Organized Culture and Organizational Cultures: The Dynamic Constraint of Religious Belief Systems Over Time*

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Abstract

To what extent does social life constrain a person's attitudes over time, and what facilitates this stability? Existing sociological research varies in the degree to which it suggests that attitudes are constrained, while simultaneously arguing in favor of three principal sources of constraint: organizations, social networks, and cultural schema. This paper makes three contributions to these debates. First, I argue that rather than think of constraint as evident in pairwise relationships between attitudes at a single point in time, as many existing measures do, constraint should be thought of as restrictions on which attitudes people feel like they can give over time. Second, I use Latent Class Analysis to derive five belief systems that differently constrain religious, family, and moral beliefs in the National Study of Youth and Religion and show that the variance in responses within groups at the survey's second wave strongly predict how much people change their responses over time, as well as which responses they give. Third, I adjuducate between cultural-schematic, organizational, and social network sources of attitude structuring, showing that as people change their organizational and social contexts, their beliefs remain more stable than these changes would imply, suggesting that belief structures are organized early in life and shape people's beliefs and behaviors over time.

1 Introduction

A key way the social world is assumed to shape individual behavior is by constraining people's understanding of which attitudes, beliefs, and behaviors are compatible (**???**). In is through this process that society is assumed to get "into the heads" of people and reproduce itself (**???**), create patterns of attitude association in the population (Rawlings 2020; DellaPosta 2020; Goldberg and Stein 2018), and shape behaviors and affiliation over time (Vaisey 2009).

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However, actual evidence of this cognitive structuring of belief systems in the public is mixed, raising questions about whether the general public's beliefs are as constrained as sociological theories often suggest (Converse 1964; Zaller 1992). In sociology, measures of attitude structuring and constraint have tended to focus, in one form or another, on the pairwise relationship between variables in cross-sectional data (Baldassarri and Gelman 2008; Baldassarri and Goldberg 2014; Boutyline and Vaisey 2017; Goldberg 2011; Hunzaker and Valentino 2019; Martin 2002). This work has led to numerous insights into the structuring of political and cultural thought in different groups, heterogeneity in belief patterns, and the social factors that give rise to constrained thinking.

But there are two central problems with this approach. First, decades of research in cultural sociology find that people do not have *an* attitude on a topic, but rather a range of considerations shaped by past experiences (Converse 1964; Swidler 1986, 2001 @zaller1992). Because they often hold contradictory considerations, and because which considerations influence cognition at any time can be shaped by local circumstances such as features of the interview setting or event outside of the interview, their attitudes appear to change substantially over time. This means that responses at a single point in time can be a bad measure of the bredth (or narrowness) of a person's range of considerations. On one hand, this frequent movement suggests that attitudes are not constrained in the population, as people seem free to change one attitude without changing attitudes that researchers expect to be linked. However, work in psychology suggests that the people who understand attitudes as related are the least likely to change (Howe and Krosnick 2017), and some members of the population are quite stable in their dispositions over time (Freeder, Lenz, and Turney 2019; Zaller 1992). This means that people might understand attitudes as related – the exact definition of this cognitive form of constraint – and as a result *not* change their attitudes.

The second major challenge of this approach is apparent in the central metaphor these researchers use to explain constraint: movement. Across these works, constraint is consistently described as limitations on the movement of attitudes over time, but it is rarely tested using within-person, over-time data (for an exception, see Rawlings 2020). In using static measures of constraint, researchers tend to assume that because people hold two ideas at the same time or because beliefs co-

vary in the population, people understand these ideas as related and constraining. But co-occurrence and co-variance in static data does not prove the cognitive linkages or the presence of constraint that these researchers tend to assume (J. L. Martin 2000). The clustering of people in social groups with divergent attitudes could be driven by a number of processes besides cognitive linkage, such as socialization or selection (Lewis and Kaufman 2018; Vaisey and Lizardo 2010).

Because measuring the structure of beliefs has proven so difficult, theories that posit that attitudes are principally shaped by orgnaizational and social influences have tended to dominate explanations for the social structuring of attitudes, even though attitudes appear to be much more stable over time than would be predicted (Kiley and Vaisey 2020).

In this paper, I attempt to reconcile these conceptual and methodological issues by rethinking the empirical signature of a belief system. I make three principal contributions. First, drawing on insights from sociology of culture and cognition, the social psychology of attitude development, and political psychology, I argue that the cultural/cognitive variant of constraint is not well demonstrated by attitude clustering at a single time, measures of relationships between attitudes at a single time, or even pairwise change over time. Instead, a belief system should be conceptualized as a set considerations that results in a restriction (or lack of restriction) on which responses a person feels they can give over time. Rather than assume belief systems constrain similar beliefs, I argue that belief systems vary in how extensive they are – the number of beliefs they constrain – as well as how intensive they are – the degree to which they constrian different beliefs.

Second, given this framework of constraint, I argue that Latent Class Analysis – a method of data reduction that groups people into classes that have similar probabilities of giving different responses – reflects the theoretical tenets of this kind of attitude constraint better than many existing measures designed to tap attitude structuring, such as pairwise correlation, relational class analysis, and correlational class analysis (Converse 1964; Goldberg 2011; Boutyline 2017). I argue that the constriants evident in the classes at a single point in time should predict how people change their attitudes over time. I test this propostion using data on religious, moral, and family-structure beliefs from the National Study of Youth and Religion. Latent class analysis identifies five belief systems.

These systems vary in the number of beliefs they constrain and the degree to which they constrain beliefs. I show that the constraints evident in cross-sectional data at Wave 2 predict which attitudes people change between waves and how they change them better than competing models of attitude formation.

Third, I adjudicate the influence of these belief systems, organizational participation, and social network influence on the pattern of changes in attitudes over time. I show that belief systems observed at wave 2 better predict the pattern of attitude changes over time than models accounting for changing social circumstances.

