

CHANGE AND STABILITY IN THE STRUCTURE OF CULTURAL BELIEFS

TURGUT KESKİNTÜRK

BOĞAZİÇİ UNIVERSITY

2021

CHANGE AND STABILITY IN THE STRUCTURE OF CULTURAL BELIEFS

Thesis submitted to the
Institute for Graduate Studies in Social Sciences
in partial fulfillment of the requirements for the degree of

Master of Arts

in

Sociology

by

Turgut Keskindürk

Boğaziçi University

2021

DECLARATION OF ORIGINALITY

I, Turgut Keskindürk, certify that

- I am the sole author of this thesis and that I have fully acknowledged and documented in my thesis all sources of ideas and words, including digital resources, which have been produced or published by another person or institution;
- this thesis contains no material that has been submitted or accepted for a degree or diploma in any other educational institution;
- this is a true copy of the thesis approved by my advisor and committee at Boğaziçi University, including final revisions required by them.

Signature.....

Date.....

ABSTRACT

Change and Stability in the Structure of Cultural Beliefs

This thesis presents a formal approach to analyze cultural beliefs, attitudes and opinions as networks of survey responses. In two substantive empirical studies, the thesis draws from network science, research on culture and cognition, and recent studies on public opinion to investigate the change and stability in the structure of cultural beliefs. I make use of two nationally representative surveys to construct belief networks and analyze their structural properties to adjudicate diverse cultural theories. In both chapters, my central argument is grounded on the following hypothesis: individuals have relatively stable and coherent belief systems around institutionalized fields, and these belief systems are dynamic in the earlier periods of life and become much more solidified with age, but remain relatively variable across cultural, social, and political contexts. This thesis shows that opinions are organized with underlying, though diverse, logics in the population.

ÖZET

Kültürel İnançların Yapısında Değişim ve Durağanlık

Bu tez, kültürel inançları, tutumları ve görüşleri anket yanıtları ağları olarak analiz etmek için formel bir yaklaşım sunmaktadır. İki bağımsız ampirik çalışmada kültürel inançların yapısındaki değişim ve durağanlığı araştırmak için ağ biliminden, kültür ve bilişsel bilim araştırmalarından ve kamuoyu üzerine yapılan son çalışmalardan yararlanmaktadır. Farklı kültürel teorileri karşılaştırmak için inanç ağları oluşturarak bu ağların yapısal özelliklerini analiz ediyor ve bu amaçla ulusal düzeyde temsili iki anketten yararlanıyorum. Her iki bölümde de temel argümanım şu hipoteze dayanmaktadır: bireylerin kurumsallaşmış alanlar etrafında nispeten istikrarlı ve tutarlı inanç sistemleri vardır; bu inanç sistemleri yaşamın erken dönemlerinde dinamiktir ve yaşla birlikte çok daha durağan hale gelir, ancak kültürel, sosyal ve politik bağlamlar arasında nispeten değişken kalır. Bu tez, kültürel inançların muhtelif mantıksal ağlarla birbirlerine bağlandıklarını göstermektedir.

ACKNOWLEDGMENTS

This thesis would not exist without the support and never-ending guidance of two great scholars, Tuna Kuyucu and Taylan Acar. As the thesis chair, teacher and friend, Tuna Kuyucu helped me immensely, and I am highly grateful that in the first day of his legendary research methods class, he drew two diagrams on the board, one of which praises explanatory social sciences. Taylan was a great friend and supporter for all my endeavors. I am not sorry for constant nagging and long conversations, but I am sorry that I have not done them more often!

Special thanks to my committee members, Barış Büyükokutan and Ceylan Engin, for their great suggestions in the preparation of this thesis. I also express my deepest gratitude to the Department of Sociology at Boğaziçi. Ceren Özselçuk and Bülent Küçük always supported my vacillating interests, and the department gave me an excellent place to learn and work. I would like to thank Güzin for her friendship, and to Doğukan, Ege, Ekin and Damla for being great co-workers and friends.

My parents are really proud that their son will have a Professor title in the future, and I had their constant support in all these years. I am grateful to my father for all the reading nights in my childhood and to my mother for her never-ending love. Thank you, Tuğçe, for being a great nuisance and a great sister! My grandfather, Kenan, has always been a great source of inspiration. My only hope is that his best qualities are reflected in this small thesis and in my future.

Most significantly, I could not have completed this thesis without the support of my best decision in life, Bahar. She never doubted me when I have doubted myself most. She was there for all my sane and crazy ideas. She is the smartest and the most brilliant person I know. Bahar, thank you for everything.

To my grandmother, Gülizar Keskintürk

TABLE OF CONTENTS

CHAPTER 1: INTRODUCTION.....	1
1.1 The meaning of culture.....	1
1.2 Connectionism, cultural schemas and belief systems.....	2
1.3 The plan of the thesis.....	4
CHAPTER 2: RELIGIOUS BELIEF ALIGNMENT.....	7
2.1 Network representation of cultural beliefs.....	8
2.2 Data and analytic strategy.....	15
2.3 Results.....	20
2.4 Discussions and conclusions.....	31
CHAPTER 3: POLITICAL BELIEF NETWORKS.....	35
3.1 Public opinion and mass belief systems.....	36
3.2 Data and analytic strategy.....	41
3.3 Results.....	45
3.4. Discussions and conclusions.....	51
CHAPTER 4: CONCLUSIONS.....	56
APPENDIX A: THE NUMBER OF BELIEFS CHANGED.....	58
APPENDIX B: THE COMPOSITION OF DATA AND SAMPLE ATTRITION....	59
APPENDIX C: MIXED EFFECTS MODELS WITH DUMMY PREDICTORS.....	63
APPENDIX D: PROCEDURES ON CORRELATIONAL CLASS ANALYSIS.....	64
APPENDIX E: THE CHARACTERISTICS OF COUNTRIES.....	66
APPENDIX F: ITEMS USED IN BELIEF NETWORKS.....	68
APPENDIX G: DESCRIPTIVE STATISTICS FOR REGRESSION MODELS.....	69
REFERENCES.....	70

LIST OF TABLES

Table 1. Survey Items, Abbreviations Used in Network Diagrams and Wordings....	17
Table 2. Multilevel Mixed-Effects Regression Models.....	23
Table 3. The Percentage of Similar Signs Among Belief Pairs Between Subgroups.	28
Table 4. OLS Regression Models Predicting Belief Network Constraint.....	47
Table E1. The Characteristics of Countries.....	66
Table F1. Items Used in Belief Networks.....	68
Table G1. Descriptive Statistics for Regression Models.....	69

LIST OF FIGURES

Figure 1. The distribution of pairwise correlations.....	18
Figure 2. The religious belief network for age 13.....	21
Figure 3. The religious belief network for age 27.....	22
Figure 4. Bootstrapped replications for belief alignment trends.....	24
Figure 5. Belief alignment trends across the subpopulations.....	26
Figure 6. Belief alignment trends across the CCA groups.....	30
Figure 7. Belief alignment trends in 5,000 random samples.....	31
Figure 8. Relationship between ideological institutionalization and constraint.....	46
Figure 9. Bootstrapped replications of belief constraint in 76 countries.....	49
Figure 10. Item selection effects.....	50
Figure 11. Mean constraint across different item levels.....	51
Figure 12. Mean constraint trajectories across different item levels.....	52
Figure A1. The predicted number of beliefs changed per individual.....	58
Figure B1. The sample composition.....	60
Figure B2. Belief alignment trends in high attrition and low attrition groups.....	61
Figure B3. Belief alignment trends in different attrition samples.....	62
Figure C1. Coefficient plot of the mixed effects model.....	63
Figure D1. Class partitionings from correlational class analyses.....	65

CHAPTER 1

INTRODUCTION

There are certain fundamental propositions with high demand in cultural sociology, one of the most important of which is the understanding of cultural beliefs as the structural organization of cognitive information, be it in the form of attitudes, opinions, or values. In this view, cultural beliefs should be understood as systems of information organized as interrelated evaluations, which in turn can be represented as a weighted belief network. In this thesis, I take this network metaphor as an organizing heuristic, formalize its implications, and propose that the relational properties of cultural beliefs should be an essential focus of cultural sociology. Below, I review the research on personal culture, showing that both the conceptualization of cultural kinds, and the accompanying strategies of formal modeling support the conclusion that individual beliefs are not singular entities, but part of an overarching system of emergent cultural phenomena.

1.1 The meaning of culture

Lizardo (2017, p. 93) defines “personal culture” as “culture made manifest at the personal level.” This minimal definition is meant to capture the higher-order distinction between “public” and “personal” forms of culture, the latter of which is conceived as a collection of declarative elements, such as attitudes, opinions or values; and nondeclarative elements, such as dispositions, skills, or cognitive schemas. Correspondingly, the former denotes personal culture in its deliberate, explicit and linguistic mode, while the latter in its automatic, implicit and practical

mode (Leschziner, 2019; Vaisey, 2009). This framework is particularly useful in evaluating the formal properties of cultural elements and categorizing the central experiential channels through which culture is internalized (Lizardo, 2017, pp. 91–93), but there seems to be certain parallels in the theory and measurement of cultural kinds, especially with the proliferation of methodological innovations in cultural sociology (Boutyline, 2017; Boutyline & Vaisey, 2017; Goldberg, 2011; Hunzaker & Valentino, 2019) that employs similar conceptual metaphors and formal tools to operationalize personal culture. In what follows, I examine two such systematic proposals for theorizing personal culture, cultural schemas and belief systems, to unpack this parallelism.

1.2 Connectionism, cultural schemas and belief systems

Sociologists in the field of culture and cognition propose cultural schemas as one of the most productive objects for cultural analysis (Boutyline & Soter, 2020; DiMaggio, 1997; Patterson, 2014; Vaisey, 2009; Wood et al., 2018). In this account, cultural schemas designate the “largely unconscious networks of neural associations that facilitate perception, interpretation and action” (Vaisey, 2009, p. 1686) and they are mental architectures automatically deployed to perceive, categorize, and understand the environment. Specifically, schemas are cultural and meaningful heuristics derived from embodied stimuli stored in one’s long-term memory, the acquisition of which is contingent on individually unique, but socially patterned experiences. Yet, as opposed to an image of unrelated chunks of experience scattered across the mind, schemas are organized as weighted associations. Grounded on the connectionist traditions in artificial intelligence and cognitive psychology (Barsalou, 1993; Rumelhart & Ortony, 1977; Strauss & Quinn, 1997), proponents of this view

propose that schemas have an algorithmic structure loosely similar to the Hebbian neural structure of the brain, namely, “cognitive processes [are understood] as the diffusion of activation states across weighted networks of ‘neurons’ (i.e., nodes)” (Boutyline & Soter, 2020, p. 36). Therefore, insofar as schemas derive from repeated experiences, weighted associations between neurons denote the degree to which these neurons are connected.

However, schemas are part of nondeclarative cultural forms that are not open to linguistic articulation (Lizardo, 2017, p. 89), which is why an explicit measurement of their properties is not easy to pinpoint. Moreover, a similar image of weighted network associations is also used frequently for most declarative cultural kinds. Employing Converse’s (1964, p. 207) definition of belief systems as an interrelation between attitudes, scholars have repeatedly invoked network metaphors to explain the structure of personal beliefs (Boutyline & Vaisey, 2017; Friedkin et al., 2016; Martin, 2000). In this view, it is inadequate to situate beliefs in unidimensional models where the level of positive and negative associations provides an answer to whether individuals “hold” that belief. Instead, one should consider the overall “structure” of belief systems, which is understood as the collection of weighted associations where nodes represent singular beliefs and edges represent the connections between beliefs. For Martin (2000), belief systems constitute a “belief space” that constrain the positionings and trajectories of cultural beliefs.

The methodological implications of the organization of cultural schemas and belief systems are thus fully realized in network analysis (Pachucki & Breiger, 2010; Wellman, 1988). There are at least two different procedures to modeling cultural kinds, each of which tries to infer cultural patterns from aggregate

population data. First, there are methods specifically tailored to find thought communities (Baldassarri & Goldberg, 2014; Boutyline, 2017; DiMaggio et al., 2018; Goldberg, 2011; Hunzaker & Valentino, 2019), where each individual constitutes a point in an aggregate belief space. Contrary to such traditional methods as principal component analysis, latent class analysis or clustering; these methods are designed to detect relational structures both within and between observations (Goldberg, 2011), chopping up the population into distinctive groups with similar schematic structures. Instead of detecting communities, the second set of methods analyze what Baldassarri and Gelman (2008) calls “alignment” (i.e., the degree to which two or more issues are connected) across the population in one or more time-points. Looking at the pairwise correlations among survey items, these studies analyze such diverse issues as opinion formation and polarization (Baldassarri & Gelman, 2008; DellaPosta, 2020; DellaPosta et al., 2015), and the structural organization of belief systems (Boutyline & Vaisey, 2017; Brandt et al., 2019).

Taken together, schemas and beliefs make up personal culture, representing analytically and functionally distinct (Vaisey 2009), but structurally and organizationally similar cultural kinds. The parallelism we see in the employment of network-analytic terms is reflected in the fact that personal culture, whether in its declarative or nondeclarative modes, is organized as webs of implications such that “what one thinks about one thing affects what one thinks about others” (Martin 2002:873). Rather than examining singular beliefs, these propositions conclude that pairs of individual beliefs can be analyzed for generating formal models of culture.

1.3 The plan of the thesis

Moving from these propositions, the aim of this thesis is to examine cultural beliefs

as networks of declarative opinions. In two substantive studies, I build upon network science, research on culture and cognition, and studies on public opinion to investigate the change and stability in the structure of cultural beliefs. I make use of two nationally representative surveys to construct belief networks and analyze their structural properties to adjudicate diverse cultural theories. In both chapters, my central argument is grounded on the following hypothesis: (a) individuals have relatively stable and coherent belief systems around institutionalized fields, and (b) these belief systems are dynamic in the earlier periods of life and become much more solidified with age, but (c) remain relatively variable across cultural, social, and political contexts.

I adopt Vaisey and Valentino's (2018, p. 137) definition of beliefs as the collection of "propositional statements about the self, others, and the world." This provides enough flexibility to operationalize beliefs as weighted networks of correlations between different statements. Naturally, it does not encompass other meanings of the term culture, but it is broad enough to cover personal culture. Moreover, it allows one to construct "belief systems" without making strong assumptions about the supposed form of cultural beliefs. The second and third chapters of this thesis present two empirical studies that investigate cultural beliefs in this framework.

In the first article, I present an alignment model of cultural formation, arguing that belief systems become increasingly constrained from the earlier periods of life-course to adulthood. Since cultural beliefs form webs of implications organized as pairwise relationships between beliefs (what social scientists call attitude constraint), pressures to resolve cognitive dissonances result in more balanced cultural belief systems. I show that this process is highly visible among

adolescents, and correlations between cultural beliefs become stronger and the structure of personal culture becomes relatively more aligned before entering adulthood. Using four waves of data from the National Study of Youth and Religion, I test these propositions through an analysis of religious belief networks from adolescence to emerging adulthood.

In the second article, I turn to political ideology. Studies on mass opinion conceptualize political ideology as an interrelated network of attitudes, beliefs and values. Drawing from the emerging literature on belief network analysis, I formalize this conceptualization to investigate different ways of organizing political ideology among 79 countries. Using an extensive cross-national dataset, I construct networks of belief correlations and examine the variations in the organization of political beliefs. Consistent with the theories of social constraint, I find that in countries with high institutionalization of political parties and low division of power, belief systems are more likely to be dense, centralized, and consolidated. These patterns are robust to a variety of predictors between-countries, but show more variability within-countries. In line with the previous accounts that emphasize people's political awareness as the central organizing factor, I find that respondents with high political awareness have more dense and consolidated belief systems, and less susceptible to political institutions.

CHAPTER 2

RELIGIOUS BELIEF ALIGNMENT

What role, if any, should cultural socialization play in explaining the formation and organization of personal beliefs? Scholars in cultural sociology explored this question time after time, emphasizing the significance of “past conditions of production” (Kiley & Vaisey, 2020, p. 478) on the trajectories of cultural orientations. These studies suggest that personal culture (Lizardo, 2017), culture manifest in individual attitudes, beliefs, and opinions, is remarkably stable throughout an individual’s life course. Change in cultural orientations, the argument goes, is typically a function of people’s age (Krosnick & Alwin, 1989; Visser & Krosnick, 1998). Namely, beliefs are formed in childhood, adolescence, and emerging adulthood, which are then followed by almost stable adulthood.

However, if adolescence is the time when most of our judgments on what to believe is done cooking, it is also the time we learn how to believe. A variety of empirical studies documented the mechanisms that undergird the former, while how the organization of beliefs changes through socialization is left unspecified. This article contributes to this discussion by investigating the relationship between cultural formation and the structure of belief systems. Building on the recent work in cultural sociology (Boutyline & Vaisey, 2017), I ask how the organization of personal beliefs changes from earlier periods of life to adulthood.

Using four waves of data from the National Study of Youth and Religion, I examine this question through an analysis of religious belief socialization. Rather than focusing on the direction of religious beliefs (whether individuals become more

or less religious), I focus on the connections between religious beliefs (whether having one set of religious beliefs implicates having another set of religious beliefs). The analyses of religious belief networks from age 13 to age 28 show that religious beliefs become much more aligned with each year of age, but the rate of alignment significantly declines. Consequently, the religious belief structure relatively stabilizes with entering adulthood.

The rest of the article is organized as follows. First, I draw an alignment model of cultural formation through an engagement with the theories of belief constraint. Second, I use mixed-effects models and network-analytic techniques to investigate religious belief socialization in the National Study of Youth and Religion. I test whether the proposed trends are sensitive to sampling variability, population heterogeneity, and item selection. Third, I discuss the theoretical and methodological implications, and conclude.

2.1 Network representation of cultural beliefs

2.1.1 The organization of cultural beliefs

Starting with Converse's (1964) widely influential treatise on the structure of belief systems, scholars have studied the composition of cultural beliefs with the idea that beliefs are organized as relatively connected sets of pairwise relationships, meaning that "what one thinks about one thing affects what one thinks about others" (Martin, 2002, p. 873). In this view, it is inadequate to understand cultural beliefs in isolation. Instead, one should consider the overall structure or organization of beliefs, what Converse calls belief systems.¹

¹ In what follows, I use the term *belief* to invoke values, attitudes, and opinions. Hence, beliefs will refer simply to "propositional statements about the self, others, and the world" (Vaisey & Valentino, 2018, p. 137). In this sense, belief system refers to the domain-specific organization of beliefs, such

In their most basic form, theories on belief systems claim that cultural beliefs are organized in a way that suggests a certain amount of coherence. In political sociology, this is grounded on the structuring power of political ideologies (Fleishman, 1988; Judd & Krosnick, 1982; Judd & Milburn, 1980; Nie & Andersen, 1974; Peffley & Hurwitz, 1985), such that latent political orientations constrain how individuals respond to survey questions. In other words, individuals respond to survey items in relatively predictable patterns, as these latent orientations have an organizing power on personal beliefs. Hence, if individuals hold certain opinions, it is probabilistically more likely that they hold certain other opinions.

