Mechanisms of Change across Issues and Contexts

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Abstract

Cohort replacement—the replacement of older cohorts by their successors who developed under different conditions—is an important process driving cultural change. Research on public opinion in the United States indicates that most aggregate changes are best understood as the result of cohort replacement, rather than individuals changing their minds. However, some publicly salient sensitive issues, like gay rights, appear to be exceptions. Why exactly these issues appear to follow different trajectories of change it not well understood. A key reason is that previous work is limited by its focus on a single national context and the lack of a systematic comparison between more and less sensitive issues. We use data from the 1981-2020 World Values Surveys to compare aggregate changes in public opinion in 8 countries. We compare the trajectories of more sensitive and less sensitive issues to see if the pattern observed in the United States is generalizable. We find common trends – like changes in attitudes towards homosexuality – across most countries, as well as context-specific patterns that follow recognizable historical processes. An important insight is that sensitive issues seem to change more through cohort replacement. In short, issues that are difficult to talk about change more privately.

Words: 7583

Introduction

Much of the scholarly interest in culture lies in trying to understand how it changes. Cultural trends like perceived secularization (Berger 2002; Chaves 1994) or the rise of (and backlash against) gender equality (Velasco 2023) continue to receive sustained academic attention. Recent work on opinion change in the U.S. suggests that these changes happen primarily through cohort replacement (Vaisey and Lizardo 2016; Kiley and Vaisey 2020). In other words, culture changes as young people, raised under different conditions, replace those that came before them. Nonetheless, some salient issues, like attitudes about homosexuality, seem to be exceptions, where individuals exhibit considerable durable change beyond adulthood (Kiley and Vaisey 2020).

This suggests that certain cultural issues might change in response to different underlying mechanisms, and this is precisely what we explore in this paper. We have two main goals in this article. First, we will examine whether there are systematic differences in the patterns of change across different variables, especially in relation to how sensitive they are considered to be. We have evidence that individuals do update their beliefs about particularly salient issues. However, these issues tend to be also hotly debated, and difficult to talk about, where we expect interlocutors to be firmly entrenched in their beliefs. The sensitivity of an topic – i.e. the difficulty around discussing it – might be a useful gateway to start asking how different variables change through varying mechanisms. Second, we want to move beyond U.S. data and examine cross-cultural variation in how different issues change. In short, we want to dig deeper into the mechanisms that underpin change for different cultural issues, and we want to examine whether these mechanisms of change are consistent across contexts.

For our analyses, we will use data from the World Value Survey (WVS) (Inglehart et al. 2000). Though the data is cross-sectional and, therefore, it cannot answer any questions about individual-level change, we can use it to adjudicate between different mechanisms that might account for large-scale cultural change. To do this, we propose a straightforward method[1]. We begin by positing an idealized model, where - after the critical period of youth - individuals do not change their beliefs. Under these assumptions, all cultural change can be explained by *between-cohort differences* and all we need to know to estimate a person's opinion on a given issue is to know their year of birth. Then, we consider another model, where the average opinion of each cohort is allowed to change over time. We contend that, when fitted to the WVS data, the relative explanatory power of both models provides an indication of the mechanism that might be driving change for a given issue. If the proportion of the variance explained is relatively unchanged when we move from the first model to the second one, then this is a plausible signal that a given issue is changing primarily through cohort replacement. If the second model has more explanatory capacity, then this would point towards the importance of *within-cohort change* in accounting for the trends.

To examine patterns of change across different types of cultural issues, we fit these models to 56 different variables, measured between 1981-2020, across 8 countries. We select the countries – Argentina, Australia, Canada, Japan, Mexico, South Africa, Sweden, and the USA – based on completeness, seeking to cover the longest time-spans possible with this survey. We also choose to focus on variables that have been asked in all the waves of the WVS, and that cover a wide-range of topics and different levels of sensitivity, from the justifiability of euthanasia to whether imagination is an desirable attribute in children. Our results highlight several key insights. We show that, consistent with previous work on cultural change, large differences are

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[1]All necessary code and data to reproduce this paper is available on: https://github.com/NicolasRestrep/sensitive_change .

hard to come by. Nonetheless, just like work on attitudinal change in the U.S. (Kiley and Vaisey 2020), we find that the variable that has changed most consistently across the countries is related to attitudes of homosexuality. Furthermore, we show that for the variables that change the most, a considerable proportion of this variation can be attributed to cohort replacement. Perhaps most relevant to the current paper, we see a pattern across the sensitivity of different cultural issues, where change in more sensitive topics can be explained mostly by *between-cohort differences*, and variation in less sensitive issues can be attributed more to *within-cohort change*. This provides some preliminary evidence for the idea that different issues do change through varying mechanisms.

Cultural change and its elements

Cultural change has been a central preoccupation of social scientists. Most social theories seek to address, to different extents, how societies change and evolve, and often the first criticism that is leveled at any account of the social world is whether it is capable of *"accounting for change"* (Martin 2015). Recently, there has been a renewed interest in trying to tackle cultural change, with the important consideration that new work has focused on linking individual mechanisms of attitudinal updating to large-scale processes of change (Kiley and Vaisey 2020; Keskintürk 2021; Bartels and Jackman 2014). When it comes to matters of opinion, societies do not change; individuals change and the aggregation of those individual processes of updating is what can be perceived as shifts at the collective level. This is not just pretentious wordplay, but rather a fundamental point in the study of social change: it means that theories of large-scale cultural change are – at their core – accounts of how individuals update their beliefs and habits, and that one cannot have the former without the latter.

Large-scale change can occur through several individual-level mechanisms. It may be the case that individuals tend to update their beliefs in a particular way as they age. For instance, they might veer away from direct action and radical politics as they accrue wealth and have more to lose in the case of a structural societal change (McAdam 1989). The type of trends we expect to happen throughout an individual's lifetime are often described as *age effects* (Fosse and Winship 2019). Large-scale change might also happen as new information or events affect a whole cross-section of the population. During a time for war, for example, we might expect individuals – across all age-groups – to shift in their sentiment towards the armed forces or their country in general. These are what are known as *period effects* (Fosse and Winship 2019). It is also possible to think that certain historical moments leave a mark on those individuals who grow up under those conditions (Elder 2018). These individuals, then, would have distinctive attitudes, due to the circumstances of their upbringing, that they would then carry throughout their lives. Regarding how old they are or the cultural zeitgeist at

any given moment, we could be able to tell something about these individuals' believes and behaviors by knowing when they were born. These are called *cohort effects* (Elder 2018; Fosse and Winship 2023).

Disentangling these different sources of cultural change is a well-known challenge (Bell and Jones 2013). This is because – in the framework of a standard regression – examining these three sources of variation would entail perfect collinearity (Fosse and Winship 2019). In other words, if we know an individual's age and we know the current year, we also know precisely when they were born. Though this is not the place to provide a full review of the work that has been done around the estimation of age-period-cohort effects (cf. (Fosse and Winship 2019)), it suffices to mention that several strategies have been devised to try to disaggregate these three sources of change. Nonetheless, all strategies involve a kind of compromise - e.g. turning continuous categories like year into categorical chunks to avoid collinearity (Vaisey and Lizardo 2016). Fortunately for us, we do not need to disentangle all three of these effects. Instead, for theoretical reasons, we can focus on the contrast between a model in which only cohort replacement matters and one where within-cohort change (by whatever mechanism) is also an important driver of aggregate change.

