Quantifying the Importance of Change for Understanding Differences in Personal Culture

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Abstract

Work in the sociology of culture has converged on a general conclusion that while people sometimes make substantial shifts in their personal culture over time, most elements of personal culture are characterized by low rates of persistent change during adulthood. Recent developments have begun to quantify change over time and initial differences, but it is unclear how to use these components to understand the relative importance of change, especially when change is modeled non-linearly. To advance this debate, we introduce a measure for quantifying the proportion of systematic variance in panel data attributable to intrapersonal change. Applying this measure to 610 items from seven surveys in five countries, we find that although intrapersonal change is common, it does not explain a large share of systematic variance. As an extension of the theoretical debate, we demonstrate that this measure provides new insights when comparing social groups, showing that intrapersonal change is less common among U.S. college graduates than among those without a college degree. Our findings provide a new perspective on several important theoretical debates, as well as a tool to address new questions.

Introduction

An important contemporary debate in sociology centers on the importance of individual change over time for understanding differences in "personal culture"—attitudes, beliefs, values, and practices (Kiley and Vaisey 2020; Lersch 2023; Lizardo 2017; Underwoood et al. 2022; Vaisey and Lizardo 2016). This question has deep roots in seemingly contradictory theoretical perspectives. For example, pragmatist theories of action claim that changes in social environments cause people to adapt their views and make new cultural meanings (Gross 2009; Swidler 2001), while Bourdieusian practice theories argue that the "past conditions of production" leave a mark on people's personal culture that lasts throughout their lives (Bourdieu 1990). Models of social influence assume that people adapt their culture in the face of new information (Goldberg and Stein 2018), while the emphasis on cohort effects in models of aggregate social and cultural change requires them to be open to change while young but become fairly resistant to it as they age (Ryder 1965). Finally, life course theories posit important changes over time as people advance through important transitions

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in their lives, but that certain life stages have more lasting influence than others (Bardi et al. 2009; Elder, Johnson, and Crosnoe 2003).

Recent work on this topic has converged on a general conclusion that people do sometimes make substantial shifts in their personal culture over time but that most elements of personal culture are characterized by low rates of persistent change during adulthood (Kiley and Vaisey 2020; Lersch 2023). Work leading to this conclusion adopted a "tournament of models" approach to adjudicating different theoretical perspectives (Lersch 2023:228). In this framework, researchers formalized different models of change over time and relied on model selection criteria—primarily the Bayesian Information Criterion (Raftery 1995)—to classify different questions as demonstrating either "no change" or "any change." The size of these piles then serves as the primary evidence for the truth of different arguments (Kiley and Vaisey 2020; Lersch 2023; Vaisey and Kiley 2021).

However, as consensus emerges, researchers are now turning toward understanding the conditions that produce persistent change in personal culture, including age, education, and life-course transitions; whether certain kinds of people are more likely to make persistent changes in personal culture; and whether certain kinds of personal culture are more likely to be characterized by persistent change or stability. The tournament of models approach, useful for the broad question of whether change happens, is ill-suited to addressing these more theoretically grounded questions.

In a recent paper, Lersch (2023) takes an important step forward by devising a Life Course Adaption Model (LCAM), a mixed-effects growth curve model that quantifies various components of cultural difference: early imprinting, persistent change, biographical experience, and fluctuation. In quantifying these aspects of cultural difference, the LCAM lets researchers address a broader range of questions than the single question of whether a measure is characterized by stability or change. However, because the LCAM produces so many different measures, it is not obvious how to use these components to understand the relative importance of within-person change across items, groups, or time periods, especially when cultural change is measured in non-linear ways.

In this paper, we build on the LCAM by outlining a single metric that combines components of the LCAM to quantify the relative importance of intrapersonal change and interpersonal difference for explaining variation in a population for a variable over time. Our approach isolates the "systematic" components of variance (i.e., it removes random change and measurement error), to provide a single summary of how much systematic variation can reasonably be attributed to people making persistent changes over time. This quantity—what we call ω—can then be used as a diagnostic to compare across questions, groups, or periods to isolate where within-person change is more or less useful for explaining aggregate variation. We demonstrate the utility of this quantity in two ways.

First, we use 610 items from seven panel surveys from five countries to quantify the proportion of variance that is attributable to systematic intrapersonal change over the study period rather than to interpersonal differences at baseline. This allows us to generate an overall picture of how much of the total systematic variation in personal culture change tends to explain. These findings largely echo previous findings, but enable clearer statements about the relative importance of change across questions, rather than binary claims about whether change "happens."