These survey patterns lead theories on belief constraint to argue that individuals have some sort of cognitive organization (Heider 1946; Osgood and Tannenbaum 1955; Rumelhart and Ortony 1977; Strauss and Quinn 1997). Scholars thus frequently use opinion surveys to measure belief constraint by constructing population-level belief networks, where nodes denote survey responses to belief questions while the edges between these nodes denote the correlations between these responses (Boutyline & Vaisey, 2017). In this vein, studies document the dynamics of belief organization with the understanding that cultural beliefs are organized as weighted networks of opinions (Baldassarri & Goldberg, 2014; Boutyline, 2017; Brandt et al., 2019; DellaPosta, 2020; Hunzaker & Valentino, 2019).

Considering personal culture in terms of weighted networks has an important implication: the question of how cultural beliefs are formed can be restated as the question of how the structure of personal culture changes from earlier periods of life to adulthood. One possible result is that life course transformations can be

that individuals can have different belief systems about politics, religion, or culture in general. I will use the terms personal beliefs and cultural beliefs interchangeably to denote beliefs pertinent to the relevant belief systems.

seen as an accumulation of cultural, moral, and political adjustments to an individual's belief system. If it is true that adulthood is relatively stable while childhood, adolescence, and emerging adulthood are relatively variable, we can conceptualize socialization as an evolution from comparatively low belief constraint among cultural beliefs to comparatively high belief constraint. Specifically, socialization can be seen as an alignment of cultural orientations.²

2.1.2 An alignment model of cultural formation

I draw on two established findings in psychological research, constraint satisfaction and attitude strengthening, to develop an alignment model of cultural formation. First, an influential finding in psychology is that individuals strive to reduce cognitive dissonance (Festinger, 1957), which refers to the psychological tension resulting from conflicting attitudes. Scholars show that individuals resolve these tensions through constraint satisfaction (Shultz & Lepper, 1996; Simon et al., 2004), such that individuals restructure their beliefs and attitudes to reduce conflict. Hence, over time, individuals should alter their cultural orientations to make incompatible cultural beliefs increasingly aligned. Correspondingly, however, individuals become less susceptible to attitude changes and more attached to certain attitudes with time (Krosnick & Alwin, 1989). Compared to adolescents, adults give more importance to attitudes, their perceived knowledge of attitudes is higher, and they are more confident of their beliefs (Visser & Krosnick, 1998). This, in turn, decreases the chances of widespread attitude change in later periods of life.

Taken together, these two mechanisms induce countervailing tendencies to

² It is essential to situate the terms *constraint* and *alignment* in more detail. The former refers to the static state of cultural beliefs, i.e., if the correlations among beliefs are high, it means that the belief system is constrained. In contrast, the latter refers to the dynamic changes of cultural beliefs, which means that alignment refers to the alignment of cultural beliefs with one another, which dynamically generates higher belief constraint.

belief systems: while beliefs change through constraint satisfaction, attitude strengthening results in higher resistance to change. Suppose that we have three beliefs in the belief system (A, B and C), and while A-B and A-C have positive connections, B and C are negatively connected. According to constraint satisfaction theories, the belief system seeks to reduce the tension in the system by pushing B or C to change and align with other beliefs. Nevertheless, if attitude strengthening leads to an increase in the importance of B or C, this move toward constraint satisfaction can be thwarted. In sum, the success of constraint satisfaction very much depends on the strength and importance of the targeted attitude.

If we extend this framework to longer time periods, we can see that these two mechanisms interact to push people to have more constraint and less susceptibility to change. If constraint satisfaction leads to constrained belief systems, the increasing connections between beliefs contribute to the attitude strengthening, since these connections enhance the strength of personal beliefs (Dalege et al., 2016; Visser & Krosnick, 1998). In other words, attitudes strengthen with the successful change of belief systems toward more constraint. Therefore, change in cultural beliefs should become less and less likely in time due to the (a) increasing constraint among beliefs and (b) strengthening of particular attitudes.

These two mechanisms have particular relevance for explaining the transitions to adulthood. Most developmental studies show that the periods of childhood, adolescence and emerging adulthood are highly significant for identity and opinion formation (Arnett, 2000; McFarland & Pals, 2005), and various social institutions pattern an individual's belief system, including parents and close adults (Regnerus et al., 2004), political elites (Zaller, 1992), social networks (Cornwall, 1989; Settle et al., 2011) and cognitive authorities (Martin, 2002; Rawlings, 2020).

These sources induce relative coherence to cultural beliefs and carve stable positions for individuals. Thus, socialization involves an extensive period of belief formation. If constraint satisfaction and attitude strengthening provide the dynamic description for belief network organization, the period of socialization should be the time when most of the alignment and subsequent stabilization takes place.³

Model Outline. (a) In earlier periods of the life course, individuals show low belief constraint. (b) In time, cultural beliefs change through constraint satisfaction, which results in the alignment of belief networks. (c) At the same time, with each year of age, individuals become less likely to change beliefs due to attitude strengthening, and therefore, the number of beliefs changed per individual declines. In the end, (d) belief networks become relatively aligned and stabilized. There are two significant implications of this model, providing two hypotheses for empirical testing. First, the average level of absolute belief network constraint should increase (Hypothesis 1). Second, since beliefs become less likely to change with each consecutive year of age, this increase should slow down over time (Hypothesis 2).

2.1.3 Empirical implications and scope conditions

The operationalization of the belief alignment model is grounded on two basic strategies. First, following the previous literature (Baldassarri & Gelman, 2008; Boutyline & Vaisey, 2017; Converse, 1964), pairwise correlations between survey items are used to indicate the degree to which these items hold together. To the extent that absolute correlations are closer to 1, the belief network is said to be

³ It is important to note that these dynamics suggest an alignment process without strictly implying that individuals *always* hold consistent opinions (Zaller 1992). There are limits as to what level of constraint one can achieve, and contextual factors can affect how people respond to survey questions (Kiley & Vaisey, 2020). Thus, the model argues that the structure of beliefs should be stabilized, not the individual responses to surveys.

constrained. Second, the changes in these belief networks are observed for each year of age. Insofar as constraint increases, the corresponding belief network is said to be aligned.

Three challenges restrict the performance of the model to evaluate the proposed alignment trends. First, the model provides individual-level mechanisms, though the observed correlations are measured at the group level. This can be problematic in at least two respects. First, the model cannot differentiate belief alignment for individuals (alignment of beliefs with one another) and belief alignment between individuals (alignment of certain groups with other groups). Thus, the model cannot adjudicate whether individuals change from low constraint to high constraint as a whole or whether there are individuals with low constraint initially, and what we see as alignment is nothing but belief consolidation for that specific group. Moreover, individuals can respond differently to such destabilizing events as institutional change and social mobilization, or the salience of one's role identities and their corresponding social networks might change. These, in turn, might disrupt the alignment process at specific points of the socialization period. This conceals the high probability that there are individuals who do not conform to the population-level trends.

Second, the range of belief systems (Converse, 1964, pp. 4–5), which defines the spectrum of beliefs deemed pertinent to the belief system, can be context-dependent and somewhat arbitrary. For instance, religiosity or parental values can significantly affect how political beliefs are organized, even though the researcher can overlook these items as not relevant to the political belief system. Increasing the number of items most likely results in a lower mean constraint, but decreasing the number of items could dampen the effects of potentially relevant variables. In sum,

including or excluding one belief item leaves too much room for variation, increasing the researcher degrees of freedom.

Third, it is well-known that survey context affects the respondents in multiple ways (Alwin and Krosnick 1991b; Zaller 1992). Most significantly, the polysemy of certain beliefs might result in the situation where some beliefs signify different things for different respondents, which can prompt potential dynamics not accounted for in the model. Therefore, whether the survey items used in the analyses have the same referents for the respondents is not considered in the final model structure.

Despite these limitations, the belief alignment model is capable of detecting broad population-level trajectories of the organization of cultural beliefs. Concretely, the model has the advantage of answering a simple question on belief organization, whether constraint increases through socialization, without making strong assumptions about the processes by which belief alignment occurs. This approach mainly allows us to test whether the periods of socialization are indeed the times for an increasing organization of beliefs.

2.1.4 The case of religious socialization

In order to test these propositions, I examine the case of religious socialization from adolescence to emerging adulthood. Studying religion in this way has at least three payoffs. First, up until now, the literature on belief systems has exclusively worked on political beliefs, leaving other domains of culture untouched. Replicating this approach for religious beliefs might show different dynamics than previously found for political beliefs.

Second, religion is an institutionally and organizationally powerful area of

culture, while it is salient enough for studying personal beliefs. For instance, in the first wave of the NSYR, 80% of the respondents reported church attendance, 70% had religious Sunday schools, and 37% were involved in religious youth groups. Thus, there are strong contextual factors at the local and organizational level, which might increase the salience of religiosity in one's life. In sum, the acquisition of religious beliefs is highly dependent on the local circumstances within which the actor is placed and the continuing salience of these circumstances through the developmental period (Regnerus et al., 2004; Smith, 2003). We can thus clearly observe the effects of these local structures on the formation and organization of religious beliefs in the adolescence and emerging adulthood.

Third, recent studies on religion and adolescence (Pearce et al., 2019) demonstrate the significance of religious institutions on adolescents' developmental trajectories. In empirical studies, religion is analyzed both as an outcome of demographic, social and cognitive determinants (Erickson, 1992; Ozorak, 1989; Smith, 2003) and as an object of cultural change across the individual life course (Desmond et al., 2010; Hardie et al., 2016; Wink & Dillon, 2002). In this sense, in addition to the direction of religiosity from earlier periods of life to adulthood, which is the sole focus of the previous research, it is equally productive to investigate the change in the structure of religious beliefs, particularly as an example of the formation of one's personal culture.

2.2 Data and analytic strategy

I apply the belief alignment model to four waves of panel data from the National Study of Youth and Religion (NSYR), a nationally representative survey of adolescents and emerging adults in the United States (for an extensive description of

the data collection process, see Smith and Denton 2008). The cumulative NSYR datafile consists of 10,648 individual observations (spanning from age 13 to age 28), which are collected through four consecutive waves between 2002 and 2013. The initial representative sample consisted of 3,370 unique individuals. The NSYR is particularly appropriate to an analysis of religious belief networks, as it includes question items encompassing various dimensions of religious beliefs (Pearce et al., 2017), and the period it covers is reasonably long.

2.2.1 Item selection and correlation coefficients

In order to decide on the relevant question items to include, I classified all non-factual questions whose responses cannot be objectively verified, such as an individual's opinions, beliefs, and values. I then dropped the variables that are not of particular relevance to religious beliefs.⁴ Since the analyses concern the connections between survey items, I excluded variables with nominal response categories that do not show or cannot be recoded to reflect an explicit ordering.⁵ I also excluded questions that are not asked in at least two consecutive waves to ensure temporal continuity. This procedure leaves a total of 20 items, all of which are detailed in Table 1.

Building on previous works (Baldassarri & Gelman, 2008; Boutyline & Vaisey, 2017; DellaPosta, 2020), I constructed 190 unique age-specific correlations between belief items across 16 years. Namely, I first grouped the observations by

⁴ Specifically, I used the NSYR codebook organization as my benchmark and kept the variables listed under the pertinent categories. See the Religion sections in the NSYR codebook at <https://youthandreligion.nd.edu/>.

⁵ To rule out the possibility that these items might change the results, I re-estimated the models with these additional nominal variables: views on Jesus Christ, views on the world's origin, and views on who will go to heaven. I recoded them as binary (1 for the most saliently religious response and 0 for all others). The substantial results are identical to the ones presented below. Since the justification of this coding strategy is somewhat arbitrary, I decided to drop these variables in the following analyses.

Table 1. Survey Items, Abbreviations Used in Network Diagrams and Wordings

Survey Items	Abbr.	Questions and Response Ranges
Belief in After Life	aftrlife	Do you believe that there is life after death: Not at all; Maybe; Definitely?
Belief in Angels	angels	Do you believe in the existence of angels: Not at all; Maybe; Definitely?
Commitment to God	comitgod	Made a personal commitment to live your life for God: Yes/No (In Wave 4, “maybe” is coded as “no”)?
Congregation Is A Must	congmust	In order to be truly religious, one needs to be involved in a religious congregation: Disagree/Agree?
Belief in Demons	demons	Do you believe in the existence of demons or evil spirits: Not at all; Maybe; Definitely?
Religious Doubt	doubts	How much, if at all, have you had doubts about whether your religious beliefs [or being nonreligious] are true: No doubts; Few doubts; Some doubts; Many doubts?
Importance of Faith	faith	Importance of religious faith: Not important at all; Not very; Somewhat; Very; Extremely Important?
Belief in Judgment Day	judgeday	Do you believe that there will come a judgment day when God will reward some, punish others: Yes/No?
Belief in God	god	Do you believe in God, or not, or are you unsure: Not at all; Maybe; Definitely?
Closeness to God	godclose	How distant or close do you feel to God most of the time: Extremely distant; Very Distant; Somewhat distant; Somewhat close; Very close; Extremely close?
Views on God	godview	Views that come closest to your own view of God: God is a personal being (1); God created the world, but not involved in it, God is not personal and none (0)?
Learning About Religion	learnrel	Interested or not in learning about religion: Not at all; not very; somewhat; very interested?
Experience in Miracles	miracle	Experienced what you believe was a miracle from God: Yes/No (In Wave 4, “maybe” is coded as “no”)?
Belief in Miracles	miracles	Do you believe in the possibility of divine miracles from God: Not at all; Maybe; Definitely?
Okay to Convert	okayconv	Religious conversion: Leave others; Okay to convert?
Okay to Pick	okaypick	Okay to pick and choose religious beliefs without having to accept the teachings as a whole: Disagree/Agree?
Practice Other Religions	onlyone	Okay for someone of your [one] religion to also practice other religions: Okay to practice; Should only practice one faith?
Answers to Prayers	prayansr	Definite answer to prayer or specific guidance from God: Yes/No (In Wave 4, “maybe” is coded as “no”)?
Spirituality	spiritua	Some people say that they are ‘spiritual but not religious.’ How true or not would you say that is of you: Not true at all; Somewhat; Very?
Views on Religion	viewrel	Views that come closest to your own view about religion: There is little truth in any religion; many religions may be true; only one religion is true?

Note: The relevant procedures are detailed at the end of each question. To obtain the full questionnaires for all waves, see The National Study of Youth and Religion at <https://youthandreligion.nd.edu/>.

respondents’ age and computed the Pearson correlations⁶ between unique pairs of belief items. Since the object of analysis is the relative strength of the correlations

⁶ Since Pearson correlations are biased for binary variables, I replicated all the analyses with tetrachoric correlations between binary variables, polychoric correlations between ordinal variables, and Kendall’s rank correlations between binary and ordinal variables. The substantial results do not change.

rather than their direction, I took the absolute values of the coefficients. This procedure resulted in 3,040 correlation pairs distributed across the ages of 13 and 28 and nested within 190 unique pairs of beliefs. Correlations range from nearly 0 to as high as 0.86. In order to maintain the balance between data sparsity, which is most pronounced in later ages, and information quality, I restricted the minimum number of observations for correlations to be gathered to 50. Figure 1 provides an overview of the distribution of correlations for each age group.⁷

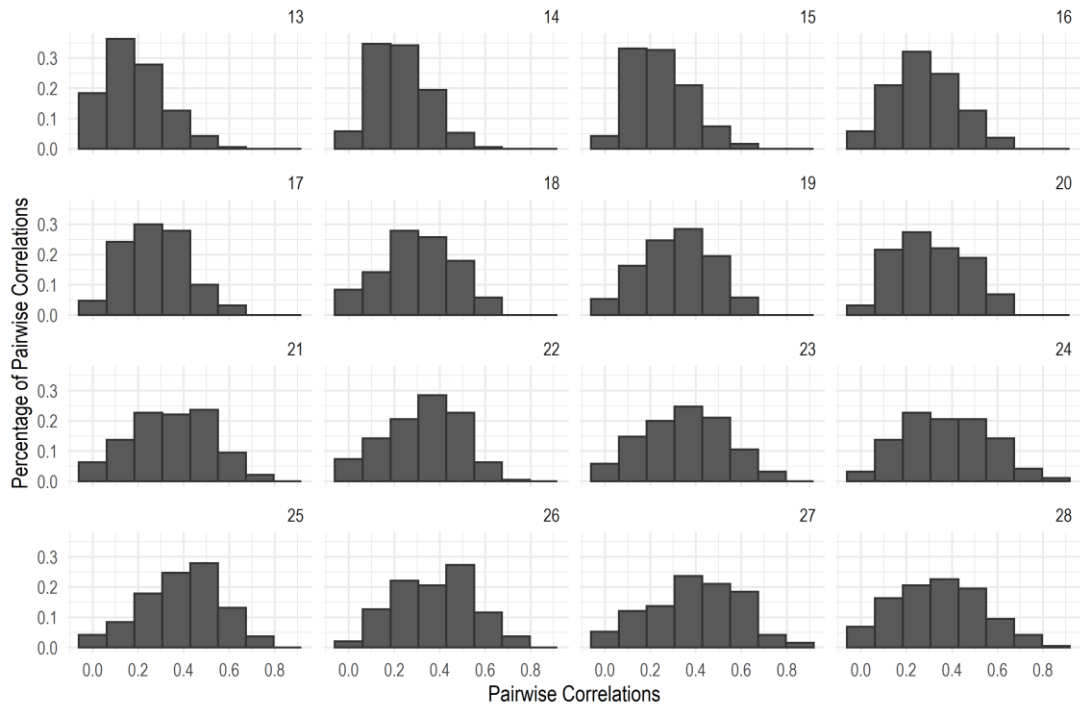


Figure 1. The distribution of pairwise correlations

⁷ One potential problem with this strategy is that there can be unique cohort and period effects in the NSYR sample. Since the data are collected through four waves, which include overlapping age groups, there might be different levels of alignment between waves, net of specific ages. To mitigate this potential bias, I replicated the models by taking the period effects into account. In doing this, I grouped the data by wave and age (instead of only age), gathered the correlations, and estimated correlations nested within both belief pairs and waves. I could detect virtually no period effects that change the substantial interpretations of the following models. Nevertheless, whether the results are due to specific cohort effects cannot be resolved with the data at hand and requires replicating this study in different settings.

2.2.2 Statistical models and alternative explanations

Since the correlation coefficients are structured in groups of belief pairs, I used a linear mixed-effects model (Baldassarri & Gelman, 2008) to produce average age-specific estimates. Formally, the set of correlations consists of pairs of religious belief items x and y , such that all unique belief correlations are indexed by a belief-pair j . For each instance of pairing (a total of 190 pairs), j represents the correlations between x and y . The resulting model takes the form

$$|r|_{j,t} = \alpha_j + \beta_j t + \epsilon_{j,t} \quad (1)$$

where $|r|_{j,t}$ is the value of the absolute correlation in belief-pair j and age t , α_j is the intercept that varies by each belief-pair j , $\beta_j t$ is the linear age-specific trend for correlations that varies by each belief-pair j , and $\epsilon_{j,t}$ is the residual variation. In order to test Hypothesis 2, I modified Equation 1 by adding the square of age as an additional predictor.

