the $blue_A$, depending on whether we regard the predicative role or the common noun modifier role of adjectives as primary, we can either assign it applier denotations of type <e,t>, or modifier denotations of type <<e,t>,<e,t>>. Then depending on this choice we can postulate an implicit semantic operator to derive denotations suitable for the other use of the adjective.

The advantage of Salmon's approach will be that we will have to postulate one less semantic variant of the word *blue*. The advantage of the latter approach will be a more uniform general syntactic and semantic account of adjectives and nouns. Unlike color terms most adjectives have morphologically different nouns that correspond to them –e.g. *alert/alertness*. We have above illustrated that these adjectives are not grammatically interchangeable with the nouns corresponding to them; and this non-interchangeability arguably has a semantic dimension as well.

Salmon criticizes the latter approach that assigns different types of denotations to the *blue*$_N$ and the *blue*$_A$ in relation with the task of explaining the entailment in 2. It apparently does not yield as neat an explanation as the one Salmon proposes drawing on his assumptions. So, let's see for ourselves how we can explain that entailment if we interpret *blue*$_A$ as an applier and the *blue*$_N$ as a designator. We can give sentences in 2 the following semantic analyses (here we suppose that Pred is an implicit operator that is triggered only when the need arises, and that it is not contributed by *is*):

2 a My true love's eyes are blue.
$[_{<e,t>}\text{blue}_A]^s([_e\text{My true love's eyes}]^s)$

b Blue is the color of the sky.
$[_e\text{blue}_N]^s=[_e\text{the color of the sky}]^s$

c My true loves's eyes are the color of the sky.
(Pred(s)([the color of the sky]^s))([My true love's eyes]^s)

Unlike Salmon's approach, under the present approach the semantic analysis of the sentences in 2 does not by itself yield the entailment. As rightly noted by Salmon, to explain the entailment under this approach we have to have recourse to a meaning postulate linking the designatum of the *blue*$_N$ with the predicative denotation of the adjective *blue*$_A$. We may think that the following postulate will do:

5 $\lambda s.\lambda x.\mathrm{pred}(s)([\alpha_{color\ noun}]^s)(x)=\lambda s.\lambda x.[\alpha_{color\ adjective}]^s(x)$

Now, Salmon finds fault with the postulate in 5, because this it apparently has the potentially unwelcome consequence that the following sentence can have two distinct interpretations which nonetheless determine exactly the same truth conditions:

6 Something is blue.
i. $(\lambda P.\exists x P(x))([_{<e,t>}\mathrm{blue}_A]^s)$
ii. $(\lambda P.\exists x P(x))(\mathrm{pred}(s)([_e\mathrm{blue}_N]^s))$

This objection depends on the assumption that the sole availability of a predicativizing operator like Pred allows any noun phrase to occur in syntactic predicate positions. I am not here in a position to question or defend this assumption. But I will just note that this assumption hits back at Salmon's own position which identifies Pred as the semantic contribution of the predicative *is*. If we grant this identification we should predict that *Someone is alertness* or *Someone is the primordial quality required for this task* will be acceptable sentences and that the former one will determine the same truth-conditions as

Someone is alert. Clearly, this prediction does not materialize. So, Salmon should rather avoid the assumption in question. But, if that assumption is dropped then we can simply hold that the noun *blue* cannot occur in syntactic predicate positions, and that consequently 6 can never have the given analysis ii.

Another point that may be found objectionable in relation with the approach in question may simply be the fact that it requires a meaning postulate to explain the entailment in 2. In comparison Salmon's approach is not in need of any such meaning postulate to explain the same entailment.

Now, although in relation with the entailment in 2 Salmon's approach does not have to recourse to a meaning postulate, the explanation of many other similar entailments under Salmon's approach will require a meaning postulate . Consider the following three sentences, and their probable analysis under Salmon's approach according to which adjectives should designate properties:

7 Alice is alert.
Alertness is the primary quality required in this job.
Alice has the primary quality required in this job.

$\mathrm{Pred}(s)([_e\ \mathrm{alert}]^s)([_e\ \mathrm{Alice}]^s)$
$[_e\ \mathrm{alertness}]^s=[_e\ \text{the primary quality required for this job}]^s$
$\mathrm{I}(s)([_e\ \mathrm{Alice}]^s)([_e\ \text{the primary quality}\ldots]^s)$

The above analysis of the sentences in 7 does not by itself explain this entailment. But the entailment will obtain, if the following postulate is introduced:

$\lambda s.[_e\ \mathrm{alert}]^s=\lambda s.[_e\ \mathrm{alertness}]^s$

So we conclude that Salmon's defense of his approach that semantically equivocates *blue*$_{\mathrm{N}}$ and *blue*$_{\mathrm{A}}$, and take both to designate the color blue falls short of making his approach recommendable over the alternative that takes only *blue*$_N$ to designate the color blue and assigns predicative denotations to *blue*$_A$. The latter approach pays heed to the difference in the syntactic distribution of adjectives and the corresponding nouns, and has the capacity to give a semantic explanation of their different syntactic distribution patterns. In contrast Salmon's approach does not present such a capacity. The approach criticized by Salmon has some apparent disadvantages in relation with explanation of the entailment in 2: it has to recourse to a meaning postulate which appears to entail that the same English sentences can receive two different interpretations that eventually determine the same truth conditions. However when scrutinized more closely it turns out that (i) Salmon's own approach too has to have recourse to meaning postulates in relation with many other entailments similar to the one 2 and (ii) the unwelcome consequences of the meaning postulate criticized by Salmon follows only if one makes an assumption which will have objectionable corollaries when conjoined with Salmon's own approach.

'Is' as a Predicativizing Operator

Salmon's analysis of the predicative *is* as a predicate forming operator out of kind level designata plays a role in his analyses of the sentences in 2. It also plays a role in his argument that *the color of the sky* should be counted as a general term in so far as it can combine with *is* interpreted as a predicativizing operator. Now, I will illustrate the difficulties faced by this peculiar analysis of the predicative *is*. Later, I will assesss the dependence of Salmon's claim that *the color of the sky* is a general term to this analysis.

Salmon proposes to analyse the predicative *is* as a semantic predicate forming operator that maps a kind level designatum k (type e) into a predicative denotation of type <e,t> that truly applies only to the instances of k.

Is(k)=λx.{x is an instance of k}

This analysis enables him to analyse the sentences in 2 in the following way:

2 a My true love's eyes are blue.
are([blue])([My true love's eyes])
λx.{x is an instance of [blue]}([My true love's eyes])

b Blue is the color of the sky.
[blue]=[the color of the sky]

c My true loves's eyes are the color of the sky.
are([the color of the sky])([My true love's eyes])
λx.{x is an instance of [the color of the sky]}([My true love's eyes]) [138]

He also extends this analysis to cover cases of nominal predication such as the following:

8 Alice is a proud mother.

Clearly here too we have a predicative *is* but it combines with the noun phrase *a mother*. If the predicative *is* is a function that takes kind level designata to map them into particular level predicative denotations, then *a proud mother* too should be taken to contribute a kind level designatum. Salmon avoids this potentially undesirable result by further stipulating that, the predicative *is* has a

[138] I revert to Salmon's extensional semantic analyses for ease of presentation.

variant *is a* that combines with common nouns, which too according to Salmon designate kinds:

is-a(k)=λx.{x is an instance of k}
is-a([proud mother])= λx.{x is an instance of [proud mother]}

But there are indefinitely many different types of noun phrases in store which too can apparently combine with the predicative *is*:

9 Alice, Carol and Dorothy are three proud mothers.

It is not clear how Salmon would treat this last example as no consideration is given to such examples in Salmon (2005). Of course Salmon can stipulate that *three proud mothers* is a kind designator. But given that he could have done the same with *a proud mother* as well and he did not, I surmise that he would reject that *three proud mothers* is a kind designator. In this case one way to deal with 9 would be to follow the precedent set by his analysis of *is a proud mother*, and stipulating that *are three* is a further variant of the predicative *is*, alongside *is a*. But then clearly there will be a need for indefinitely many non-equivalent variants of the predicative *is*. –*are two, are four,* … etc.

Another way to deal with 8 and 9 will be to claim that, they are different from 2a and 2c in that the *is* occurring in the former is the *is* of identity. Indeed Salmon (2005) indicates in a footnote that in relation with such sentences as 8 he wants to remain non-commited whether they involve the *is* of predication or the *is* of identity.[139] If the latter option is adopted *a proud mother* and *three proud mothers* will have to be interpreted as quantified noun phrases. But given

[139] Pg.123, note 13.

that Salmon holds that common nouns including the modified ones are kind designators he has to explain how they can combine with the quantificational determiners *a* and *three*. This can be done either by adopting a non-standard interterpretation for quantifiers which allows them to operate on kind level designate (type e) or by postulating an implicit predicativizing operator. In the mentioned footnote Salmon explores the latter option. He suggests an implicit predicativizing operator which he labels as –*izes* that maps a kind k into a predicative denotation which truly applies only to the instances of k:

(k)-izes=λx.{x is an instance of k}
([proud mother])-izes= λx.{x is an instance of [proud mother]}

Given this predicativizing operator 8 and 9 can be given analyses along the following lines:

8 Alice is a proud mother.
λP.∃x(([proud mother])-izes(x) & P(x))(λy.[Alice is$_=$ t_y])
∃x(([proud mother])-izes(x) & λy.[Alice is$_=$ t_y](x))
∃x(([proud mother])-izes(x) & [Alice is$_=$ t_x])

9 Alice, Carol and Dorothy are three proud mothers.
λP.∃x((three(x) & ([p. m.])-izes(x)) & P(x))(λy.[Alice, Carol and Dorothy are$_=$ t_y])
∃x((three(x) & ([p.m.])-izes(x)) & λy.[Alice, Carol and Dorothy are$_=$ t_y](x))
∃x((three(x) & ([proud mothers])-izes(x)) & [Alice, Carol and Dorothy are$_=$ t_x])

So, even if 8 and 9 are analyzed as identity sentence there will be a need for an implicit predicativizing operator that does the same job as the explicit predicative *is*. Probably for this reason, in that same footnote Salmon (2005) writes that it will be preferable to regard the article *a* figuring in nominal predications as in 8 to be a semantically vacuous element. Thus, according to this last suggestion of Salmon it is better if we drop the idea of treating 8 as an identity sentence and instead treat it as a predication with the *is* operating as predicativizing operator and *a* as a semantically vacuous element. But in making this last suggestion Salmon does not take into account such sentences as 9, where the determiner *three* cannot be regarded as semantically vacuous element.

To recapitulate, Salmon is officially non-commited with regard to whether sentences like 8 are identity sentences or predications, but tentatively thinks that it will be better to interpret them as predications; with regard to such sentences as 9 he does not express any opinion as he does not take them into consideration at all; and it is not clear whether Salmon would have revised his opinions about sentences like 8 in favor of a identity sentence treatment, had he considered sentences like 9.

All possible options with *is* interpreted as a predicativizing operator has undesirable consequences. If sentences like 8 and 9 are treated as identity sentences, there will be a need for an implicit predicativizing operator that does exactly the same job as the explicit predicative *is*. Or if sentences like 8 are treated as predications with semantically vacuous determiner *a* then this treatment cannot be extended to sentences like 9 although 8 and 9 sound syntactically and semantically very similar. And finally if both 8 and 9 are treated as predications with non-vacuous *a* and *three*, unless one wants to hold that *a proud mother* and *three proud mothers* are kind designators alongside the noun *proud mother(s)*, then one has to postulate alongside *is* an indefinite amount of other explicit predicativizing operators like *is a, is two, is three …*etc.

Moreover, as we have noted if one wants to hold that common nouns are designators, regardless how 8 and 9 are analyzed, an implicit predicativizing operator is anyway needed to account for such quantificational noun phrases as *every proud mother*, unless one is willing to adopt a non-standard interpretation of the quantificational determiners. We have previously indicated that common nouns are standardly taken to be appliers because apparently this choice very neatly explains the different syntactic distribution of common nouns from kind designating noun phrases and pronouns on grounds of semantic interpretability. We mentioned that one area where this differential syntactic distribution is observed was quantified noun phrases. Common nouns can combine with quantificational determiners, but designators such as pronouns, proper names, definite phrases cannot. In relation with this last point, quantifiers are standardly assigned denotations of type <<e,t>,<<e,t>,t>> that take predicative denotations of <e,t> (the denotation type of appliers) and yield quantified noun phrase denotations of type <<e,t>,t>. So, If Salmon wants to hold that common nouns designate kinds (that is, they are of type e) either he has to adopt a non-standard interpretation for quantifiers which will enable them to semantically combine with the designata of the common nouns. Or, if he wants to keep the standard interpretation of the quantifiers he has to introduce an implicit predicativizing operator that map kind level designata of common nouns into particular level denotata that can then combine with the denotata of the quantifiers standardly interpreted. Given that *is* does not play a part when quantifiers combine with common nouns, *is* will not be of help to explain how kind designating common nouns can combine with quantifiers under their standard interpretation.

There are further problems with the identification of *is* as predicativizing operator. Consider the following sentences:

10 a Alice is plump and strong.
   b Alice is plump, strong and the mother of Bob's children.
   c Alice is the mother of Bob's children.

The syntactic predicates of these sentences are formed by conjunctive phrases. If the predicative *is* is a predicate forming operator that maps kind level designata into predicative denotations then the conjunctive phrase *plump and strong* figuring in the predicate of 10a should be interpreted as a kind designator. But this phrase is semantically complex; it is the conjunction of two adjectives which according to Salmon designate kinds, and its designatum ought to be a function of the designata of these two adjectives. This can be ensured by postulating a variant of *and* to be interpreted along the following lines:

[and](k_1)(k_2)=k, such that for any evaluation index s, x is an instance of k at s iff both x is an instance of k_1 at s and x is an instance of k_2 at s

But note that this approach will not be of help in relation with 10b. Here, the conjunctive phrase occurring in the syntactic predicate involves the definite phrase *the mother of Bob's children* which cannot possibly be taken to designate a kind.