The results have several implications. First, they suggest that beliefs are more structured than many theories posit, but not in the way that typical measures of constraint suggest. Second, they show that modeling beliefs as a multinomial draw from a belief space provides a good fit to the observed pattern of attitude behavior over time. Finally, these results show that social circumstances appear to be less influential in individuals' attitudes over time than the early imprinting they receive. It is not that organizations and social networks lack importance; it is that these influences matter strongly early in life and less later in life.

2 What Are Attitudes?

Understanding the empirical signature of a belief system must start with a model of the behavior of attitudes. A key finding from decades of work in cultural sociology and public opinion is that people consume diverse and contradictory bits of culture, often storing this heterogeneous mixture without taking time to reconcile its contraditions (Martin 2010; Swidler 1986; Zaller 1992). Without strong motivation to reconcile conflicts, people have a hard time keeping conflicting considerations out of their heads (Martin 2010; Zaller 1992). As a result, "our heads are full of images, opinions, and information, untagged as to truth value, to which we are inclined to attribute accuracy and plausibility" (DiMaggio 1997: p. 267). In their day-to-day lives, people have no trouble believing that "love is (1) a clear, all-or-nothing choice; (2) of a unique other; (3) made in defiance of social forces; and (4)

permanently resolving the individual's destiny" while simultaneously believing that "(1) Real love is not sudden or certain … (2) There is no 'one true love' … (3) The kind of love that leads to marriage should not depend on irrational feeling in defiance of social convention … [and] (4) Love does not necessarily last forever" (Swidler 2001: pp. 113-114), despite the inherent contradictions in these sentiments.

This heterogeneity of considerations has consequences for opinion behavior over time. When asked to give an opinion on an issue, people seem to sample from the range of considerations stored in their heads, shaped by local influences such as question structure and wording, as well as recent stimuli such as discussions with peers or the news, and generate an opinion on the basis of these stored considerations and short-term influences (Swidler 2001; Zaller 1992). People with conflicting considerations do not simply pick scale midpoints (though they do this frequently), but they can range widely in their responses over time. This behavior is evident in interviews, where people tend to draw on diverse considerations to explain or justify behavior, often contradicting themselves (Swidler 1986, 2001). It is also evident in people's responses to the same survey question over time, where they vascillate between ends of scales much more frequently than we would expect if they were stable opinion holders (Zaller 1992; Converse 1964).

At the same time, not all people display this level of ambivalence. On any particular question, some proportion of the population does clearly articulate the same opinions over time, with people varying on which issues they are stable (Converse 1964; Hill and Kriesi 2001). And social behaviors appear to affect attitude stability. In politics, people who pay more attention to political debates tend to be much more stable on their attitudes over time than people who do not (Converse 1964; Freeder, Lenz, and Turney 2019; Zaller 1992). Other work shows that the presence of cognitive authorities facilitates the structuring of attitudes over time as well (Martin 2002; Rawlings 2020). And work in cultural sociology suggests that attitudes can predict behaviors and patterns of affiliation over time (Vaisey 2009; Vaisey and Lizardo 2010), which we would not expect if attitudes were temporary constructs shaped by local circumstances. An intepretation of this over-time stability is that stable people have somehow constrained their consideration sets.

In general then, it is wrong to say that people have *an* attitude about something. What they have is a set of considerations that might point toward a single attitude or a set of considerations that might cause them to shift around in response to local changes. Any single response will be a draw from this consideration set with more or less random error shaped by personal circumstances. For example, consider a person who has the heterogeneous and conflicting models of love that Swidler (2001) recounts. When asked if unhappy couples should get divorced, this person could give either answer depending on which considerations are foremost in their mind. If something has triggered the prosaic model of love, the person might say that people should git divorced if they are unhappy. If something has recently triggered the romantic model of love, the person might oppose divorce. But we can also imagine a person whose cultural influces constrain them to oppose divorce, perhaps by making it a religious taboo. This person might be more likely to oppose divorce each time you ask them.

3 Sources Atttiude Structuring

If people encounter a heterogeneous mixture of culture and store most of it uncritically, how do we account for the fact that some people – exposed to the same heterogeneous mixture of culture – demonstrate remarkable consistency in their attitudes over time and the fact that that attitudes often predict behavior (Miles 2015; Vaisey 2014)? There are two principal explanations in sociology: one cultural, and one stuctural (DiMaggio 1997: p. 267).

The cultural explanation for attitude stability posits that people's attitudes are shaped by cognative sturctures called schema, "knowledge structures that represent objects or events and provide default assumptions about their characteristics, relationships, and entailments under conditions of incomplete information" [DiMaggio (1997); p. 269]. In cultural sociology, schema are conceptualized as connections of concepts, generated through repeated exposure, that shape how people process information. These relationships between concepts are often the principal goal of methods designed to measure (Hunzaker and Valentino 2019; Goldberg 2011; Boutyline 2017).

Schema facilitate the interpretation and recall of information, shaping the belief patterns people exhibit over time (DiMaggio 1997; **???**; Hunzaker 2016).

While schema can be ideosyncratic, many are cultural, shaped by early socialization experiences. Under this framework, socializing institutions – churches, families, schools, etc. – are highly important in shaping people's cognition early in life, but less influential in shaping thier cognition later in life.

In this framework, people demonstrate stable attitudes because their cultural-cognitive schema prevent the internalization of schema-inconsistent information and facilitate the recall of schema-consistent information (Hunzaker 2016; Hunzaker and Valentino 2019). A person who believes that God exists and has deemed divorce antithetical to eternal salvation is going to have an easier time answering a question about whether divorce is acceptable than someone who has internalized conflicting information about heterogeneous models of love. People become inconsistent in their responses when cognition is weakly schematized, preventing the rejection of heterogeneous information, and therefore leaving a concept connected to conflicting bits of culture (Martin 2010).