In addition to the models, I also conducted several sensitivity analyses to test the robustness of the findings. First, to rule out the possibility that the results are contingent on sampling variability, I followed Boutyline and Vaisey (2017) and used nonparametric bootstrapping. I first generated 1,000 bootstrap iterations for each year of age and examined the changes in the mean constraint of the correlations. Second, I divided the population along 16 demographic dimensions and reestimated the models for each subpopulation to tackle possible population heterogeneity canceled out at the population level. I examined alignment trajectories and compared the correlation signs between these networks, testing the possibility that belief connections mean different things for each group. Nevertheless, whether these

sample partitions adequately capture how different groups organize their belief networks remains problematic. Thus, I used correlational class analysis (Boutyline 2017), or CCA, to inductively search heterogeneities in the sample, testing the age-specific trajectories for each belief community. Third, I analyzed the possibility that item selection drives the observed conclusions. I constructed 5,000 additional samples by randomly dropping 10 belief items out of 20 and estimated the models with the remaining 45 pairs to mitigate possible selection effects. For each resample, I again implemented mixed-effects models, extracted the coefficients, and examined the signs of the coefficients and their variation.

2.3 Results

Figure 2 presents the religious belief network for age 13, while Figure 3 presents the religious belief network for age 27.⁸ The graphs reveal striking differences between the structure of belief systems in the two periods. In the first graph, the average strength of ties is relatively low (mean = 0.19, standard deviation = 0.13), while in the second graph, tie strengths substantially increase (mean = 0.40, standard deviation = 0.19). Curiously, the centralization of the second graph (i.e., the degree to which the overall network is organized around its most centralized point) is lower than the first graph, suggesting that an increased number of beliefs gain influence over the whole network. These two measures provide strong visual evidence for the alignment of religious beliefs from adolescence to emerging adulthood.

⁸ Since the number of observations is substantially smaller in age 28 ($N = 183$) than age 27 ($N = 426$), I decided to present the network for age 27.

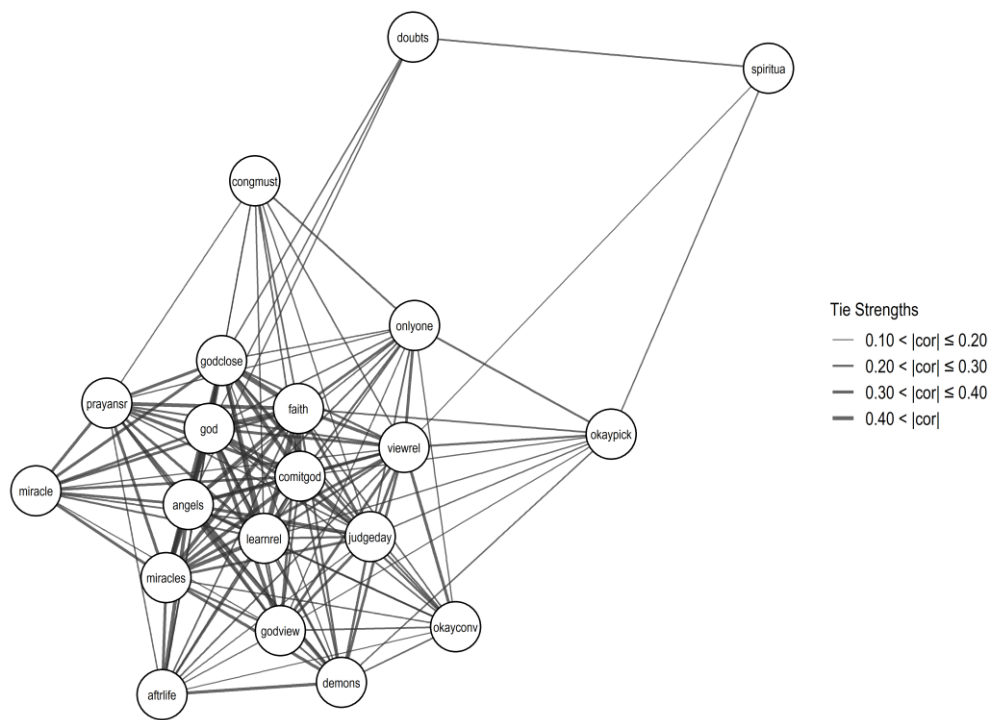


Figure 2. The religious belief network for age 13

Note: Nodes represent religious beliefs and the edges between these nodes represent the absolute correlations between these beliefs. Correlation coefficients below 0.10 are not depicted for legibility. The graph is force directed and depicted using the Fruchterman–Reingold algorithm.

In order to substantiate the initial evidence, I conducted multi-level linear mixed-effects regressions of the absolute correlations on respondents' age. Table 2 presents the results. As previously hypothesized, average correlations from age 13 to age 28 are estimated to increase 1.17% per year of age, with an estimated standard deviation of 0.66% across the pairs (see Model 1), which confirms Hypothesis 1: the average level of mean constraint increases with time, and the individual effect for each belief pair is either close to zero or positive. In order to test Hypothesis 2, which claims that this rate of increase should slow down with each consecutive year of age, I included an additional predictor (age-squared) to Model 2. Results confirm Hypothesis 2: coefficients for age and age-squared are 2.50% and -0.09%, respectively, both of

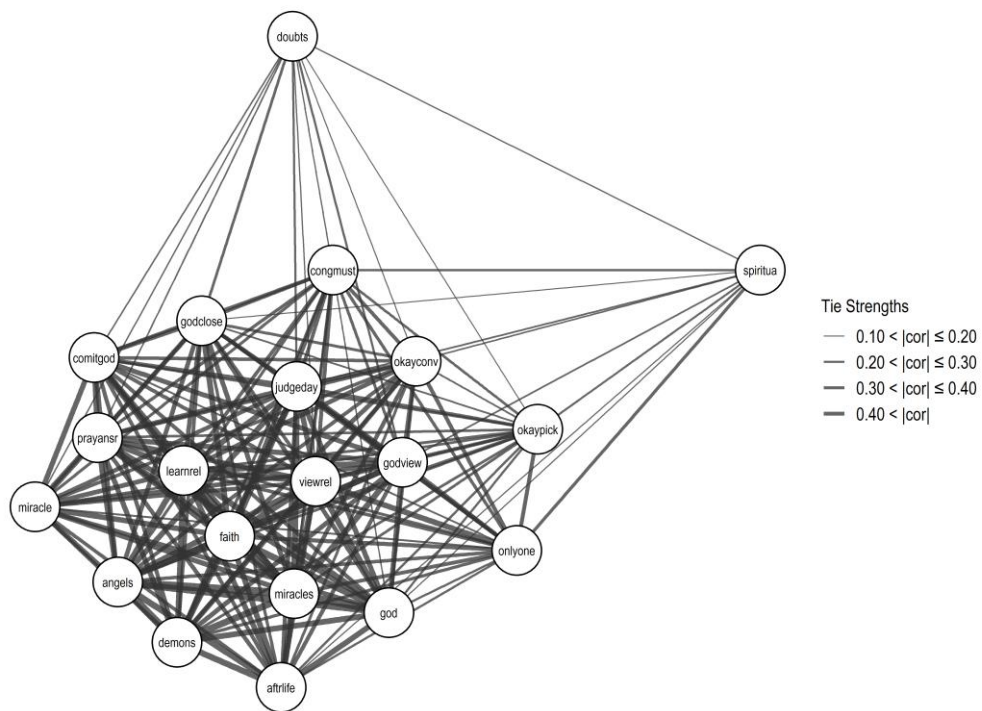


Figure 3. The religious belief network for age 27

Note: Nodes represent religious beliefs and the edges between these nodes represent the absolute correlations between these beliefs. Correlation coefficients below 0.10 are not depicted for legibility. The graph is force directed and depicted using the Fruchterman–Reingold algorithm.

which are statistically significant at $p < 0.001$, and the residual standard deviation of age is not different from Model 1 (0.67%). Comparing the model fits, both Akaike Information Criterion ($-8,807 < -8,446$) and Bayesian Information Criterion ($-8,764 < -8,409$) show that Model 2 fits significantly better than Model 1. In additional analyses that are not shown in the regression output, I experimented with cubic polynomial regressions but could not detect an additional spike in the final quadratic fit. Overall, mixed-effects regressions validate the claim that mean constraint increases with each year of age, and the correlations between religious belief items

become stabilized over time.⁹

Table 2. Multilevel Mixed-Effects Regression Models

	Model 1	Model 2
Age	0.0117*** (0.0005)	0.0250*** (0.0008)
Age ²		-0.0009*** (0.0000)
Intercept	0.2280*** (0.0092)	0.1970*** (0.0093)
SD: Age	0.0066	0.0066
SD: Intercept	0.1249	0.1252
AIC	-8,446.09	-8,807.03
BIC	-8,409.98	-8,764.90

Note: Models estimate zero-order bivariate correlations (N = 3,040) nested within 190 unique pair of items. The minimum number of observations for correlations to be gathered is set to 50. Age is rescaled such that age 13 is equal to 0 and each unit corresponds to 1 year. AIC refers to Akaike Information Criterion and BIC refers to Bayesian Information Criterion. Standard errors in parantheses. ***p < 0.001 (two-tailed tests).

2.3.1 Sampling variability

There are three sources of potential error that need to be addressed. First, the alignment trends might simply result from the peculiarities of the particular sample at hand. In order to provide more rigorous estimations, I followed Boutyline and Vaisey (2017) and DellaPosta (2020) and used non-parametric bootstraps to establish the statistical significance of the presented results. In each bootstrap replication, I re-sampled the NSYR respondents 1,000 times for each year of age, created belief networks for each iteration of the bootstrap, resulting in 1,000 networks per year of age, calculated the mean constraint levels, as well as the eigenvector centralization scores. In the end, I arranged the resulting network statistics and calculated their mean and 95% confidence intervals for each age.

⁹ In an alternative specification, I estimated the models with age dummies in the predictors. The results are presented in the Appendix C. These estimations show that, although there is an increase in correlations with each year of age, there is a substantial drop in correlation coefficients at age 28. This alone does not discard the conclusion that there is an increase of constraint from adolescence to emerging adulthood, but it should lead us to ask whether this increase can be sustained over the years. See Appendix C for the complete results. I also examined whether beliefs change with respect to age, the results of which are presented in Appendix A.

The results are presented in Figure 4, confirming that the previous estimations are not sensitive to sampling variability. In order to substantiate the observed trends, I again fitted quadratic regression models to grouped bootstrapped samples. Similar to multi-level mixed-effects models, the coefficients for constraint are 2.47% for age and -0.08% for age-squared; both are significant at $p < 0.001$. An additional concern would be to ask whether this alignment occurs with or against the backdrop of belief centralization. Perhaps, the alignment is the result of an increasing influence of certain items over others. The second plot (“centralization”) rejects this claim. In fact, centralization scores slightly reduce with time: the coefficient of age is significant at -1.07% ($p < 0.001$) and age-squared at 0.04% ($p < 0.05$). In sum, bootstrapped replications support the belief alignment model.¹⁰

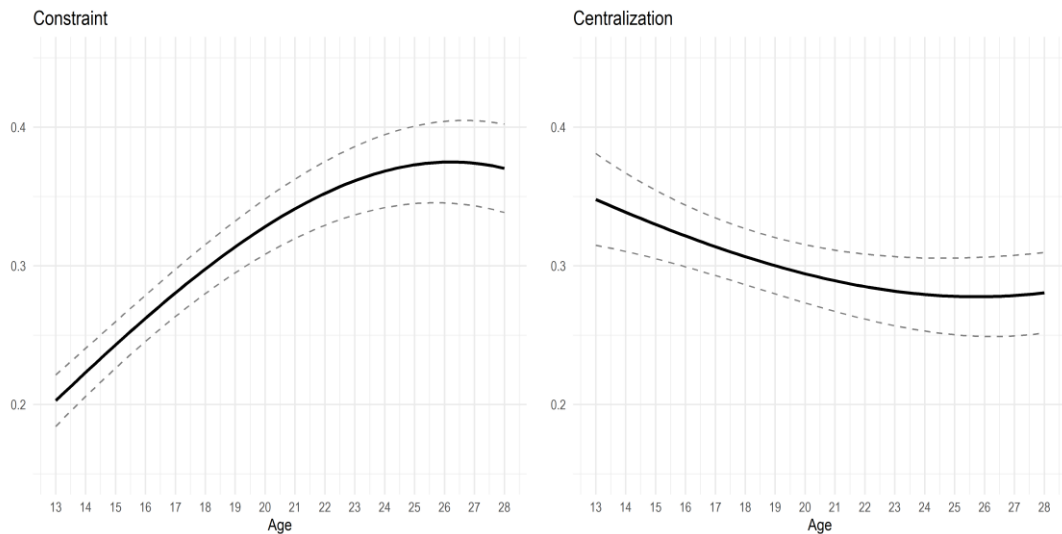


Figure 4. Bootstrapped replications for belief alignment trends

Note: Each panel is represented with cubic spline-smoothing functions of age-specific mean values for 1,000 bootstrapped replications: constraint refers to mean correlations and centralization refers to the overall eigenvector network centralization score for each age. Dashed lines indicate 95% confidence intervals.

¹⁰ In addition to sampling variability, panel attrition can also affect the results (see Appendix B for discussion).

2.3.2 Population heterogeneity

An additional source of error is population heterogeneity (Baldassarri & Goldberg, 2014; Goldberg, 2011), i.e., the proposed trends may vary systematically across the subpopulations. In order to test this possibility, I divided the sample along 16 axes organized around 4 main themes. First, for demographic differentiation, I compared groups across whether (1) the respondent is coded as male or female, (2) white or non-white, (3) living in the South or not, and (4) affiliated with any religion.¹¹ In order to disentangle distinct life trajectories and social relations, I divided the sample along (5) social network homogeneity (defined as the percentage of close ties with same beliefs about religion), (6) whether the respondents went through traumatic experiences such as the death of close relatives or accidents, (7) whether the respondent went to college, and (8) downward mobility, defined as the reported financial hardships given that the respondents' parents had annual income above the median country-level income in 2002.¹² To capture the effects of parents, I compared respondents across whether (9) faith is "extremely important" for parents, (10) parents are married, (11) at least one of the parents went into college, and (12) household income is above or below \$40,000, which is relatively close to the median income in 2002. Finally, I also divided the respondents with respect to their religiosity, comparing groups across (13) church attendance, (14) the respondent's participation in religious youth groups, (15) the respondent's religious training, and (16) religious conversion (including non-affiliation). I then replicated the same

¹¹ Religious affiliation is coded according to self-report. Thus, religiously non-affiliated individuals are the ones that explicitly identify themselves as not affiliated with any religion.

¹² Changes in socioeconomic status are relatively hard to operationalize with the NSYR, and this measure is less than satisfactory. Nevertheless, given limitations, it seems to be the only way to approximate mobility.

modeling process for each subgroup. Figure 5 presents the results.¹³

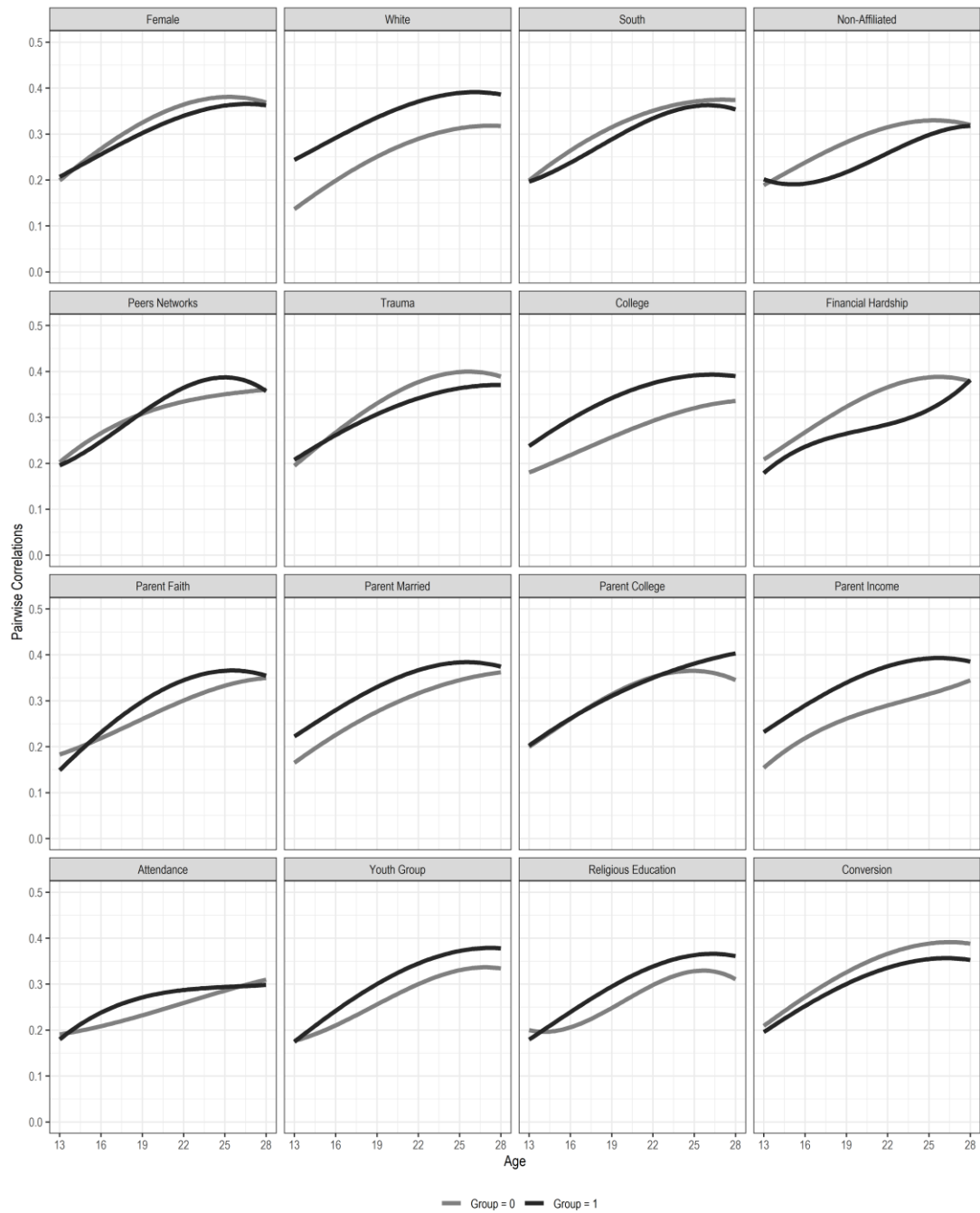


Figure 5. Belief alignment trends across the subpopulations

Note: Each panel is represented with cubic spline-smoothing functions of age-specific mean values.

¹³ An important caveat for the following results is the relatively low levels of observations in certain ages when the unit of analysis is reduced to subpopulations.

Overall, most trends conform to the population-level process of belief alignment, though there are two significant exceptions. First, there are substantial differences between the intercepts of White and non-White respondents (the latter of which has significantly lower levels of mean constraint), respondents above and below the \$40,000 cutoff (again, the mean constraint of the latter is substantially lower than the former), and those that had a college education and those that had not. Second, the rate of belief change for respondents with more institutional contact with religion is strikingly different from the others: church attendees rise relatively more quickly than non-attendees, and those who have not participated in youth groups or received religious training rise more slowly and remain less constrained than the others. Nevertheless, the alignment trends are still present across the subpopulations. All coefficients for age are positive and statistically significant (ranging from 1.37% to 3.16%), which is similar for age-squared, whose coefficients are negative and statistically significant (ranging from -0.12% to -0.01%). I estimated regressions with cubic terms as well. Still, AIC and BIC estimations show that in 15 out of 16 subpopulation comparisons, quadratic estimations provide the best-fitting models, except for the network homogeneity, where the cubic model is marginally better than the quadratic model. These results support the argument that, despite the varying levels of mean constraint observed in different subpopulations, the alignment of beliefs is present in all groups.