Salmon appears to be aware of this problem. For example, in a footnote he cites Graff (2001) who partly on the basis of such examples as 10b argues that definite phrases occurring in syntactic predicates are not designators but appliers and that such sentences as 10c should be interpreted as nominal predications (p. 123). Graff (2001) follows the common wisdom that both adjectives and common nouns are appliers; and given that definite phrases can be conjoined with common nouns and adjectives in conjunctive phrases that occur in syntactic predicates, she infers that definite phrases too should be appliers (considering with what sorts of constituents a certain expression E can grammatically and meaningfully form conjunctive phrases is a standardly used test to determine the syntactic and semantic category of E). Under Graff's approach the conjunctive phrase *plump, strong and the mother of Bob's children* occurring in 10b will be an applier whose denotation will derive from the denotations of its constituents which are themselves interpreted as appliers under the function expressed by *and* which can be formulated as such:

Let P, Q, R be predicative denotations (type <e,t>)
[and](P)(Q)(R)=λx.((P(x) & Q(x)) & R(x))

[and]([plump])([strong])([the mother of Bob's children])=λx.(([plump](x) & [strong](x)) & [the mother of …](x))

And under Graff's approach there is no need for an implicit or explicit predicativizing operator in so far as adjectives, common nouns, and even definite nouns phrases as appliers have native predicative denotations; thus under this approach the predicative *is* will be semantically vacuous apart from indicating tense.

Returning to Salmon now, in the same footnote where he cites Graff (2001) he suggests that in cases where a definite phrase that pertains to particulars, like *the mother of Bob's children*, combines with the *is* of predication the definite phrase should be interpreted predicatively rather than as a singular term. I take this to mean that such definite phrases should be interpreted as appliers but not as designators. But it is not clear how this suggestion will be of help in relation with 10b from Salmon's standpoint. If *the* *mother of Bob's children* is to be interpreted as an applier than we will have a conjunctive phrase in which *plump* and *strong*, treated as designators *per* Salmon, are conjoined with the applier *the mother of Bob's children* which seems impossible. Furthermore, given that *is* is still treated as a predicativizing operator it has to combine with a kind designator, and under this suggestion it is still not clear how a kind designatum will be derived for the whole conjunctive phrase *plump, strong and the mother of Bob's children* from the denotata of its constitutents.

In the next footnote Salmon comes with another suggestion. To stipulate that there is a further predicativizing operator *is the*, alongside *is* and *is a* and probably indefinitely many others. The predicativizing operator *is the* will have the following definition:

is-the([author of Waverly])= is-a([unique author of Waverly]) *Salmon's original proposal*
is-the(k)=is-a(the kind k' such that necessarily for any x k' is instantiated by x iff k is intantiated uniquely by x)

Here *is-the* is defined in terms of *is-a*. According to the previously given definition of *is a*, it is supposed to be a function that applied to kinds. Then, *unique author of Waverly* too should be taken to designate a kind. Salmon does not give a definition for *is-the* that does not refer to verbal expressions, but I above tentatively added such a definition as well (viz. the second identity clause).

Now the operator *is the* can be of help in relation with such sentences as 10b, if there is a need to interpret them as nominal predications rather than as identity sentences. But in relation with 10b it appears to be of no use. In 10b we do not have any occurrence of the string *is the*.

Perhaps, one may try to deal with 10b by distributing the *is* inside the conjunctive phrase, *plump,strong and the mother of Bob's children*, so that contrary to appearances the conjunction will have scope over the predicative *is*:

10 b Alice is plump, strong and the mother of Bob's children.
Alice is plump, is strong and is the mother of Bob's children.

But then the predicative *is* that occurs in the surface form has to be taken to express different operators simultaneously. The predicativizing operator *is* that applies to *plump* and *strong* cannot be the same operator as the one that applies to the definite phrase *the mother of Bob's children*. Neither can the operator *is* be considered to be a constitutent of the operator *is the* under their current definitions. Maybe we can drop the operator *is the* and revise the definition of *is* in such a way that the operator it expresses combines two distinct operations, and effects one or the other according to whether the designatum it applies to is a property/kind or a particular.

Let α be a designator (denotation type e),
Let $I(x,y)$=Truth iff x instantiates y
$is([\alpha])=\lambda x.I(x,[\alpha])$, if $[\alpha]$ is a property/kind
$is([\alpha])=\lambda x.x=\alpha$, if $[\alpha]$ is a particular[140]

But will all this gerrymandering worthwhile? Especially if it is not only possible to simply drop the idea of analyzing *is* and such strings as *is a* and *is the* as predicativizing operators, but also it is more appropriate to do so. In fact, there

[140] This last suggestion can in fact work in relation with 10b; but Salmon cannot adopt it and would rather prefer to keep *is the* for reasons to be clear in the next section of our discussion on Salmon (2005).

is one further very compelling reason to do so which I delayed to mention so far. In certain modal contexts predication can take place without any occurrence of *is* or its variants.

11 Bob found Alice ill.
Bob considered Alice a lawyer.
Bob considered Alice a proud mother.
Bob found Alice a stern mother.

So, if one wants to account for these cases of predication while also holding that common nouns and adjectives designate kinds, one has no choice but postulate an implicit predicativizing operator. And if such an implicit operator has to be postulated anyway then there is no need to burden oneself with the complications generated by taking the predicative *is* to express such an operator.

So, if like Salmon we want to hold that adjectives and common nouns are designators to account for their capacity to form syntactic predicates we should rather postulate an implicit operator that map the designata of adjectives and common nouns into predicative denotations that truly apply only to the instances of these designata. And to account for the capacity of such definite noun phrases as *the mother of Bob's children* to figure in syntactic predicates, we should postulate another implicit syntactic operator that maps their designata into predicative denotations that truly applies only to their designata. Or even better we can postulate only one implicit predicativizing operator combining these two operations, and effects one or the other operation depending on whether the designatum to which it applies is a particular or kind/property. Below is defined such an implicit predicativizing operator:

Let α be a designator (denotation type e),
Let I(x,y)=Truth iff x instantiates y
Pred*([α])=λx.I(x,[α]), if [α] is an kind/property
Pred*([α])=λx.x=α, if [α] is a particular

Given this operator we can now represent 10b in the following way:

10 b Alice is plump, strong and the mother of Bob's children.
[and](Pred*([plump]))(Pred*([strong]))(Pred*([the mother of …]))([Alice])
λx.((Pred*([plump])(x) & Pred*([strong])(x)) & pred*([the m. of …])(x))([A.])

Now, we can account also for kind designating common nouns' combining with quantificational determiners interpreted in the standard way without the intermediacy of *is*.

Every mother is proud.
(λP.λQ.$\forall$x(P(x)$\supset$Q(x))(pred*([mother])))(pred*([proud]))
λQ.$\forall$x(Pred*([mother])(x)$\supset$Q(x))(pred*([proud]))
$\forall$x(Pred*([mother])(x)$\supset$ pred*([proud])(x))

Furthermore, under the proposed revision we can analyze of such sentences as *Alice, Carol and Dorothy are three mothers* in the following way:

Alice, Carol and Doroth are three mothers.
λx.([three](x) & PL(Pred*([mother]))(x))([Alice, Carol and Dorothy])

Thereby we don't have to postulate indefinitely many non-equivalent operators supposedly expressed by the strings *are two*, *are three*, or alternatively to take such terms as *three mothers* to designate kinds.

I conclude that Salmon should rather have postulated one (or two) implicit predicativizing operator, instead of identifying *is*, the strings *is a*, *is the* and probably some other strings too with predicativizing operators.

As we have seen previously Salmon's way of explaining the entailment in 2 with *blue* and *the color of the sky* taken kind designators can be pulled off regardless whether we postulate an implicit operator such as Pred* or take *is* and its variants to express such operators. Thus, Salmon's argument that both *blue* and *the color of the sky* should be taken to be kind designators because thereby we can neatly explain the entailment in 2, is not affected by the considerations raised here against the identification of *is* with a predicativizing operator.

However we cannot say the same for Salmon's contention that *the color of the sky* should be a general term in so far as, like *blue*, it can combine with the predicative *is*. Below I will argue that unless Salmon treats the string *is the* that occurs in such sentences as 10c as a unit that expresses a special predicativizing operator he cannot demarcate the category of general terms in such a way that it includes such definite phrases as *the color of the sky* but excludes such phrases as *the mother of Bob's children*.

Can Salmon Maintain a Category of General Terms that Include 'the color of the sky' But Excludes Some Other Odd Balls?

We indicated that the point most forcefully defended by Salmon (2005), is the inclusion of such terms as *the color of the sky* into the category of general term. Salmon defends this inclusion on the basis of the usability of *the color of the sky* as a syntactic predicate in place of the adjective *blue*, and apparently with the same denotation:

2 a My true love's eyes are blue.
  b Blue is the color of the sky.
  c My true loves's eyes are the color of the sky.

Salmon claims that any term that forms a syntactic predicate combining with the predicative *is* must be a general term. Now considered as sufficient condition for being a general term this condition generates a number of problems. When this is taken literally, such a noun phrase as *a proud mother* which can form the syntactic predicate in a nominal predication should too count as a general term. On the other hand the modified common noun *proud mother* may not count as a general term, because it can never combine with the *is* without the indefinite determiner:

12 Alice is a proud mother.
*Alice is proud mother.

Presumably in response to this problem, Salmon proposes to take the string *is a* as a single syntactic constituent which is a variant of the *is*. We have previously indicated that Salmon takes both *is* and *is a* to express a predicativizing operator that maps properties/kinds, the designata of adjectives and common nouns, into appropriate predicative denotations of type <e,t>. So, according to Salmon *is a* counts as a syntactic unit and a variant of the predicative *is*, and it combines with common nouns. Therefore singular common nouns such as *proud mother* too should count as general terms, and *a proud mother* should not be treated as a syntactic unit in syntactic predicates in English.

So far so good, but we have already seen examples of nominal predications in which such a phrase as *three proud mothers* can combine with the predicative *is* to form the syntactic predicate:

9 Alice, Carol and Dorothy are three proud mothers.

Will then *three proud mothers* count as a general term alongside *proud mothers*? Perhaps Salmon would accept this. But given the way he deals with the phrase *a proud mother*, it seems more consistent for him to add *are three* to his variants of predicative *is* and reject that *three proud mothers* is a general term. Of course if he takes this course he cannot simply stop with *are three*, he has to add *are two*, *are four* … as well. Note also that unlike *is a*, *are three* and its kin cannot be semantically equivalent variants of the simple predicative *is*. *Are three* should be taken to be an operator that maps a kind u into predicative denotations that truly applies to triplets of the instances of u.

Another problematic aspect of Salmon's stated criterion for being a general term follows from the fact that definite noun phrases that apparently designate particulars can quite often figure in syntactic predicates, conjoined with common nouns or adjectives. We have already seen such examples as well:

10 a Alice is plump and strong.
b Alice is plump, strong and the mother of Bob's children.

Salmon would probably regard the conjunctive *plump and strong* 10a as a general term combining the two simple general terms *plump* and *strong*. But then what would be his verdict about the *plump, strong and the mother of Bob's children* in 10b? Would he be ready to regard this too as a general term formed through the conjunction the adjectives *plump* and *strong*, and the definite phrase *the mother of Bob's children*? If he did he would have to regard *the mother of Bob's children* as a general term. But *the mother of Bob's children* designates a concrete particular, if it is a designator at all; and in that case it seems it is best regarded as a singular term, if one intently wants to keep the *general term/singular term* terminology. Note that *the mother of Bob's children* can be grammatically replaced in 10b by many other definite phrases as well – e.g. *the torment of Bob's life*, *the lifelong head of mother truckers association* etc. Are all these definite phrases both general terms and singular terms?

We have seen that Salmon is apparently aware of such examples as 10b, and that in a footnote he takes into account the possibility that such sentences as 10c can be interpreted as nominal predications rather than as identity sentences:

10 c Alice is the mother of Bob's children.

In response to such a possibility we have seen that Salmon suggested to take the string *is the* too to constitute a syntactic unit and as such to express the following predicativizing operator:

is-the (α) = is-a (unique α)

Presumably, with the implicit condition that α be a term that pertains to particulars –such as *author of Waverly, mother of Bob's children* etc. This proposal entails that there cannot be any particular designating definite phrase in syntactic predicate positions, in so far as according to this analysis the article *the* has to function as a constituent of the predicate forming operator, and not as a determiner that combines with a noun to form a definite noun phrase. Thus, there cannot be any question as to whether the definite phrases *the torment of Bob's life* and *the mother of Bob's children* which apparently can form syntactic predicates by combining with the predicative *is* are general terms or not, since in fact these phrases cannot occur in that position.

But this last move will not be of help in relation with 10b and is even rendered objectionable by it. In 10b there is no occurrence of the string *is the* and the definite article *the* appears to form a syntactic unit rather with the noun *mother of Bob's children*. Is it viable to hold that *the* belongs to different syntactic units in 10b and 10c. Especially when the string *the mother of Bob's children* so strongly appears to form a single syntactic and semantic unit wherever it occurs in a sentence and to make the same semantic contribution both in 10b and 10c.

Above we have speculated that one possibility to deal with 10b while keeping the analysis of *is* as a predicativizing operator of is to drop the idea of treating the string *is the* as a constituent expressing an operator and revise the definition of the *is* in such a way that the operator it expresses combines two distinct operations, and effects one or the other according to whether the designatum it applies to is a kind/property or a particular. This can be done by taking the predicative *is* to express Pred* defined above:

Let α be a designator (denotation type e),
is([α])=Pred*([α])

Let I(x,y)=Truth iff x instantiates y
Pred*([α])=λx.I(x,[α]), if [α] is a property/kind
Pred*([α])=λx.x=[α], if [α] is a particular

If furthermore we assume that in 10b *is* under its revised definition is distributed inside the conjunctive phrase, *plump,strong and the mother of Bob's children*, and that contrary to appearances the conjuction has scope over the predicative *is*, then we can analyze 10b in the following way:

10 b Alice is plump, strong and the mother of Bob's children.
[and](Is([plump]))(Is([strong]))(Is([the mother of …]))([Alice])

λx.((Is([plump])(x) & Is([strong])(x)) & Is([the mother of …])(x))([Alice])
Is([plump])([Alice]) & Is([strong])([Alice]) & Is([the mother of …])([Alice])

Ignoring for the time being other problems discussed above pertaining to the idea taking *is* to express a predicativizing operator, we see that 10b can after all be successfully analyzed in accordance with this idea. Yet, Salmon cannot forsake *is the* as an operator and adopt this analysis according to which *is* expresses Pred*. For then he has to admit that the definite phrase *the mother of Bob's children* as a particular designating phrase can combine with the same *is* as the adjectives *plump* and *strong* combines with; and given his stated sufficient condition for being a general term, he will then have to face the undesirable consequence that *the mother of Bob's children* and many other similar particular designating definite phrases are general terms.