The principal alternative explanation for attitue stability argues that social structures – organizations and social networks – facilitate attitude stability throughout the life course. Under this framework, people's attitudes and beliefs are principally shaped by the dual process of social influence and homophily (DellaPosta, Shi, and Macy 2015) and by the scaffolding provided by organizational structures (Martin 2002; Rawlings 2020).

In this framework, people maintain consistency because they consistently hear a single line of cultural reasoning and rarely hear heterogeneous infromation. Cognative leaders provide clear guidelines for what attitudes go together and organizational hierarchies make certain … (Martin 2002). Social interactions make some pairs of attitudes uncomforatble. People would be … if their institutional participation changed or if their social networks suddenly started introducting heterogeneous considerations.

To some extent, both these processes likely shape attitudes over time. Stability likely reflects a dynamic interplay between cognitive and social structures (Lizardo and Strand 2010; Martin 2010).

And adjudicating the relative influence of these processes is difficult because people's cultural beliefs and preferences appear to shape their social networks (Lizardo 2006; Lewis and Kaufman 2018; Vaisey and Lizardo 2010) and their organizational participation.

But research in the social sciences has tended to favor the latter explanation, that social networks and organizations are the principal causes of stability over time. A key reason for this is because measuring cultural belief structures has proven difficult.

4 Measures of Attitude Structures

The most common approach to measuring belief structures in the social sciences focuses on the pairwise relationships between survey items in cross-sectional data, typically using covariance or correlation (Baldassarri and Gelman 2008; Boutyline and Vaisey 2017; Converse 1964; DellaPosta, Shi, and Macy 2015). Related measures designed to address measurement error in individual responses (Ansolabehere, Rodden, and Snyder 2008) still tend to look at the pairwise relationship between latent beliefs.

These correlational models rest on what I call the "diametric assumption" that beliefs are constrained when they covary across people, that people who are high on the first attitude are high on the second, while people who are low on the first attitude are low on the second. While this is good evidence for a static variation of constraint – that two issues tend to cluster in the population – it is not necessarily indicative of a cognitive connection in people's heads. Under this logic, if liberals and conservatives have opposite positions, then they are assumed to understand a link between them, even if they, in their own heads, do not. Similarly, if they do not have opposite positions, neither is assumed to be constrained in their thinking, even if members of both groups subjectively understand their belief system to imply that position (the theoretical definition of the cognitive version of constraint). But there are often times when different belief systems constrain people to the same position in belief space. For example, all varities of American popular nationalism uncovered by Bonikowski and DiMaggio (2016) restrict people to some level of agreement that it is important for Americans to

have American citizenship and some level of pride in the Armed Forces. No form of popular nationalism rejects these, saying that Americans should not have U.S. citizenship, but that does not make these unconstrained forms of thought.

A more recent development in schema measurement are relational and correlational class analysis methods, which attempt to partition people into groups that have similar patterns of relationships among beliefs, allowing for heterogeneous and non-oppositional belief systems in the same population (Goldberg 2011; Boutyline 2017). However, the diametric assumption still underlies interpretation of these methods. If people are located in opposite positions, researchers employing these methods assume that people see the same "logic" of a space, which might not be warranted. For example, Baladassarri and Goldberg assume that "a high-earning and secular Manhattan lawyer, squeezed by her progressive leanings on moral issues and her support for fiscal austerity" and "a working-class devout churchgoer torn between his moral conservatism and redistributive economic interests" see politics through the same logic, though this might not be true (Baldassarri and Goldberg 2014: p. 46). In fact it is hard to imagine that these people see political conflict as an opposition between "libertarian" thought on one hand and "populist" thought on the other, when the main political parties align orthogonal to this axis. What is more plausible is that these peoples views are simply unconstrained by the liberal-conservative paradigm, not a separate belief structure.

There are three other major challenges with these approaches. First, as discussed above, if we think of attitudes expressed in surveys and interviews as manifestations of the bredth of considerations people have available to them in their heads, rather than stable dispositions that they carry with them over time, belief systems as networks of connections between survey responses becomes hard to justify. In any survey wave, people might be presenting one of several answers that does not truly reflect the bredth of their considerations, which is a key component of people's cognition. A feature of a belief system might be that it does not constrain an attitude.

Second, these approaches all fail to connect the methodological implication of belief structuring with the core theoretical implication that they highly. These authors all repeatedly invoke the imagery of movement to explain what constraint is (emphasis added in all):

- "However, these beliefs are still tightly connected, in that *movement* in one implies *movement* in the other" (Martin 2002: p. 868). "Tightness, as defined above, can be interpreted as the imposition of *rules of movement* within the belief space (think of the difference between the constrained motion of driving on surface streets and the unconstrained motion of four-wheeling on the beach). Consensus, on the other hand, can be interpreted as a gross *inability to move away from* some privileged areas of the belief space toward others (without channeling in particular directions whatever degree of *motion* is allowed)" (Martin 2002: p. 874).
- "we might best see the distribution of people in this space as giving us clues about the *rules of motion* in the belief space. If one were to take a picture of some well populated area from a low-orbiting satellite, and marked a spot wherever there was a car, one would be able to figure out rather well where the roads were, and where cars were allowed to go. It is these analogous *rules of movement* that will give us clues as to the nature of social cognition" (J. L. Martin 2000: p. 11).
- "Culture, in this context, can be understood as the unspoken set of rules that tie beliefs together by restricting *movement* in this space along certain axes, which demarcate different social worlds" (Goldberg 2011: p. 1403).
- "We therefore interpret different *axes of movement in a belief space* … as the empirical signature of ideological constraint" (Baldassarri and Goldberg 2014: 59).
- "attitudes toward science and religion *move* in tandem" (DiMaggio et al. 2018: p. 40).