Two models of individual-level change

Broadly speaking, there are two main models that can help us think about how change unfolds at the individual level. The first one has been called the "settled-dispositions" model (Kiley and Vaisey 2020; Underwood et al. 2022). The main argument here is that an individuals' beliefs and preferences are mainly forged during a critical period of socialization. Thus, after the learning associated with one's formative years, attitudes remain relatively stable across the lifetime. This has the further implication that individuals raised in similar socio-historical contexts will share certain attitudinal dispositions that they will then carry throughout their lives (Elder 2018; Gerber and Green 1998; Ryder 1985). The "settled-dispositions" has a longstanding history in the social sciences, from Parsons's (2014) work on the internalization of values to Mannheim's (1970) "Problem of Generations". Perhaps the most telling evidence for the widespread influence of this model is that most of our theories of socialization acknowledge – either explicitly or implicitly – its validity. The very idea of socialization requires the assumption that certain dispositions, acquired during the critical period of upbringing, are particularly sticky, proving influential throughout the life-course (Guhin, Calarco, and Miller-Idriss 2021).

The second model portrays individuals as constantly open to revisiting their beliefs. This model of "active updating" is based on social theories that portray the self as continuously under construction (Gross 2009). Individuals then are always open to novel information – including biographical information gained through aging – and, thus, highly sensitive to changes in their cultural and social contexts. This implies that cultural

moments would play a much bigger in shaping individuals' attitudes. In other words, individuals will reconsider their attitudes in light of the cultural trends and/or political movements that happen to be popular at a particular historical moment. Visions of history as propelled by the zeitgeist of an epoch – which takes hold across whole swathes of the population – rely implicitly on the idea that individuals are attuned to the "spirit of the age", ready to change their attitudes as new information arises.

Trying to adjudicate the explanatory power of the two models has been at the center of research about large-scale change for the past two decades. The "settled-dispositions" and "active-updating" model assume quite different theories about how change occurs throughout an individual's life, and – as a consequence – provide widely diverging accounts of social change. In very practical terms, Lizardo and Vaisey (2016) argue that the differences between these models can be boiled down to a rather simple question: *to predict a person's attitudes at a given point are we better off knowing the current year or their date of birth?*

Now, these two broad models have vastly different implications for the patterns we should expect to see at the collective level. If the "active updating" model were the dominant process in the social world, we would expect individuals to be highly receptive to new information and the changing characteristics of the environment. We would expect then cultural change to happen swiftly, following particular events or shocks. An unexpected economic downturn might lead the members of a group – regardless of age – to be more conservative in their financial choices. A series of catastrophic climate disasters might lead them to update their beliefs on man-made climate change. In other words, extraneous changes will be reflected directly in aggregate cultural attitudes, as the population updates their attitudes in light of new information and/or circumstances. The "settled-dispositions" model paints a rather different picture. If this model were true, we should expect agents, who have passed their formative years, to be less swayed by new information. Thus, cohorts raised under the unfavorable economic circumstances or the perilous climate will develop attitudes based on these formative experiences. These beliefs, however, will only change aggregate attitudes about fiscal policy or man-made climate change, as their predecessors, raised under different circumstances, die and give way to their new ideas (Ryder 1985). Aggregate social change in this scenario will be gradual, and the consequences of extraneous circumstances will become apparent as younger cohorts, who experience them during their critical periods, replace those than came before them.

Recent work on attitudinal change suggests that the "settled-dispositions" model explains the bulk of aggregate social change (Vaisey and Lizardo 2016; Kiley and Vaisey 2020; Underwood et al. 2022). Lizardo and Vaisey (2016), for instance, compare the explanatory power of both models in cross-sectional time-series data from the US. They find that most attitudes remain relatively stable within cohorts, giving weight to the idea that aggregate change is most adequately explained by cohort succession. Moreover, when looking

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at individual-level longitudinal data, there is evidence that points in the same direction (Kiley and Vaisey 2020; Bartels and Jackman 2014). Cohorts seem to share certain dispositions, which appear to remain remarkably stable across the life-course. Thus, for both cross-sectional and individual-level longitudinal data, across many different issues, there is consistent evidence that highlights the explanatory validity of the "settled-dispositions" model.

Variation in mechanisms of change across issues

At this point, readers might be – understandably – conjuring up counter-examples of rapid cultural change. It is important to highlight that arguing that cultural change occurs primarily through cohort replacement does not mean stating that this is the only mechanism. Recent work by Lersch (2023) shows that individuals do exhibit some change in adulthood, even if this change is small relative to persistent between-person differences. Moreover, the aforementioned work by Kiley and Vaisey (2020) shows that there are certain issues where we do observe considerable durable change, even among adults. In the U.S., for instance, there is evidence of within-individual updating with regards to attitudes towards homosexuality, a particularly salient issue for the past few decades. It is possible that for certain issues, that enjoy enough sustained public attention, we might observe attitudinal updating even among agents we should expect to have settled dispositions. This evidence suggests that it is, then, perhaps more accurate to think about updating across an individual's lifetime as probabilistic, where attitudes are less likely – but not impossible – to change after the critical period of socialization. But certain issues do seem to exhibit change across the life-course, either because of particular biographical trajectories (2023) or perhaps because they seem to capture the public's attention (Zaller 1992). The goal is trying to understand what it is about these issues that makes them more likely to be updated even in adulthood, and whether there are cross-cultural patterns in the what these issues are.

Sensitivity is a concept that perhaps allows us to get an initial handle on this question. Mace et al. define sensitive issues as those topics that are difficult to talk about. At first glance, we see that issues like gay civil rights or abortion – which have exhibited considerable change in the last few decades – are just such issues. In this sense, given the difficulty around discussing these topics, we should expect individuals to not change their attitudes around them much. This would mean that the swift changes we have observed – at the aggregate level – around this subjects should be mostly attributed to cohort replacement.

Nonetheless, as Kiley and Vaisey's (2020) work shows, these issues are also the ones where we do see evidence of individual updating. We should remember that these issues were not always considered sensitive, but rather there have been concerted efforts to bring them to the forefront of political discussions. For example, work on the history of public opinion for abortion rights suggests that the topic was not central for Conservative

thinking in the middle of the 20th century (Holland 2020). This issue became sensitive through intentional efforts by the Christian right to shed light on this topic and to bring it into the core of the conservative political identity (Holland 2020).

This leaves us at a crossroads. Sensitive issues should change more slowly, and yet we have evidence of individual updating around these topics, even among those whose attitudes should be stable. Radio programs and editorial sections always brim with discussions about these subjects, which are particularly difficult to bring up at family dinners and where we expect individuals not to cede an inch of ideological ground. Sensitive issues then occupy an interesting position. For many of them, we should expect there to be a lot of inter-cohort disagreement and, thus, we should expect them to change through cohort replacement. However, given that the differences between the average attitudes of different cohorts is large, even gradual change might lead to considerable variation at the level of public opinion. Moreover, given that these issues dominate public discussion, we should also expect them to lead to more attitudinal updating among those who are less likely to revise their opinions. Therefore, so-called "sensitive issues" might change differently than other topics that are less salient and emotionally wrapped. This is precisely what we seek to test in our analyses.

Methods

Disentangling within-cohort and between-cohort differences

The above discussion suggests that the goal is not disentangling the relative importance of age, period, and cohort effects, but rather adjudicating the relative explanatory power of the two broad models of individual-level updating. Both goals are not equivalent. If the settled-dispositions model is dominant, then we should expect most group-level cultural change to be driven by differences between cohorts, as younger individuals move away from the attitudes of those that came before them. In turn, if the "attitudinal updating" model is more explanatory, then we should see evidence of considerable changes within cohorts, as they are exposed to new information and/or as they age. The central distinction, then, is between the relative importance of *between-cohort differences* and *within-cohort change*, with issues like *period* and *age effects* already enveloped in the latter.