Again it is for this same reason that Salmon cannot drop altogether the problematic idea of taking predicativizing operators to be expressed by explicit elements such as *is*, *is a*, *is the* and rather postulate an implicit operator like Pred*. For then again he will have to admit that besides adjectives, common nouns and kind/property designating definite phrases such as *the color of the sky* particular designating phrases such as *the mother of Bob's children* too can form syntactic predicates by combining with *is* –where *is* will now be treated as semantically vacuous apart from expressing tense.

The problematic consequences of Salmon's claim that any expression that combines with the predicative *is* must be a general term does not however stop here. Among the types of phrases that can apparently combine with the predicative *is* to form syntactic predicates there even are quantified phrases:

13 a Alice is some kind of lunatic [she lets her kids drive trucks unattended]
b Alice has been every kind of woman [to satisfy Bob but to no effect]
c Alice has been every type of warrior [but she always prefers to be a mage over other classess][141]

Shall Salmon count the highlighted phrases above among general terms? If he does then there will be some general terms which are not designators but rather are quantifiers. I am not sure whether Salmon would like to make the category of general terms such an eclectic category, involving not just common nouns, adjectives, definite noun phrases that designate kinds, but also quantified noun phrases that quantify over kinds.

If Salmon wanted to avoid general terms of the latter kind, one option to follow would be to inflate further the collection of explicit predicate forming operators, by adding operators like *is some kind of*, *is every kind of* etc.

Another option for Salmon in response to such examples will be to argue that these sentences are interpreted relative to an implicit logical form which is not reflected in the surface form of these sentences, and that combinining with the predicative *is* is a sufficient condition for being a general term only relative to the underlying logical form of sentences. Accordingly it may be argued that the logical form of 13a and its interpretation relative to that logical form is as follows:

13 a Alice is some kind of lunatic.
[Some kind of lunatic]$_1$ [Alice is t_1]
$\lambda P.\exists x.([\text{kind of lunatic}](x) \mathbin{\&} P(x))(\lambda y.[\text{Alice is } t_y])$
$\exists x.([\text{kind of lunatic}](x) \mathbin{\&} \lambda y.[\text{Alice is } t_y]\ (x))$
$\exists x.([\text{kind of lunatic}](x) \mathbin{\&} [\text{Alice is } t_x])$

[141] I became aware of such examples through Zamparelli (2000).

In the purported logical form the phrase *some kind of lunatic* does not function as a syntactic predicate. Rather that phrase stands as a syntactic argument and binds a trace (a pronoun like theoretical category), and it is that trace which functions as the syntactic predicate. Thus, in the logical form what combines with the predicative *is* is not *some kind of lunatic* , but a trace (pronoun) that designates the kinds over which *some kind of lunatic* range. And in so far as relative to the logical form *some kind of lunatic* does not combine with the predicative *is*, it need not be regarded as a general term.

Note however that the quantifying phrases that occur as syntactic predicates in the surface forms of the sentences in 13 are rather similar to *the color of the sky* of 2b. They all are noun phrases formed through the combination of a determiner (*some, every, the*) with a taxonomic noun which can only meaningfully apply to a kind/property (*kind of lunatic*, *kind of woman*, *color of the sky*). Most probably, the logical form the sentences in which they superficially occur as syntactic predicates will also be similar, and these sentences will all be interpreted in a similar manner. So, it is likely that 2b too has a logical form like the logical form we above ascribed to 13a and that it is interpreted in a similar manner.

2 b My true loves's eyes are the color of the sky.
$\lambda P.\exists x(([\text{color of} \ldots]^s(x) \ \& \ P(x)) \ \& \ \forall y([\text{color of} \ldots]^s(y) \supset x{=}y))(\lambda z.[\text{my} \ldots \text{are } t_z]^s)$
$\exists x(([\text{color of} \ldots]^s(x) \ \& \ \lambda z.[\text{my} \ldots \text{are } t_z]^s(x)) \ \& \ \forall y([\text{color of the sky}]^s(y) \supset x{=}y))$
$\exists x(([\text{color of} \ldots]^s(x) \ \& \ [\text{my} \ldots \text{are } t_x]^s) \ \& \ \forall y([\text{color of the sky}]^s(y) \supset x{=}y))$

According to this analysis of 2b, in the logical form the definite phrase *the color of the sky* does not combine with the *is* of predication. It rather binds a trace which in turn combines with the *is*. Thus relative to this analysis, *the color of the* *sky* is on the same footing as *some kind of lunatic* of 13a; and there is no more reason to label the former phrase as a general term than there is for the latter. Furthermore, given that this analysis of 2b is just a special case of a general approach for analyzing kind denoting noun phrases that superficially occur as syntactic predicates, which can also satisfactorily applied in the case of the sentences like those in 13, it is preferable to other approaches that differentiates without any explicit reason between cases like 2b and cases like those in 13.

Salmon argues that capability to combine with the predicative *is*, which he takes to express a predicativizing operator, is a sufficient condition for being a general term. Thereby, on the basis of such examples as 2b he can include such kind/property designating definite noun phrases *the color of the sky* among general terms. Setting aside the implausibility of taking the predicative *is* to express a predicativizing operator, we have seen that this sufficient condition generates further complications. First such phrases as *a tiger*, *a proud mother, four tigers*, *eleven proud mothers* etc. will count as general terms, but the stated condition will not entail anything about the status of the underlying common nouns *tiger*, *proud mother* etc. Second, in so far as definite phrases that designate particulars can combine with the same *is* as the adjectives, then they too have to count as general terms. Third, not just kind/property designating definite phrase but also quantiying phrases such as *some kind of lunatic* that pertain to kinds can combine with the *is* of predication.

We have indicated that Salmon is aware of some of these complications and has proposed some fixes. But these fixes don't work. For instance, we have seen that Salmon proposes to treat *is the* as a constituent that expresses a predicativizing operator different than the one allegedly expressed by *is* to address the issue regarding the possibility of particular designating definite phrases such as *the mother of Bob's children* to form syntactic predicates. But, such phrases can be conjuncts alongside adjectives in conjunctive predicates that arguably combine with the predicative *is* in such a way that there is no occurrence of the string *is the*. There are possible ways to account for such cases, yet they require to drop the idea of treating the string *is the* as a constituent that expresses a predicativizing operator. And they are no avail to Salmon, as these entail that such definite phrases *the mother of Bob's children* can combine with the same *is* as adjectives do.

In relation with some other complications following from his stated sufficient condition Salmon does not have anything to say. Quantified phrases such as *some kind of lunatic* too can combine with the predicative *is*, should they then count as general terms? The sensible way to treat such cases appears to be claiming that when the underlying logical form is considered it is not quantified phrases that combine with the predicative *is* but traces that are bound by them. But if this path is followed then given the clear similarity between such definite phrases as *the color of the sky* and quantified phrases such as *some kind of lunatic*, the same treatment should be extended to the occurences of such phrases as *the color of the sky* in syntactic predicate positions. Then *the color of the sky* may be interpreted as quantified phrase in the Montague way, which binds a trace that combines with predicative *is*. The result will be that contrary to what the surface form suggests, *the color of the* *sky* does not combine with the predicative *is* when in the surface form it occurs in the position of syntactic predicate.

So, we conclude that Salmon's proposal to maintain a category of general terms that includes the phrase *the color of the sky* by taking the capacity to combine with the predicative *is* as a sufficient condition, and some additional fixes, founders. It cannot exclude particular designating definite phrases, which are rather standardly regarded as singular terms, unless he adopts the problematic fix of treating *is the* as a consititutent that expresses a special predicativizing operator. It cannot exclude quantifying phrases such as *some kind of lunatic* unless he further extends his bloated collection of explicit predicativizing operators to include such strings as *some kind of, every kind of* etc.

All these problems will of course disappear if we don't regard the capacity to combine with the predicative *is* as a sufficient condition for being a general term. Instead we can adopt a lexical-enumerative demarcation of the category of general terms, which is also in line with the standard usage of the label *general term*, by taking only common nouns, including the modified ones, and adjectives to be general terms.

However then we will also have to regard the main contention of Salmon (2005) as a non-starter. Remember that Salmon (2005) aimed to show that if general terms are generally taken to be designators, there will after all be some general terms like *the color of the sky* that are not rigid designators and rigid designation will not be a vacuous byproduct of being a general term; and it is for this reason that the claim that *the color of the sky* should be counted as a general term constitutes the most extensively argued point of Salmon (2005).

General Term/Singular Term Dichotomy

Now, although I have already said a lot problematizing Salmon's inclusion of such terms as *the color of the sky* among general terms, I think that this issue is a diversion given that what motivated the so called controversy on the rigidity of general terms was principally Kripke's extension of the property of rigid designation to the case of common nouns and adjectives.

Even if terms like *the color of the sky* are granted the general term status, and thereby it is shown that some general terms are not rigid after all and that rigidity is not a vacuous property that for general terms, it still remains the case that the issue we initially and primarily wondered about Kripke's extension of the property of rigidity to the case of adjectives and common nouns was whether that property made any difference *among adjectives and common nouns*. Kripke's discussion in the third lecture of *Naming and Necessity* was principally about common nouns; the literature that responded to Kripke's discussion, including Salmon's previous work, again exclusively focused on adjectives and common nouns. Moreover it seems to me that not everything that can said about the extension of the property of rigidity to the case of common nouns has already been said. And further scrutiny about the extent of the general term category will be of no help in this respect, as there is not any question about the extent of the category of common nouns.

It seems that prior to Salmon's scrutiny about the extension of the category of general terms there was not a clear, more or less established semantic and/or syntactic characterization of the category. Common nouns and adjectives were regarded as typical general terms, although syntactically these two types of terms do not have exactly the same syntactic distribution. On the one hand, adjectives can combine with common nouns to form modified common nouns, but common nouns cannot, on the other hand common nouns can combine with determiners, including quantifiers but adjectives cannot. The only syntactic overlap between the adjectives and common nouns is their figuring in syntactic predicates. But again even in this respect there is a difference, as singular count nouns cannot figure in predicates without taking the indefinite determiner. Neither could adjectives and common nouns have been singled out as typical general terms on semantic grounds, as both the parties that took common nouns to be designators for kinds and the parties that took them to be appliers for particulars still applied them the label *general term*. From a semantic point of view the most we can say is that the denotation of both the adjectives and the common nouns, be they treated as appliers or designators of kinds/properties, potentially pertained to a plurality of entities, and they were singled out as general terms for this reason. So, when it comes to the inclusion of such kind/property designating noun phrases *the color of the sky* into the category of general terms, everything depends on whether we want the label *general term* to cover a group of terms which we have discovered to behave like the typical general terms in one respect and to behave differently in other respects. We can specify the hitherto unscrutinized criteria for inclusion in such a way that they be included, or we can do otherwise to exclude them.

But do we really need the category of general terms; or more precisely the dichotomy singular term/ general term? The established linguistic categories of noun phrase, common noun, adjective phrase, adjective already give us clearly defined classess that overlap with important syntactic differences and that cover all the terms covered by the singular term/general term dichotomy. It can be objected that these linguistic categories cross over important semantic differences which we would like to be reflected in a semantic classification and the singular term/general term dichotomy yields such a classification. In response to this objection let me note the following points. First, it is not true that this dichotomy has been a purely semantic one. As already indicated both the people that took common nouns to be designators for kinds and those who took them to be appliers regarded them as general terms. Second, semantic classess are less established than the syntactic classess. Although syntactic classifications too are theory dependent and occasionally change, they are relatively more stable and more commonly accepted than the semantic ones. Consequently, if one makes the singular term/general term dichotomy dependent on semantic differences, then it will not be useful to compare and assesss different semantic theories. For such purposes a syntactic classification will be more suitable as it will be neutral with regard to semantic views that are being compared and assesssed. Third, if there is indeed a need for a semantic classification, besides a syntactic one then we already have the clearly defined terms *designator, applier, quantifier* to divide terms according to their semantic differences.

General Terms Are Appliers, Some Are Rigid Appliers, Some Are Not: Devitt (2005)

Devitt (2005) is another response to Kripke's assigning rigid designation to natural kind common nouns and adjectives, commingled together as natural kind general terms. It is also a response to the two pronged argument against it that challenges the very significance assigning to some general terms rigid designation or an analogue of it.

Devitt accepts the two pronged argument, but still argues that there is a property of rigidity that gives a theoretically significant rigid/non-rigid difference among general terms. He takes general terms to be appliers (denotation type <e,t>). He argues that some are rigid appliers and some are not, and that this difference does some significant theoretical work.

Devitt's Rigid*-application

Obviously Devitt's rigid application has to be different than what we have been taking in this work to be the default meaning of rigid application. We had proposed a generalized property of rigidity as constancy of denotation relative to every evaluation index. Accordingly rigidity can apply to expressions of any type regardless their mode of denotation, be they designators (type e), appliers (type <e,t>) or quantifiers (<<e,t>,t>>) or what not. Thus according to the above definition α is a rigid applier if and only if it has the same denotation of type <e,t> relative to every evaluation index. Yet, rigid application understood in this way cannot be a property that marks a significant difference among common nouns and adjectives. Except common nouns such as *number*, *triangle* and adjectives such as *even*, *equilateral* that truly applies solely to abstract objects, no common noun or adjective is a rigid applier in this sense.