Nevertheless, an analysis of subgroups requires that each group understands the correlations between beliefs in the same manner, and there is a single dominant process that generates a belief network at the population. To test these assumptions, I conducted two additional tests. First, rather than looking at the absolute belief correlations, I compared the coefficient signs across subpopulations. Following

Boutyline and Vaisey (2017), I first constructed adjacency matrices for each group. Since statistical noise can affect the results, I removed all correlation coefficients that were not statistically different from 0 at $p < 0.05$. Then, I compared the correlation signs of belief pairs between these exclusive groups. For example, at age 28, 149 belief-pairs out of 190 (78%) are statistically different from 0 for two subgroups, those who attend church gatherings and those who do not, and 140 (93%) of these pairs have the same sign. This suggests that these groups are not substantially different in understanding the relationalities between religious beliefs. Table 3 presents the summary measures for each subpopulation, including the mean percentage of similar signs in all ages and their standard deviation. The results show that there are indeed significant differences between groups, albeit modestly. Nearly 22% of belief correlations have different signs for affiliated and non-affiliated respondents, followed by church attendance and religious education. Therefore, one's religious adherence, as well as her socialization into religious organizations, do seem to affect the ways belief networks are constructed.¹⁴

Table 3. The Percentage of Similar Signs Among Belief Pairs Between Subgroups

Subpopulations	Percent Similar (Mean)	Percent Similar (SD)
Non-Affiliated	0.781	0.032
Church Attendance	0.854	0.046
Religious Education	0.884	0.046
Youth Group	0.932	0.027
Financial Hardship	0.948	0.034
Parent Faith	0.955	0.020
College	0.963	0.022
Parent Married	0.967	0.020
Parent Income	0.968	0.022
White	0.969	0.025
Female	0.980	0.017
Trauma	0.983	0.020
South	0.983	0.014
Conversion	0.985	0.012
Homogeneous Peers	0.989	0.007
Parent with College	0.991	0.012

¹⁴ I also checked whether the signs of belief pairs change with respect to age, but apart from differences between subpopulations, there are no age trajectories.

If there are heterogeneities in the population but no perceptible differences in age trajectories of belief constraint, population heterogeneity tests may have assumed too much, since looking at paired subpopulations detects heterogeneity only if one set of identities dominates the others. Specifically, populations can differentiate through shared understandings, “the extent to which they organize meaning in similar ways” (Goldberg, 2011, p. 1403). Hence, it is vital to look at the data inductively. To that end, I used correlational class analysis (CCA) to identify different groups (Boutyline, 2017), the detailed procedure of which is documented in the Appendix D. In particular, I applied the CCA for the first wave, and analyzed the correlational structure of the resulting groups. Then, I assigned these classes to later waves and inspected the trajectories of these classes throughout the period.

The CCA detected four distinct classes. Group 1 distinguishes itself from the others with its position on religious belief items that can be conceptualized as what Pearce, Hayward and Pearlman (2017) call “religious exclusivity,” whether individuals “hold particular religious beliefs to a more global belief in absolutes” (371). These beliefs have negative correlations to other beliefs, suggesting that religiosity and absolutism are not congruent with each other for these individuals. Group 2 is characterized by the negative relation of *congmust* (whether congregations are vital for religiosity) to the other variables, suggesting that individuals in this group have less emphasis on institutional adherence. Group 3 is distinctive with its focus on spirituality (this is the only group where spirituality is positively correlated with the other items) and the centrality of such variables as closeness to God and belief in angels. Finally, Group 4 is the one that has the most similarity to the population-level trends, having strongly positive connections between religious items and negative connections with religious doubt and

spirituality. The results are depicted in Figure 6, which shows that all groups have a similar pattern: the absolute correlations between religious beliefs become increasingly aligned and relatively stabilized. Nevertheless, it can be seen that Group 4 starts with high constraint, and the alignment occurs a lot earlier than the others.

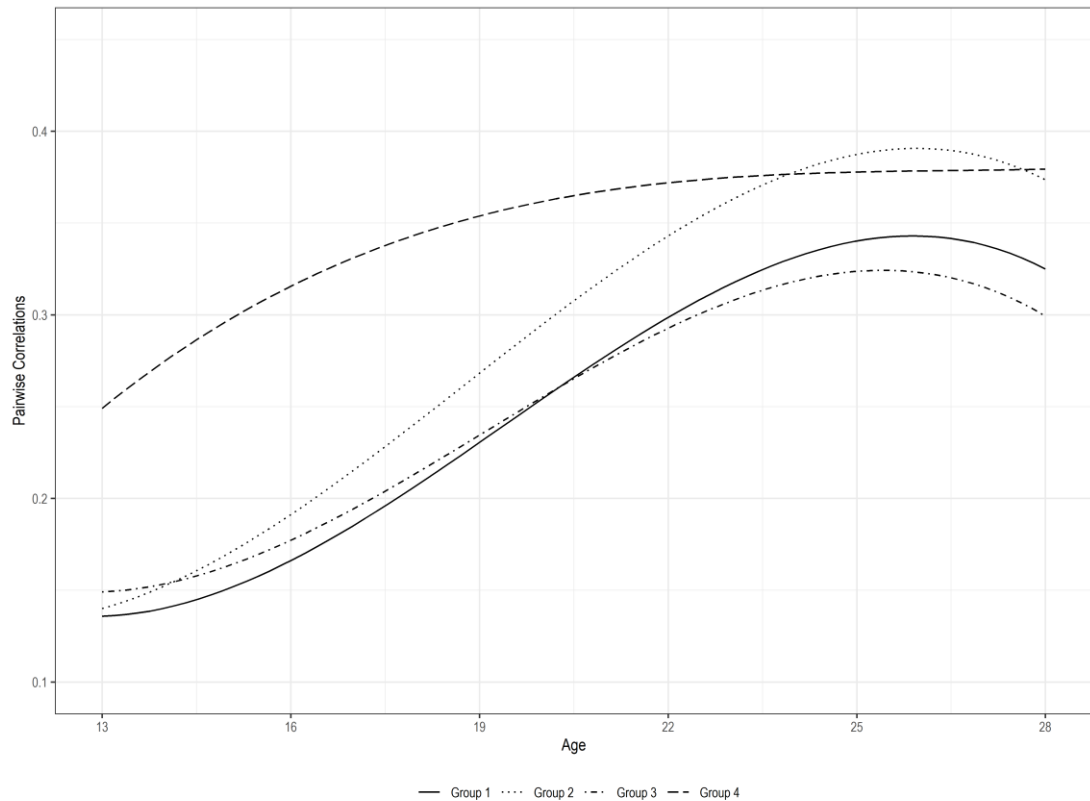


Figure 6. Belief alignment trends across the CCA groups

Note: Each line is represented with cubic spline-smoothing functions of age-specific mean values.

2.3.3 Item selection

The last set of analyses concerns the possibility that the variable selection induces an error in the estimations. The collection of belief items presented in Table 1 was the result of an iterative process. Therefore, there can be selection bias because choosing one set of variables instead of another might transform the results. To rule out this possibility, I constructed 5,000 additional samples by randomly dropping 10 belief items out of 20. In each resampling, I reconstructed the pairwise belief correlations

(45 belief pairs per year of age), estimated the multi-level mixed-effects regression models with age and age-squared, and extracted the coefficients. Figure 7 demonstrates that the distribution of the coefficients across 5,000 samples confirms the expectations. The mean score for age is 2.34%, and all coefficients are statistically significant, while the mean score for age-squared is -0.08%, and again, all coefficients are negative and statistically significant.

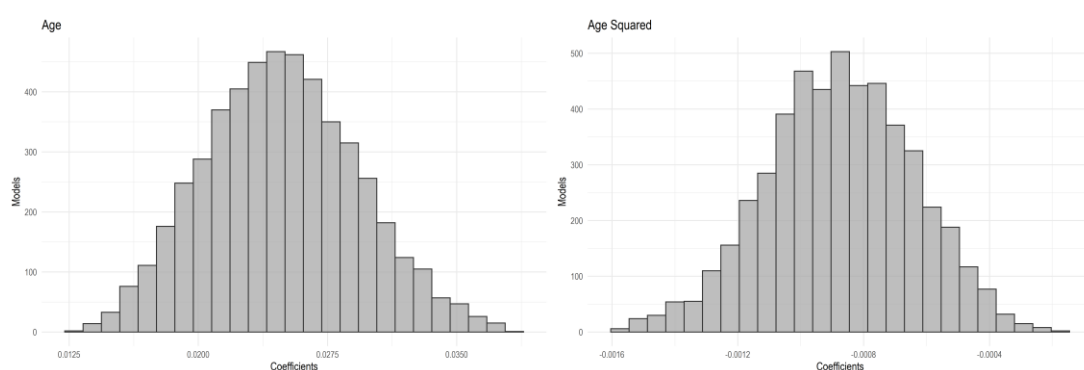


Figure 7. Belief alignment trends in 5,000 random samples

Note: The first histogram (left) presents the distribution of age coefficients drawn from 5,000 samples of 10 randomly chosen belief items. The second histogram (right) presents the same distribution for age squared.

2.4 Discussions and conclusions

In this article, I developed an alignment model of cultural formation from adolescence to emerging adulthood, and I showed that religious beliefs become relatively aligned with time. Pairwise correlations between religious belief items become higher, and the rate of increase slows down with each consecutive year of age. Both the changes in the structure of religious belief networks and the multi-level mixed-effects regression models confirmed this conclusion. Furthermore, results were shown to be insensitive to possible sources of error, including sampling variability, population heterogeneity and item selection. Rather than looking at the direction of religious change, I analyzed the changes in its structure, demonstrating

that no matter what the content of the belief network is, cultural socialization is crucial for the organization and adjustment of the form of belief networks.

2.4.1 Implications for cultural sociology

These results are consistent with the recent psychological and sociological accounts of cultural change and persistence (Alwin & Krosnick, 1991a; Kiley & Vaisey, 2020; Krosnick & Alwin, 1989; Vaisey & Lizardo, 2016; Visser & Krosnick, 1998). An important implication of these studies was to emphasize the past conditions of production in explaining the durability of cultural orientations across the life course. Most accounts argued that earlier life periods constitute “impressionable years” (Alwin & Krosnick, 1991a), the periods in which people’s susceptibility to change is much higher, and cultural, moral, and political transformations are most probable. To account for this, I provided a possible explanation for cultural formation and stabilization. This conclusion can be replicated for such salient areas as moral or political beliefs and the construction of cultural lifestyles and preferences.

I extended the methodological innovations in cultural sociology (Baldassarri & Gelman, 2008; Boutyline & Vaisey, 2017; DellaPosta, 2020) to studies on socialization and life course transformations. Since the data cover a relatively short period compared to other studies that use surveys like General Social Survey or American National Election Studies, potential changes in the meaning and usage of the belief items are minimized. Yet, applying this analytic framework to both other areas and long-term periods necessitates an engagement with the Age-Period-Cohort problem. This might prove fruitful with the multi-level modeling approach adopted in this article (Yang & Land, 2006).

Using religious socialization as an orienting case, this article also

contributed to the debates around religious formation and change in adolescence and emerging adulthood (Desmond et al., 2010; Hardie et al., 2016). Most notably, I showed that most religious beliefs become constrained over time. Consequently, this article calls for an examination of how religious belief systems are organized. Considering the rich methodological work carried out in studies on the measurement of religiosity (Adams et al., 2020; Cornwall et al., 1986; Pearce et al., 2013, 2017), the question of how different dimensions change the belief structure and affect one another can be promising.

2.4.2 Limitations and extensions

The model of belief alignment outlined in this article has certain constraining assumptions, which hindered the full realization of the model's implications. Most importantly, beliefs are restricted to an assemblage of religious attitudes, opinions, and preferences, leaving out other domains that have potential relevance for the organization of religious beliefs. The analytic payoff of this theoretical choice was to enable temporal continuity and item consistency. Still, at the same time, this might conceal the effects of such issues as morality or politics.

It is also important to note that this article theorizes the change from adolescence to emerging adulthood, but whether belief systems remain stable afterward is an empirical question. In fact, the results show a slight but significant decrease in constraint in age 28, suggesting that the subsequent life course can be more variable than suggested in this article. The previous literature shows that attitude and opinion reports can be random in certain quarters of the population (Converse, 1964), and individuals have conflicting opinions in many cases (Zaller, 1992). However, this does not preclude the possibility that opinion instability and

structural stability can be present simultaneously. Future work is needed to assess the conditions under which the belief alignment model does not work and the degree to which social instabilities translate to belief system instabilities.

Finally, the belief alignment model is operationalized at the population level, meaning that the alignment trajectories we see in the sample do not necessarily imply that the effects are similar at the individual level. As previously stated, the model cannot adjudicate whether we see belief alignment for individuals (alignment of beliefs with one another) and belief alignment between individuals (alignment of certain groups with other groups). Future work is needed to assess the results of this study at the individual level.

In conclusion, the propositions of this study are all converged on the claim that the socialization period is decisive in setting the tone for an individual's subsequent life. Adopting Swidler's (1986) famous term, childhood, adolescence, and emerging adulthood are "unsettled cultural periods." This is why understanding how cultural, moral, and political beliefs are organized necessitates an extensive investigation of cultural formation. This article attempts to show that the formal analysis of personal culture can be best complemented with understanding the role of time and the question of political and cultural socialization in shaping the dynamics of personal development.

CHAPTER 3

THE ORGANIZATION OF POLITICAL BELIEF NETWORKS

In *The Nature and Origins of Mass Opinion*, Zaller (1992, p. 96) defines ideology as an organizational scheme for holding together disparate political considerations. Similar formulations are common in the public opinion literature, where popular accounts conceptualize ideology as “a learned knowledge structure consisting of an interrelated network of beliefs, opinions, and values” (Jost et al., 2009, p. 310). Ideology, in other words, specifies an organization or structure of sociopolitical orientations. This emphasis on the relational capacities of ideologies produced an immense number of studies examining the form of political opinions in mass publics (Converse, 1964; Judd & Milburn, 1980; Zaller, 1992), the degree to which ideologies are centralized (Boutyline & Vaisey, 2017; Brandt et al., 2019) and the sources of political sophistication and constraint (Gordon & Segura, 1997). The structural differences in ideologies are also examined across various demographic and cognitive variables.

However, less attention is paid to the cross-national variation of mass opinions, the structure of which can systematically vary with respect to numerous contextual factors. In this paper, I use belief network analysis (Boutyline and Vaisey 2017, henceforth BNA) to investigate ways of organizing political ideologies. Analyzing the political belief networks of 76 countries from the joint dataset of World Values Survey (WVS) and European Values Study (EVS), I explore the predictors of variation in the organization of mass political belief systems. Consistent with the theories of social constraint (Zaller, 1992), I provide substantial evidence for

the role of the political field in structuring public opinion. I find that political party institutionalization significantly predicts higher organization of political beliefs. More directly, ideologically motivated political parties strengthen the connections between political opinions, and construct strong ties among political beliefs that have different topical and systemic properties.

I organize the rest of the article as follows. First, I review the literature on public opinion, and hypothesize that political parties facilitate high belief constraint. Second, I use survey data from the WVS/EVS to construct 76 unique belief networks. I empirically examine the potential predictors of high belief organization in the cross-national context, proposing that the political fields, especially the structure of political parties, significantly predict how political ideologies are organized. In the final part, I discuss the main findings and propose future directions.

3.1 Public opinion and mass belief systems

3.1.1 The varieties of public opinion

Scholars in the public opinion literature have repeatedly discussed whether individuals have consistent and coherent beliefs or not. Starting with Converse's (1964, p. 267) now-classical definition of belief systems, an extensive number of empirical studies documented "belief constraint" (Converse, 1964; Inglehart, 1985; Nie & Andersen, 1974), defined simply as the degree to which having one set of beliefs implicates having another set of beliefs. Most of these studies have focused on the United States, examining the potential differences between political elites and non-elites (Converse, 1964), those with high and low education (Judd & Milburn, 1980), politically sophisticated and unsophisticated (Zaller, 1992), and politically informed and uninformed (Boutyline & Vaisey, 2017). In principle, this idea entails

that there are “webs of implications” among political beliefs (Martin, 2002), and individuals might be stratified according to their abilities to map out the political field consistently and coherently.¹⁵

Following these questions, most studies on belief systems revolve around the problem of how political beliefs are organized among different social groups, proposing that some form of differentiation across education and political awareness should affect the organization of political opinions for individuals. Some studies claim that individuals do not have strongly patterned beliefs (Converse, 1964; Zaller, 1992) while others suggest that the observed inconsistencies are due to measurement error and people *do* have organized belief systems (Ansolabehere, Rodden, and Snyder 2008; Judd and Krosnick 1982; Judd and Milburn 1980; Peffley and Hurwitz 1985). Regardless, strong belief constraint is seen as an essential form of political sophistication, and an ability to form connections between different political issues.

Nevertheless, just because individuals do not have coherent belief systems does not mean that their cognitive abilities are the main culprits. It is one thing to claim that individuals show varying susceptibilities to information (Zaller, 1992), it is quite another thing to claim that these information bits have logical and inherent connections, such as political ideology. In fact, given that individuals have conflicting considerations about much of the cultural stuff (Swidler, 1986), and pluralistic social structures can cut across political issues (DellaPosta, 2020), it is quite hard to connect different spheres of political beliefs (Martin, 2000). Thus, I argue that it is significant to ask if certain social support structures might be helping individuals to make relations among different political and cultural issues relatively

¹⁵ Throughout the paper, I use the term “belief” to invoke values, attitudes, and opinions. Therefore, “belief system” refers to the domain or issue-specific organization of cultural and political orientations.

more salient (Lizardo & Strand, 2010). In other words, rather than looking at people's cognitive abilities to make connections, we can look into the contextual predictors that establish these connections between political beliefs.

3.1.2 Tying one opinion to another

How, then, can we understand the mechanisms for high constraint? If seeing opinion A implies seeing opinion B, cultural beliefs can be understood as *networks of co-occurrences* (Goldberg & Stein, 2018), meaning that individuals, to use Goldberg and Stein's (2018) apt observation, "impute" some associations between cultural beliefs from observing others' behaviors. Recent studies show that this imputation process can be developmental, that is, individuals' constraint levels can be differential to age (Keskintürk, 2021). Nevertheless, even this developmental process should be dependent on externalized cultural structures (Lizardo & Strand, 2010) so that individuals can have support systems to easily navigate cultural beliefs.

One such support structure is what Martin (2002) calls "cognitive authorities." According to Martin, even in the absence of deliberate rationalization, belief systems should be *tighter*¹⁶ if the corresponding beliefs are placed "within the same domain of authority" (872), which exerts pressure for beliefs to have "mutually supporting implications." In this view, if individuals (a) allow some figures to have cognitive influence and (b) that influence is deemed legitimate, then cognitive authorities emerge, which in turn put pressure on individual beliefs to bundle together and systematize. Analyzing intentional communities, Martin found that social groups with clear authority figures have high belief constraint relative to

¹⁶ Martin (2002) defines *tightness* as the overall "degree of organization attributable to the interconnection of beliefs" (866), which is conceptually similar to the idea of constraint used in this article.

groups with no clear cognitive authorities. Using the same dataset, Rawlings (2020) showed that these cognitive authorities have even the power to make correlated attitude changes via social influence. Therefore, the systematization of cultural beliefs can be dependent on the existence of strong cognitive authorities.