These researchers understand constraint to be a dynamic phenomenon, but in these studies dynamics are inferred from a snapshot and, importantly, not tested over time. Because people are arrayed along a diagonal in belief space, they are assumed to only travel along this diagonal (Martin 2002; Baldassarri and Goldberg 2014). Because people are clustered in portions of the belief space, they are assumed not to move from one cluster to another. These are not unreasonable assumptions, but they are assumptions.

Finally, because these measures of belief systems do not make clear predictions for the behavior of attitudes over time, it is hard to assess their validity. While they identify structuring of the

population over time, they do not truly make predictions for how attitudes will change over time, especially in the absence of knowledge about people's *other* beliefs at time 2. If a person changes between two time points, it is unclear if that change is compatible with belief system.

5 Rethinking Belief Structures

Taking as a starting point the idea that observed attitudes are reflections of a range of considerations that people internalize, then thinking about belief systems as the relationship between survey responses at a single point in time becomes problematic. The schema that govern cognition likely exist well below the level of single survey responses, so drawing connections about cognition based on the connections between survey responses seems problematic.

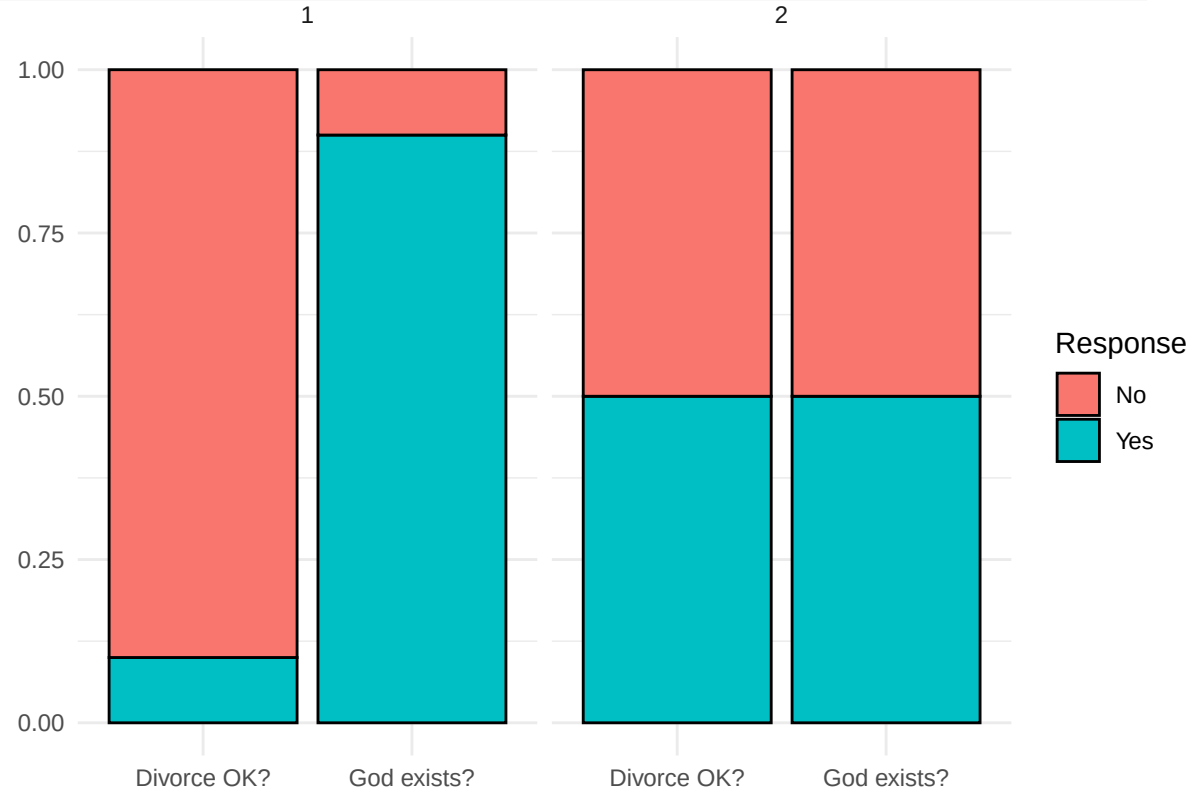
Instead, the preceeding discussion suggests that we think of cultural belief systems as sets of influences that shape the range of considerations that people internalize and draw from over time, thereby limiting (or not limiting) their responses to certain portions of the belief space over time. A system might shape people's considerations by directly providing considerations ("marriage is good"); by linking certain considerations together ("god exists says that marriage is important for eternal salvation"); or by linking beliefs to social groups ("getting married is an important part of being a member of this community"). In doing these things, belief systems shape the range of messages people receive; the degree to which they reject messages they receive; and their ability to recall considerations over time.

Belief systems should reflect "some process whereby the arbitrary movement of individuals in this space has been reined in; more exactly, it may be thought of as the most general introduction of form to an otherwise formless distribution" (J. K. Martin, Pescosolido, and Tuch 2000: p. 865).

Figure XXX presents two hypothetical belief systems on two questions. The first is a highly constrained system that restricts people to believing in God and rejecting divorce, either because a person cognatively links these concepts or because they hear both messages frequently from organizations (such as a church). The second belief system is less constrained, reflecting a heterogeneity

of considerations present in contemporary American society. People in this group internalize heterogeneous messages on both dimensions and, as a result, should vacillate on both questions over time.

```
data.frame(q = c(rep("God exists?", 4), rep("Divorce OK?", 4)),
           group = c(1,1,2,2,1,1,2,2),
           resp = rep(c("Yes", "No"), 4),
           prob = c(.9, .1, .5, .5, .1, .9, .5, .5)) %>%
  ggplot(aes(x = q, y = prob, fill = resp)) +
  geom_bar(stat = "identity", position = "stack", color = "black") +
  facet_wrap(~group) +
  theme_minimal() +
  labs(x = "", y = "", fill = "Response")
```



This example highlights the challenges of using the pairwise relationship between questions at a single point in time to deduce belief systems. While most members of the first might be readily

identified, members of the second could result in four equally likely response patterns in a single wave.