Devitt (2005) defines rigid application in the following way (heretofore rigid*-application):

Let α be an applier, $[\alpha]^s$ be α's denotation at s, and $D_e(s)$ be the domain of entities of type e at s, then,
α is a rigid*-applier
iff
If there is s' such $x \in D_e(s')$ and $[\alpha]^{s'}(x)=1$,then for every s if $x \in D_e(s)$ then $[\alpha]^s(x)=1$

Yet, following Mondadori (1978) it can equivalently be formulated in the following way: [142]

Let α be an applier, $[\alpha]^s$ be α's denotation at s, and $D_e(s)$ be the domain of entities of type e at s, then
α is a rigid*-applier
iff
there is a set Ω_α such that $\Omega_\alpha \subseteq D_e$ and for every $x \in D_e(s)$, $[\alpha]^s(x)=1$ iff $x \in \Omega_\alpha \cap D_e(s)$

[142] *α satisfies the second definition → α satisfies the first definition*: Suppose that there is set Ω_α associated with an applier α such that, for every evaluation index s, for every $x \in D_e(s)$, $[\alpha]^s(x)=1$ iff $x \in \Omega_\alpha \cap D_e(s)$. And suppose that there is an evaluation index s' and an entity x of type e such that, $x \in D_e(s')$ and α applies to x at s' (i.e. $[\alpha]^{s'}(x)=1$). Let s'' be such that, s''≠s' and $x \in D_e(s'')$. Then α applies to x at s'' as well (i.e. $[\alpha]^{s''}(x)=1$). *α satisfies the first definition → α satisfies the second definition*:Conversely suppose that α is an applier such that, If there is s' such $x \in D_e(s')$ and $[\alpha]^{s'}(x)=1$,then for every s if $x \in D_e(s)$ then $[\alpha]^s(x)=1$.Then there is a set Ω_α defined in the following way: $\Omega_\alpha = \{x \in D_e$: there is an s such that $x \in D_e(s)$ and $[\alpha]^s(x)=1\}$. Now , let x be an entity, let s'' be an evaluation index such that, $x \in D_e(s'')$ and $[\alpha]^{s''}(x)=1$. Then, $x \in \Omega_\alpha \cap D_e(s'')$. Conversely suppose that, $x \in \Omega_\alpha \cap D_e(s'')$. Then, given the definition of Ω_α there is a s''' such that, $x \in D_e(s''')$ and $[\alpha]^{s'''}(x)=1$. Then, given the supposition about α, $[\alpha]^{s''}(x)=1$. Thus, Ω_α is such that for every evaluation index s, for every $x \in D_e(s)$, $[\alpha]^s(x)=1$ iff $x \in \Omega_\alpha \cap D_e(s)$.

But are there rigid*-appliers? Devitt claims that such natural kind common nouns as *tiger*, *gold* are rigid*-appliers. He also claims that such nominal kind common nouns as *bachelor*, *hunter* and such artifact kind common nouns as *TV set*, *transistor* are not rigid*-appliers.

Devitt's argument that some general terms are rigıd-appliers and some are not:*

What is Devitt's justification of his claim that such common nouns as *gold* and *tiger* are rigid*-appliers? In this vein he says the following in relation with the common noun *gold*:

> Consider 'gold', for example. As we use 'gold' it applies to lots of stuff in the actual world with atomic number 79 and will apply to any of that actual stuff in another possible world should it exist there. Furthermore, should it apply to nonactual stuff in a possible world it will apply to that very stuff in every other world in which the stuff exists. Any piece of gold is essentially gold and 'gold' is a rigid applier.

The purport of this seems to be that we use such terms *gold*, *tiger* in our talk about possible states of affairs in such a way that if we apply them to an actual or possible entity we stick to that application in so far as that same entity is in question, and this is so even if we shift to talk about another possible configuration of states of affairs than the one we started with. This seems indeed to be the case with such natural kind nouns as *gold*, *tiger*. For example sentences such as the following appear to be necessarily false:

Something might have been gold but it might also not have been so.
Something might have been a tiger but it might also not have been so.

If we accept this judgment of necessary falsity as a datum and give a semantic analysis of such sentences treating such common nouns as *tiger*, *gold* as appliers, we will then have to conclude that these common nouns satisfy the given definition of rigid*-application.

In contrast such common nouns as *bachelor*, *hunter*, *wounded tiger*, *projectile* will apparently fail this test. The following sentences appear to be true:

Someone might have been a bachelor but he might also not have been so.
Someone might have been a hunter but she might also not have been so.
Something might have been wounded tiger but it might also not have been so.
Something might have been a projectile but it might also not have been so.

The truth of these sentences entail that the nouns *bachelor*, *hunter*, *wounded tiger*, *projectile* does not satisfy the definition for rigid*-application.

Yet, Devitt more controversially claims that artifact nouns such as *PC*, *automobile*, *TV set* too fail to be rigid*-appliers. Such nouns rather appear to pass the test however:

Something might have been a TV set but it might also not have been so.
Something might have been a PC but it might also not have been so.

The above sentences *prima facie* appear to be necessarily false. It seems that a TV set might not ever fail to be a TV set. Devitt's intuitions on this matter points otherwise, so he is ready to claim that the above sentences are true. To support this claim he rather suggests us to consider a noun such as *paperweight* that corresponds to a less complicated artifact than TV sets, computers. Indeed *paperweight* appears to pass the test:

Something might have been a paperweight but it might also not have been so.

A hand-sized stone indifferently waiting on the shore might indeed have been a paperweight if someone had picked it and used it thus, or might not ever have been a paperweight until it is grinded out of existence by wear and tear.

To extend the morale of the *paperweight* to the case of such artifact nouns as *TV set* Devitt claims that there might have been a natural species, whose instances could be used as TV sets. And according to Devitt any such individual apparently might be a TV set and it might not be a TV set, depending on whether it is domesticated for that use or not. For a less far-fetched scenario Devitt claims that it is also possible that objects that have the full functionality of a TV set are produced by people that use it for another purpose –we can enliven Devitt's scenario here by adding that the people in question might be of a species that altogether lack the faculty of vision and produce these objects that have the TV functionality with the sole purpose of using them as components of larger technological devices of theirs. According to Devitt any of these components might be TV sets or they might not be TV sets, depending whether some one uses them to watch TV.

Are There *De Jure* Rigid*-appliers?

Devitt is a proponent of the so called causal theory of denotation determination with respect to natural kind common nouns. According to this theory, very roughly, the denotations across all possible worlds of such a common noun as *tiger* is fixed by the fact that in the origin of the causal chain that lead to the introduction of the noun *tiger* lies specimens of a certain kind of animal, namely

Panthera Tigris. Given this, the noun *tiger* comes to truly apply to anything that is of the same kind as the original specimen and only to them. This is the case even if some of the individuals which it can truly apply might not look like the stereotypical tiger at all –this consequence of the causal theory is often lauded as its superiority over very simplistically conceived descriptive theories of denotation fixing which allegedly take the instantiation of certain stereotypical properties as the necessary and sufficient condition for the true application of the noun *tiger*.

In the previous paragraph I produced a crude aside into theories of denotation fixing because I want to quote a passage from Devitt (2004) which refers to the causal theory of denotation fixing. The passage in question runs as follows, the emphasis is mine:

> A kind term covered by the causal theory applies to all objects that are of the same kind as the actual sample in which the term was grounded (allowing perhaps for a few "errors" in the sample). So, wherever being a member of that kind is essential to any member, the term will be a rigid applier. *So the rigid application of a natural kind term like 'gold' is explained partly by the semantic fact that it is covered by a causal theory and partly by the metaphysical fact that each piece of gold is essentially gold.* Perhaps all kind terms covered by a causal theory are rigid but, we are a long way from establishing this.

According to this passage the rigidity* of a natural kind common noun is not stipulatively fixed in the introduction of the noun, but it depends on whether the causally relevant target kind happens to be of a sort that is essentially instantiated by all of its instances, actual or possible. If that is not the case, the introduced noun will not be a rigid*-applier. So, according to Devitt whether a noun is a rigid*-applier is not a parameter that is fixed by language as a semantic design feature that applies to all nouns of a certain type or a parameter that is stipulatively fixed by those who introduce a certain noun. Rather it is a parameter that is fixed, possibly unbeknownst to us, by the metaphysical profiles of the individuals to which the noun is to truly apply.

This has the consequence that if we change our opinions about the metaphysical profile of individuals of a certain type, we might be obliged to revise our views as to whether certain nouns that applied to those inviduals are rigid*-appliers or not. For example, Devitt apparently holds a view of tigers that is similar to the view that has been defended by Aristotle and his followers: according to this view tiger tokens are substances *qua* tigers, and the moment they fail to be tigers they will not exist. But he does not hold the same view about TV set tokens: TV set tokens are not substances *qua* TV sets but are substances *qua* something else (say *qua* plant tokens or animal tokens as Devitt thinks that it is possible for some plants or animals to be TV sets); thus they can subsist without being TV sets. Now, if Devitt changes his Aristotelian view of living things, and say adopts a view about them according to which a tiger, or any animal for that matter, is not a substance *qua* a tiger, or *qua* an animal but rather animals are substances *qua* souls, then Devitt will be obliged to revise his ascription of rigidity* to the noun *tiger*. I am not sure whether such a view is ever held, but at least it seems that some schools of Hinduism and Buddhism hold views that entail that some thing which actually is a tiger might not have been a tiger.

Now, if all rigid*common nouns are like *tiger*, that is if their rigidity* is not a linguistic design feature or is not stipulatively fixed but depends on the metaphysical profiles of the entities to which they truly apply, then the significance of rigid*-application from the point of views of semantic theorizing and philosophy of language will be greatly reduced.

A rigidly denoting expression might be thought to be rigid in two ways. In the case of some expressions the rigidity is arguably a semantic-design feature of the language they belong to. In the case of some other rigid expressions rigidity is not linguistically fixed design feature, but these expressions acquire this feature in virtue of the metaphysical profile of the entity (or entities) they denote.

This difference is most easily seen in the case of designators. The rigidity of proper names and indexical pronouns is believed to be a semantic-design feature of natural languages. If this is true then their rigidity does not depend on the metaphysical profiles of the entities they denote, and will thus not be open to revision in relation with our changing opinions about the metaphysical profiles of the entities they are used to designate. This appears indeed to be the case: the name *Saul Kripke* will be a rigid designator however we opine about the metaphysical profile of the entity it designates: regardless whether that entity is a soul or a body or a process or a bundle of tropes the name will track that same entity in every talk about possible states of affairs. The same is the case for indexical pronouns used in a specific context. If the rigidity of names and pronouns is a design-feature of natural languages, then names and pronouns will be very handy in metaphysical theorizing to describe the metaphysical profiles of particulars.

Clearly it is not the case that every rigid designator is so in virtue of natural languages' design features. For instance, *the species Simba belongs to* is arguably a rigid designator. But this crucially depends on the metaphysical profile of the designated entity. If we hold that tigers could not have been tigers, then we have to deny that *the species Simba belongs to* is a rigid designator; and such a denial arguably does not contradict any design feature of English.

The idea that the rigidity of proper names and pronouns is a semantic design feature of natural languages is commonly expressed by saying that they are *de jure* rigid designators. In contrast the designators the rigidity of which is not a linguistic feature but a consequence of the metaphysical profiles of the entities they designate are qualified as *de facto* rigid designators.

Returning now to Devitt, in light of what we have discussed above and in light of what Devitt himself thinks about rigid*-appliers, it appears that Devitt's favorite rigid*-applier example, the species noun *tiger*, is a *de facto* rigid*-applier. If it were *de jure* rigid* then it would not *linguistic-semantically* be possible for a believer in the Hindu doctrine to say something like *I might have been a tiger but I am not*. For if *tiger* were *de jure* rigid* he would then have run against a linguistically fixed feature of *tiger*. The same may be argued to be the case for *gold*, another example by Devitt. Although the claim, *something that is gold might not have been gold*, is very unlikely to be endorsed by anyone, this arguably is not due to a linguistic feature of the noun *gold*, but rather due to the metaphysical profiles universally ascribed to entities which we apply the noun *gold*. So, Devitt's rigid*-appliers are at best *de facto* rigid appliers.

But what is wrong with *de facto* rigid*-appliers? The property of rigidity that is of primary interest in semantic theory and in philosophy of language is clearly the *de jure* variety. Semantic design features of languages are established by considering semantic phenomena patterns of a great generality and of a nature that cannot be dodged by any competent speaker. Semantic design features are postulated to explain such phenomena. Arguably this is the case with the rigidity of proper names. For example, we appear to have an apparently irreversible intuition that identity sentences that have as arguments names or pronouns are non-contingent, no matter what these sentences are about. This intuition can be explained by assuming that names are rigid designators as a design feature of natural languages –i.e. that names are *de jure* rigid designators. For another example, the non-ambiguity of such sentences as *Alice might have married Bob* versus the ambiguity of such sentences as *Alice might have married Claire's eldest son* can be explained under the same assumption regarding names.

De facto semantic properties of expressions however are by definition not suitable to play the same role as *de jure* semantic properties in semantic theory. *The species that Simba belongs to is Panthera tigris* may well be necessarily true, and *The species that Simba belongs to might not have been the species that Simba belongs to* may well not have a true reading. And if these are indeed the case *The species that Simba belongs to* has to be a rigid designator. But these semantic judgments are of a nature that can be contradicted by negating the former sentence and affirming the second sentence, without thereby committing any linguistic-semantic transgression.

Kripke did not use the qualifications *de jure* and *de facto* in relation with rigidity in the main text of the lectures entitled *Naming and Necessity*. But he clarified in the later written preface that his thesis in those lectures was that names were *de jure* rigid designators. This is in line with his remark that, if α and β are proper names we *a priori* know that "if α is β then necessarily α is β" is true. If the rigidity of proper names is a feature of languages then competence in these languages will be enough to know this truth. He also makes a similar remark in relation with the natural kind nouns to which he ascribed rigidity. He claimed that we a priori know that *if cats are animals then necessarily cats are animals* is true because *cat* and *animal* are rigid. He apparently thought that if *cat* and *animal* are *de jure* rigid expressions then *Cats are animals* would entail *Necessarily cats are animals*, and we would know this entailment *a priori*. He apparently held the same opinion about many other similar sentences which he labeled as theoretical identifications. To this day no semantic analysis of such sentences as *Cats are animals* and no formulation of rigidity have been given that can support Kripke's claim, and thus Kripke was probably wrong about this hunch. Yet, this very hunch suggests that Kripke thought that the rigidity of natural kind nouns, like the rigidity of proper names, was a feature fixed by natural languages. And he has been generally interpreted to have thought so.

Then the controversy about the rigidity of general terms appears to be incited by the understanding that Kripke meant to ascribe *de jure* rigidity to natural kind nouns and related adjectives. That is that he meant to claim that such nouns and adjectives were different in that their rigidity was a feature of natural languages. The motivation behind the controversy about general terms was certainly not to find a property of rigidity applicable to general terms that is analogous to the rigidity of *de facto* rigid designators such as *the species Simba belongs to*.