To clarify the distinction between patterns of large-scale change mainly driven by *between cohort differences* or *within-cohort change*, it is useful to envision two idealized models of aggregate change. First, imagine a scenario where after the critical period of socialization, cohorts settle into their dispositions and then hardly deviate from their averages. If we were able to track the data by cohort it would look like overlapping horizontal lines, with different intercepts on the y-axis. Change, at the aggregate level, would look like

a gradual shift towards the averages of the younger cohorts. Figure 1 illustrates both dynamics. In this case, knowing a person's year of birth would tell us reliably their opinion. Cohort would also explain all the variation in aggregate change, given that – in this idealized scenario – all change occurs through cohort replacement and, therefore, large-scale variation is exclusively the result of *between-cohort differences*.
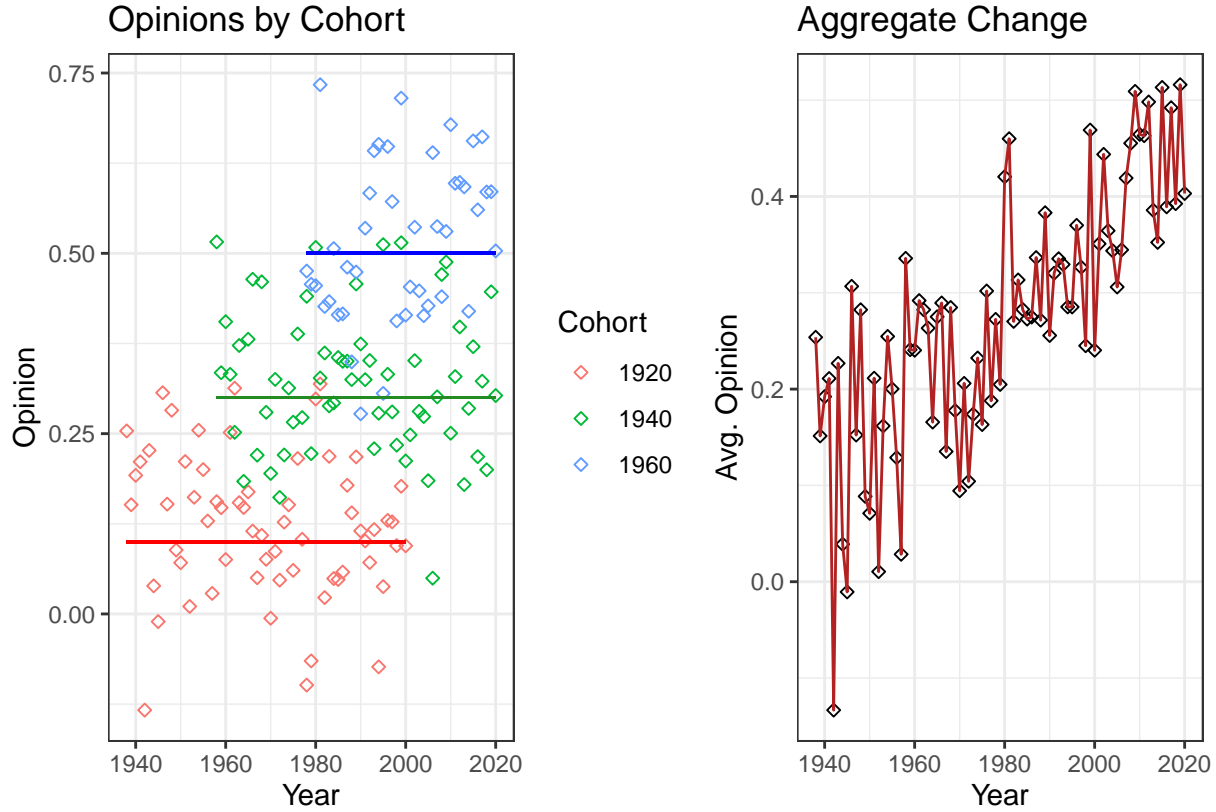