Under this framework, even taking a person's average response to a question over time seems insufficient, since it sacrifices varianace. A person who consistently selects a scale midpoint is likely very different from a person who selects from the full range over time, even if both demonstrate the same average over time.

The obvious challenge of this approach is that we do not frequently observe people's responses to the same question repeatedly over time, with many panels of attitudes stopping at three waves.

In this framework, the presence of a cultural belief system will observable if we observe groups of people who have the same probability of answering a question in a particular way. Such a method exists and has been used in sociological studies of attitude sturcturing before (Bonikowski and DiMaggio 2016; DiMaggio et al. 2018).

6 Latent Class Analysis and Belief Systems

Latent Class Analysis is a data-reduction methods that seeks to group people into unobserved categories where, within these categories, the probability of giving a particular response is independent from the probability of giving other responses. This fundamental assumption of latent class analysis, the conditional independence assumption, assumes that once the latent class is identified, each person's response on a particular question is an independent draw from the probabilites of the different responses observed within that group. This aligns closely with the theoretical model of a belief system outlined above.

6.1 Hypotheses

6.1.1 Latent Class as a Measure of Belief System

Understanding belief structures as cultural structures that constrain (or do not constrian) people's consideration sets gives us clear expectations for relationship between belief systems and change over time. The preceeding discussion suggests an empirical signature of the cognitive variant of constraint should be a structure to the movement of beliefs over time, or a constraint of ideas to certain portions of the belief space. When people view attitudes as linked, holding one of them stable limits the degree to which another can be changed. It does not control how a person moves; it controls when he does not move. The preceeding discussion gives us a set of expectations for how we should expect constrained beliefs to behave.

Hypothesis 1: Within belief systems, beliefs that are more constrained will demonstrate less change over time than less constrained beliefs.

Hypothesis 2: Across belief systems, the same belief will show less movement over time if it is in a more constrained belief system.

The model outlined above suggests that the belief system at wave 2 should only predict the degree to which attitudes in any particular system will change, but also *how* people in these belief systems will change over time. The central assertion is that responses at a particular wave should be conceptualized as independent draws from the deduced multinomial distribution. This distribution is shaped by broad culture forces, but which specific response a person gives at any wave will be shaped by (random) local influences. This means that while it will be very hard to predict what any particular person will say in each wave, assuming these draws are independent can give us strong predictions for the overall count of observed patterns over time.

Hypothesis 3:

6.1.2 Adjudicating Culture and Structure

Assuming that the latent class model sufficiently deduces belief systems that align with the theory outlined here, and that the preceeding hypotheses are proven correct, identification of the belief system through latent class analysis allows for adjudication of the competing influences of belief systems, organizational structures, and social networks in shaping attitudes over time.

The fundamental claim of the cultural schema literature is that belief systems, once established, are relatively impervious to outside social influences. If people have sturctured schematic thinking, they are less susceptible to the influence of alternative considerations that come from changing social environments []. This might in part be because they … , but it is also likely … process new information.

The alternative is that as people move across social locations, they hear different sets of considerations that …

Hypothesis 4: Belief systems will better predict people's observed changes better than models using changing social circumstances over time.

7 Data and Measures

7.1 The National Study of Youth and Religion

Data for this analysis comes principally from waves two through four of the National Study of Youth and Religion, a four-wave panel data set of adolescents that began when respondents were between the ages of 13 and 17 and surveyed them every three or four years for four waves. In wave 2, respondents were between 16 and 20, and in wave 3 respondents were between 17 and 24.

The age range of the NSYR is very important to the theoretical argument outlined here as it pertains to the movement across organizational and social contexts. Existing work suggest that adolesence and early adulthood, the period leading up to interviews at Wave 2 and between waves 2 and 3, is a particular formative period for attitudes and behaviors (Kiley and Vaisey 2020; **???**; **???**).

The period between wave 2 and wave 3 represents a significant time of transition for young people in the United States, as they move out of their parents homes, into college and the workforce, began to form long-term romantic attachments, and generally transition from adolesence to adulthood. There is likely more movement across social contexts at this period than most other periods of life. As such, this provides a good window in which to test the competing influences of cultural belief structures, organizational settings, and social change.

Because I do not use data from the first wave of the NSYR, and because time matters significantly in the theoretical testing, for clarity, I will refer to Waves 2, 3, and 4 of the NSYR as Waves 1, 2, and 3 for the rest of this document.

7.2 Measures

7.2.1 Beliefs

In waves 2 through four, NSYR respondents were asked a series of questions about their religious, moral, and family-structure beliefs. They include seven questions asking about specific religious beliefs, four questions asking about morality and the role of religion in daily life, and six questions about gender relations and family structures.[1] These questions are asked on either three-point scales of "yes," "maybe," and "no," or five-point scales of "strongly agree," "agree," "undecided/don't know,"[^dk] "disagree," "strongly disagree." These variables are outlined in Table XXX.

To make the range of responses to each question comparable, I scale all attitude measures to five-point scales between 1 and 5 by converting questions on three point scales: "yes" to 1, "maybe" to 3, and "no" to 5.

7.2.2 Covariates

I examine three principal sources of attitude structuring: sociodemographic background, organizational participation, and social networks. Sociodemographic background variables include respon-

[1] While I would have liked to include the question Vaisey (2009) uses to predict adolescent behavior over time, because of a coding error, responses to that question were lost for most respondents at Wave 3.

dent gender (male or female), race (black, white, or other), census division (northeast, south, midwest, west) whether at least one parent has a bachelor's degree, parent's income, and whether a two parents are present in the household.