Devitt's rigid*-application will therefore be irrelevant, or at best not as much of interest as a *de jure* property of rigidity, in relation with the controversy on the rigidity of general terms unless there are examples of *de jure* rigid*-appliers. If we believe Devitt's own story of how rigid*-application comes about, which was expressed in the quoted passage, then we should not expect that there will be *de jure* rigid*- appliers. According to that story the rigidity* of a noun is neither fixed by language nor is it fixed stipulatively. But that story depended on the causal theory of denotation fixing, and for that matter on a certain specific conception of that theory. Neither we need buy that theory nor Devitt's own conception of it. Still even if we disregard this story, the fact that such affirmations as *I might have been a fish but I am not* do not seem to be semantically problematic and that as such they are being produced by people who subscribe to certain metaphysical doctrines indicate that at least nouns for animal kinds are not *de jure* rigid*-appliers. In relation with such stuff nouns as *gold* I will rather withhold judgment. I will just indicate that *gold* too will not be a *de jure* rigid*-applier unless such claims as *some gold might not have been gold* are unacceptable on purely linguistic-semantic grounds.

One may think that in principle it is impossible to have *de jure* rigid*-appliers, because one cannot stipulatively introduce a rigid*-applier. This view is put forward and defended by Inan (2008). I however think that it is in principle possible to introduce a rigid*-applier stipulatively. To see this let's reconsider the alternative definition of rigid*-application we had provided above:

Let α be an applier, $[\alpha]^s$ be α's denotation at s, and $D_e(s)$ be the domain of entities of type e at s, then
α is a rigid*-applier
iff
there is a set Ω_α such that for every s, for every $x \in D_e$, $[\alpha]^s(x)=1$ iff $x \in \Omega_\alpha \cap D_e(s)$

One can stipulatively introduce a rigid* noun α, by assigning it a set Ω_α determined by way of listing its members. Let's then introduce the noun *widget* as a noun that applies to an individual x relative to evaluation index s if and only if $x \in \Omega_{widget} \cap D_e(s)$ and let's put Ω_{widget}={the moon, Neil Armstrong, the actual Apollo 11 Capsule}. Then anything that might possibly be a widget will necessarily be widget. But this won't be in any way due to metaphysical profiles of widgets, but due to the linguistic stipulation through which the semantics of *widget* is defined.[143]

Another way to introduce a rigid*-applier α by stipulation, apart from determining the set Ω_α by way of plainly listing its members, may be thought to be determining that set by way of description. Yet we should be careful here because a given descriptive condition might apply to an entity relative to one evaluation index but might not apply relative to another. And such a descriptive condition will not be suitable to determine a subset Ω_α of D_e, the set of all individuals actual or possible. For example only the first four of the following six set-descriptions will non-problematically manage to determine a subset of D_e:

14 a {$x \in D_e$: x is actually a hunter who is also a bachelor}
b {$x \in D_e$: x is possibly a hunter who is also a bachelor}
c {$x \in D_e$: x is necessarily a hunter who is also a bachelor}
d {$x \in D_e$: x has the same essence as these}

[143] I figured out the possibility of this way of introducing a *de jure* rigid*-applier by way of listing the entities to which it will rigidly* apply by reading Cordry (2004).

e $\{x \in D_e$: x is of the same species as these$\}$
f $\{x \in D_e$: x is a hunter who is also a bachelor$\}$

14e will determine a subset of D_e only if we presuppose that necessarily anything of a certain species is necessarily so. 14f will not determine a subset of D_e because any possible or actual entity who is a hunter who is also a bachelor relative to an evaluation index may not be so relative to another to another evaluation index.

It appears that, to *descriptively* determine a set Ω_α with the aim of introducing a rigid*-applier by stipulation one inevitably has to use a description with modal force. The need for a description with modal force does not entail that the description should specify a metaphysical profile as a condition for membership. For example the first description (14a) does not require the satisfaction of any metaphysical profile as a condition for membership. However, the noun which will be introduced on the basis of (14a) is bound to truly apply only to actual individuals. To stipulatively introduce a rigid*-applier α that can truly apply to non-actual entities as well one has to determine a subset Ω_α of D_e that contains non-actual entities as well; and such sets can be determined only by specifying a metaphysical profile as the membership condition –e.g. 14b-d.

Nouns α that are introduced in the latter way, by specifying a general metaphysical profile that determines a subset Ω_α of D_e and by stipulating that for any s, for any x, α will truly apply to x relative to s iff $x \in \Omega_\alpha \cap D_e(s)$ should count as *de jure* rigid*-appliers. For, although their rigidity* depends on the metaphysical profiles of the entitites they will truly apply to, this dependence is explicitly brought in by the stipulation that introduced the noun. The rigidity* parameter is determined by the stipulation and it is not left for post-introduction determination. A certain metaphysical profile, for example the one expressed by *x is necessarily a hunter who is also a bachelor* can yield an empty set Ω_α. Still the noun α to be introduced thereby is stipulatively bound to be a rigid*-applier, albeit one that is not true and that cannot be true of anything.

So, it is possible to stipulatively introduce rigid*-appliers. But rigid*-appliers that can truly apply to non-actual entitities relative to non-actual evaluation indexes can only be introduced by specifying a metaphysical profile as the membership condition determining the global set from which comes the entities to which the applier truly applies.

Now the crucial question is whether any natural language common noun is introduced in one of described manners. If this is the case then there will be some *de jure* rigid* appliers. The introduction by way of listing can easily be ruled out. Natural language common nouns are semantically open in the sense that they can truly apply to merely possible entities as well.[144] The stipulative introduction by way of a specifying a metaphysical profile cannot however be as easily ruled out. In fact, it is often thought that natural kind nouns are introduced by denotation fixing descriptions like *things that have the same inner structure as these*, *things of the same species as these* or *things that have the same essence as these*.

[144] A point made by Ilhan Inan in conversation.

The descriptions of the latter type, those that explicitly refer to essences, are by themselves sufficient to specify a metaphysical profile; descriptions of the former two types will specify metaphysical profiles if it is also explicitly presupposed that entities instantiate inner structures and species necessarily. Such metaphysical profiles will determine subsets Ω_{α} of D_e which can then be used to stipulatively introduce rigid appliers α.

So, I think that if this rather popular account of natural kind noun introduction through denotation fixing descriptions, then it follows that the nouns introduced thereby will be *de jure* rigid*-appliers –provided that it also explicitly assumed that species or inner structures are instantiated non-contingently. For, their rigidity* will directly follow from the stipulation that introduces them by way of fixing their denotations across possible worlds.

This account lends support to Devitt's position against the possible criticism that rigid*-appliers, if there are any, are *de facto* rigid*-appliers and thus not significant from the point of views of semantic theory and philosophy of language. For, if natural kind common nouns are introduced as this account claims them to be, these nouns will be rigid*-appliers by stipulation –i.e. *de jure* rigid appliers.

But I am not sure whether Devitt will be ready to accept this account. Devitt is not an adamant supporter of a pure causal theory of denotation fixing for natural kind common nouns. Elsewhere he admits that fixing the denotation of a natural kind noun requires both causal contact with some original specimen and a description that determines which kind instantiated by those specimen is the target for the noun to be introduced.[145] But the quoted passage suggests that for some reason he does not want to presuppose that the descriptions that will accompany the causal contact should explicitly require that the target kind be instantiated necessarily by the tokens to which the noun will apply. Devitt rather envisions a post-introduction determination of the rigidity* parameter: in that passage we have seen him to put "…wherever being a member of that kind is essential to any member, the term will be a rigid applier".

Here, I am not in a position to criticize the sketched account for the introduction of natural kind nouns, nor can I propose an alternative account as to how the denotations of natural kind nouns are fixed across all possible evaluation indexes. However I think that most natural kind nouns are not *de jure* rigid* appliers, for reasons already stated: it is possible to affirm in English in these very terms that *I might have been a fish but I am not* or that *some gold might not have been gold*; such affirmations can be very tenuous from a metaphysical point of view but still it seems that they cannot be ruled out purely on linguistic-semantic grounds. Yet, if natural kind nouns were *de jure* rigid* appliers, they could be ruled out purely on linguistic-semantic grounds. If these considerations are accepted, it follows that it cannot be the case that such nouns as *tiger* have been introduced by stipulating that it will truly apply to anything that belongs to the same species as these by explicitly presupposing that species are instantiated necessarily. For, then *tiger* would be a *de jure* rigid* applier.

[145] Devitt (1981).

<u>The Theoretical Work Done by Rigid*-application</u>

The two pronged argument raised against Kripke's ascription of rigidity to some general terms challenges the linguistic-semantic significance of doing so. If general terms are designators of kinds/properties then all should be rigid designators. If general terms are appliers then virtually none (apart from those that apply to abstract entities) will be rigid appliers. Either way the property of rigidity will be not expected to do in any sort of linguistic-semantic explanation that is comparable to the one done by rigid designation in relation with singular terms –e.g. ambiguity divergence between modal sentences with proper name arguments and those with definite description arguments, non-contigency divergence between identity sentences with proper name arguments and those with definite description arguments.

As indicated however Devitt's rigid*-application is different than mere rigid-application, and even if all general terms are interpreted as appliers, only some are rigid*-appliers. Thus, *prima facie* there is a chance that the property of rigid*-application can do some work comparable to rigid designation's work in relation with singular terms.

To see what we mean by linguistic-semantic explanatory work here we can reconsider previously illustrated cases of linguistic-semantic explanations that had recourse to the property of rigid designation. Proper names' being *de jure* rigid designators can be used to explain non-contigency of identity sentences with proper name arguments; it can also be used to explain divergent ambiguity phenomena between pairs of modal sentences that are differ only in one of them having a proper name argument where the other has a definite noun phrase argument. The *de jure* rigidity of such kind designating definite phrases as *the honeybee*, *the groundhog* can be used to explain similar phenomena. These pass as linguistic-semantic explanations in so far as the phenomena are explained by recourse to semantic design features of languages. Proper names' being rigid designators is commonly thought to be such a feature. The same is arguably the case for such kind designating definite phases as *the honeybee*, *the groundhog*: they are named as definite generics and their semantics is commonly acknowledged to be different than that of the ordinary definite noun phrases. Conversely such linguistic-semantic explanatory work constitute a justification for the assumptions that enable them –viz. proper names are rigid designators as a design feature of natural languages or that definite generics are rigid designators as a design feature of English. If no such explanatory work were done, if for example ascription of *de jure* rigid designation to names did not explain and correctly predict anything about the way we evaluate sentences then there would be no reason to make such an ascription.

So, *prima facie* rigid*-application can be expected to do this type of linguistic-semantic explanatory work, provided that we come upon general patterns of semantic phenomena that is best explained by assigning rigidity* to certain common nouns as a design feature of the language.

One apparently semantic phenomenon we can *prima facie* expect rigid*-application, assigned as a linguistic design feature to natural kind nouns, to explain is the non-contingency of theoretical identification sentences such as *A* *lightning is an electrical discharge*, *Tigers are cats* etc. We've above mentioned that Kripke has been plausibly taken to suggest that this non-contingency is due to the rigidity of the common nouns involved and that it is also a priori known. These sentences are clearly not identity sentences and they are usually analyzed as universal quantifications. Perhaps rigidity understood as rigid*-application and assigned as a linguistic design feature to the nouns forming such identifications can yield a linguistic-semantic explanation of their non-contingency as was apparently expected by Kripke. This expectation however does not materialize. The truth of the formula $(\forall x)([\alpha]^s(x) \supset [\beta]^s(x))$ relative to s does not entail that it be also true relative to any other evaluation index s', even if α and β are assumed to be rigid*-appliers: for some s' and x such that $x \notin D_e(s)$ and $x \in D_e(s')$ it is possible that $[\alpha]^{s'}(x)=1$ and $[\beta]^{s'}(x) \neq 1$. That is, assuming that actually every tiger token is a mammal token and that *tiger* and *mammal* are rigid*-appliers, does not preclude the possibility that there might have been a tiger token different from all actual tokens, and also not a mammal.[146]

The previously used test for rigid* application can also be regarded to constitute a candidate for a linguistic-semantic explanation. We noted that the following sentence schema yields true sentences for some common nouns and necessarily false sentences for some other common nouns; and that to yield a necessarily false sentence of this form a common noun has to be a rigid*-applier:

[146] As noted by Soames (2002), (pp. 257-258).

15 Something might be (a) α and might not be (a) α.

Now it may be thought, the fact that when the place marked by α is filled in with natural kind nouns such as *tiger* and *gold* usually the resulting sentence will be necessarily false can be explained by assuming that such nouns are rigid*-appliers as a design feature of English. However, as noted previously the necessary falsity of these sentences can be contested on metaphysical grounds, and there are actual metaphysical doctrines that will contest it. If the necessary falsity had followed from a semantic design feature of English, these contestations would not be possible, they could simply be ruled out on linguistic-semantic grounds. So, rigid*-application cannot be cited as linguistic design feature of natural kind nouns due to which these sentences are false.

Curiously Devitt thinks that the primary theoretical role to be expected of rigid*-application will not be to provide linguistic-semantic explanations of general semantic patterns as illustrated above. He even does not think that its primary theoretical role will be to give semantic explanations under some additional non-semantic, metaphysical presuppositions. He thinks that this latter type of work will be at best a secondary role. Rather Devitt thinks that in general the primary theoretical role of the property of rigidity (be it rigid designation or rigid*-application) is to refute certain strong variants of descriptivist theories for denotation fixing. According to these strong variants denoting expressions are synonymous with certain descriptions and thus have the same intensions as these descriptions. For example, according to such theories *Bertrand Russell* may be synonymous with some description like *the youngest son of Katherine and John Russell*. And *Bertrand Russell*'s being a rigid designator refutes that theory, because *the youngest son of Katherine and John Russell* is not a rigid designator. Again according to such theories *tiger* is synonymous with something like *feline that can roar and has a tawny yellow fur with black stripes and white belly*; *tiger*'s being a rigid*-applier refutes this the theory because *feline that can roar and has a tawny yellow fur with black stripes and white belly* is not a rigid*-applier.