Yet, most people do not live in cohesive communes, and cognitive authorities with strong influences are easy to miss. Even though self-sustaining cultural cascades can emerge in highly pluralized social structures (Goldberg & Stein, 2018), recent studies also show that one's local environment stands relatively thin compared to national politics (Lindner & Houle, 2021), and cultural beliefs are highly responsive to institutional cues (Goren, Federico and Kittilson 2009). The puzzle then is as follows: how can individuals have relatively high belief constraint without simply relying on local structures, particularly when the political field is pluralistic (DellaPosta, 2020) and political information cues are highly heterogeneous (Zaller, 1992)? Going further, is it possible to see cognitive organizers in the broader context, such as nations?

I propose that political parties, if they are organized as ideological embodiments of overarching political worldviews, facilitate high belief constraint. Most directly, previous literature shows that political parties provide leadership cues and shape information flows (Zaller, 1992), help paving the way for reduced information costs (Gordon & Segura, 1997), generate party alignment if novel issues arise (Carmines & Stimson, 1986) and strengthen attitude constraint among partisans (Goren et al., 2009). Extending the logic of cognitive authorities to the national level, political parties can work as the defining center for organizing and structuring the belief space. Using such channels as the media, local organizations and discussion networks, political parties can operate as the social background of organizing values,

attitudes, and beliefs.

There are two implications of this proposition. First, the theoretical implication is that an ideologically motivated party can operate similar to religious preachers and ideologues, helping to cohere political disagreements and provide basic cues for navigating the belief space. This, in turn, should combine different spheres of political beliefs, tying ideological beliefs to policy questions and social attitudes. Second, the empirical implication is that the structural properties of political belief systems should vary according to country-level party indicators.

3.1.3 The structural properties of political belief systems

In this framework, the central proposition of the preceding discussions is that institutionalized, i.e., ideologically motivated and organizationally strong political parties should systematize the ways in which political beliefs are organized, resulting in high belief constraint. Let us suppose that we have N political beliefs, which can be mapped onto N -chooses-2 unique pairs. In doing this, we can construct political belief systems from the $N \times N$ adjacency matrices where nodes are unique beliefs and the edges between these nodes represent belief connections. Building on Boutyline and Vaisey's (2017) recent work, we can operationalize belief systems as *belief networks*, where survey responses to opinion questions represent unique beliefs and the correlation coefficients between these responses denote the connections between political beliefs.

This approach grants considerable advantage for examining the variation in the relational properties of political belief systems. Most importantly, the evaluation of belief systems can be systematically disaggregated to both graph-level metrics, as well as micro-level node and edge properties. Theoretically, modeling belief systems

as belief networks is consistent with the idea that individuals have at least some amount of “cognitive organization” (Cartwright & Harary, 1956; Heider, 1946; Osgood & Tannenbaum, 1955). Empirically, though, it allows measuring the properties of this organization with as few assumptions as possible.

There are at least two potential objections to this framework. First, BNA obscures within population heterogeneities, assuming single opinion generation structures for each unit of analysis (for alternative views, see Baldassarri and Goldberg 2014; DiMaggio et al. 2018; Goldberg 2011; Martin 2000, 2002). However, this simplification also allows one to establish meaningful comparisons between units in higher levels of aggregation. Second, measuring population-level structures does not grant sufficient evidence for uncovering cognitive structures (Heider, 1946; Martin, 2000). It is indeed true that graph-level measures cannot show direct evidence for individual-level mechanisms, which would otherwise imply some form of ecological fallacy. Yet, it is also true that if the organization of attitudes is derived from “a single dominant process in the population” (Boutyline & Vaisey, 2017, p. 1373), this assumption helps construct an alternative avenue for conceptualizing public opinion structure simply as an emergent phenomena. In this article, the central question I pose is whether these dominant processes of opinion organization can be adequately captured in the cross-national context of public opinion.

3.2 Data and analytic strategy

In order to test these ideas empirically, I use data from the World Values Survey and European Values Study (EVS/WVS 2020, EVS/WVS in short). In the 2017-2020

period, EVS/WVS covered 79 unique countries (34 from EVS and 49 from WVS),¹⁷ surveying representative samples with more than 127,000 individuals. Each questionnaire included diverse opinion items ranging from economic values and political culture to moral issues. Both organizations developed their questionnaires independently, the overlapping items of which were combined in an EVS/WVS variable correspondence sheet. I screened the list of all joint variables, and kept 32 belief items relevant to political issues, including economic redistribution, government spending, immigration, gender norms and political organization. The complete list of countries and corresponding surveys are documented in the Appendix E, and the set of opinion items are documented in the Appendix F.

3.2.1 Measuring political belief networks

Building on the previous literature (Baldassarri & Gelman, 2008; Boutyline & Vaisey, 2017; DellaPosta, 2020), I obtained the zero-order squared correlation coefficients¹⁸ between each pair of political belief items for each country, resulting in 496 correlation pairs per unit, and 37,355 total correlation pairs for all countries.¹⁹ Since opinion alignment describes the degree to which correlations go together (Baldassarri & Gelman, 2008) rather than making specific predictions for their direction, I used the absolute values of the coefficients. Correlations range from nearly 0 to as high as 0.98 ($\mu = 0.03$ and $\sigma = 0.07$). I constructed 79 networks from

¹⁷ Four countries are surveyed in both datasets. These are Germany, Romania, Russia, and Serbia. Data from each survey are then pooled in the joint EVS/WVS dataset.

¹⁸ To obtain correlation coefficients, I used polychoric correlations for ordinal variables, Pearson correlations for interval variables, and polyserial correlations for ordinal and interval variables. The items that have seven or fewer response options are treated as ordinal variables. I estimated correlation coefficients with pairwise complete observations, meaning that I used every information for each pair. In order to relax the normality assumption, I used nonparanormal transformation from R's *huge* package to implement Gaussianization.

¹⁹ In 11 countries, the question of “political ideology” (the position on the left-right scale) is not asked. I controlled for this omission in the upcoming models, and dropping this item did not change the overall results.

these belief pairs, where nodes denote political belief items and weighted edges denote the correlations.

3.2.2 Contextual predictors of cross-national belief organization

I compiled a series of variables from different sources to examine the cross-national variations. The central proposition necessitates an informative measure for the political parties, especially their ideological motivations and organizational powers. The most pertinent variables for these questions, as far as the items that I know of, can be obtained from the Varieties of Democracy (V-Dem) dataset (see Coppedge et al. 2020). V-Dem is an independent research institute collecting cross-national data from an international team of more than 3,200 experts, whose ratings of various questions provides an extensive number of items on such diverse issues as electoral systems, the form of democratic institutions, and the structure of political parties. I picked three variables from this dataset: (1) *party linkages*, which quantifies the degree to which parties and constituents have programmatic agreement, compared to clientelist hoarding, (2) *distinct party platforms*, which measures whether major national parties have ideological manifestos, and (3) *legislative party cohesion*, which asks whether the party members vote with their parties all the time. I combined these three variables (Cronbach's $\alpha = 0.75$) using the average values between 2000 and 2017 in order to dampen the effects of idiosyncratic periods, though the final scale is highly correlated (0.98) with an alternative scale that uses only 2017 values. This item, what I call *ideological institutionalization*, provides the main predictor for the central proposition.

I also included various control variables, which can moderate the effects of political fields on network organization. First, replicating Laakso and Taagepera's

(1979) well-known method that provides an *effective number of parties* (i.e., number of political parties adjusted according to their electoral success), I controlled for the organization of parties. The majority of the values comes from the extensive study of Gallagher's (2020) election indices data. There were nearly 10 missing cases, all of which I hand-calculated from the online sources of election results. In addition to the effective parties, I computed a political activism scale (Cronbach's $\alpha = 0.79$) and a civic membership scale (Cronbach's $\alpha = 0.82$) from the EVS/WVS.²⁰ I also included four items from the V-Dem dataset: deliberative democracy index, which quantifies the extent of public reasoning in decision-making; alternative sources of information index, which shows the degree to which media is differentiated; ideological legitimization, which measures whether the governments promote specific ideologies; and person of the leader, which provides a measure for patrimonial characteristics. The final variables consist of a standardized education index (United Nations Development Programme), the logarithm of GDP, and the logarithm of population (the last two come from the World Bank). The descriptive statistics for predictors used in the following regression models are presented in the Appendix G.²¹

3.2.3 Analysis steps

The following analyses proceed in three steps. First, I examine the variation in the organization of political beliefs and evaluate the evidence in favor of ideological

²⁰ To calculate political activism scale, I first summed four variables (signing petition, joining in boycotts, attending demonstration and joining unofficial strikes), and then calculated the average scores for all countries. Similarly, I added eleven dichotomous items for the civic membership scale (belonging to religious organizations; education, arts, music and cultural activities; labor unions; political parties; environmental groups; professional associations; sport groups; consumer groups; charitable organizations; self-help groups; and non-mentioned other groups).

²¹ There are missing observations at the country-level (Andorra, Macau and Puerto Rico), which reduces the number of countries used in the analyses to 76.

institutionalization. In doing this, I use mean squared correlations to have an estimation for network-level political belief constraint. I then estimate OLS regression models to adjudicate whether strong ideological institutionalization is associated with increased belief constraint. Since the number of data points is low and chance relationships between variables are likely, I use Bayesian Model Averaging (BMA) to decide on the best fitting models (Raftery, 1995). Second, I use nonparametric bootstraps to examine potential sampling variabilities of network estimations (Boutyline & Vaisey, 2017). I generate 1,000 bootstrapped samples for each country and evaluate the significance of ideological institutionalization in these samples. Since the selection of political belief items can affect the results, I also construct 2,000 additional samples (1,000 samples by randomly dropping 25% of the items and 1,000 samples by randomly dropping 50% of the items) and analyze the main proposition in these samples. Third, I evaluate edge-weights to understand the specific item-level connections. Particularly, I categorize the variables into two – one for symbolic beliefs, i.e., those that pertain to ideological attitudes, social values and labels, and one for operational beliefs, i.e., those that can be implemented in certain policies (Brandt et al., 2019). This allows me to answer whether the proposed relationships are sensitive to item-specific relations.

3.3 Results

Figure 8 presents the relationship between graph level political belief constraint and ideological institutionalization across 76 countries. The constraint levels range from 0.01 to 0.06 ($\mu = 0.03$ and $\sigma = 0.01$), and the figure shows high variation in the organization of political belief systems. It is evident that ideological institutionalization and belief constraint are highly correlated (the Pearson's $r = 0.66$)

and the cubic spline-smoothed function shows an almost linear relationship. Thus, the first inspection confirms the initial proposition: the structure of major political parties has strong associations with the structure of political opinions among the public.

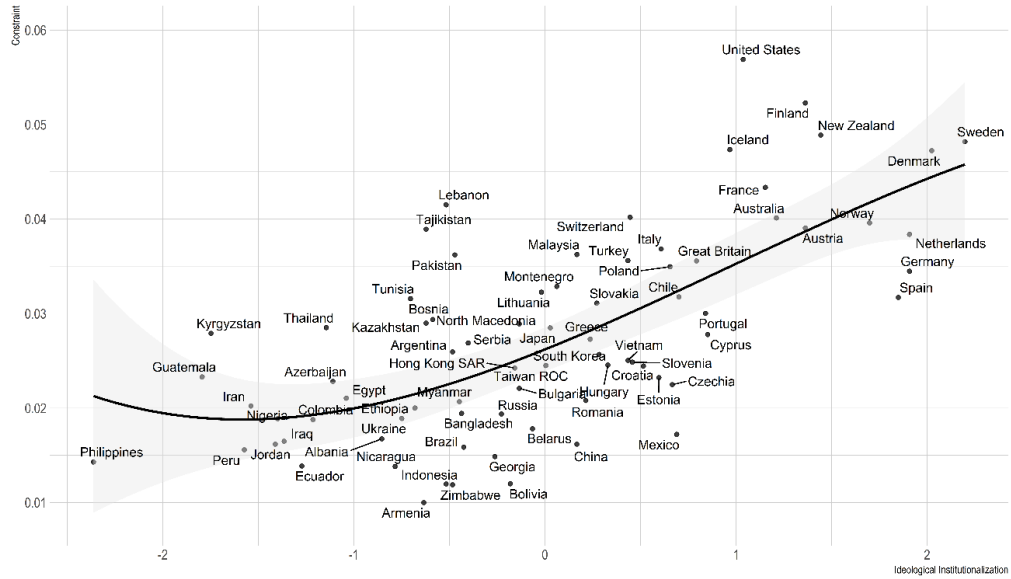


Figure 8. Relationship between ideological institutionalization and constraint
Note: Each point represents country-level belief constraint. Shaded regions represent 95% confidence intervals.

Table 4 provides the OLS regression results and the corresponding BMA probabilities of coefficients. Overall, the results reveal substantial evidence that favors the central proposition. BMA estimations show that the best model consists of two central variables, and the probability that the coefficients are not equal to zero is more than 90% in both cases. Considering that the number of observations is fairly low, the coefficient estimate for the main variable is even more impressive. Looking at the regression diagnostics, the reduced model fits well, and the Shapiro-Wilk test confirms the normality of the residuals ($W = 0.97$, $p = 0.25$). Moreover, the posterior probability of the reduced model is 0.39, and the second-best model, which includes

the log of population, has a posterior probability of 0.9, and the overall results are identical.

Table 4: OLS Regression Models Predicting Belief Network Constraint

Predictors	Full Model	Reduced Model	$p \neq 0$
Ideological Institutionalization	0.410* (0.157)	0.501*** (0.082)	1.00
Country-Level Engagement with Politics	0.359* (0.145)	0.414*** (0.104)	0.99
Effective Number of Parties	0.013 (0.142)		0.05
Deliberative Democracy Index	0.029 (0.332)		0.05
Alternative Sources of Information Index	-0.102 (0.160)		0.06
Ideological Legitimation Index	0.006 (0.150)		0.05
Personal Leadership Index	0.096 (0.175)		0.05
Country-Level Civic Engagement	0.084 (0.124)		0.06
Logged Population	-0.665 (0.470)		0.11
Logged Gross Domestic Product	0.561 (0.513)		0.08
Educational Attainment	-0.149 (0.252)		0.05
N	76	76	—
Adjusted R ²	0.508	0.525	—

Note: Coefficients are standardized. Heteroskedasticity-consistent standard errors are in parentheses. $p \neq 0$ refers to the probability that the estimate is not 0. The missing countries are Andorra, Macau and Puerto Rico. *** $p < 0.001$, ** $p < 0.01$, * $p < 0.05$.

Substantially, these results confirm that the variation in the organization of sociopolitical beliefs can be predicted from the organization of political fields. This

does not mean that people update their beliefs in response to changing period effects (Kiley & Vaisey, 2020) nor does it mean the changes in politics directly translate into changes in public opinion. After all, opinion structures and political structures are co-constitutive, each harboring different mechanisms for shaping the other. Rather, these results emphasize an observation that the cohesion of political ideology is associated with the relative cohesion of the political field. Since clear signals from political elites and cognitive authorities might strengthen the tightness of attitude reporting, the robustness of political environments can induce high constraint among individuals.

3.3.1 Sampling variability and item selection

Having established the contextual differences between countries, I turn to sampling variability and item selection. In order to assess sampling variability, I used non-parametric bootstrapping to evaluate the statistical significance of the regression results (Boutyline & Vaisey, 2017). In 1,000 bootstrap iterations, I gathered 1,000 samples for each unit of analysis, and followed the same strategy outlined before to estimate belief constraints. Figure 9 presents the main results. The left panel shows the distribution of t-values from bootstrapped regressions, confirming that ideological institutionalization is significantly associated with belief constraint in all cases (the coefficients are also in the expected direction). The right panel plots the predicted values from the cubic spline-smoothed function that uses the mean scores and 95% confidence intervals of bootstrapped belief constraints. Substantially, non-parametric bootstraps reveal that the results are not sensitive to sampling variability, substantiating the central proposition.

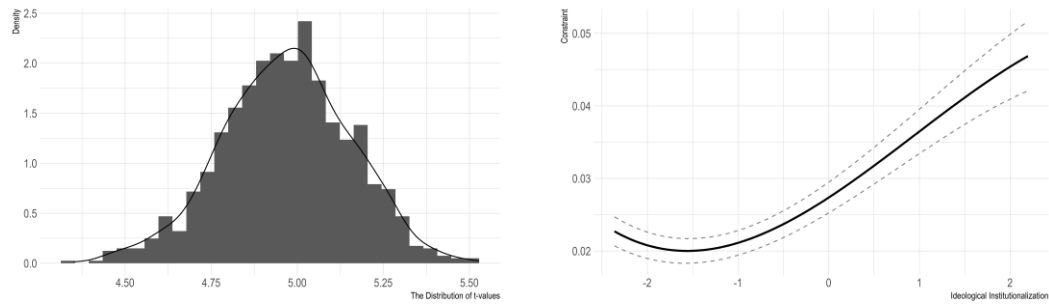


Figure 9. Bootstrapped replications of belief constraint in 76 countries

Note: The left panel plots the distribution of t-values from 1,000 robust regression models. The right panel shows the cubic spline-smoothed function from the bootstrapped mean values of belief constraints.

The previous analyses made use of the EVS/WVS items that pertain to politics and have been asked in all countries. While it is true that these items are highly comprehensive to cover political issues, it is also true that there might be variable selection effects. Moreover, changes in the set of variables can change the belief constraint patterns in substantial ways. In order to test this possibility, I systematically change the set of variables used in the network estimations. In 2,000 random samples, I created 1,000 networks for each unit of observations with the 75% of the variables (24 out of 32) and 1,000 networks with the 50% of the variables (16 out of 32). In doing this, I followed the same procedure, estimated the networks, calculated their constraint levels, and compare the country-specific estimates. Figure 10 depicts the distribution of t-values from these comparisons. The left panel shows that ideological institutionalization is still strong and statistically significant in all random samples (the coefficients are in the expected direction) while the right panel shows that 99.2% of the comparisons reveal statistically significant effects from the main predictor, even when the number of nodes is reduced to half. These estimations show that, overall, the results seem not sensitive to sampling or item variabilities.

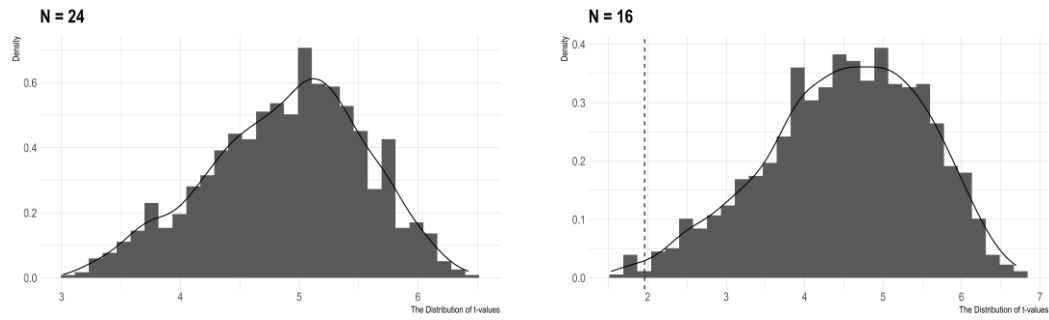


Figure 10. Item selection effects

Note: The left panel plots the distribution of t-values from 1,000 samples that randomly choose 24 out of 32 items, while the right panel plots t-values from 1,000 samples that randomly choose 16 out of 32 items.