A second set of covariates is designed to tap organizational participation. I focus on two types of organizations: religious organizations and participation in formal education. Given the role of religious organizations in shaping the attitudes under examination here, I include a set of dummies for the respondents' religious tradition and a measure of church attendance. I also include a variable measuring the number of years of education a person has received above ninth grade.

Finally, to measure social network influence, I include the proportion of a respondents' friends that share that person's religious orientation, including no relious orientation for people who do not express one.[2] I also include the highest level of closeness a respondent reported with either parent.

These covariates are measured at waves 2 and 3. Table XXX presents these covariates.

7.3 Belief Systems

I use Latent Class Analysis to deduce a set of belief systems using the 19 attitude items asked at wave 2. Latent Class Analysis attempts to assign a class to each responsent such that their responses are independent from each other within classes. Maximum likelihood estimation is used to and

$$P(Y = y) = \sum_j P(K = j)P(Y = y|K = j)$$

The LCA model estimates the relative class proportions, $P(K)$, and the conditional probabilities of each response as a function of each class.

The LCA model treats responses as nominal, even though they are often assumed to have some underlying latent structure.

, the model includes the covariates outlined above as predictors of class assignment. The

[2] Almost all respondents at wave 2 said they had five close friends.

model simultaneously estimates two coditional probabilities: the probability of response conditional on group assignment and the probability of group assignmetn conditonal on covariates.

7.4 Testing Hypotheses

7.4.1 Change Over Time

The first two hypotheses make predictions about how much attitudes should change over time as a function of the constraint within a belief system at a single point in time. Within a system, more constrained beliefs should change less over time than less constrained beliefs, and across systems, a belief should change less in a more constrained system.

I measure constriant of a particular attitude by calculating the within-group standard deviation of responses to that attitude. In contrast to the latent class model, this approach treats the outcome as an interval response. A group where most people tend to give the same response or cluster in adjacent responses will have a low standard deviation and therefore demonstrate high constraint. A group where people tend to give answers across the scale will have a high standard deviation and therefore low constraint.

$$\sigma_{jk} = \sqrt{\frac{\sum (x_{ijk} - \mu_{jk})^2}{N_k - 1}}$$

I capture a person's change over time by simply taking that absolute differences of their responses at wave 3 minus their responses at time 2.

$$\delta_{ij} = |J_{i,t=3} - J_{i,t=2}|$$

I test the first and second hypothesis using a single linear regression of absolute within-person change between wave 2 and wave 3 on the within-class standard deviation at wave 2, with fixed effects for question and for person. This amounts to simultaneously testing whether people exhibit more change in their less constrained beliefs than their more-constrained beliefs and whether a belief demonstrates more over-time change when it is in a less constrained belief system than when

it is in a more constrained belief system.

$$\delta_{ij} = \sigma_{jk} + \mu_i + \mu_j + \epsilon_{ij}$$

7.5 Pattern Prediction

The … makes a strong claim that the probabilities identified in the latent class analysis reflect the range of considerations that members of that group possess, and that their responses at any time point can be modelled as independent draws from these probabilities. To assess this proposition, I take a predictive approach to comparing the theoretical model outlined above to other competing theoretical data-generating processes (**???**; **???**).

Hypotheses 3 and 4 focus on the observed counts of change patterns over time. To illustrate this approach, assume two belief systems that differently constrain people's views on the following question: "Do you think that, in general, a couple without children should end their marriage if it is empty and unfulfilling, or should they stick with it even if they are not happy?" In one belief system, people are constrained to oppose divorce quite strongly ($Pr(yes) = .9$). These people have many considerations against marriage, but there is a chance that a local event could tip their disposition either way at any particular wave. In the second belief system, people have roughly equal considerations in favor of and opposed to divorce ($Pr(yes) = .5$). They have considerations telling them that people should stay together, and considerations telling them that people should divorce. And which response they give at a particular wave will be affected by the balance of considerations on their mind at any time.

If a person's response at wave is an independent draw from these their consideration set, then people in the first group should say "yes" in both waves about 81 percent of the time ($.9 * .9 = .81$). People in the second group should say "yes" in both waves about 25 percent of the time ($.5 * .5 = .25$). We can calculate the probability of each of the four possible two-wave response patterns, presented below:

Pattern	$Pr(yes) = .9$	$Pr(yes) = .5$
Yes -> Yes	.81	.25
Yes -> No	.09	.25
No -> Yes	.09	.25
No -> No	.01	.25

We could use the distribution of these two belief systems in the population, as well as the distribution of responses observed at wave 2, to generate a range of plausible predictions for the count of each pattern we observe in the data set.

Predicting response patterns in the latent class model requires two steps: sampling class identification and sampling responses. The LCA model assigns each a probability of belonging to each class based on their covariate probile. I sample class assignment from these probabilities. Then, using class assignment, I sample responses from the probabilities assigned to members of that class. I can then count the number of people who demonstrate each response patterns ("Agree" in wave 1 to "Disagree" in wave 2) and compare that to the observed count of response patterns. While the theoretical framework makes within-class predictions, because people are probabilistically assigned to different classes , and to make comparisons to other theoretical processes, I aggregate counts of response patterns at the question level, rather than the class level. I sum the squared deviations from the expectation to penalize larger differences between the expected and observed counts.

$$\lambda_i = \sum_{y_{t=1}=i} \sum_{y_{t=2}=k} (Exp - Obs)^2$$

Becuse both group assignment and response probabilities reflect sources of uncertainty, I iterate this process 10,000 times to generate a distribution of accuracy.