Devitt's taking such refutations to constitute the primary theoretical roles for rigid designation and rigid*-application is problematic in two respects. The relatively less significant problem, one that Devitt himself acknowledges, is that names' being rigid designators and natural kind nouns' being rigid*-appliers does not refute the general theory that names and natural kind nouns are synonymous with descriptions. For example, the claim that *Bertrand Russell* is synonymous with *the actual youngest son of Katherine and John Russell*, cannot be refuted by the fact that *Bertrand Russell* is a rigid designator, because *the actual youngest son of Katherine and John Russell* too is a rigid designator. In the same way, the claim that *tiger* is synonymous with *token that is necessarily of the same kind as the actual felines that can roar and have a tawny yellow fur with black stripes and white belly*, cannot be refuted by the fact that *tiger* is a rigid*-applier, because *token that is necessarily of the same kind as the actual felines that can roar and have a tawny yellow* too is a rigid*-applier.

The most significant problem about Devitt's taking such refutations to constitute the primary theoretical role for rigid designation and rigid*-application is that a theory's refuting another theory can hardly be considered as a theoretical role for a theory, let alone its primary role. A theory is never given with the primary aim of refuting another theory. Theories are given to explain phenomena. These explanations constitute the primary role of a theory, and its justification. Refuting alternative theories is a just a consequence of the fulfillment of the explanatory role better than the alternatives, and can hardly be qualified as a theoretical role.

Specifically, the primary theoretical role of the theory that proper names are *de jure* rigid designators cannot be that it refutes some other theories about names. Rather the primary role is the semantic explanatory work done by this theory. And this explanatory work constitutes an abductive justification for this theory. Pending such work what would be the justification for that theory? It will at best be idle, or worse it will make predictions that contradict the observed semantic phenomena. Its contradicting another theory can hardly be a justification for it, if it too cannot explain the observed phenomena –e.g. the non-contingency of identity sentences with proper name arguments, and the divergent ambiguity patterns of modal sentences that involve proper names and definite descriptions. And pending a justification deriving from successful explanations that cannot be delivered by alternative theories how can the rigidity theory refute these alternative theories?

Devitt puts the cart before the horses here. The theory that names are rigid designators refutes description theories because it explains the phenomena that contradict the consequences of these theories. The refutation is a consequence of successful explanations that it delivers. It is the horse of successful semantic explanations of phenomena that pulls the cart of the refutations, rather than the other way round.

The same considerations clearly apply to the case of rigid*-application. Rigid*-application cannot refute any theory that it contradicts unless it does some explanatory semantic work. Above we have illustrated what such explanatory semantic work would be like: to explain the necessary falsity of such sentences as, *Something might have been a tiger and it might also not have been a tiger*. There we claimed that unlike the case of proper names' being rigid designators, the rigidity* of natural kind common nouns cannot be regarded as giving a *linguistic*-semantic explanation of this phenomenon. For, arguably this phenomenon partly follows from contestable metaphysical presuppositions extrinsic to suppositions about the semantic design properties of natural languages. Still, when these metaphysical presuppositions are granted this phenomenon will follow and rigid*-application, albeit not its *de jure* variant, can be alluded to explain it. And it is this explanation or similar ones that should count as the rigid*-application's primary theoretical role.

Devitt is aware of the prospect of such semantic explanations, but it assigns them secondary importance. Devitt (2005) illustrates some types of semantic phenomena which he believes can be explained by the rigidity* of the natural kind common nouns involved. Let's now assesss them.

16 Tigers make dangerous pets.
Large carnivorous quadrupedal felines that are tawny yellow in color with blackish transverse stripes and white belly make dangerous pets.

According to Devitt the above sentences differ in that although both are about tigers when evaluated relative to the actual world, relative to other evaluation indexes only the first one will continue to be about tigers yet the second one might as well be about entities which are not tigers. Devitt claims that this difference can be explained by the fact that *tiger* is a rigid*-applier. Note that if *tiger* were not rigid* the same difference between the sentences in 16 would obtain. Thus rigidity* does not play any role in the explanation of the difference. To see this clearly consider the following pair:

Wounded tigers are dangerous.
Large carnivorous quadrupedal wounded felines that are tawny yellow in color with blackish transverse stripes and white belly are dangerous.

Wounded tigers can hardly be claimed to be a rigid*-applier. Still the first sentence will be about wounded tigers relative to all possible worlds, although the second sentence may not be so.

The second example of semantic phenomenon which Devitt thinks can be explained by alluding to the property rigidity* is the following:

17 a Large carnivorous quadrupedal felines . . . might not have been large carnivorous quadrupedal felines.
b Tigers might not have been tigers.

The first sentence is true and the second sentence is false. Devitt thinks that this difference is explained by the rigidity* of *tiger* and non-rigidity* of *large carnivorous quadrupedal feline that are tawny yellow in color with blackish transverse stripes and white belly*. This is indeed true, provided that 17b is false. Yet, is 17b indeed false? As discussed above it is possible to contest its falsity. Thus, its falsity is not a semantic phenomenon that can be given a linguistic-semantic explanation. For if it were, it would on linguistic-semantic grounds be impossible to contest its falsity and *tiger* would be *de jure* rigid*.

Devitt's third example is the following:

18 a It might have been the case that large carnivorous felines. . .with blackish transverse stripes and white belly were not striped.

b It might have been the case that tigers were not striped.

Devitt thinks that the first sentence is ambiguous due to scope interaction between the noun phrase *large carnivorous felines. . .with blackish transverse stripes and white belly* with the modal operator *it might have been the case that*. If the noun phrase takes wide scope the sentence will be true, on the other hand if the modal operator takes the wide scope the sentence will be false. According to Devitt the second sentence is not however ambiguous, despite the fact that the same scope options should be available for *tigers* as well. Devitt claims that this is so because the reading that results when *tigers* takes the wide scope is equivalent to the reading that results when *tigers* take the narrow scope. This indifference in the semantic output of *tigers* under difference scope options relative to a modal operator is according to Devitt explained by the rigidity* of *tiger*.

Now, contrary to what Devitt claims 18b can be ambiguous, and it will remain so even if we suppose that *tiger* is a rigid* applier. Clearly, 18b can be read as claiming that *it is possible that tiger tokens are not striped* but also as claiming that *actual tiger tokens are such that it is possible that they be not striped*. To make the possible ambiguity even more clear let's interpret the modal operator in 18b as expressing a more restricted sense of possibility, say biological possibility. Let's now evaluate 18b relative to an evaluation index where every tiger token is striped–although there too it is possible that there be some tiger tokens that did not have stripes due to some genetic mutations. Now, relative to such an evaluation index 18b will be false if *tigers* is interpreted in the wide scope. For no tiger token of that evaluation index might have failed to be striped, as they cannot biologically fail to have the genes with which they were born and the genes with which they are born biologically requires that they be striped. However, relative to the same index the reading of 18b with *tigers* interpreted in the narrow scope will be true. Because relative to that evaluation index it is possible that there be non-striped tigers, yet that possibility did not materialize. Clearly whether *tiger* is a rigid*-applier or not makes no difference here. Tiger tokens' being metaphysically necessarily tigers is compatible with the facts that biologically a striped tiger could not fail to be striped tiger and that it is nonetheless biologically possible that there be non-striped tiger tokens, and this is all that is needed for 18b to be ambiguous.

It may be thought that the interpretation of possibility as biological possibility may be relevant in this result, but this is not the case. I alluded to biological possibility only to give a more plausible example. If modal sentences like 18b cannot be ambiguous when possibility is interpreted metaphysically because *tiger* is a rigid*-applier and otherwise they would be ambiguous then the same would be the case also when possibility is interpreted in a more restricted way -the set of biologically possible worlds relative to a possible world w should be a subset of the metaphysically possible worlds relative to w.

Concluding Remarks about Devitt (2005)

Devitt proposed rigid*-application as a semantic property that will contradict the two-pronged argument against seeking an analogue of rigid designation in relation with general terms. If general terms are designators of kinds or properties, then all should be rigidly so. If general terms are appliers then virtually none will be rigid-appliers –in the sense of having the same predicative denotation relative to every evaluation index. That argument concluded that, *pace* Kripke's discussion in the third lecture of *Naming and Necessity*, there is not a theoretically significant property of rigidity for general terms which is analogous to the rigid designation property for singular terms.

Apparently Devitt circumvents this argument because there are many common nouns such as *bachelor, hunter, paperweight* that are not rigid*-appliers, but also many that are, apparently most natural kind nouns such as *tiger*, *gold*, *star* etc.

The assesssment of the success of Devitt's proposal in relation with that argument depends on how we interpret it. If we interpret the theoretical significance expected from the general term's counterpart of singular term rigidity, merely to give an even division of general terms and explain semantic phenomena that hold only if certain metaphysical presuppositions are granted then rigid*-application is fine. For, if for example we accept on metaphysical grounds that some sentences of the form *an α might not have been an α* are necessarily false for some but not all common nouns α, then such common nouns ought inevitably be rigid*-appliers. However so long as the necessary falsity of such sentences require metaphysical presuppositions from our part, we cannot apply the very important qualification *de jure* to the common nouns that should be rigid*-appliers if such sentences are necessarily false.

If on the other hand the theoretical significance expected from a candidate that will be the general term's counterpart of singular term rigidity implies capability to yield linguistic-semantic explanations of general patterns of semantic phenomena which apparently does not depend on metaphysical presuppositions of ours, then rigid*-application fails. The rigid*-appliers of English do not seem to be so due to a semantic design feature of English; that is, they do not seem to be *de jure* rigid*- appliers. For, there does not seem to by any general semantic phenomena pattern that is not conditional on metaphysical presuppositions in the explanation of which rigid*-application has to play a role. Nor, for that matter Devitt claims about any of his examples of rigid*-appliers that they are *de jure*; we have seen that he explicitly regards rigidity* as a parameter that is fixed *after* the introduction of a common noun. However if there are no *de jure* rigid*-appliers, then this indicates that rigid*-application cannot play a role in linguistic-semantic explanations.

I think the theoretical significance expected from the general terms' counterpart of singular term rigidity should be interpreted in the latter way. For, only that level of significance can be a match for the significance the property of rigid designation in relation with the semantics of singular terms. Among the singular terms, proper names and pronouns are believed to be *de jure* rigid designators; that is, they are believed to bear the property of rigidity due to a semantic design feature of natural languages. This view is supported by general patterns of semantic phenomena –non-contingency of identity sentences, divergent ambiguity patterns- that do not seem to be conditional on metaphysical presuppositions. The assumption that proper names and pronouns are set to be rigid designators as a linguistic design feature enables to give *linguistic*-semantic explanations of these general semantic phenomena patterns.

It therefore seems that Devitt's rigid*-application cannot achieve the level of theoretical significance that rigid designation has in relation with singular terms -unless, of course we are willing to regard such phenomena as the necessary falsity of most sentences of the form α *might not have been an* α, where the place marked by α involves a natural kind noun, to be on a par with regard to independence from metaphysical presuppositions with the non-contingency of identity sentences with proper name arguments. And it seems that it is precisely this level of theoretical significance that should be required from any candidate for general term rigidity that will be of interest for semantic theory and philosophy of language.

Rigidity Does Not Have a Theoretical Significance in Relation with General Terms: Schwartz (2002)

Schwartz (2002) contends that Kripke's extension of the property of rigidity to the case of general terms is a mistake as it does not correspond to any difference among general terms. He considers LaPorte (2000) as an attempt to defend this extension, criticizes it.

Schwartz' formulation of LaPorte's Position

Schwartz (2002) reads LaPorte (2000) as an attempt to defend the extension of the property of rigid designation to the case of general terms by way of rejecting the first horn of the standard two-pronged argument previously described: namely that, if natural kind common nouns are attributed rigid designation (in the sense of having the same denotation of type e relative to every evaluation index) then the same attribution will follow for all general terms. Schwartz formulates LaPorte (2000)'s position as follows: LaPorte holds that general terms that are natural kind common nouns (*honeybee*, *water*, *bumblebee* etc.) are rightly taken to be rigid designators for kinds because their rigidity explains the non-contingency of such identities as *The honeybee is the Apis mellifera*; LaPorte moreover admits that this has the consequence that general terms that are nominal kind common nouns such as *bachelor, hunter, soda pop* as well will have to be regarded as rigid designators for kinds; but LaPorte rejects that it thereby follows that all general terms are rigid designators; for according to LaPorte besides common nouns there are such general terms as *the insect species that is typically farmed for honey*, *the beverage my uncle requests at superbowl parties* which designate different kinds relative to different evaluation indexes.

Schwartz formulates LaPorte (2000)'s position using the label *general term* both in relation with common nouns such as *honeybee* and in relation with kind designating definite phrases such as *the honeybee* and *the insect species typically farmed for honey*. However as we have previously indicated LaPorte (2000) did not even once use the label *general term*, instead he refered both to common nouns and kind designating definite phrases as *kind designators* and formulated his own position as holding that not all kind designators are rigid.

Apparently Schwartz does not have any scruples against labeling such definite phrases as *the honeybee* and *the insect species typically farmed for honey* as general terms, and even against the consideration of the case of such definite phrases as being relevant with regard to the problematic aspects of Kripke's extension of the property of rigid designation to the case of common nouns and adjectives (which above was discussed as my own principal criticism against LaPorte (2000)). For, the criticisms Schwartz raises against LaPorte (2000)'s position as he formulates it concern neither of these points. Instead, one criticism of Schwartz alleges that LaPorte's claims that the definite phrase *the honeybee* is a rigid designator and that the definite phrase *the insect species typically farmed for honey* is not a rigid designator are based on a dubious metaphysical presupposition. Another criticism alleges that *pace* LaPorte the explanation of the non-contingency of such identity sentences as *the honeybee is Apis Mellifera* does not require us to presuppose that *the honeybee* and *Apis Mellifera* are rigid designators. And a further criticism alleges that LaPorte confuses rigidity with the banal fact that when we speak about possible states of affairs our expressions keep bearing their usual meanings.

Schwartz' Criticisms of the Metaphysical Underpinnings of LaPorte's Claims

Now, let's consider these criticisms of Schwartz against LaPorte in a more detailed manner, beginning with his claim that LaPorte is able defend that *the honeybee* is and the definite phrase *the insect species typically farmed for honey* is not a rigid designator only on the basis of dubious metaphysical presuppositions. According to this criticism LaPorte's claim that *the insect species typically farmed for honey* designates different kinds relative to different evaluation indexes is made possible only by LaPorte's rejection of the existence of such a kind as the-insect-species-that-is typically-farmed-for-honey because it is an abstruse kind.