Second, to illustrate how this quantity might be used by a researcher with a specific theoretical interest, we investigate differences in the relative importance of intrapersonal change for people with and without a college degree, using several political preferences in the Swiss Household Panel as a case study. We find that change explains a smaller proportion of systematic variance among college-educated respondents, suggesting that college crystallizes one's personal culture rather than fostering an openness to new information. This offers a new empirical basis to theorize about

the role of education in influencing personal culture, while at the same time showcasing a simple use of our proposed ω measure in a substantive theoretical context.

Background

Stability and Change in Personal Culture

Recent debates about whether adults undergo intrapersonal cultural change emerged in part because theories of cultural change at the aggregate level tend to implicitly invoke one of two models of individual behavior. The first, what Kiley and Vaisey (2020) call a "Settled Dispositions Model" (SDM), assumes that peoples' personal culture is relatively fixed by the time they are adults. While they might make temporary changes in their declarative culture in reaction to their environments, this model assumes that people return to a settled baseline over a short period of time. This model underlies theories of cultural change that suggest people are imprinted by early socialization experiences such as the "past conditions of production" in Bourdieusian practice theory (Bourdieu 1990), cohort replacement theories of aggregate change (Mannheim 1952; Ryder 1965), and control theories in social psychology (Robinson 2007; Smith-Lovin and Heise 1988).

The second model summarized by Kiley and Vaisey (2020), an "Active Updating Model" (AUM), posits that people continually update their personal culture as they move through life. This model suggests people change their personal culture as they adapt and make new meanings when encountering new social environments, discourses, and information (Gross 2009; Swidler 2001). This model underlies, among others, theories of cultural diffusion (Christakis and Fowler 2010), attitude alignment (DellaPosta 2020), and polarization (Bail et al. 2018). It is also implicit in most studies that ask whether specific experiences, changes in social roles, or political events, affect personal culture (Gelman and Margalit 2021; Slothuus and Bisgaard 2021).

There is no reason to believe that only one of these two models is "correct" at all times and in all places. A population observed over some period of time contains a mix of people who are changing and people who are not. Instead, different perspectives argue that each of these ideal-typical models is more operative at different times, for different people, and for different elements of personal culture. For example, adolescence and early adulthood is typically viewed as a "formative period" for personal cultural development and thus characterized by higher rates of active updating, while middle age and later life are potentially characterized more by settled dispositions (Alwin and Krosnick 1991; Eaton et al. 2009; Krosnick and Alwin 1989). Similarly, salient issues, such as views around gay rights in the 2010s; issues that see substantial elite realignments, such as views around the Vietnam conflict in the 1970s (Zaller 1992); and novel issues of public opinion, such as views around vaccines during the Covid-19 pandemic (Scoville et al. 2022), might be characterized by active updating, while established issues of low salience are characterized by stability.

Empirically comparing which of these models better fit a broad range of questions from the General Social Survey's rotating panels, Kiley and Vaisey (2020) found limited evidence of durable change. While the majority of items did prefer the AUM, the amount of durable change detected on these items was small. A substantial minority of questions (39 percent) favored the SDM, meaning they were more consistent with zero durable change. Questions with more evidence of durable change included salient issues like gay marriage and questions tapping "public" statements or behaviors such as partisan identification and religious service attendance. There was also more evidence of durable change among early adults (people ages 18-30) than among the rest of the population. Overall, the researchers concluded that "results ultimately suggest that real, persistent attitude

change is an uncommon phenomenon among adults" (Kiley and Vaisey 2020:500). This lack of durable change is consistent with other recent findings that cohort replacement plays a larger role than period effects in explaining differences in personal culture (Vaisey and Lizardo 2016).

On the other hand, the claim that change is a relatively infrequent phenomenon has been difficult to square with research identifying durable change as a result of social experiences across a number of cultural dimensions, such as morality (Brońć and Miles 2021), trust (Mewes et al. 2021), and concerns about immigration (Kratz 2021). Similarly, there are longitudinal studies showing that cues from political elites can change an individual's position on specific policy issues (Slothuus and Bisgaard 2021; Zaller 1992) and that changes in their close contacts and acquaintances can change individuals' attitudes on group-related politics (DellaPosta 2018; Gelman and Margalit 2021). Given how often we observe people change their personal culture, it is hard to accept that adults do not change.