Now, imagine another scenario where cohorts do update their attitudes around an issue, either because as individuals get older they tend to change their beliefs or because an issue has been particularly salient in public discussions. In other words, we would assume that there are – in addition to initial *between-cohort differences – within-cohort changes* in this example, which can be either *period* or *age* effects. In this stylized example, we can imagine an issue – like attitudes towards homosexuality – that has become increasingly important in the public sphere since the middle of the 20th century and where individuals seem to have updated their beliefs. Figure 2 shows this second example. We notice here that we see *within cohort changes*, due to common trends experienced by all members of the group. This, in turn, translates into much steeper cultural change at the aggregate level. Cultural change here is not only due to the overall differences between cohorts - and their replacement - but also due to variation in opinions, in the same direction, within cohorts.
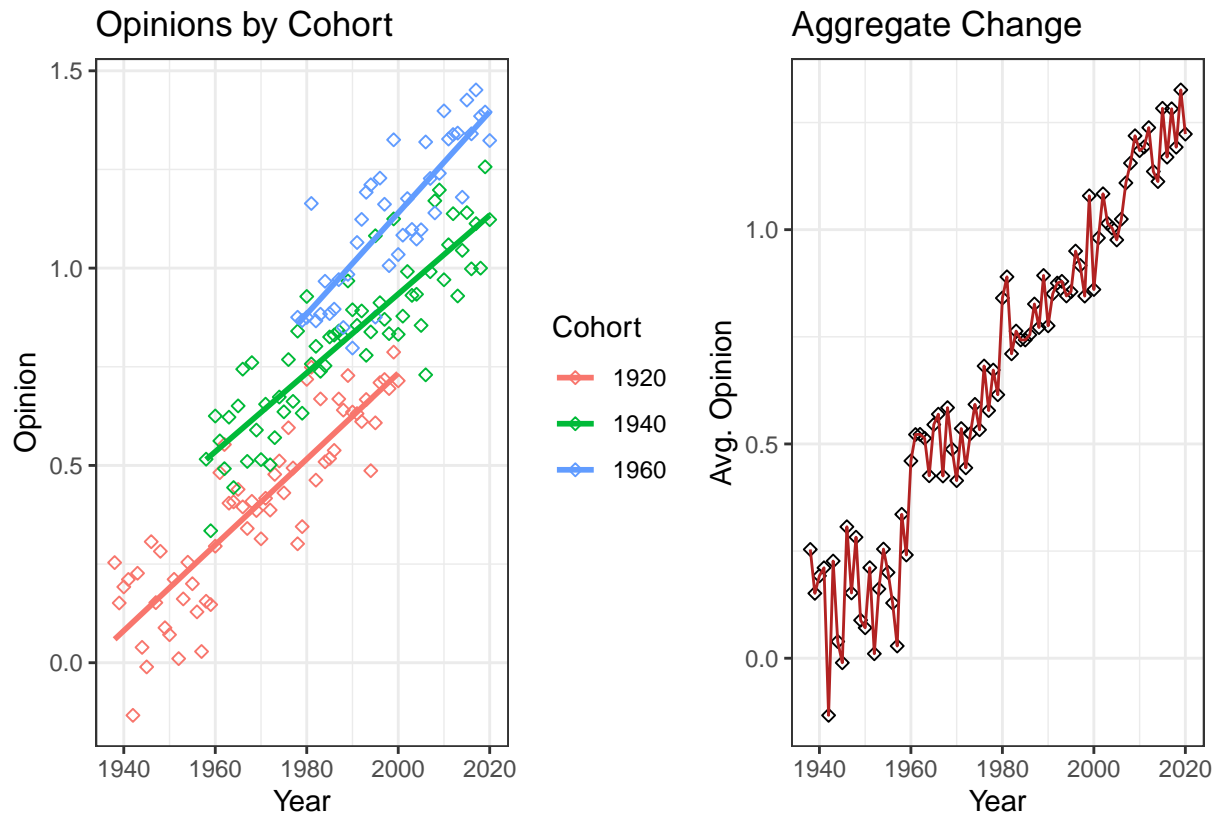
A more extreme variant of this example would be one where all cohorts start from the same average opinion – regardless of the current year – and endure the same *within-cohort changes*. In other words, we can imagine a scenario where there are no initial *between-cohort differences* and all age-groups follow the same trends in opinion change. Figure 3 illustrates such a case:
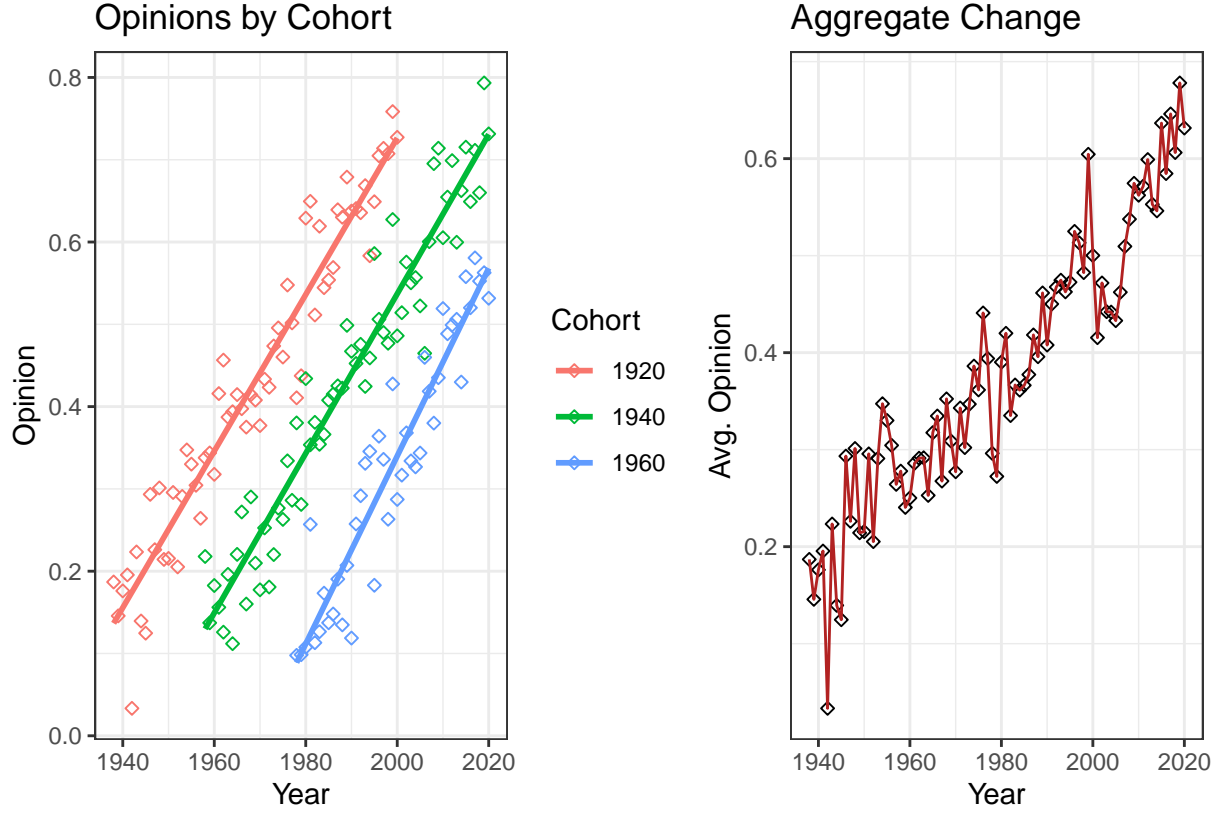
Based on these idealized models, we propose a simple test that can help us differentiate the relative contribution of *within-cohort change* and *between-cohort differences* for understanding aggregate cultural change. We can fit two models to the same data. One would be a linear regression where the outcome variable is regressed over the cohort of each respondent:

$$y_i \sim N(\mu, \sigma^2)$$

$$\mu = \alpha + \beta_{\text{cohort}[i]}$$

The second model would be similar but it would also include an interaction effect between cohort and year, to include the possibility that there have been period effects, and these effects influence each cohort in a different way:

$$y_i \sim N(\mu, \sigma^2)$$

$$\mu = \alpha + \beta_{\text{cohort}[i]} + \phi_{\text{year}[i]} + \zeta_{\text{cohort}[i]*\text{year}[i]}$$

We then compare the variance explained by each model. Specifically, we divide the variance explained by the first model over that accounted for by the second one.

$$\tau = \frac{V(BD)}{V(BD + WC)}$$

τ then could be interpreted as the proportion of variance explained that is preserved when only *between-cohort differences* matter - i.e. when we remove the effect of time from the model. As the number gets closer to one, then, this would be a plausible indication that change in a given variable is mostly explained by cohort replacement as opposed to period effects. For example, in our rather simple scenarios, τ for the first case would be 0.98 and in the second case would be 0.72. For the third – admittedly extreme – case, τ would be 0.07. Almost all variance explained is preserved in the first case when we take the effect of year out of the model. In the second case, we do seem to lose information, as we expected. In the third case, almost *none* of the variance explained is preserved when we do not consider *within-cohort changes*, as these explain almost all the change in aggregate opinion in this case. This simple test, then, is a useful indicator to begin to differentiate the mechanisms that underpin the large-scale opinion change.

At this point it is important to discuss an important assumption our approach makes. The second model we fit assumes that *within-cohort change* is linear. This means that we are unable to capture within-cohort fluctuations that might be caused by temporary shocks – e.g. a temporary increase in support of defense spending after a terrorist attack. While we acknowledge that these fluctuations are an important component of *within-cohort change*, we also contend that they are unlikely to explain aggregate changes over time. When social scientists discuss cultural change, they often mean *directional* change. In other words, we tend to be interested in variation that follows a trend, like the secularization of group or the expansion/erosion of civil liberties. Given that we are interested in how average opinions, within cohorts, have changed in a single direction across time, the linear assumption is warranted. However, this does prevent us from drawing any conclusions about any *non-linear* changes that might happen within cohorts, which can certainly be important for understanding opinion change.

Data

To understand mechanisms of change, across different contexts and issues, we use the World Values Survey (WVS) (Inglehart et al. 2000). The WVS is a large-scale effort to collect comparable attitudinal data across multiple countries, which started in 1981. For each country and each wave, the WVS collects high-quality, nationally representative samples, and covers a wide range of questions from views on gender equality to

socio-economic indices. The survey, however, is not longitudinal, which means that we are unable to track any within-individual changes across time. However, it allows us to examine trends in aggregate opinion across time for different countries.