We have previously related that the possibility of such kinds and the consequences of the existence of such kinds for the non-rigidity claims about such definite phrases as *the insect species typically farmed for honey* were first considered by LaPorte himself. Neither is it true that if one admits that such a kind exists he will be bound to take *the insect species typically farmed for honey* to designate that kind relative to all evaluation indexes. Nor is it true that LaPorte has completely dismissed the existence of such kinds in order to sustain his claim. These points have already been clearly established above in the section destined to LaPorte (2000). Let's briefly review them. Indeed it is true that one part of LaPorte's answer to a possible criticism that may arise by accepting the existence of such a kind as the-insect-species-that-is typically-farmed-for-honey is that if such metaphysical oddities are to be taken into consideration then a similar criticism might also be raised against the claim that definite phrases such as *the president of US* are not rigid designators – remember Sidelle's PREZ. But this is just the first part of LaPorte's response and if one considers the second part of LaPorte's response it is seen that the first part is not meant to dismiss the existence of such abstruse entities as the-insect-species-that-is typically-farmed-for-honey and PREZ. The second part of LaPorte response correctly points out that notwithstanding the possible of existence of such oddities it is obvious that just as we use *the president of US* to designate whoever concrete person is at presidential office relative to an evaluation index and we use *the insect species typically farmed for honey* to designate whichever insect species is typically farmed for honey relative to an evaluation index. As insect species that are typically farmed for honey change relative to different evaluation indexes, then under such a use *the insect species typically farmed for honey* will be non-rigid. That we use such definite phrases in this way can be demonstrated by pointing to such possibly true sentences as the following:

19 The insect species that is typically farmed for honey is the honeybee.

LaPorte is ready to grant that perhaps such phrases as *The insect species that is typically farmed for honey* are ambiguous between a non-rigid, ordinary use as in 19, and a rigid use to designate such an abstruse kind as the kind the-insect-species-that-is typically-farmed-for-honey. But here LaPorte is being too lenient since as we've argued previously it is altogether dubious whether *The insect species that is typically farmed for honey* is ever used to designate the kind the-insect-species-that-is typically-farmed-for-honey.

So, Schwartz allegation that LaPorte's can defend his claim that *the insect species typically farmed for honey* is not a rigid designator only by rejecting the existence of such a kind as the-insect-species-that-is typically-farmed-for-honey is false. But Schwartz extends this line of criticism by some new twists.

Schwartz puts forward the following claims. In formal semantics there is not a need to postulate kinds. In formal semantics we instead have properties: sets of particular entities possible and actual. Normally any such set counts as a property and these properties normally serve as the intensions of terms rather than as their denotata, *pace* LaPorte. Since any such set counts as a property, there will as well be properties corresponding to such a term as *insect species that is typically farmed for honey* (Schwartz appears to suggest that this is the set consisting of all possible and actual token bees that are of the insect species that is typically farmed for honey).[147] And if *the insect species that is typically farmed for honey* is taken to designate that property, it has to be a rigid designator because the property corresponding to *insect species that is typically farmed for honey* will not change relative to different evaluation indexes. So, LaPorte, in order to defend his position, has to assume that some sets of actual and possible particulars, such as the one determined by *insect species that is typically farmed for honey*, do not count as properties. LaPorte may attempt to contrast such sets with those corresponding to such terms as *honeybee* and exclude the former by arguing that they are not *natural*. However there are insurmountable difficulties in singling out some such sets as natural properties and exclude others.

These claims by Schwartz are to a great extent erroneous or groundless. First, the properties Schwartz claims to be taken to be intensions of common nouns in formal semantics cannot be sets of actual and possible entities (unless one's semantic framework adopts Lewisian worlds). Consider the noun

[147] The description expressed by the phrase *the insect species that is typically farmed for honey* apparently involves a reference to a species and the descriptive condition for being in the set particulars corresponding to that description appears to be an instance of that species. But Schwartz also claims that kinds do not have a use in formal semantics. I do not know how to resolve this apparent inconsistency in Schwartz' criticism.

bachelor and a certain male x. Is x a member of the property expressed by *bachelor*? Even if x is actually a bachelor, he might well not have been, and vice versa. So there is not a well defined set that can be identified as the property expressed by *bachelor*. Rather in formal semantic properties are usually identified with predicative intensions of type <s,<e,t>>, unless one adopts a Lewisian framework of possibilia .

Second, as we will later see in the present work, it is by no means obvious that there is not a need to postulate kinds in formal semantics. There are certain uses of common nouns and noun phrases formed by them which apparently are best accounted if they are taken to *denote* one way or another kinds. And, the postulation of kinds as entities of type e (i.e. as designata) alongside particulars to deal with some such uses is very common place in formal semantics.[148] Some formal semanticists do indeed identify kinds with intensions of some sort or another –i.e. with functions mapping evaluation indexes into entities of type e.[149] But these intensions are still assigned to expressions as their denotata, and are thereby distinguished from the proper intensions of these expressions.

Third, let's grant that there are no kinds but properties understood as functions of type <s,<e,t>> and that LaPorte has to re-formulate his position by taking such properties to be the denotata of such definite phrases as *the*

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[148] Carlson (1980), Krifka et al. (1995), Chierchia (1998), Dayal (2004) are much cited works dealing with the semantics of certain noun phrases formed by common nouns by way of postulating kinds taken as the denotata of these phrases. In the 5th and 6th chapters of the present work we have extensively referred to these works and discuss edexamples deriving from them.

[149] Chierchia (1998) and Dayal (2004).

honeybee and *the insect species typically farmed for honey*. It does not thereby follow that LaPorte will be bound to take *the insect species typically farmed for honey* to rigidly denote the same property –a function of type <s,<e,t>>- relative to every evaluation index. More specifically it does not follow that *the insect species typically farmed for honey* should rigidly denote the function which relative to an evaluation index s maps to truth all and only instances of the insect species that is typically farmed for honey at s. If one identifies a function of type <s,<e,t>> to be the denotation of a term α relative to a given evaluation index, then evidently that function will not serve as the semantic intension of α. Rather the semantic intension of α will then be a function of type <s,<s,<e,t>>>, which relative to an evaluation index w will yield a function of type <s,<e,t>> as the denotation of α at w.[150] As we indicated above the definite phrase *the insect species typically farmed for honey* can obviously be used in such a way that it has the same denotation as *the honeybee*, but these two definite phrases obviously have different semantic intensions. Under the presently envisaged reformulation of LaPorte's position, this is accounted for in the following manner. *The honeybee* and *the insect species that is typically farmed for honey* have different functions of type <s,<s,<e,t>>> as their semantic intensions, but relative to certain evaluation indexes w_i these semantic intensions will yield the same function of type <s,<e,t>> as the denotation relative to w_i both of *the honeybee* and *the insect species that is typically farmed for honey*. So, there is no need for LaPorte to find a way to exclude some

[150] At any rate Schwartz should now better. We have previously seen that Mondadori (1978) which Schwartz (1980) criticized proceeds exactly in the described way.

properties as non-natural in order defend his position, even if he were to take such definite phrases as *the honeybee* and *the insect species that is typically farmed for honey* to denote properties (entities of type <s,<e,t>>) rather than kinds (entities of type e).

Schwartz's Criticism of the Theoretical Significance Attributed by LaPorte to the Rigidity of Such Phrases as *The Honeybee*

LaPorte (2000) claimed that the rigid/non-rigid division among kind designators has the same level of theoretical interest as the rigidity of proper names and the non-rigidity of definite descriptions for particulars. He indicated, given that such kind designators as *the honeybee* and *Apis mellifera* are rigid, we can explain on semantic grounds our intuition that the identity sentence *Apis mellifera is the honeybee* will be necessarily true, if it is actually true. And again given that *the insect species that is typically farmed for honey* is not a rigid designator, we can explain our intuition that *Apis mellifera is the insect species that is typically farmed for honey* will not be necessarily true, even if it is actually true.

As previously indicated LaPorte (2000) did not use the label *general term* at all; his discussion there was rather laid using the label *kind designator*. Schwartz however labels LaPorte's *kind designators* as *general terms*, be they common nouns or definite noun phrases. Schwartz therefore formulates LaPorte's claim of theoretical significance with regard to kind designator's rigidity/non-rigidity as an attribution of theoretical significance to general terms' rigidity/non-rigidity, and criticizes it as such.

Schwartz argues that that *the honeybee* and *Apis Mellifera* are *de jure* rigid does not play a role in the explanation the necessity of *Apis Mellifera is the honeybee* because that sentence is analytic.

That a sentence is necessarily true because it is analytic does not relieve us of the need to analyze how come the contributions of the constituents of that sentence bring about that the sentence is necessarily true.

For example we can see why and how in the case of *Every bachelor is an unmarried* the meanings of the constituents and their syntactic organization bring about the necessity only by giving a semantic analysis which reveals the semantic contribution of the constitutents and their organization to the truth-conditions. One common way to analyze *Every bachelor is unmarried* will be the following:

20 Every bachelor is an unmarried.
[Every bachelor] [unmarried]
$\lambda P.\forall x([\text{bachelor}]^s(x)\supset P(x))([\text{unmarried}]^s)$
$\forall x([\text{bachelor}]^s(x)\supset [\text{unmarried}]^s(x))$

Given this analysis we see that 20 will be true relative to every index of evaluation s if and only if for any evaluation index s, the extension of *bachelor* at s is a sub-set of the extension of *unmarried* at s. We can now state exactly which feature of the meanings of *bachelor* and *unmarried* makes this sentence necessarily true: these terms have such intensions that for every evaluation index s the denotation of *unmarried* at s maps to truth every individual that is mapped to truth by the denotation of *bachelor* at s. That 20 is allegedly analytic can then be seen as the result of *bachelor* and *unmarried*'s intensions being related in the described manner by virtue of explicit linguistic stipulation or an implicit semantic-lexical design feature of contemporary English. The alleged analyticity of 20 does not make it exempt from the principles that the truth-conditions of sentences are determined by the meanings of their constituents and their syntactic organization and that necessity is a semantic feature the instantiation of which depends on these truth conditions. The alleged analyticity only indicates that the truth-conditions will be satisfied by every evaluation index by force of explicit or implicit semantic stipulations.

Let's now consider the case of *Panthera tigris is the tiger*, and attempt to trace out how its necessity comes about given the meanings of its constituents and its syntactic organization. To this end, as in the case of 20 we have to draw on a plausible semantic analysis of *Panthera tigris is the tiger*.

21 Panthera tigris is the tiger
[Panthera tigris][is [the tiger]]
$\lambda x.(x=[\text{the tiger}]^s)([\text{Panthera tigris}]^s)$
$[\text{Panthera tigris}]^s = [\text{the tiger}]^s$

Under the given analysis this sentence will be true relative to every evaluation index if and only if relative to any evaluation index s *Panthera tigris* and *The tiger* denotes the same entity. That is, if and only if the meanings of *Panthera tigris* and *The tiger* determine exactly the same semantic intension. That these meanings determine the same intension is a necessary and sufficient condition for the necessity of 21, under the proposed analysis of that sentence. Admittedly, *Panthera tigris* and *The tiger* could meet this condition even if their common intension was not a constant one; that is even if they were not rigid designators. Yet, the consideration of some related semantic phenomena obliges us to acknowledge that they actually meet the stated necessary and sufficient condition for the necessity of 21 rather in virtue of having the same *constant* intension. The semantic phenomena to be taken into account is this. If the intensions of *Panthera tigris* and *The tiger* were non-constant then we would be at a loss to explain why the following sentences cannot have a true reading:

Panthera tigris might not have been Panthera tigris.
The tiger might not have been the tiger.
Panthera tigris might not have been the tiger.

If this consideration is granted, then one has to acknowledge that the *de jure* rigidity of *Panthera tigris* and *the tiger* plays a role in bringing about the necessity of 21. In this respect 21 is for example different from *The keepers of Panthera tigris are the keepers of the tiger*. This latter sentence too is necessary but not in virtue of *the keepers of Panthera tigris* and *the keepers of the tiger*'s determining the same constant intension.

That *Panthera tigris is the tiger* is stipulated to be true and thus is analytic, cannot change the fact that its necessity is brought about by *Panthera tigris* and *the tiger*'s determining the same constant intension. Thus it does not change the fact that the *de jure* rigidity of *Panthera tigris* and *the tiger* plays a role in making it a necessary sentence. The attribution of analyticity can only aim to provide an explanation as to why *Panthera tigris* and *the tiger* determine *the same* constant intension. Instead of explaining it by recourse to how the world is, the attribution of analyticity seeks to explain it by recourse to linguistic stipulation.

So, granting that 21 is analytic does not diminish the theoretical significance of the *de jure* rigidity *Panthera tigris* and *the tiger* in explaining its necessity.

Of course it was all along questionable whether 21 is analytic at all or whether there cannot be any necessary sentence similar to 21 but which arguably is not analytic. In this vein consider the following:

22 The warmint is the groundhog.

22 happens to be true; the species termed as *the groundhog* (Marmota monax) is the same species as the one that is termed as *the warmint* in the southern parts of the US. But the sentence is by no means analytic. The warmint is not identified with the groundhog by any stipulation, and it should have taken some empirical investigation to establish that the warmints of the southerners are groundhogs; after all it may have turned out that they are different species despite external resemblance. But regardless whether it turned out true or not, arguably we could intuitively fathom that if it is true it will be necessarily true (if it is true *the warmint might not have been the groundhog* will be false). And this intuition can readily and plausibly be explained by our linguistic competence, by the way we are linguistically wired to use such definite generic phrases as *the warmint* and *the groundhog*, namely rigidly just as we use proper names.

I conclude that rigid/non-rigid difference with respect to definite phrases that designate kinds is a significant one (more of this in later chapters) and that Schwartz' criticism on this point is ineffective on two counts. First, the analyticity of a sentence cannot be a reason to forego the explanation of its concomitant necessity, and in the case of such sentences as *the honeybee is Apis melifera* this explanation requires us to take the constituent phrases *the honeybee*, *Apis mellifera* to be *de jure* rigid designators. Second, Schwartz is wrong in thinking that there are no non-analytic necessary identity sentences formed with kind designators whose non-contingency can be explained on linguistic-semantic grounds alone.