3.3.2. Item consolidation and edge heterogeneity

It is important to note that the previous conclusions are estimated at the graph-level, which can conceal within-network heterogeneities across the countries. The recent works on belief system dynamics show that items have different properties according to their substantive meaning, i.e., those that have symbolic backdrops (items that pertain to values and labels) have high influence in contrast to those that have operational meanings (items that pertain to specific governmental policies). In fact, these studies show that symbolic items have more centrality than operational items (Brandt et al., 2019). One possible repercussion of this is that ideological institutionalization might occur simply because political parties feed symbolic concerns, leaving other beliefs relatively untouched. If this is indeed true, then the effects of political parties are heterogeneous and solely dependent on the specific qualities of the political beliefs.

In order to account for this possibility, I labelled 32 items as symbolic or operational (see Appendix B for the full list). Then, I calculated the mean constraints for each level, looking at belief pairs either among symbolic or operational beliefs, or between beliefs. Figure 11 shows the country-specific mean

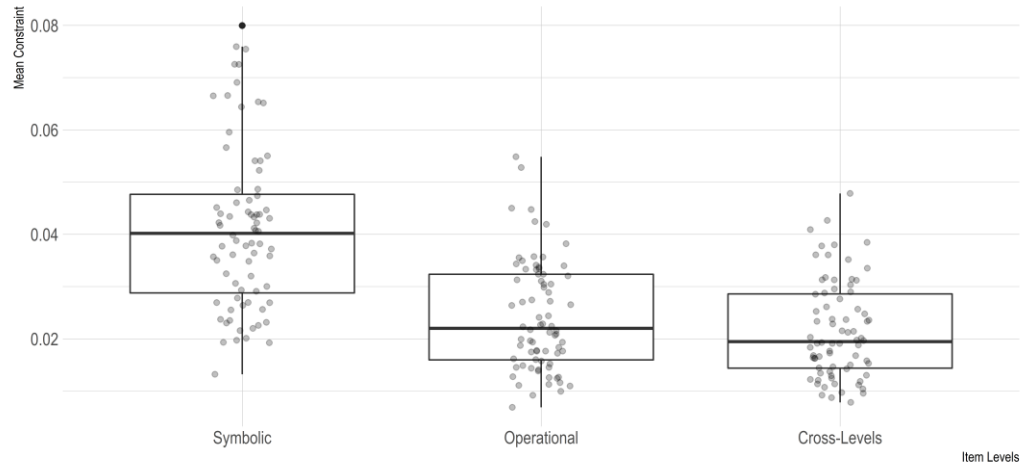


Figure 11. Mean constraint across different item levels

Note: The points represent belief constraint for each country, categorized according to item levels.

values of political beliefs. In line with the previous work, it is evident that correlation pairs among symbolic beliefs have higher constraint than the others. Of course, the question is whether ideological institutionalization has differential effects across these item levels. Considering that distinct levels have belief-pair variability, I standardized the correlation coefficients within categories and compared the trajectories of belief constraint with respect to ideological institutionalization. The results are presented in Figure 5, which confirms that ideological institutionalization has similar trajectories across item levels, even though there is a statistically significant drop in operational belief pairs. Nevertheless, the results show that the same patterns observed if graph-level metrics are predicted in the edge-level, too.

3.4 Discussion

In this article, I used belief network analysis to understand the cross-national differences in the organization of political beliefs. Investigating the structure of political opinions in 76 countries, I found that the differences are substantial and

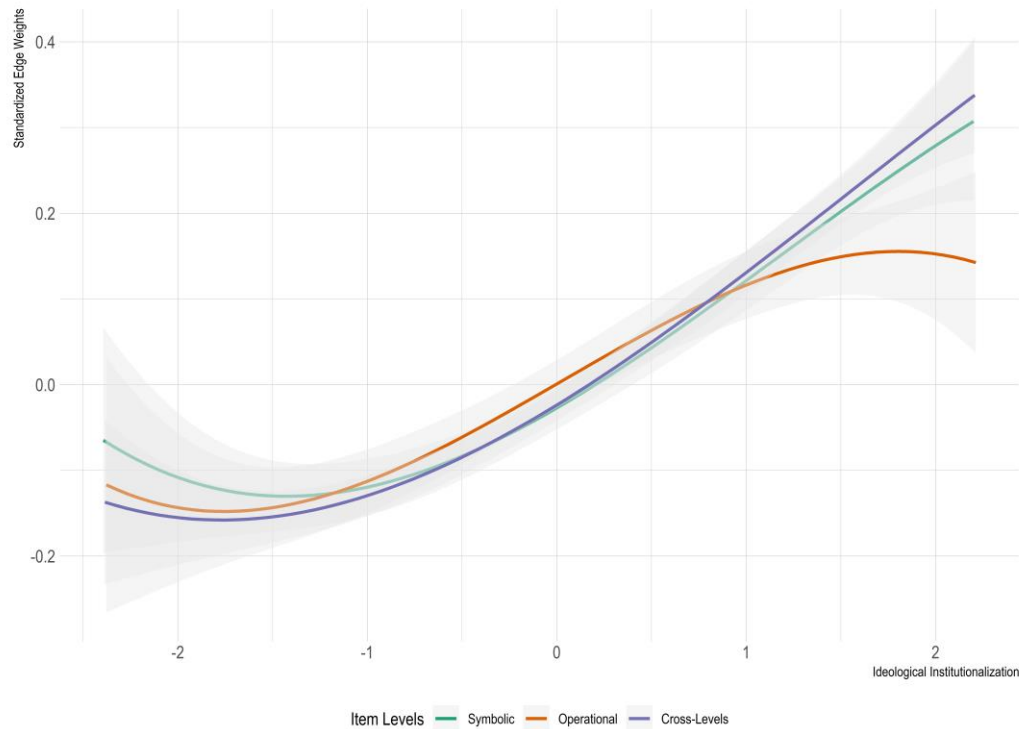


Figure 12. Mean constraint trajectories across different item levels

Note: The figure shows the cubic spline-smoothed functions of ideological institutionalization.

highly variable. I argued that the political parties, particularly the partisan organization of ideologies, significantly predicts the way in which political beliefs are structured. Consistent with social constraint accounts (Converse, 1964; Zaller, 1992), I observed that an increased salience of political structure is associated with higher constraint. These results are robust to a variety of controls, including political engagement among the populace, media differentiation or personalities of leaders. Moreover, I showed that results are not sensitive to sampling variability, item selection, and edge heterogeneity.

3.4.1 Theoretical and methodological implications

These findings have important implications for the public opinion literature, as well

as political and cultural sociology. First, it proves vital to test the structure of opinions in the cross-national context. Up until now, most studies have focused on the United States, but the proposed mechanisms have not been adequately tested in other countries. Taking these studies forward should increase the validity and generalizability of the previous findings. Second, the studies on public opinion should use network methods to relax the assumptions on the ways opinions “ought” to organize, thereby allowing multiple organizational logics to emerge. This article contributes to this objective, arguing for the import of network techniques to the studies on public opinion. It is significant not to overstate the causal importance of structural organization for all aspects of opinion formation and change, but it is also evident that political beliefs are not isolated entities, but part of larger structures of opinion dynamics within which all beliefs interact.

These findings also lend support to the emerging literature in cultural and political sociology, which calls for an acknowledgment that cultural, moral, and political beliefs exhibit high degrees of relationalities (Baldassarri & Gelman, 2008; Boutyline, 2017; Boutyline & Willer, 2017; DellaPosta, 2020). This mode of analysis is also broadly consistent with how theories of cognitive organization conceptualize the structure of cultural schemas and attitudes (Boutyline & Soter, 2020; Cartwright & Harary, 1956; Heider, 1946; Rumelhart & Ortony, 1977). In its simplest sense, investigating the relationalities of opinions should provide both intuitive depictions of political beliefs and powerful formal models of belief structures.

Emphasizing the contextual sources of belief organization, this article also complements psychological and cognitive accounts of opinion structure, most of which derives from theories on constraint satisfaction on attitudes (Goldberg & Stein, 2018; Rawlings, 2020; Rawlings & Friedkin, 2017). Instead, these results also

show that cultural, political, and institutional differences can serve as fruitful channels for explaining the variation in belief networks. Combining social constraint accounts with work on psychological systems and identity (Brandt et al., 2019), we can establish rigorous theories on the dynamics of opinion change and stability.

3.4.2 Limitations and future directions

However, this article does have its limitations. First, examining the structure of belief networks does not provide causal identification nor does it produce definite predictions. This problem is exacerbated if we consider the fact that this research uses observational data, meaning that there is no temporal dimension to evaluate the replicability of belief networks, as well as the direction and causal effects of the contextual variables. Therefore, it is imperative for future research to incorporate the questions of time and causal identification into the analyses. The utilization of panel studies and careful identification strategies would be much valuable.

Second, the limits of belief networks should receive more attention. In this article, I used political beliefs covered in the EVS/WVS, which is why the analyses are limited to these items. However, incorporating untapped political beliefs and even beliefs that are not visibly pertinent to political questions can change the previous conclusions. This problem is intricately tied with the question of how belief systems are generated, and what their limits are. Using an extensive set of items from the General Social Survey, DellaPosta (2020) was able to relax these assumptions, covering more than one belief domain. However, considering the fact that the design and execution of surveys can significantly affect the responses (Alwin & Krosnick, 1991b), collecting cross-national data seems difficult. Hence, future studies can experiment with this problem, adjudicating whether an extensive set of items or

theoretically limited belief measures are more reliable. One possible question is to investigate the construction of communities under different item sets, which can provide valuable findings to detect “issue publics” (Converse, 1964).

Following the final points, the third limitation pertains to the simplifying assumption that the generation of belief networks in all countries follows the same logic in all population. How sub-populations differ or not is an empirical question, which should receive strong focus from cultural sociologists. One possible extension for this question might be the inclusion of demographic variables and possible predictors in the network design, allowing to explicitly measure the possible effects of social positions and personal dispositions on belief systems.

If ideologies provide organizing heuristics to individual beliefs, I believe that BNA is an essential tool to examine the trajectories of opinion formation and change. Modeling beliefs as an organization of attitude correlations helps us extend and clarify Converse’s (1964) insightful studies. Most significantly, multiple lines of research from psychology, sociology, and political science can be effectively synthesized with this approach. Drawing from the BNA approach, I tried to offer one example for this synthesis. Using the wide coverage of World Values Survey and European Values Study, I was able to estimate the variation in the organization of political beliefs among several countries, explicitly tying these differences to cross-national diversities. I believe that the investigation of public opinion as an emergent system can be vastly improved if we define and test it as a *structural phenomenon*.

CHAPTER 4

CONCLUSION

Though the previous studies have addressed different settings and questions, they point towards the same conclusion: studying cultural beliefs necessitates an engagement with the “structure” within which each belief is situated. There are at least three reasons for this. First, cultural kinds are relational to the extent that social life is itself relational. As the socialization of individuals occur in different settings, social experiences and their corresponding effects are heterogeneous for people. In plain English, culture is messy. Considering the fact that most individuals do not care enough about politics or morality, the fluctuations in opinion surveys may not necessarily translate to the fluctuations in the structure of opinions. Individuals have intuitions (Haidt & Joseph, 2004), strategies (Swidler, 1986) and motivations (Vaisey, 2009), and disregarding them in favor of infrastructural explanations is simply a grave mistake.

Second, consistent with the recent studies on culture and cognition (Brekhus & Ignatow, 2019), modeling cultural beliefs and attitudes requires us to have a more advanced understanding of *the cultural mind*. This means that cultural sociology cannot and should not refrain from the cognitive turn (Lizardo et al., 2019). In this sense, this study calls for increased engagement with behavioral and cognitive sciences. If our assumptions are assumptions “for us”, but vibrant empirical research domains “for others” (DiMaggio, 1997), sociological study of culture should reconsider these assumptions to develop improved models of cultural beliefs.

Finally, the structural analysis of belief formation and organization is

promising for what Lizardo calls “omnivorous theorizing” (Lizardo, 2017), which refers to theories that are not tied to their respective subfields, but have the potential to speak to different subfields at once. This thesis, for instance, could provide shared arguments for two relatively different social “milieus” (religion and politics), allowing to construct transposable predictions for different domains. In this sense, I believe that an increased engagement with belief network analysis can prove fruitful for different subfields to propose testable hypothesis of cultural organization.

In the end, this thesis shows that opinions are organized with underlying, though diverse, logics in the population. The task of cultural sociology now is to resolve the interdependencies between micro-level belief formation processes and macro-level opinion organization, finding the degree to which one or the other dominates the causal background. The analytical power of the belief network analysis is a solid and promising place to start.

APPENDIX A

THE NUMBER OF BELIEFS CHANGED

The belief alignment model outlined in the article assumes that the number of beliefs changed should decline with time, which is why the organization of cultural beliefs becomes stable. Even though the mixed-effects models confirm that the quadratic estimations provide the best functional form, this assumption is still to be tested.

In order to confirm whether the number of beliefs changed per year of age really declines, I first calculated the difference scores for each variable for each wave and recoded the resulting scores 1 if the respondent changes attitudes between two waves and 0 if not. Then, I summed the change scores to generate a summary measure that captures the total number of beliefs changed per respondent from one wave to another. Since survey contexts might vary between waves, I estimated a Poisson regression model predicting the number of beliefs changed with age and wave dummies. Figure A1 presents the results. It is unclear whether respondents indeed increased their attitude strength, but it is clear that the number of beliefs changed per individual declines with time.

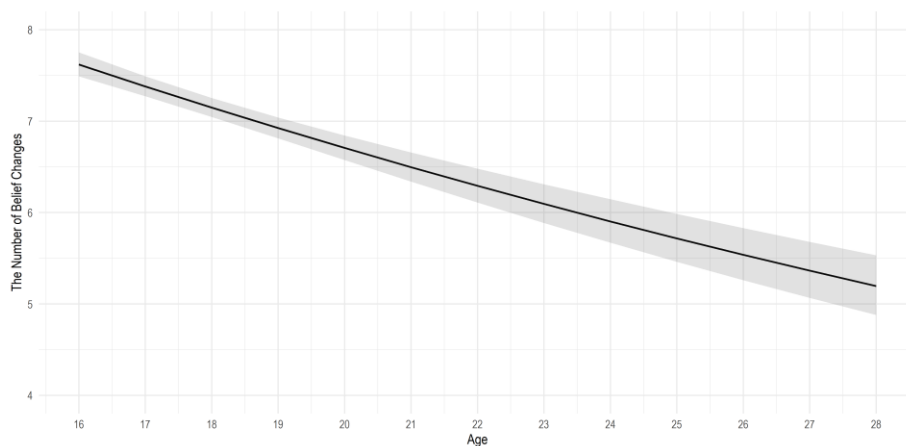


Figure A1. The predicted number of beliefs changed per individual

APPENDIX B

THE COMPOSITION OF DATA AND SAMPLE ATTRITION

Since the NSYR was collected as panel surveys, some respondents dropped out of the surveys over the waves, resulting in high sample attrition. The total sample is 3,369 for Wave 1, 2,604 for Wave 2, 2,531 for Wave 3, and 2,144 for Wave 4. Considering the decreasing numbers, it is essential to ask whether attrition rates affect the estimations. In Figure A2, I depicted the changing composition of the sample in 16 domains. The dashed horizontal lines are the percentage of respondents for the specific category at Wave 1, and the solid lines are the percentage of the respondents at each age. For instance, in Wave 1, nearly 65% of the respondents were coded as White, while in Wave 4, this rate increased to 73%. Since Wave 1 is nationally representative, this figure shows the deviation of respondent characteristics in each age relative to the respondent composition in Wave 1.

There are fluctuations in the sample composition, most notably in terms of race, education, and parent income.²² Expectedly, respondents who are non-white are more likely to drop from the surveys, and those that do not have a college education and those who come from lower SES. In Figure A3, I divided respondents once more, using college, parent income and race. In other words, group 0 refers to those who are white, have a college degree and whose parents earn more than the national median ($N = 3,996$), and group 1 refers to those who are non-white, who do not have a college degree and whose parents earn less than the national median ($N = 870$). The

²² There are substantial differences in such variables as attendance and non-affiliation, but this is expected as these are highly dynamic from adolescence to adulthood. For instance, it is known that church attendance significantly decreases in these periods (Desmond et al. 2010), and religious disaffiliation becomes much more probable (Pearce et al. 2019). Thus, these changes should not be seen as evidence of attrition.

same results apply. There is still an alignment trajectory, but the level of alignment differs between the two groups. Mainly, respondents with high panel attrition are more likely to have a lower constraint, but the population level alignment is still observable in this group, too. Note, however, that due to the low number of observations in group 1, these results should be replicated in other settings as well.

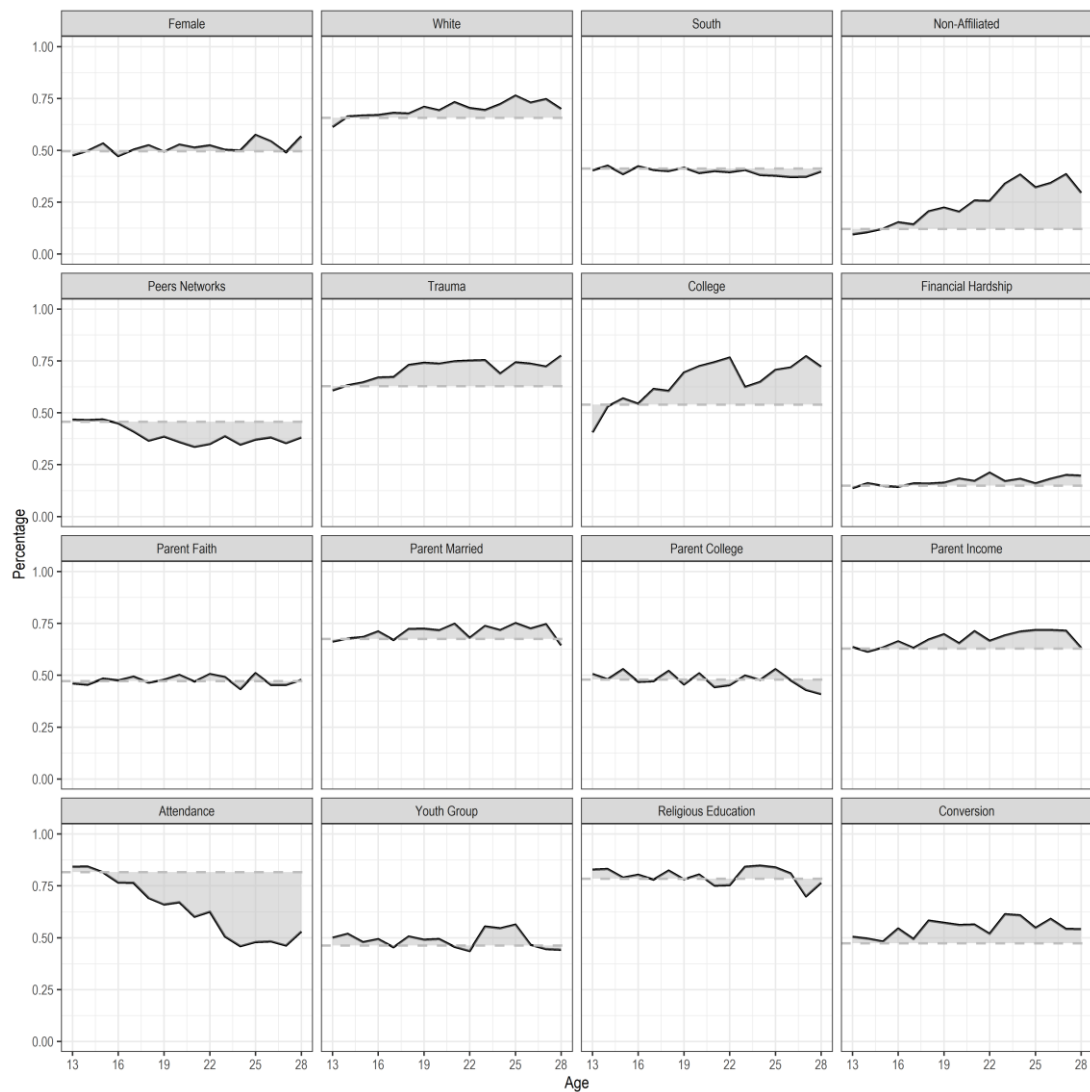


Figure B1. The sample composition

Note: Each panel describes the relative position of one group (e.g. female = 1) to another group (e.g. female = 0) over time. Dashed lines denote the percentage of individuals in group 1 (e.g. the percentage of females) at Wave 1, while solid lines denote the actual percentage of these groups across the specific ages.