Our method will be most insightful when we have information about aggregate information in each country across a considerable span of time. This is a challenge because not all countries feature in every wave, and not all questions were asked in the times when we do have samples. We decide to select countries based on completeness: those for which we have the most measures. This leads us to eight countries: Argentina (ARG), Australia (AUS), Canada (CAN), Japan (JPN), Mexico (MEX), South Africa (ZAF), Sweden (SWE), and the USA. We are aware that this is not comprehensive or particularly diverse sample of countries. We are missing some of the world's most populous countries – India and China – and we do not have a majority-Muslim countries. However, given that these mechanisms of social change have yet to be tested across different cultures, an initial comparison – albeit limited – is valuable. We also select the variables for our analysis based on relevance and completeness. In terms of the former, we choose variables that reflect cultural attitudes that could plausibly change over time. This includes a wide range of items, from opinions about child-bearing to attitudes about the acceptability of euthanasia. We also select the variables based on whether they have been asked in all the waves for the countries selected. After implementing both criteria we are left with 56 variables that cover a wide variety of issues, some everyday and some highly sensitive. The full list of items, alongside their respective questions and the abbreviations we use below, is available in the supplementary materials.

Analysis

For each variable, we calculate the τ, using the test explained above. Then, we examine how this metric is related to the total amount of change each variable exhibits in each country. Finally, we fit two linear regression models to explore whether the sensitivity of the issues is related to how much they change and to the mechanism that most likely underpins that variation.

Though capturing the sensitivity of an issue is a difficult task, we use two strategies that can help us operationalize this concept in a principled way. At first glance, we cover variables that differ widely in terms of how sensitive they are. For example, it is possible to contend that questions about the justifiability of euthanasia are more sensitive that questions about whether imagination is an important quality in a child. But we want to ascertain the sensitivity of these questions in a more principled way. Our first approach is to use an LLM to rate each one of the questions in terms of sensitivity on a scale from 1 to 10. The script used to prompt the LLM for the ratings is available in the supplementary materials. The following plot shows the

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ratings associated with each question:

LLM Sensitivity Ratings
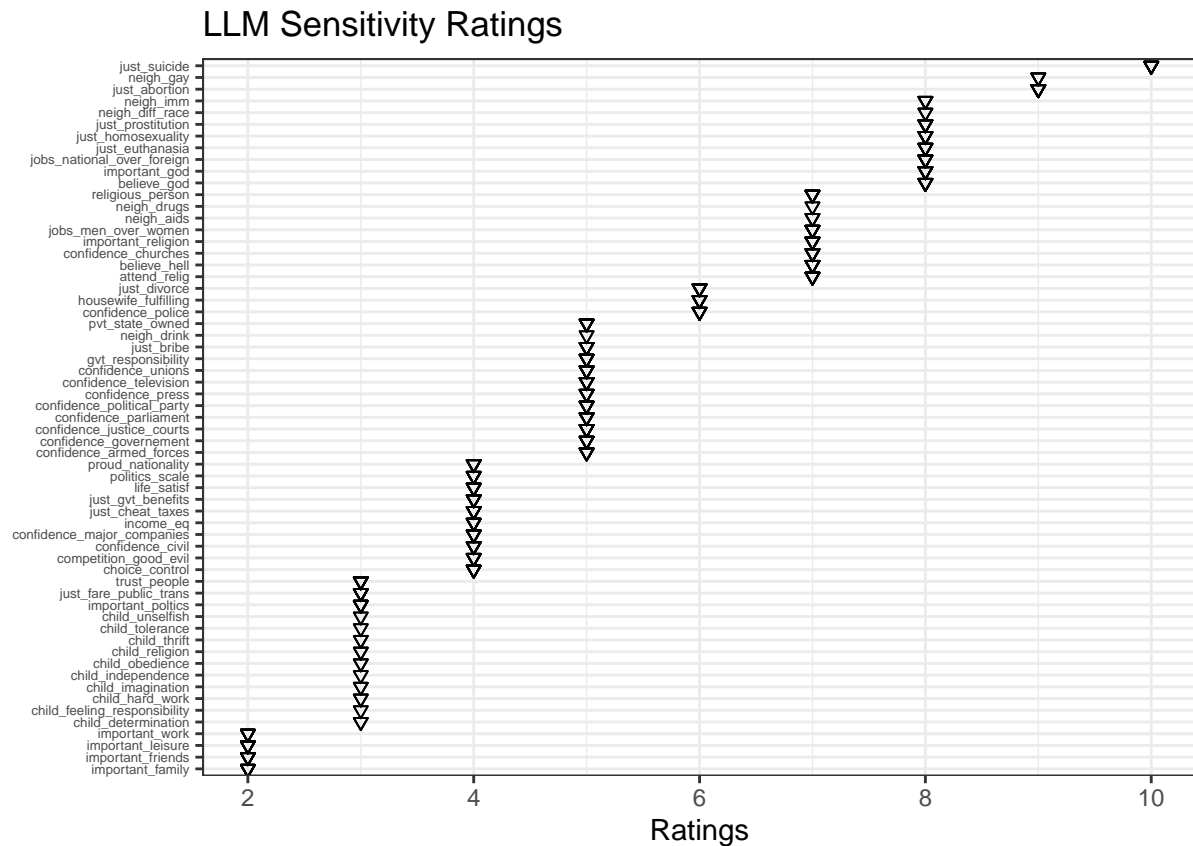
We notice that the ratings seem intuitive. Questions about euthanasia and suicide have quite high ratings. In contrast, questions about the importance of friends and those pertaining to child rearing tend to have lower scores.

Nonetheless, we recognize there are several limitations to this scoring system. Perhaps the biggest is that LLMs are trained on text that might favor certain cultural biases, those of industrialized and highly educated countries. Therefore, these ratings hide cross-cultural variation in sensitivity — i.e they cannot tell us whether an issue that is sensitive in Japan might be prosaic in Sweden.

To complement this approach, we develop another measure for sensitivity that takes advantage of patterns of missingness in the WVS. Like most large-scale survey efforts, the WVS codes different types of missingness in their data. Missing values here are coded as: does not know (-1), does not apply (-3), did not answer (-2), and missing for other reasons (-5). As we mentioned above, in this special issue, sensitive topics are defined as those that are difficult to *talk about*. If sensitivity is indeed related to how difficult it is to speak about a subject, then we could plausibly interpret participants' unwillingness to answer the questions as an – admittedly weak – indicator of an issue's sensitivity. The proportion of missing data coded as (-2) in each

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³¹⁷ question then could give us an indication of whether an issue is sensitive or not. We calculate this proportion

³¹⁸ for each question for each country and averaged across all countries. For our analyses, we use the latter

³¹⁹ because it is most comparable to the LLM ratings, but we also conducted all tests using the country-specific

³²⁰ proportions and the results are largely the same. In Figure X, we see the sensitivity ratings calculated as the

³²¹ proportion of missing data that denotes unwillingness to answer per question:

LLM Sensitivity Ratings


³²²
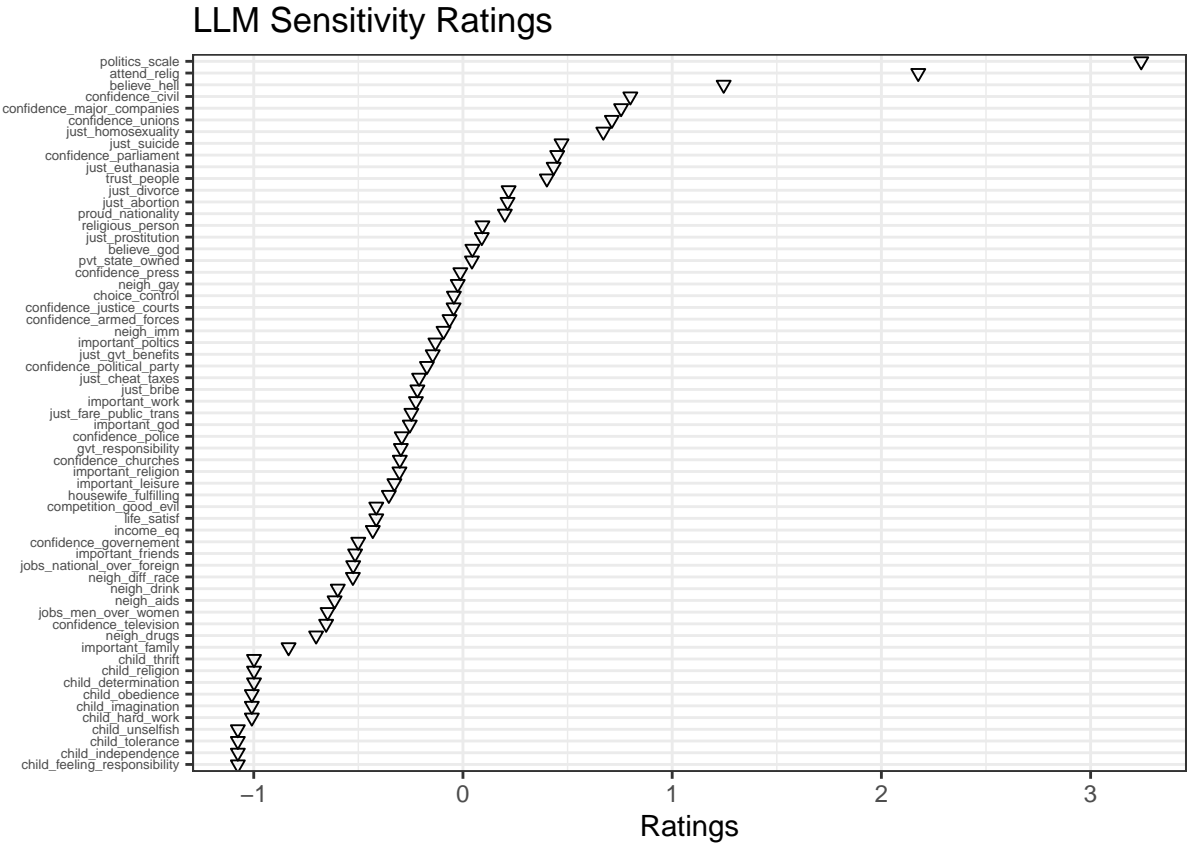
³²³ Though not entirely similar, both of our measures weakly positively correlated. We notice similar patterns,

³²⁴ like questions about child-rearing being deemed mundane, while the justifiability of homosexuality and suicide

³²⁵ are still high up the list. Nonetheless, there are important differences. For instance, we notice here that

³²⁶ questions about religion and political self-placement, as well as some questions about confidence in institutions,

³²⁷ are high on this list.

³²⁸ Now, we are aware these are by no means perfect measures of sensitivity. The LLM ratings are based on

³²⁹ training data that is not very sensitive to cultural differences, and the measure based on missingness is only a

³³⁰ weak indicator of respondents' unwillingness to discuss a subject. However, both strategies seem to capture

³³¹ aspects of sensitivity, and display results that are – at least at first glance – intuitive. Moreover, if the

³³² patterns of change of sensitive issues exhibit similar relationships when considering both of our measures,

³³³ this would give us further confidence about the validity of our results.

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Results

We begin by calculating the τ measure for all variables across each country. Figure X displays the relationship between τ on the y-axis and absolute change of the variable across the recorded time span on the x-axis:

Relationship between Tau and Change
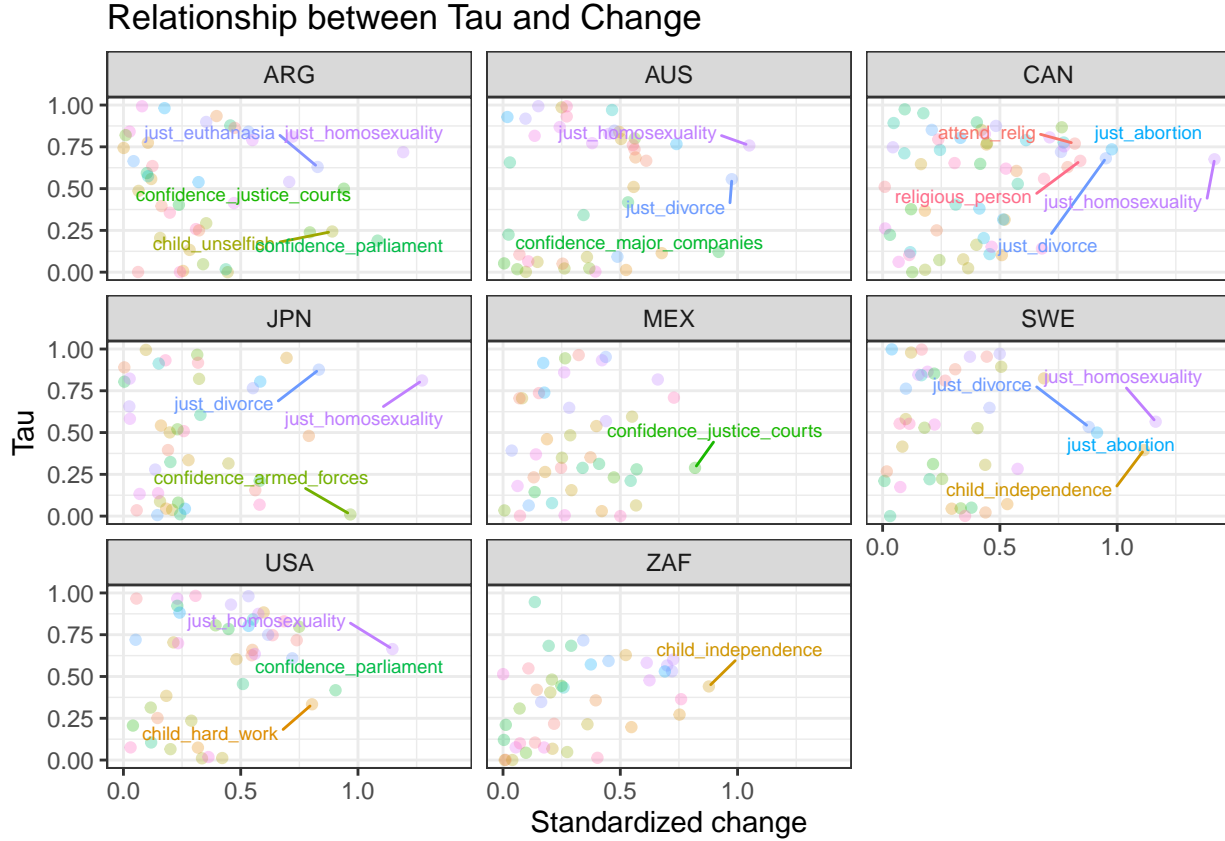
On the y-axis, we have our measure τ, which can be interpreted variance explained that is preserved when *within-cohort changes* are removed from the model. On the x-axis, we have the absolute change - in standard deviations - between the first and last wave. Therefore, in the upper right quadrant of each plot, we should see variables that have changed a lot and whose change is explained mostly by cohort replacement. On the lower right quadrant, we should see variables that have also exhibited a lot of change but whose variations are mostly accounted for by *within-cohort change.*

The first striking result is that most variables do not display considerable change - i.e. most variables hover around the left-hand side of the x-axis. This is most evident in countries like Mexico and South Africa. In the plot, we label the variables that have displayed a directional change higher than 0.8 standard deviations. Another important pattern that emerges is that, consistent with previous work on cultural change (Kiley and Vaisey 2020), the variable that seems to display consistently large change across countries is the justifiability of homosexuality. Moreover, notice that this variable tends to be on upper-right quadrant, which suggests

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that this change tends to be driven mostly by *between-cohort differences*, rather than *within-cohort change*. In fact, at first glance, we see that this seems to be a common patterns for sensitive issues such as the justifiability of abortion, euthanasia, and divorce. When they do exhibit considerable change, most of the variation is explained by cohort differences. The variables that exhibit change through *within-cohort change* are mostly related to confidence in institutions and child-rearing. Our results do seem to capture certain *period effects* that we would expect to show up given the time when the surveys were administered. For instance, changes in confidence in justice courts in Argentina coincide with the famous trials of the military dictatorship and the variation in confidence in the armed forces in Japan runs parallel with a restructuring of that institution. Thus, there seems to be a pattern in how change in different variables is underpinned mostly by *within-cohort changes* and *between-cohort differences*, and it seems to be organized around sensitivity. We test this idea properly below.