I should clarify though that by supporting the theoretical significance of rigid/non-rigid difference with respect to kind designating definite phrases I do not mean to imply that this difference is therefore also theoretically significant with regard to general terms or with regard to common nouns. First it is dubious that we would like to count such definite phrases as *the honeybee* and *the insect species that is typically farmed for honey* as general terms (as I argued in the section on Salmon (2005)). Second, as I argued in the section on LaPorte (2000) the rigidity (non-rigidity) of definite phrases such as *the honeybee* and *the insect species that is typically farmed for honey* does not by evidently entail the rigidity (non-rigidity) of the common nouns *honeybee* and *insect species that is typically farmed for honey* that form them.

Does LaPorte confuse rigid designation with constancy of intensions/meanings?

Schwartz claims that LaPorte in taking such phrases as *the honeybee* and common nouns as *honeybee* to rigidly designate kinds is merely confusing the constancy of meanings in talk about different possible state of affairs.

Apparently Schwartz thinks that the kinds which LaPorte and others take as the rigid designata of common nouns such as *honeybee* and the related definite generics such as *the honeybee* are better regarded as the intensions the common nouns involved; and therefore, Schwartz thinks, what these people think to capture as rigid designation is nothing but the banal fact that meanings modeled as intensions remains the same in talk about different possible state of affairs. To support these considerations Schwartz sets a challenge:

> Explain what it means for e.g. 'gold', 'tiger', 'water' to be rigid just using set theoretic tools and possible worlds made up of individuals actual and possible (and perhaps using the notion of natural property).

What Schwartz asks us here is to formulate a property of rigidity to apply to common nouns on the basis of a semantic-ontology that has as basic types entities of types e (individuals), s (possible worlds) and t (truth-values); and additionally functions defined in terms of these basic types (e.g. properties/intensions: type <s,<e,t>>). Although he is not explicit on this matter, clearly he furthermore requires that entities of type e will consist only of concrete particulars, and will not involve entities like kinds (otherwise this challenge could easily be met).

Schwartz claims that this challenge cannot be met in such way that the rigidity of the common nouns will amount to something other than the sameness of their intensions (type <s,<e,t>>) in every verbal context they are used, be they modal or not:

> We can do it easily for rigid singular terms. A proper name that is rigid is a constant function from possible worlds to individuals. I.e. it takes the same individual at every possible world in which it designates at all. The corresponding try with general terms does not work. A rigid general term is not a constant function from possible worlds to sets of individuals. Nor will talk of natural properties help us. Of course, a rigid general term names the same property in every possible world because trivially words keep the same meanings when talking about other possible worlds.

We can further explicate the portent of Schwartz' claim here in the formal framework adopted in the present work in the following manner. For example, if we take common nouns to be appliers (denotation type <e,t>) then we will have to take the common noun *dodo* to contribute the same intension (the function $\lambda s.\lambda x.[\text{dodo}]^s(x)$ of type <s,<e,t>>) in both of the following sentences.

23 a Alice might have shot a dodo.
b Alice shot a dodo.

In the former sentence $\lambda s.\lambda x.[\text{dodo}]^s(x)$ is within the scope of the modal quantifier expressed by *might* and the values of type <e,t> it will get for different possible worlds (*dodo*'s denotations for different possible worlds) will be relevant for the determination of the truth value of the whole sentence. In the latter sentence $\lambda s.\lambda x.[\text{dodo}]^s(x)$ will be evaluated simply relative to the actual world, will yield the denotation of *dodo* relative to the actual world. So, although *dodo* will have different denotations relative to different possible worlds and probably different denotations will be relevant for the determination of the truth value in the case of 23a and23b, these different denotations will all derive from the same intension contributed by *dodo*.

Now, the foremost questionable aspect of this challenge which shuns kinds is whether it is worthwhile. The ontological framework it imposes is arguably too narrow to be suitable. As we will see in a later chapter there are cases in which such definite generics as *the honeybee*, bare plurals as *honeybees* are used in such way that their semantic contribution cannot easily be cashed out in terms of the particular tokens which the common nouns that form them pertain to. In this vein consider the following sentences:

24 The dodo is an extinct species.
The dodo and the Rodrigues Solitaire descend from the same species.
Dodos are extinct.
Dodos and Rodrigues Solitaires descend from the same species.

These sentences will have very simple semantic analyses that are in line with those of the syntactically similar sentences that pertain to concrete particulars, if the phrases *the dodo* , *the Rodrigues Solitaire*, *dodos*, *Rodrigues Solitaires* were taken to denote kinds taken as entities of type e, alongside concrete particular individuals.

If we shun kinds, and take any recourse to them as cases of confused recourse to the predicative intensions of common nouns, then we will have to find a find ways to analyze such sentences as those in 24 in terms of *dodo*'s denotation (type <e,t>). Perhaps this is possible but as we have amply discussed in the fifth and sixth chapters this not the way that is taken in the formal semantic literature pertaining to the interpretation of definite generic phrases and bare plural phrases. Either the definite generics and the bare plurals, like the common nouns that form them, are taken to designate kinds taken as entities of type e (Krifka et al.1995, Krifka 1995, Zamparelli 2000). Or kinds are identified with certain intension of type <s,e>, and the definite generics and bare plurals are taken to *denote* such intensions which are derived from the predicative intensions of the common nouns (type <s,<e,t>>) that form them (Chierchia 1998, Dayal 2004). So, these intensions taken as the *denotata* of the definite generics and bare plural phrases will be different than the proper semantic intensions of the common nouns that form them. In the previous sentences I italicized 'denote' to stress the point that these intensions are assigned to definite generics and bare plural phrases as their denotata and are not regarded as the proper semantic intensions of these phrases, in the sense of semantic intension as the function that yields the denotations of terms relative to different evaluation indexes.

So, either way Schwartz' stated claims are gainsaid by the formal semantics literature. On the one hand kinds as basic entities of type e and the designata of common nouns and/or definite generics and/or bare plural phrases are often included in the semantic ontology; and in such frameworks rigidity of common nouns and/or definite generics and/or bare plural phrases can simply be identified as constancy of designation relative to different evaluation index. Other approaches treat kinds not as basic entities of type e but identify them with a certain type of intension that pertain to particular tokens, thus they meet Shwartz' challenge. But in these approaches these kinds *qua* intensions are still assigned to definite generics and bare plural phrases as their *denotata* and not as their proper intensions and they are not the same as the intensions of the common nouns that form them; and thus in these latter type of approaches it is possible to define the rigidity that pertains to definite generics or bare plural phrases as constancy of denotation, without thereby confusing, pace Schwartz, the rigidity of these phrases with the banal fact that the common nouns that form these phrases bring in the same intension to all verbal contexts in which they are used.

Schwartz's Principal and Concluding Claim that Rigidity Is Not a Theoretically Significant Property for General Terms

Schwartz discussion of Laporte (2000) was destined to support his principal contention that rigid designation does not have any theoretical significance in relation with general terms.

We have previously seen that Schwartz (1978) argued that rigid/non-rigid difference will either explain a certain intuited difference between such natural kind terms *honeybee*, *tiger*, *water* and nominal kind terms such as *bachelor*, *soda-pop* or it will be devoid of theoretical significance. Schwartz more than once indicates that LaPorte's proposal and similar proposals cannot distinguish between natural kind terms and other terms.

In response to this expectation LaPorte (2000) had previously argued that NKT can be distinguished by other means, and that it is not right to expect rigid designation to do that work. LaPorte has suggested that NKT are distinguished by the way their denotation is fixed: namely indexically by pointing to some specimen, whereas the denotation of non-NKT are fixed by way of general description. Now, Schwartz (2002) professes that it turned out erroneous to expect rigid/non-rigid difference to distinguish NKT from other common nouns. And furthermore, drawing on his criticism of LaPorte he proposes to go further and accept that rigid designation or some analogue of it does not play any theoretically significant role in the semantics of general terms. Now I want to briefly assess this sweeping claim by Schwartz.

Schwartz, like LaPorte he criticizes, appears to semantically equivocate both common nouns such as *dodo* and the definite phrases formed by them such as *the dodo*, and take both to be general terms. We have previously argued that this equivocation is unwarranted. Furthermore we have argued that it is questionable whether definite phrases can be labeled as general terms. Anyway we can avoid this moot point and assesss Schwartz claim of theoretical insignificance of rigidity separately for common nouns and for definite phrases that apparently designate kinds.

Definite phrases that apparently designate kinds are most easily interpreted as really designating kinds (taken as basic entities or identified with certain types of intensions), and this is the way they are standardly interpreted in the relevant literature. When these phrases are interpreted as designators whether they are rigid or not has a genuine theoretical significance. As LaPorte and many others have indicated if we suppose that kind designating definite phrases are divided into rigid and non-rigid ones we can easily explain the intuited contingency/non-contigency difference that obtains among the identity sentences that involve kind designating definite phrases.

25 a The woodchuck is the groundhog. *Non-contingent*
b The woodchuck is the only rodent with its own holiday. *Contingent*

We have above seen that Schwartz (2002) dismisses this explanatory work assigned to rigidity/non-rigidity difference among definite phrases that pertain to kinds. But above I have counter-argued that regardless whether such identity sentences as 25a are taken to be analytic, a semantic account of how their necessity comes about will be required and that in such an account the property of rigid designation will play a role. I have also argued that there surely are non-contingent but also non-analytic identity sentences. In relation with non-contingent but non-analytic identity sentences Schwartz thinks that their non-contingency involves non-semantic, metaphysical presuppositions. Yet, when the non-contingency can easily be explained solely on linguistic-semantic grounds, in terms of rigid designation, presumably the linguistic explanation is to be preferred over explanation by implicit metaphysical presuppositions.

The idea that in this case the linguistic-semantic explanation has to be preferred over a metaphysical one can be supported additionally by considering the ambiguity/non-ambiguity divergences that obtain among the modal sentences that involve definite phrases that pertain to kinds:

26 The woodchuck might not have been the groundhog.
Non-ambiguous, its only reading is false.
The woodchuck might not have been the only rodent that has its own holiday.
Ambiguous, it has one true one false reading.

The ambiguity/non-ambiguity difference illustrated above can easily be explained by the supposition that definite generics such as *the woodchuck* and *the groundhog* are *de jure* rigid designators but that definite phrases such as *the only rodent that has its own holiday* are merely taxonomic definite descriptions that are not rigid designators. In the case of definite generics the different scope possibilities for the definite generic phrase relative to the modal verb do not generate an ambiguity because definite generics are always *de jure* rigid; in the case of definite phrases that are not definite generics the same scope possibilities generate an ambiguity because the latter are not rigid designators.

These pieces of theoretical significance of course presuppose that such definite phrases as those illustrated above be taken as kind designators. Yet, this how they are standardly treated in the formal semantic literature. And as we assured above no one who thus takes kinds as denotata, even those who identify them with some sort of intension, are thereby mistaking the proper semantic intensions of the common nouns for kinds. It falls on Schwartz to show that such phrases as *the woodchuck, the only rodent that has its own holiday* can be interpreted without recourse to kinds in all the different types of sentential contexts they may appear, and that the semantic phenomena illustrated in 25 and 26 can be explained this way without having to postulate an analogue of rigid designation.

Perhaps Schwartz is wrong as regards the significance of rigidity/non-rigidity difference in relation with definite phrases that denote kinds, but he is right as regards the significance of this difference in relation with common nouns. On this point Schwarz has few things to say other than the standard two pronged argument, already repeated several times above. That argument roughly run like this. Common nouns are either designators or appliers. If they are designators then all will be rigid designators. If they are appliers and rigid application is understood in the sense of having the same predicative denotation relative every evaluation index, then only a few common nouns, namely only those like *prime, rectangle* which pertain to abstract entities, will be rigid appliers.

Now I think that Schwartz as well as other authors contributing to the controversy accept the two pronged argument too easily in relation with common nouns. One of the principal goals of the present work has been to show how we may plausibly resist the two pronged argument. In the sixth chapter of the present work we have considered plausible semantic reasons to take some common nouns to be kind designators and some others to be appliers to kinds. Some common nouns such as *tiger*, *whale*, *transistor* can form definite generics like *the tiger*, *the whale*, *the transistor* and bare plural noun phrases like *tigers*, *whales*, *transistors* that are in the semantic literature commonly taken to designate kinds:

27 The tiger is an endangered species.
Compared to the lion, the tiger prefers denser vegetation.
The transistor is invented by Edgar Lilienfeld.
Clear communication between the officer of the bridge and the helmsman is essential for safe operations.
Tigers are an endangered species.
Compared to lions, tigers prefer denser vegetation.
Transistors are invented by Edgar Lilienfeld.
Clear communication between officers of the bridge and helmsmen is essential for safe operations.

One straightforward way to explain the kind designation by these noun phrases is to take the common nouns that form them to designate kinds and to take these phrases to inherit this designation.

Some common nouns on the other hand appear to taxonomically apply to kinds:[151]

28 Some whales are not endangered.
The Beluga is an endangered whale.
The NPN is a new bipolar transistor.
The TY 93 is an obsolete transistor.
Alice used an obsolete transistor on this board.

[151] Some apparently do double duty. *Transistor* and *whale* can be used to form the definite generics *the transistor* and *the whale* that respectively designate the super-kind of which every token transistor is an instance and the family of which every token whale is an instance. But they can also be used to form definite phrases that respectively designate the contextually salien transistor model and the contextually salient whale species or genus.

And in the seventh chapter of the present work we have shown that there is an ambiguity divergence between such pairs of sentences as the following:

29 Alice might have used a TY 93 on this board.
Alice might have used an obsolete transistor on this board.

That can be explained by taking such common nouns as *TY 93* which can form definite generics as rigid designators whereas such common nouns as *obsolete transistor*, which cannot form definite generics, are taxonomic appliers that are not rigid (i.e. do not denote relative to every evaluation index the same predicative function of type <e,t> which applies to kinds).

Thus, it is possible, or so I have argued in the main text of the present work, to defend that there is a theoretically significant rigid/non-rigid difference that applies to common nouns –albeit understood more generally as rigid/non-rigid denotation, and taking predicative application and designation as modes of denotation. Schwartz' and other authors' accepting the two pronged argument in relation with common nouns is premature in that they do not consider the semantics of common nouns and the noun phrases formed by them in all its richness and complexity. And in the present work I have aimed to compensate for this omission. By tapping on the resources of the formal semantic literature on the semantics of common nouns and the noun phrases formed by them I have strived to mount a plausible argument that uses the rigid/non-rigid difference to do some semantic explanatory work in the way illustrated above.

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