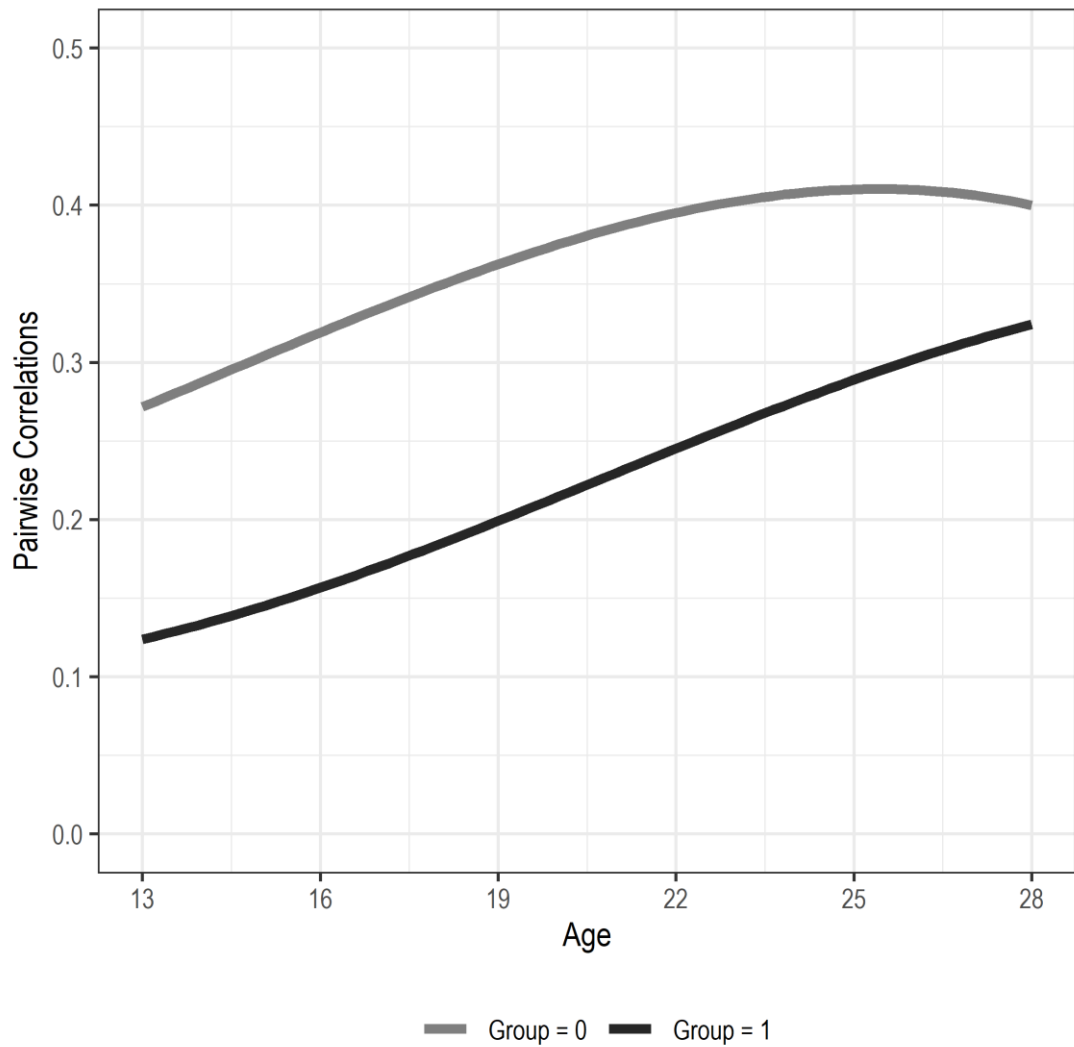


Figure B2: Belief alignment trends in high attrition and low attrition groups

To test attrition more stringently, I looked at the differences between those who have not dropped out of the surveys and those who have. Figure A4 depicts the trajectories of four groups of respondents. The solid lines depict the respondents who are present in all waves, while others depict those present in all but in one wave, those who are not present after Wave 2, and those who are not present after Wave 3. In all cases, it is evident that there are no significant differences between these groups, although the amount of belief organization is high in low attrition groups and low in high attrition groups.

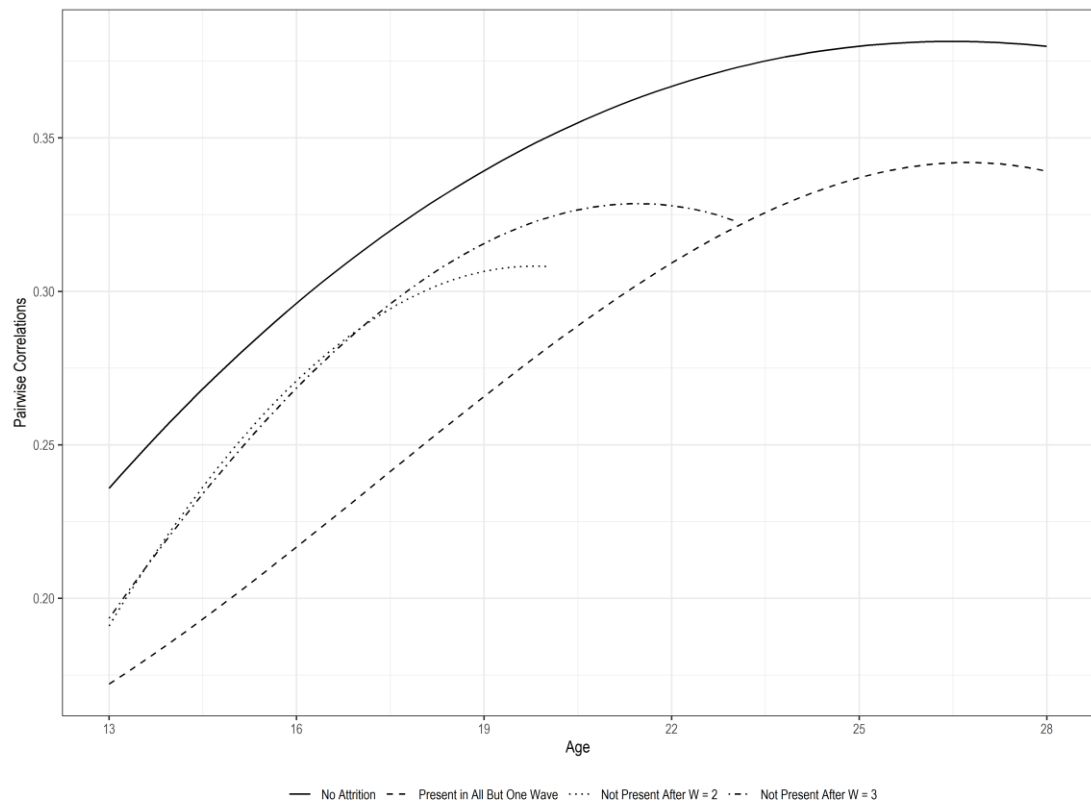


Figure B3: Belief alignment trends in different attrition samples

APPENDIX C

MIXED EFFECTS MODELS WITH DUMMY PREDICTORS

In order to test the age coefficients more precisely, I also estimated the mixed-effects models by regressing the mean absolute correlations on age dummies.

Figure A5 shows the coefficient plot of this model, where age 13 is the reference category. As can be seen, the absolute correlations increased nearly 0.20 across these periods, and after age 24, the values are nearly indistinguishable. Nevertheless, we see a substantial drop in age 28, which might indicate that the organization of beliefs can be more variable at later ages than theorized in this article. I also tested whether the quadratic trend is driven primarily by the distribution of correlations at age 28. In doing this, I reestimated the mixed-effects models by dropping all observations at this age. The BIC and AIC comparisons show that, again, the quadratic model is a better fit than the linear model.

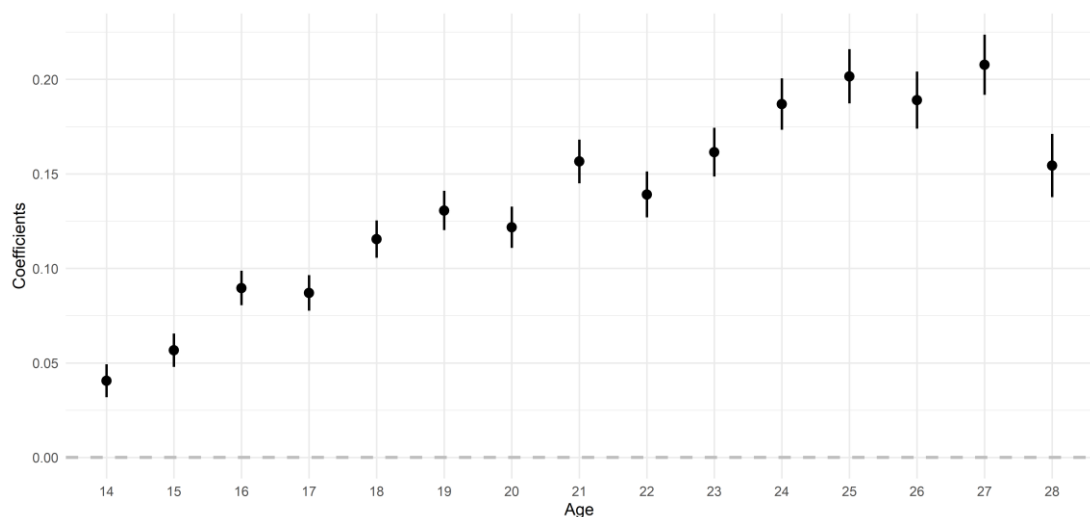


Figure C1: Coefficient plot of the mixed effects model

APPENDIX D

PROCEDURES ON CORRELATIONAL CLASS ANALYSIS

Correlational Class Analysis (CCA) is a network-partitioning technique used to discover groups of respondents or classes with similar survey response patterns (Boutyline 2017). In contrast to other methods that focus on the distribution of responses, such as Latent Class Analysis or Hierarchical Clustering, CCA is adept at finding schematic patterns, meaning that it focuses on the similar *structure* of responses rather than the similar responses. Formally, the algorithm works as follows: (a) a network adjacency matrix of absolute row correlations is calculated, (b) statistically insignificant correlations are set to 0 (which helps reducing noise), (c) the resulting network is partitioned through a graph partitioning algorithm, and (d) each community is assigned with a class id. Boutyline's CCA (2017) is shown to work more efficiently than Goldberg's (2011) Relational Class Analysis, especially in detecting communities more accurately. CCA is also more appropriate to the NSYR since the latter does not use correlations between responses, which are less susceptible to the violation of bivariate linearity between the variables.

I implemented the CCA for Wave 1, which resulted in four distinct classes. In doing this, I first rescaled all the variables from 1 to 5. For instance, *belief in God* is coded as 1-3-5 (instead of 1-2-3), or *views on religion* is coded as 1 and 5 (instead of 0 and 1). Then, I implemented the CCA algorithm with the significance cutoff equaled to 0.05. Figure A6 shows the correlation networks for each class, the details of which are depicted in the Results section. I also checked whether the partitioned model shows a better fit than the single correlation network model. Following

Boutyline's (2017) recommendation, I used multiple group testing from structural equation modeling. Specifically, I tested whether using separate correlation matrices for each class improves model fit than using a single correlation matrix. I estimated two models, where the variances and covariances are constrained to be equal between classes in the first model. The results strongly prefer the CCA partitions according to both the BIC ($170,692 < 170,696$) and AIC ($169,343 < 169,366$) estimations.

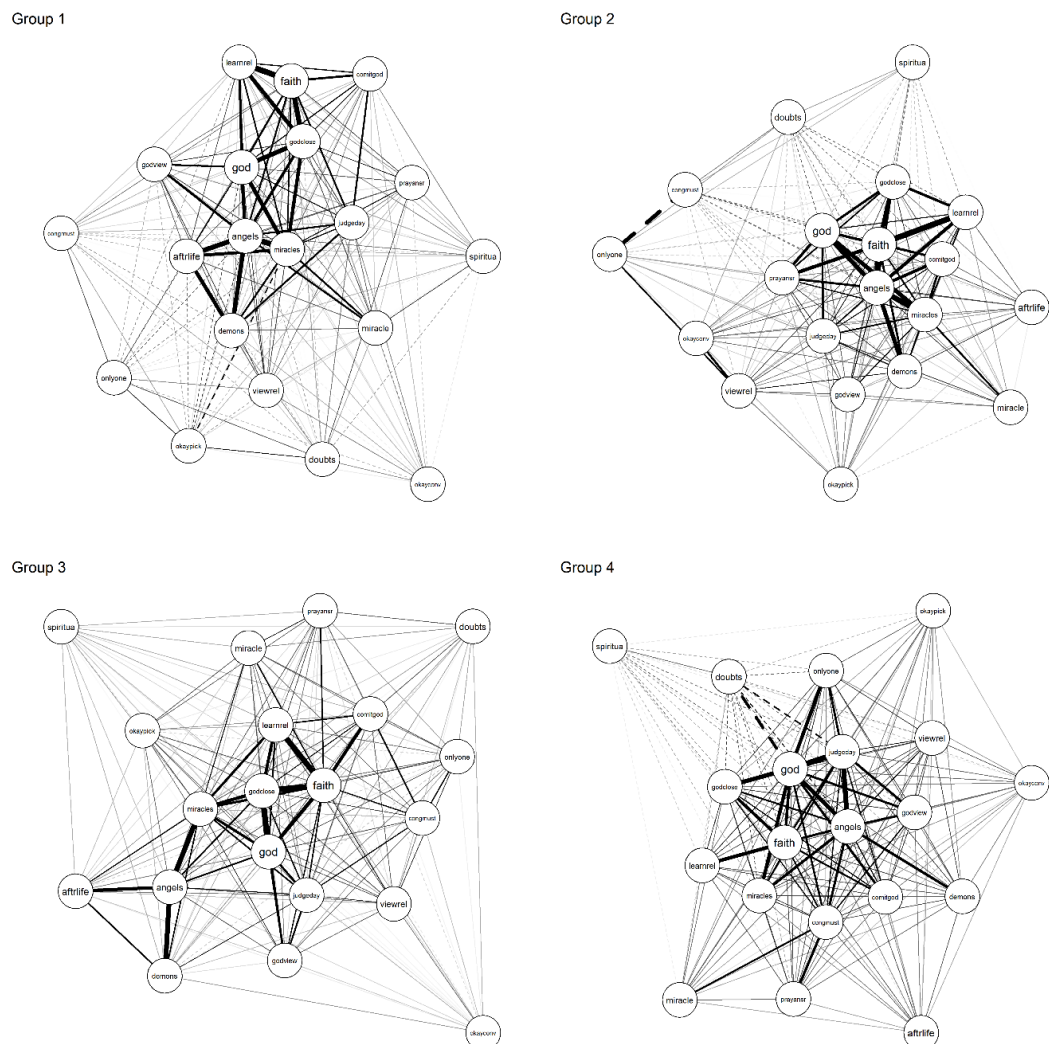


Figure D1: Class partitionings from correlational class analyses

Note: Nodes represent religious beliefs and the edges between these nodes represent the correlations between these beliefs (solid lines denote positive correlations, while dashed lines denote negative correlations). The graphs are force-directed and depicted using the Fruchterman-Reingold algorithm.