In our background section, we suggest that sensitive issues occupy an interesting position: they enjoy sustained public attention and individuals' attitudes seem particularly entrenched. We then hypothesize that these issues might display different patterns of cultural change, but our hypothesis is non-directional. Next, we test two ideas. First, we examine whether the sensitivity of an issue is predictive of how much change it has undergone. Second, we analyze whether sensitive issues seem to change more through *within-cohort changes* or *between-cohort differences* – i.e. whether an issue's sensitivity is informative of its τ.

To see if sensitive issues display different rates of overall change, we fit two linear regression models where the outcome variable is overall change and the main independent variable is an issue's sensitivity. We fit one model for each one of our measures of sensitivity, and include varying intercepts for country. The following tables display the results for both models:

Characteristic	Beta	95% CI	Beta	95% CI
Sensitivity	0.00	-0.03, 0.03	0.07	0.04, 0.10
Country Intercept SD	0.03		0.04	
Residuals SD	0.28		0.27	

Here, we have mixed evidence. When we use the sensitivity ratings based on unwillingness to answer the questions, we find that there no differences in rates of overall change between more and less sensitive issues. However, when we use the ratings by the LLM, we do see that there are some small differences: a one standard deviation increase in sensitivity would lead to a 0.07 standard deviations increase in overall change. Thus, even though we have some indications that sensitive issues tend to exhibit more overall change, given the

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contradictory evidence, it is not possible to draw strong conclusions.

The next tables, in turn, display the coefficients for two regression models where the outcome variable is τ and the main independent variable is an issue's sensitivity. Again, we fit the models for each one of our measures of sensitivity, and we include varying intercepts for countries:

Characteristic	Beta	95% CI	Beta	95% CI
Sensitivity	0.05	0.01, 0.08	0.08	0.04, 0.11
Country Intercept SD	0.05		0.06	
Residuals SD	0.31		0.31	

Here, both models are broadly consistent. The results suggests that as sensitivity increases, so does τ. For the model that includes the LLM ratings, a one standard deviation increase in sensitivity leads to a 0.08 increase in τ. In turn, for the model that operationalizes missingness as an unwillingness to answer questions, a one standard deviation increase in sensitivity is associated with a 0.05 increase in τ. Although the coefficients are not large, this means that – on average – we should expect more sensitive issues to change more through *between-cohort differences* as opposed to *within-cohort changes*. Sensitive issues do seem to vary in terms of the mechanism that undergirds their variation across time: they appear to change more due to cohort replacement. These are small effects, but they are consistent with the theoretical mechanisms we discussed above. The fact that both models point in the same direction lends further confidence to the results.

Discussion

In this paper, we expand on previous work on large-scale cultural change by examining multiple cultural contexts, and by systematically examining *what* variables have changed in each setting and *how*. The last decade has seen renewed interest in one of the central theoretical questions in the social sciences: how societies change. There have been important steps in understanding this puzzle. At the aggregate level, there is evidence that most average intra-cohort opinions remain relatively stable, which implies that large-scale change most likely occurs through cohort replacement. At the individual-level, previous work shows that although adults do sometimes change their beliefs, they mostly remain stable in their attitudes throughout their lives. This – again – reinforces the idea that the main mechanism of aggregate-level change is most likely cohort succession. What previous research has not done is move beyond a single cultural context to make systematic comparisons between different settings, and try to adjudicate how different types of variable change across cultures and groups. We follow the methods that analyze aggregate-level change to try to

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address these gaps.

Building on previous research on cultural change, we seek to adjudicate the mechanisms that drive processes of large-scale cultural change. We note that there are two broad ways in which we can understand change at the individual level across the life-course: the "active-updating" model and the "settled-dispositions" model. The former portrays individuals as continuously open to new information, and the latter notes that, after the critical period of socialization, individuals are mostly stable in their attitudes. At the aggregate level, both models predict widely different patterns of social change. If individuals are active updaters, we would expect change to happen swiftly, as whole sections of the population react to new information and/or circumstances. That is, we should expect change to b driven largely by *within-cohort changes*. In turn, if individuals are mostly stable in their attitudes after adolescence, then change should be gradual, as younger cohorts replace their predecessors. Here, change would mostly be explained by *between-cohort differences*. We contend that we can begin to adjudicate which one of these two models is most likely to be driving change in a given variable by examining how much variance is explained by two different regressions. In an idealized world, where all change is driven by cohort replacement, knowing the current year does not give us any information about attitudes at the aggregate level. On the other hand, if active-updating is driving change, then knowing the current year – and therefore the current circumstances – is crucial for understanding current beliefs at the level of the population. Our measure τ captures this relationship: it represents the proportion of variance explained that is preserved when the effect of time is taken out of the model. In other words, a higher τ would suggest that most of the variance in certain issue is explained by *between-cohort differences* rather than *within-cohort changes*.

We not only want to examine the explanatory power of each mechanism, but we want to understand if different types of variables are changing due to different mechanisms. We contend that the idea of sensitivity allows us to get an initial handle on this question. Sensitive issues like gay civil rights and abortion have displayed change across many contexts in the last several decades. These changes have been contentious and have resulted in acrimonious divisions and political backlash. Sensitive issues are paradoxical in a way: at the aggregate level they have displayed considerable change, we have evidence of individual attitudinal updating around them, and yet they seem like the beliefs where agents are most firmly entrenched. Previous work, then, suggests that these issues might change differently than other topics that are considered perhaps more mundane.

Operationalizing the concept of sensitivity, however, is difficult. In this paper, we use two strategies to tackle this challenge. First, we use a LLM to get sensitivity ratings for each of the variables we examined. These ratings are largely intuitive and plausible, but they are inevitable constrained by the data with which LLMs

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are trained. To complement these ratings, we examine patterns of missingness in our data. Based on the definition of sensitivity provided in this special issue, we hypothesize that unwillingness to answer a question could be a weak indicator of how sensitive a topic is. Thus, we calculate the proportion of this type of missing data – where the participant did not answer — for each variable and country. Again, the results here are intuitive, and they are weakly positively correlated with the LLM ratings. Having the two measures allow us to tackle the issue of sensitivity from multiple angles and in a more principled way.

Our results capture context-specific dynamics across different countries, while also revealing important commonalities in processes of cultural change. For instance, we show that stability is quite common across most of the issues we examine. Across most countries, attitudes towards homosexuality exhibit considerable change, and this change can be mostly attributed to *between-cohort differences.* In some countries, we see a similar pattern for other sensitive issues like attitudes around divorce and euthanasia. The variables that display more variation through *within-cohort change* tend to be related to confidence in institutions and the characteristics that are desirable in children. These issues also seem to – at times – capture important historical processes, like the restructuring of the armed forces in Japan.