This range of numbers provides a quantification of how good the model predicts future responses, with 0 being a perfect prediction, but it is meaningless on its own, since there is no clear alternative expectation for how many counts we observe. However, I can compare whether this theo-

retical process does a better job predicting the count of observed changes over time than other theoretical models, such as a model that predicts that people give the exact same response in wave 3 that they gave in wave 2, or one that predicts that people sample randomly from the full belief system with equal probability, or one that … . These are implausible models, but we can outline more theoretically grounded alternatives.

The clearest theoretically grounded alternative explanation would suggest that people have more or less ideosyncratic belief systems (or sets of considerations) as a function of their social experiences. In contrast to the belief systems model, this theory would expect no systematic relationship between beliefs in this framework. Instead, people would receive separate influences on each belief from their social environments – churches, schools, families, friends, etc. – and these would shape their responses at each wave.

To estimate these ideosyncratic patterns I conduct a multinomial logit regression for each individual attitude at wave 2 on the range of covariates included in the latent class analysis.[3] This produces a set of individual-specific probabilities of giving each response to a question. I then use those probabilities to simulate potential responses at wave 3 and compare the two approaches.

Model comparisons tend to penalize models for complexity, as complexity tends to lead to greater predictive accuracy within a sample. The latent class model, while quite complex, is substantially less complex than estimating separate models for each response. The latent class analysis estimates 348 separate parameters (coefficients predicting class assignment and probabities of response in each class for 19 questions), while the mutlinomal logit model requires 952 parameters. If the latent class model makes better predictions, there is no reason to prefer the approach of estimating separate probabilities for each response on the grounds of parsimony.

There are obviously ways to simplify both models by removing parameters that do not aid

[3] An common alternative to the assumption that each person's response at each wave is a draw from a multinomial distribution is to assume that each person's response is a latent variable observed with error. This would model the outcome not as a set of independent categories (multinomial logit/probit), but as manifestation of a latent variable (ordinal logit/probit). In practice, the multinomial logit is a less constrained instantiation of the ordinal logit model. If attitudes do reflect an underlying latent construct, the multinomial logit will reflect this structure, but the reverse is not true. Since I am not principally concerned with model parsimony, but rather on adjudicating theoretical processes, I use the multinomial logit model.

in prediction, or by treating responses as ordinal rather than multinomial. However, the main goal of using the same predictors and same outcome scale is to design two models that reflect two similar but distinct theoretical processes: one where beliefs influence and constrain each other, and one where they do not.

7.6 Changing Circumstances

To this point, hypothesis testing has been oriented toward establishing that latent class analysis provides a good methodological fit for the theoretical concept of a belief system and the predictions it makes over time. If that is established, then we can use the deduced belief systems to compare the relative influence of the belief system with social structural features that might produce changes in beliefs over time.

To test the influence of organizational change and social network change, I use the coefficients derived from the latent class and multinomial logit model at wave 2 to predict class assignment and responses at wave 3 using social structural and social network variables observed at wave 3. If changing circumstances – increased church attendance or a more diverse friend group, for example – have the effect of producing changes in attitudes, then using information about social change between waves will produce better estimates of the patterns of change over time.

To ensure comparability across prediction models, each prediction model uses all people with full beliefs at wave 2 and all observed covarates at waves 2 and 3. A handful of people with covariates at wave 3 failed to answer some of the belief questions. They are evaluated on the questions we do observe them on, meaning there is some small variation in the counts of responses tested for each question.

8 Results

The results proceed in three parts. First, I deduce and exlain the belief systems identified through latent class analysis. Second, I test the proposition that the constraints implicit in each belief system

are good predictors of over-time change. Third, I adjudicate the competing influences of the belief system and social structures in predicting wave 3 responses.

8.1 Belief Systems

Based on goodness of fit measures and substantive interpretability, I selected and present a five-class model to summarize the belief systems across the three domains outlined above. Figure ### presents the expected probability of each response option for all 19 questions for all of the classes. There is a lot of information contained in the figure, but there are some obvious patterns. I briefly summarize each belief system, giving a substantive interpretation based on response probabilities and covariates, as well as the implications for over-time change that they imply.

Ardents: The first group, which comprises about 10 percent of survey respondents, displays the most strongly constrained religious beliefs. Almost everybody in this class expresses a belief in the major tenets of Christian theology, and they uniformly reject non-Christian beliefs (reincarnation and astrology). They strongly contrast with other classes in being much more likely to say they disagree and strongly disagree with moral relativism (moralchg; moralrel) and the notion that religion is a private matter (relprvte). Identification as an Evangelical Christian is a strong predictor of being in this class, as is frequent attendance at religious services.

A key feature of this class is that they are less constrained in their beliefs about family and gender than many of the other classes. This lack of constraint arises because their belief space is broader than that of most other classes; their belief system presents them considerations that are at odds with the prevailing culture that views divorce as an acceptably option. While most other groups are constrained to the "disagree" side of the scale on whether "Most of the important decisions in the life of the family should be made by the man of the house," members of this group occasionally agree or strongly agree. They are also the group most likely to say that divorce and sex before marriage are not acceptable.

Under the belief system framework outlined aboce, we should expect members of this group to be highly unlikely to make changes in their beliefs about religious phenomena, both relative to their

other beliefs and relative to other groups. They will also be more constrained in their views of morality. At the same time, because they have these conflicting considerations about family structures, they should be more likely to change those beliefs – both more likely to change those than other groups and more likely to change those than other beliefs.

Agnostics: The second class, which comprises about 15 percent of respondents, manifests as a rejection of religious beliefs. They either reject or question the principal components of Christian theology. At the same time, they also reject astrology and reincarnation. In fact, they look more similar to the most constrained religious group on these two issues than . They are the most constrained to the "relative" side of the moral relativism-moral absolutism scales. In terms of covariates, they tend not to identify as identify with a religious denomination or attend religious services. However, people who identify as Jewish also strongly cluster in this group.