APPENDIX E

THE CHARACTERISTICS OF COUNTRIES

Table E1: The Characteristics of Countries

Country/Territory	Shortened Name	Survey	Sample Size
Albania	AL	EVS	1435
Andorra	AD	WVS	1004
Argentina	AR	WVS	1003
Armenia	AM	EVS	1500
Australia	AU	WVS	1813
Austria	AT	EVS	1644
Azerbaijan	AZ	EVS	1800
Bangladesh	BD	WVS	1200
Belarus	BY	EVS	1548
Bolivia	BO	WVS	2067
Bosnia and Herzegovina	BA	EVS	1724
Brazil	BR	WVS	1762
Bulgaria	BG	EVS	1558
Chile	CL	WVS	1000
China	CN	WVS	3036
Colombia	CO	WVS	1520
Croatia	HR	EVS	1487
Cyprus	CY	WVS	1000
Czechia	CZ	EVS	1811
Denmark	DK	EVS	3362
Ecuador	EC	WVS	1200
Egypt	EG	WVS	1200
Estonia	EE	EVS	1304
Ethiopia	ET	WVS	1230
Finland	FI	EVS	1199
France	FR	EVS	1870
Georgia	GE	EVS	2194
Germany	DE	EVS	2170
Germany	DE	WVS	1528
Great Britain	GB	EVS	1788
Greece	GR	WVS	1200
Guatemala	GT	WVS	1203
Hong Kong SAR	HK	WVS	2075
Hungary	HU	EVS	1514
Iceland	IS	EVS	1624
Indonesia	ID	WVS	3200
Iran	IR	WVS	1499
Iraq	IQ	WVS	1200

Italy	IT	EVS	2277
Japan	JP	WVS	1353
Jordan	JO	WVS	1203
Kazakhstan	KZ	WVS	1276
Kyrgyzstan	KG	WVS	1200
Lebanon	LB	WVS	1200
Lithuania	LT	EVS	1448
Macau SAR	MO	WVS	1023
Malaysia	MY	WVS	1313
Mexico	MX	WVS	1739
Montenegro	ME	EVS	1003
Myanmar	MM	WVS	1200
Netherlands	NL	EVS	2404
New Zealand	NZ	WVS	1057
Nicaragua	NI	WVS	1200
Nigeria	NG	WVS	1237
North Macedonia	MK	EVS	1117
Norway	NO	EVS	1122
Pakistan	PK	WVS	1995
Peru	PE	WVS	1400
Philippines	PH	WVS	1200
Poland	PL	EVS	1352
Portugal	PT	EVS	1215
Puerto Rico	PR	WVS	1127
Romania	RO	EVS	1613
Romania	RO	WVS	1257
Russia	RU	EVS	1825
Russia	RU	WVS	1810
Serbia	RS	EVS	1499
Serbia	RS	WVS	1046
Slovakia	SK	EVS	1432
Slovenia	SI	EVS	1075
South Korea	KR	WVS	1245
Spain	ES	EVS	1209
Sweden	SE	EVS	1194
Switzerland	CH	EVS	3174
Taiwan ROC	TW	WVS	1223
Tajikistan	TJ	WVS	1200
Thailand	TH	WVS	1500
Tunisia	TN	WVS	1208
Turkey	TR	WVS	2415
Ukraine	UA	WVS	1289
United States	US	WVS	2596
Vietnam	VN	WVS	1200
Zimbabwe	ZW	WVS	1215

APPENDIX F

ITEMS USED IN BELIEF NETWORKS

Table F1. Items Used in Belief Networks

Nodes	Question Labels	Question Level
A124_02	Neighbors: People of a Different Race	Symbolic
A124_06	Neighbors: Immigrants/Foreign Workers	Symbolic
B008	Protecting Environment vs Economic Growth	Operational
C001	Jobs: Men over Women	Operational
C002	Jobs: Nation over Immigrants	Operational
D059	Men Are Better Political Leaders than Women	Symbolic
D060	University More Important for Boys than Girls	Symbolic
D061	The Children Suffer with Working Mother	Symbolic
D078	Men Are Better Business Execs than Women	Symbolic
E033	Self-Positioning in Political Scale	Symbolic
E035	Income Should Be Equal	Operational
E036	Private vs State Ownership of Business	Operational
E037	Government's Responsibilities	Operational
E039	Competition Good or Harmful	Operational
E114	Political System: Strong Leadership	Symbolic
E115	Political System: Experts	Symbolic
E117	Political System: Democratic Politics	Symbolic
E224	Governments Tax The Rich And Subsidize The Poor	Operational
E225	Religious Authorities Interpret The Laws	Symbolic
E226	People Choose Their Leaders In Free Elections	Symbolic
E227	People Receive State Aid For Unemployment	Operational
E229	Civil Rights Protect People's Liberty Against Oppression	Operational
E233	Women Have The Same Rights As Men	Operational
E233A	The State Makes People's Incomes Equal	Operational
E233B	People Obey Their Rulers	Symbolic
E235	Importance of Democracy	Symbolic
F120	Ethical Values and Norms: Abortion	Operational
F144_02	Ethical Values and Norms: Death Penalty	Operational
G052	Evaluate the Impact of Immigrants Over Country	Operational
G007_35_B	Trust: People of Another Religion	Symbolic
G007_36_B	Trust: People of Another Nationality	Symbolic
conf	Confidence in Political Institutions (E069_01-E069_20)	Symbolic

APPENDIX G

DESCRIPTIVE STATISTICS FOR REGRESSION MODELS

Table G1: Descriptive Statistics for Predictors Used in the Regression Models

Predictors	Mean	SD	Min	Max
Ideological Institutionalization	1.21	0.86	-0.82	3.11
Engagement with Politics	1.79	0.18	1.32	2.20
Effective Number of Parties	4.66	2.90	0.03	18.01
Deliberative Democracy	0.50	0.25	0.06	0.87
Alternative Sources of Information	1.14	1.14	-1.86	2.58
Ideological Legitimation	-0.43	1.22	-2.75	2.57
Personal Leadership	-0.55	1.35	-3.07	2.87
Country-Level Civic Engagement	1.56	1.06	0.15	5.02
Logged Population	16.69	1.79	11.26	21.07
Logged Gross Domestic Product	25.94	1.87	21.87	30.67
Educational Attainment	0.75	0.13	0.33	0.94

REFERENCES

- Adams, J., Schaefer, D. R., & Ettekal, A. V. (2020). Crafting Mosaics: Person-Centered Religious Influence and Selection in Adolescent Friendships. *Journal for the Scientific Study of Religion*, 59(1), 39–61.
- Alwin, D. F., & Krosnick, J. A. (1991a). Aging, Cohorts, and the Stability of Sociopolitical Orientations Over the Life Span. *American Journal of Sociology*, 97(1), 169–195.
- Alwin, D. F., & Krosnick, J. A. (1991b). The Reliability of Survey Attitude Measurement: The Influence of Question and Respondent Attributes. *Sociological Methods & Research*, 20(1), 139–181.
- Ansolabehere, S., Rodden, J., & Snyder, J. M. (2008). The strength of issues: Using multiple measures to gauge preference stability, ideological constraint, and issue voting. *American Political Science Review*, 102(2), 215–232.
- Arnett, J. J. (2000). Emerging adulthood: A theory of development from the late teens through the twenties. *American Psychologist*, 55(5), 469–480.
- Baldassarri, D., & Gelman, A. (2008). Partisans without constraint: Political polarization and trends in American public opinion. *American Journal of Sociology*, 114(2), 408–446.
- Baldassarri, D., & Goldberg, A. (2014). Neither ideologues nor agnostics: Alternative voters' belief system in an age of Partisan politics. *American Journal of Sociology*, 120(1), 45–95.
- Barsalou, L. W. (1993). Flexibility, Structure, and Linguistic Vagary in Concepts: Manifestations of A Compositional System of Perceptual Symbols. In A. C. Collins, S. E. Gathercole, & M. A. Conway (Eds.), *Theories of Memory* (pp. 29–101). London: Lawrence Erlbaum.
- Boutyline, A. (2017). Improving the measurement of shared cultural schemas with correlational class analysis: Theory and method. *Sociological Science*, 4, 353–393.
- Boutyline, A., & Soter, L. (2020). Cultural Schemas: What They Are, How to Find Them, and What to Do Once You've Caught One. *SocArXiv*.
- Boutyline, A., & Vaisey, S. (2017). Belief network analysis: A relational approach to understanding the structure of attitudes. *American Journal of Sociology*, 122(5), 1371–1447.
- Boutyline, A., & Willer, R. (2017). The Social Structure of Political Echo Chambers:

- Variation in Ideological Homophily in Online Networks. *Political Psychology*, 38(3), 551–569.
- Brandt, M. J., Sibley, C. G., & Osborne, D. (2019). What Is Central to Political Belief System Networks? *Personality and Social Psychology Bulletin*, 45(9), 1352–1364.
- Brekhus, W. H., & Ignatow, G. (Eds.). (2019). *The Oxford Handbook of Cognitive Sociology*. Oxford: Oxford University Press.
- Carmines, E. G., & Stimson, J. A. (1986). On the Structure and Sequence of Issue Evolution. *American Political Science Review*, 80(3), 901–920.
- Cartwright, D., & Harary, F. (1956). Structural balance: a generalization of Heider's theory. *Psychological Review*, 63(5), 277–293.
- Converse, P. E. (1964). The Nature of Belief Systems in Mass Publics. In D. Apter (Ed.), *Ideology and Discontent* (pp. 206–261). Princeton: Princeton University Press.
- Coppedge, M., Gerring, J., Knutsen, C. H., Lindberg, S. I., Teorell, J., Altman, D., Bernhard, M., Fish, M. S., Glynn, A., Hicken, A., Luhrmann, A., Marquardt, K. L., McMann, K., Paxton, P., Pemstein, D., Seim, B., Sigman, R., Skaaning, S.-E., Staton, J., ... Ziblatt, D. (2020). V-Dem Dataset v10. *Varieties of Democracy (V-Dem) Project*.
- Cornwall, M. (1989). The Determinants of Religious Behavior: A Theoretical Model and Empirical Test. *Social Forces*, 68(2), 572–592.
- Cornwall, M., Albrecht, S. L., Cunningham, P. H., & Pitcher, B. L. (1986). The Dimensions of Religiosity: A Conceptual Model with an Empirical Test. *Review of Religious Research*, 27(3), 226–244.
- Dalege, J., Borsboom, D., Van Harreveld, F., Van den Berg, H., Conner, M., & Van der Maas, H. L. J. (2016). Toward a formalized account of attitudes: The Causal Attitude Network (CAN) Model. *Psychological Review*, 123(1), 2–22.
- DellaPosta, D. (2020). Pluralistic Collapse: The “Oil Spill” Model of Mass Opinion Polarization. *American Sociological Review*, 85(3), 507–536.
- DellaPosta, D., Shi, Y., & Macy, M. (2015). Why do liberals drink lattes? *American Journal of Sociology*, 120(5), 1473–1511.
- Desmond, S. A., Morgan, K. H., & Kikuchi, G. (2010). Religious Development: How (and Why) Does Religiosity Change from Adolescence to Young Adulthood? *Sociological Perspectives*, 53(2), 247–270.
- DiMaggio, P. (1997). Culture and Cognition. *Annual Review of Sociology*, 23, 263–287.

- DiMaggio, P., Sotoudeh, R., Goldberg, A., & Shepherd, H. (2018). Culture out of attitudes: Relationality, population heterogeneity and attitudes toward science and religion in the U.S. *Poetics*, 68, 31–51.
- Erickson, J. A. (1992). Adolescent Religious Development and Commitment: A Structural Equation Model of the Role of Family, Peer Group, and Educational Influences. *Journal for the Scientific Study of Religion*, 31(2), 131–152.
- EVS/WVS. (2020). European Values Study and World Values Survey: Joint EVS/WVS 2017-2021 Dataset (Joint EVS/WVS). *JD Systems Institute & WVSA. Dataset Version 1.0.0.*
- Festinger, L. (1957). *A Theory of Cognitive Dissonance*. Stanford: Stanford University Press.
- Fleishman, J. A. (1988). Attitude Organization in the General Public: Evidence for a Bidimensional Structure. *Social Forces*, 67(1), 159–184.
- Friedkin, N. E., Proskurnikov, A. V., Tempo, R., & Parsegov, S. E. (2016). Network science on belief system dynamics under logic constraints. *Science*, 354(6310), 321–326.
- Gallagher, M. (2020). *Election Indices Dataset*. Retrieved online.
- Goldberg, A. (2011). Mapping Shared Understandings Using Relational Class Analysis: The Case of the Cultural Omnivore Reexamined. *American Journal of Sociology*, 116(5), 1397–1436.
- Goldberg, A., & Stein, S. K. (2018). Beyond Social Contagion: Associative Diffusion and the Emergence of Cultural Variation. *American Sociological Review*, 83(5), 897–932.
- Gordon, S. B., & Segura, G. M. (1997). Cross-national variation in the political sophistication of individuals: Capability or choice? *Journal of Politics*, 59(1), 126–147.
- Goren, P., Federico, C. M., & Kittilson, M. C. (2009). Source cues, partisan identities, and political value expression. *American Journal of Political Science*, 53(4), 805–820.
- Haidt, J., & Joseph, C. (2004). Intuitive ethics: How innately prepared intuitions generate culturally variable virtues. *Daedalus*, 133(4), 55–65.
- Hardie, J. H., Pearce, L. D., & Denton, M. L. (2016). The Dynamics and Correlates of Religious Service Attendance in Adolescence. *Youth & Society*, 48(2), 151–175.
- Heider, F. (1946). Attitudes and Cognitive Organization. *Journal of Psychology: Interdisciplinary and Applied*, 21(1), 107–112.

- Hunzaker, M. B. F., & Valentino, L. (2019). Mapping Cultural Schemas: From Theory to Method. *American Sociological Review*, 84(5), 950–981.
- Inglehart, R. (1985). Aggregate Stability and Individual-Level Flux in Mass Belief Systems: The Level of Analysis Paradox. *American Political Science Review*, 79(1), 97–116.
- Jost, J. T., Federico, C. M., & Napier, J. L. (2009). Political Ideology: Its Structure, Functions, and Elective Affinities. *Annual Review of Psychology*, 60(1), 307–337.
- Judd, C. M., & Krosnick, J. A. (1982). Attitude centrality, organization, and measurement. *Journal of Personality and Social Psychology*, 42(3), 436–447.
- Judd, C. M., & Milburn, M. A. (1980). The Structure of Attitude Systems in the General Public: Comparisons of a Structural Equation Model. *American Sociological Review*, 45(4), 627–643.
- Keskintürk, T. (2021). Religious belief alignment: The structure of cultural beliefs from adolescence to emerging adulthood. *Poetics*, 101591.
- Kiley, K., & Vaisey, S. (2020). Measuring Stability and Change in Personal Culture Using Panel Data. *American Sociological Review*, 85(3), 477–506.
- Krosnick, J. A., & Alwin, D. F. (1989). Aging and Susceptibility to Attitude Change. *Journal of Personality and Social Psychology*, 57(3), 416–425.
- Laakso, M., & Taagepera, R. (1979). “Effective” Number of Parties. *Comparative Political Studies*, 12(1), 3–27.
- Leschziner, V. (2019). Dual-Process Models in Sociology. In W. H. Brekhus & G. Ignatow (Eds.), *The Oxford Handbook of Cognitive Sociology* (pp. 169–191). Oxford: Oxford University Press.
- Lindner, A. M., & Houle, J. N. (2021). Are All Politics National? County-Level Social Contexts and Inequality Remediation Attitudes, 2006 to 2012. *Socius: Sociological Research for a Dynamic World*, 7, 1–14.
- Lizardo, O. (2017). Improving Cultural Analysis: Considering Personal Culture in its Declarative and Nondeclarative Modes. *American Sociological Review*, 82(1), 88–115.
- Lizardo, O., Sepulvado, B., Stoltz, D. S., & Taylor, M. A. (2019). What can cognitive neuroscience do for cultural sociology? *American Journal of Cultural Sociology*, 8(1), 3–28.
- Lizardo, O., & Strand, M. (2010). Skills, toolkits, contexts and institutions: Clarifying the relationship between different approaches to cognition in cultural sociology. *Poetics*, 38(2), 205–228.

- Martin, J. L. (2000). The relation of aggregate statistics on beliefs to culture and cognition. *Poetics*, 28(1), 5–20.
- Martin, J. L. (2002). Power, Authority, and the Constraint of Belief Systems. *American Journal of Sociology*, 107(4), 861–904.
- McFarland, D., & Pals, H. (2005). Motives and Contexts of Identity Change: A Case for Network Effects. *Social Psychology Quarterly*, 68(4), 289–315.
- Nie, N. H., & Andersen, K. (1974). Mass Belief Systems Revisited: Political Change and Attitude Structure. *The Journal of Politics*, 36(3), 540–591.
- Osgood, C. E., & Tannenbaum, P. H. (1955). The Principle of Congruity in the Prediction of Attitude Change. *Psychological Review*, 62(1), 42–55.
- Ozorak, E. W. (1989). Social and Cognitive Influences on the Development of Religious Beliefs and Commitment in Adolescence. *Journal for the Scientific Study of Religion*, 28(4), 448–463.
- Pachucki, M. A., & Breiger, R. L. (2010). Cultural Holes: Beyond Relationality in Social Networks and Culture. *Annual Review of Sociology*, 36, 205–224.
- Patterson, O. (2014). Making Sense of Culture. *Annual Review of Sociology*, 40, 1–30.
- Pearce, L. D., Foster, E. M., & Hardie, J. H. (2013). A Person-Centered Examination of Adolescent Religiosity Using Latent Class Analysis. *Journal for the Scientific Study of Religion*, 52(1), 57–79.
- Pearce, L. D., Hayward, G. M., & Pearlman, J. A. (2017). Measuring Five Dimensions of Religiosity Across Adolescence. *Review of Religious Research*, 59(3), 367–393.
- Pearce, L. D., Uecker, J. E., & Denton, M. L. (2019). Religion and Adolescent Outcomes: How and Under What Conditions Religion Matters. *Annual Review of Sociology*, 45, 201–222.
- Peffley, M. A., & Hurwitz, J. (1985). A Hierarchical Model of Attitude Constraint. *American Journal of Political Science*, 29(4), 871–890.
- Raftery, A. E. (1995). Bayesian Model Selection in Social Research. *Sociological Methodology*, 25, 111–163.
- Rawlings, C. M. (2020). Cognitive Authority and the Constraint of Attitude Change in Groups. *American Sociological Review*, 85(6), 992–1021.
- Rawlings, C. M., & Friedkin, N. E. (2017). The Structural Balance Theory of Sentiment Networks: Elaboration and Test. *American Journal of Sociology*, 123(2), 510–548.

- Regnerus, M. D., Smith, C., & Smith, B. (2004). Social context in the development of adolescent religiosity. *Applied Developmental Science*, 8(1), 27–38.
- Rumelhart, D. E., & Ortony, A. (1977). The Representation of Knowledge in Memory. In R. C. Anderson, R. J. Spiro, & W. E. Montague (Eds.), *Schooling and the Acquisition of Knowledge* (pp. 99–135). Hillsdale: Lawrence Erlbaum.
- Settle, J. E., Bond, R., & Levitt, J. (2011). The Social Origins of Adult Political Behavior. *American Politics Research*, 39(2), 239–263.
- Shultz, T. R., & Lepper, M. R. (1996). Cognitive Dissonance Reduction as Constraint Satisfaction. *Psychological Review*, 103(2), 219–240.
- Simon, D., Krawczyk, D. C., & Holyoak, K. J. (2004). Construction of preferences by constraint satisfaction. *Psychological Science*, 15(5), 331–336.
- Smith, C. (2003). Theorizing Religious Effects Among American Adolescents. *Journal for the Scientific Study of Religion*, 42(1), 17–30.
- Smith, C., & Denton, M. L. (2008). *Methodological Design and Procedures for the National Study of Youth and Religion*. Retrieved online.
- Strauss, C., & Quinn, N. (1997). *A Cognitive Theory of Cultural Meaning*. Cambridge University Press.
- Swidler, A. (1986). Culture in Action: Symbols and Strategies. *American Sociological Review*, 51(2), 273–286.
- Vaisey, S. (2009). Motivation and Justification: A Dual-Process Model of Culture in Action. *American Journal of Sociology*, 114(6), 1675–1715.
- Vaisey, S., & Lizardo, O. (2016). Cultural Fragmentation or Acquired Dispositions? A New Approach to Accounting for Patterns of Cultural Change. *Socius: Sociological Research for a Dynamic World*, 2, 1–15.
- Vaisey, S., & Valentino, L. (2018). Culture and choice: Toward integrating cultural sociology with the judgment and decision-making sciences. *Poetics*, 68, 131–143.
- Visser, P. S., & Krosnick, J. A. (1998). Development of Attitude Strength Over the Life Cycle: Surge and Decline. *Journal of Personality and Social Psychology*, 75(6), 1389–1410.
- Wellman, B. (1988). Structural Analysis: From Method and Metaphor to Theory and Substance. In B. Wellman & S. D. Berkowitz (Eds.), *Social Structures: A Network Approach* (pp. 19–61). Cambridge: Cambridge University Press.
- Wink, P., & Dillon, M. (2002). Spiritual development across the adult life course: Findings from a longitudinal study. *Journal of Adult Development*, 9(1), 79–94.

- Wood, M. L., Stoltz, D. S., Van Ness, J., & Taylor, M. A. (2018). Schemas and Frames. *Sociological Theory*, 36(3), 244–261.
- Yang, Y., & Land, K. C. (2006). A Mixed Models Approach to the Age-Period-Cohort Analysis of Repeated Cross-Section Surveys, with an Application to Data on Trends in Verbal Test Scores. *Sociological Methodology*, 36(1), 75–97.
- Zaller, J. R. (1992). *The Nature and Origins of Mass Opinion*. Cambridge: Cambridge University Press.