It is worth briefly discussing why issues like confidence in institutions would display more *within-cohort change.* These institutions change in meaning as their occupants come and go. Thus, what it means to support – or have confidence in – an institution might change depending on who currently occupies it. For a Democrat in the U.S., for example, the election of Donald Trump might have considerably changed their confidence in the presidency, even though none of their attitudes really varied. Similarly, a conservative Catholic in that country might currently look favorably at a Supreme Court that they might have distrusted a few decades ago. We would not say these individuals have changed their minds – at least not in the ways that are most interesting to social scientists. What has changed is the meaning associated with those institutions.

We explore differences between more or less sensitive issues more rigorously by examining whether our ratings of sensitivity are predictive of the extent to which variables have changed and how they have changed. We find mixed evidence about whether the sensitivity of issues is informative of how much they change, which prevents us from drawing strong conclusions in this regard. Nonetheless, out analysis suggests that sensitive issues tend to change more through cohort replacement than through *within-cohort change.* In other words, it seems that issues that are difficult to talk about change more privately.

Now, this seems like an intuitive conclusion but it has important implications. First, it provides initial evidence that different types of variables change – at the aggregate level – through different mechanisms. Second, it sheds light on current heated discussions about the sensitive issues that are the center of public

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debate. In his work about transnational LGBT+ rights, Velasco (2023) shows that there has been considerable backlash in reaction to some of the political victories of this community. Through the lens of attitudinal change, this presents a puzzle: how do we reconcile the variation in attitudes towards homosexuality with this forceful backlash? Well, if most of that change has occurred through cohort replacement, it means that older individuals, many who occupy positions of power, have not been swayed in their opposition to the expansion of civil rights for the LGBT+ community. As younger cohorts move further away from their predecessors, we should still expect the fight to be acrimonious while the latter are still a considerable – but perhaps dwindling – portion of the civil sphere. Moreover, we should expect these divisions to be particularly salient in contexts where older cohorts hold more anti-LGBTQ+ views, and therefore where inter-cohort average opinions might be further away. This is reflected in Velasco's cross-cultural analyses. The fact that some issues are difficult to talk about, then, might mean that when these topics change, they might display both considerable variation at the aggregate level and entrenchment at the individual level.

Our study, then, helps widen ongoing conversations about the mechanisms of cultural change by contrasting different variables and national contexts. We contend that, at the heart of current debates about cultural change, lies the question of the relative explanatory power of *within-cohort changes* and *between-cohort differences*. We outline a straightforward method to adjudicate which one of these sources of variance explains most change at the aggregate level for a variable. Then, we carry out this test for 56 different variables across 8 different countries. We find that common patterns – like changes in attitudes towards homosexuality – as well as processes particular to each context, like changes in public trust towards the armed forces in Japan. We also find variation in what kind of processes underpin change in different variables. For attitudes towards homosexuality, for example, *between-cohort changes* appears to be an important mechanism of change. For issues that relate to confidence in institutions, we find that *within-cohort changes* explain a lot of the variation evidenced at the group level. In general, we find evidence that suggests that more sensitive issues tend to change more through cohort replacement. In other words, themes that are more difficult to talk about change more privately. This represents a theoretically-informed finding that suggests that different issues might change through distinct mechanisms. This is an important finding for scholars of cultural change, because it suggests that different aspects of culture can change through varying mechanisms and at varying paces. It is key then to begin to outline clear and testable theoretical statements that link these different aspects of culture with the mechanisms of change that might undergird them. Here, we suggest that one such mechanism is how difficult it may be to talk about certain subjects. These issues should change more through cohort replacements, as people are less likely to change their already established positions.

References

Bales, Robert F., and Talcot Parsons. 2014. *Family: Socialization and Interaction Process.* routledge.

Bartels, Larry M., and Simon Jackman. 2014. "A Generational Model of Political Learning." *Electoral Studies* 33: 7–18.

Bell, Andrew, and Kelvyn Jones. 2013. "The Impossibility of Separating Age, Period and Cohort Effects." *Social Science & Medicine* 93: 163–65.

Berger, Peter L. 2002. "Secularization and de-Secularization." *Religions in the Modern World: Traditions and Transformations* 336.

Chaves, Mark. 1994. "Secularization as Declining Religious Authority." *Social Forces* 72 (3): 749–74.

Elder, Glen H. 2018. *Children of the Great Depression: Social Change in Life Experience.* Routledge.

Fosse, Ethan, and Christopher Winship. 2019. "Analyzing Age-Period-Cohort Data: A Review and Critique." *Annual Review of Sociology* 45: 467–92.

———. 2023. "The Anatomy of Cohort Analysis: Decomposing Comparative Cohort Careers." *Sociological Methodology*, 00811750231151949.

Gerber, Alan, and Donald P. Green. 1998. "Rational Learning and Partisan Attitudes." *American Journal of Political Science*, 794–818.

Gross, Neil. 2009. "A Pragmatist Theory of Social Mechanisms." *American Sociological Review* 74 (3): 358–79.

Guhin, Jeffrey, Jessica McCrory Calarco, and Cynthia Miller-Idriss. 2021. "Whatever Happened to Socialization?" *Annual Review of Sociology* 47: 109–29.

Holland, Jennifer L. 2020. *Tiny You: A Western History of the Anti-Abortion Movement.* University of California Press.

Inglehart, Ronald, Miguel Basanez, Jaime Diez-Medrano, Loek Halman, and Ruud Luijkx. 2000. "World Values Surveys and European Values Surveys, 1981-1984, 1990-1993, and 1995-1997." *Ann Arbor-Michigan, Institute for Social Research, ICPSR Version.*

Keskintürk, Turgut. 2021. "Religious Belief Alignment: The Structure of Cultural Beliefs from Adolescence to Emerging Adulthood." *Poetics*, 101591.

Kiley, Kevin, and Stephen Vaisey. 2020. "Measuring Stability and Change in Personal Culture Using Panel Data." *American Sociological Review* 85 (3): 477–506.

Lersch, Philipp M. 2023. "Change in Personal Culture over the Life Course." *American Sociological Review* 88 (2): 220–51.

Mannheim, Karl. 1970. "The Problem of Generations." *Psychoanalytic Review* 57 (3): 378–404.

Martin, John Levi. 2015. *Thinking Through Theory*. WW Norton, Incorporated.

McAdam, Doug. 1989. "The Biographical Consequences of Activism." *American Sociological Review*, 744–60.

Ryder, Norman B. 1985. "The Cohort as a Concept in the Study of Social Change." In *Cohort Analysis in Social Research: Beyond the Identification Problem*, 9–44. Springer.

Underwood, Ted, Kevin Kiley, Wenyi Shang, and Stephen Vaisey. 2022. "Cohort Succession Explains Most Change in Literary Culture." *Sociological Science* 9: 184–205.

Vaisey, Stephen, and Omar Lizardo. 2016. "Cultural Fragmentation or Acquired Dispositions? A New Approach to Accounting for Patterns of Cultural Change." *Socius* 2: 2378023116669726.

Velasco, Kristopher. 2023. "Transnational Backlash and the Deinstitutionalization of Liberal Norms: LGBT+ Rights in a Contested World." *American Journal of Sociology* 128 (5): 1381–1429. https://doi.org/10.1086/724724.

Zaller, John. 1992. *The Nature and Origins of Mass Opinion*. Cambridge university press.