Ambivalent: The thid group is characterized by a high degree of uncertainty on religious and moral beliefs. They are the most likely to say they don't know in response to questions about the existence of agnels, demons, and , as well as non-christian elements such as astrology and reincarnation. These respondents tend to be Catholic or unaffiliated with a religious tradition.

Mainline Christians: This group most closely resembles the strong religious group, but their constrianed religious beliefs do not appear to spill over into other domains. Members of this group appear torn between their religious commitments and contemprary American society, or at least have not taken the time to reconcile these contradictions, producing relatively high levels of ambivalence on issues of family structuree and morality, rarely giving "stong" responses to either. This is the largest class in the data set, drawing members from all religious groups, principally people who do attend religious services, but do not attend them frequently.

Last Group: The final group resembles the mainline Christians but appear to have greater clarity regarding their family and moral beliefs than the ambivalents, being more likely to select "strong" responses to both. They appear to be slightly more open to non-Christian religious beliefs than ardent Christians or the nonbelievers.

While I call these five groups "belief systems," it is not necessary that these … They might

be the product of diverse influences – schooling, parent's education, social netowrks, and religious participation – that … range of considerations … . It – especially in the domains – these people should principally be considered "unconstrained" on their views over time. What these belief systems seek to represent are groups of people with similar sets of considerations in their cognition. The central assumption is that people's responses over time on all 19 issues should resemble independent draws from these distributions.

The assumption of the model outlined here is that people in the strongly religious group do not have an attitude about divorce. They have a set of considerations that leads them to respond to "no" about three-fourths of the time. But any particular person in that group might say "yes" about a quarter of the time, depending on his or her circumstances. The only way to test this proportion is to test whether people appear to behave that way over time. I do that now.

8.2 Over-Time Change

Figure … plots the average within-class standard deviation at wave 2 against the average within-person change between waves 2 and 3, group by question and class. If within-group constraint is a good proxy for within-person considerations, there should be a positive correlation between these two measures.

```
t %>%
  group_by(group, question, grp.var) %>%
  summarise(abs_diff = mean(abs_diff, na.rm = TRUE)) %>%
  ggplot(aes(x = grp.var, y = abs_diff, fill = as.factor(group))) +
  geom_point(shape = 21) +
  geom_text_repel(aes(label = question), size = 2) +
  labs(x = "Within-Class S.D., wave 2",
       y = "Avg. Within-Person Change between Wave 2 and 3",
       fill = "Class") +
  theme_minimal()
```

There is an incredibly strong relationship between the amount that a particular question varies within a group at time 2 and the average within-person change that members of that group demonstrate between the two waves ($\rho = .86$). This relationship holds within groups (lowest correlation is .566 for group … ; highest correlation is .880 for group …) and within questions (lowest correlation is 0.557 for belief in the afterlife; highest correlation is 0.991 for whether God created the world).

To test hypotheses 1 and 2, I estimate a regression of within-person change between times 2 and 3 on within-group variance at time 2. Table XXX presents the results of that regression.

REGRESSION TABLE HERE

As expected, Table ### shows a strong positive association between within-group variance at wave 2 and within-person change at wave 3. In other words, consistent with Hypothesis ###, people are more likely to change attitudes that are less constrained in their group at time 2. And consistet with Hypothesis ###, within questions, groups that are less constrained exhibit more change their answers over time.

8.3 Response Patterns

While the regression above presents strong evidence that people are more likely to change their less constrained beliefs and that beliefs change less in more constrained belief systems, the belief structure model outlined above makes a stronger prediction: that constraints not only predict how much responses will change, but how often members of each group … . Figure XXX presents the sum of squared deviations from the expected counts.

I use … the probabilities of class assignment estiamted at wave 2 to generate , and use those class assignment to generate expected responses at wave 3. I compare them to a model that generates predictions for each belief separately.

… 10,000 iterations of each model.

The predictions generated through the latent class model consistently outperform the pre-

dictions made through the multinomal logit model. For some of the questions, especially the Christian religious beliefs, the latent class model significantly outperforms the multinomal logit. Other questions are less conclusive, but the latent class model still outperforms the ideosyncratic beliefs model on average. These latter beliefs – astrology, reincarnation, unmarsex – tend to be the least different across belief systems, suggesting that the other beliefs exhibit little constraining influence on how people understand them.

8.3.1 Changing Social Circumstances

Finally, I adjudicate between the competing influences of belief systems and social structures in predicting change over time. I reiterate the approach outlined above, using wave 3 covariates to predict changes in response patterns between wave 2 and 3.

Figure … compares the prediction from the belief … Again, the b… There is little change in the predictions for the multinomial logit model, but the latent class model actually performs worse when we account for changes in … This appears to be principally because people decrease their religious participation between waves 2 and 3, which should have the effect of unconstraining several beliefs, which does not happen. This is not surprising, as the gap between these waves principally reflects people leaving their parent's home and relatively homogenous communities and transitioning to independent life, college, and the workforce.

9 Discussion

10 Conclusion

An important caveat to the above presentation is that Wave 2 of the NSYR occurs at what seems to be a particularly formative period in people's life course. Respondents were between the ages of 16 and 20 when they were interviewed for wave 2 of the NSYR. Existing research suggests that people's attitudes on a range of issues appear to crystalize prior to adulthood (Kiley and Vaisey 2020; **???**;

Vaisey and Miles 2017). It might not always be the case that the first wave of a panel survey is as strongly predictive for each belief system.

There are two general reasons why we should expect constrained beliefs to demonstrate greater stability. First, people with constrained beliefs will demonstrate less change in their social contexts. Strong belief systems guide people's behavior across domains, including the networks people select into, the institutions in which they choose to participate, and more (Vaisey and Lizardo 2016). Heterogeneous belief systems allow people to draw on different considerations when constructing (Harding 2007).

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