Drawing on these findings, Lersch (2023) challenged the SDM and AUM as a "needless dichotomy," proposing the "Life Course Adaption Model" (LCAM) as an alternative. This model draws on the life course perspective to model personal culture as a linear trajectory[1] over the duration of a panel for each respondent. In doing this, Lersch rectified three shortcomings of the AUM and SDM. First, the AUM, as described by Kiley and Vaisey, posits that changes follow a Markov process where responses at time t are a function of responses at time $t-1$, but not earlier time points. However, earlier life experiences can (directly and indirectly) mold personal culture when transitioning to new social roles or into new environments, even if their initial impact is delayed. For example, childhood events might influence views on family structures later when individuals form their own families. Therefore, the LCAM considers earlier influences on responses at time t.

Second, Kiley and Vaisey's conclusions about the AUM and SDM were based on examining three-wave panel data over four years, which might not be intensive or extensive enough to adjudicate the two models. Lersch evaluates the LCAM against the AUM and SDM using panel data spanning a wider duration (from 3 to 36 years) and more waves at the respondent level (3 to 18), offering a better chance to observe durable change in a longer time frame.

Third, and most importantly, the LCAM quantifies various components of cultural difference, allowing researchers to ask a more varied set of questions than simply whether people change. For example, researchers can use the LCAM framework to quantify the magnitude of change in a measure of culture over time (how much do people change on average?), the variance in age-based slopes over time (do people tend to change in similar ways as they age?), or how much personal culture tends to fluctuate around these age-based trends (how consistent are responses over time?).

When Lersch compared the LCAM to the AUM and SDM on data from five countries, 198 of the 428 questions he analyzed preferred the LCAM and 113 preferred the AUM, suggesting that we observe some change for adults on most items. The SDM was preferred on 93 items, and the rest did not yield conclusive results. He concludes that "new experiences over the life course [...] can persistently move individuals' personal culture in novel directions" (Lersch 2023: p. 243-244).

Despite differences in how these researchers interpret their findings, the empirical results are not far apart. Kiley and Vaisey (2020) found that the majority of items they tested favored the AUM, meaning there was evidence of persisting change among adults, a pattern consistent with Lersch's results. Also, Lersch (2023) found evidence of persisting change on most items, but these changes were relatively small. On average, people changed only about .07 standard deviations over 10

[1] In supplemental materials, Lersch uses splines as well, with results generally showing the same conclusions.

years. This is consistent with Kiley and Vaisey's finding that persisting change is often small in magnitude. Moreover, a quarter of the items Lersch studied still preferred the SDM, suggesting that even with different assumptions about change and more extensive data, many questions still are consistent with a model that allows zero intrapersonal change.

Other studies are compatible with these findings as well. For example, Brocic and Miles (2021) estimate that completing graduate degrees in humanities, arts, and social sciences shift peoples' moral relativism only about .20 standard deviations on average compared to people with no college degree, and this is the largest effect they identify. And studies of aggregate change show that, even on items where cohort effects explain more variance than period effects, there is always evidence that some people change over time (Vaisey and Lizardo 2016). In other words, despite different interpretations, the results of previous work are in many ways highly consonant.

Quantification, Not Adjudication

To this point, the debate has broadly centered on drawing conclusions about whether people *ever* change. But this is rarely the right question since the answer is almost always "yes." Over sufficient time and in a large enough sample, researchers will likely observe some evidence for change in the population. A lack of evidence for change may be due to a poor survey question, a low resolution in response options, or that the question simply was not asked for long enough or to enough people. Conversely, finding evidence for some change tells us only that it was "not zero." From that alone, we learn little about how much intrapersonal change has happened in a population.

A more theoretically productive approach begins with a model assuming that during an observed time period people might remain stable, might change a little, or might undergo significant shifts in their personal culture. Lersch's LCAM does this by modeling each individual as following a personal linear trajectory. In doing so, the LCAM opens the door to a variety of questions. We assert that among the many things that can be done with the LCAM, it provides the opportunity to shift from asking, "do people change?" to asking, "what are the relative contributions of change and pre-existing differences for explaining variance in personal culture?"

Our approach—which we formalize below—offers such a quantification. Our measure relates two variance components that each reflect a combination of relevant theoretical processes. The first component, stable interpersonal differences, reflects the accumulated experiences of people prior to entering the panel survey. Lersch (2023:24) calls this "early imprinting." While commonly associated with experiences during a formative period that result in settled dispositions, this variation could also reflect experiences that happened at any time as long as they predate the panel and consistently affect subsequent responses. For instance, for those people entering the panel post-retirement, this "imprinting" might reflect this pivotal life transition and its subsequent effects observed in the panel window. Consequently, this component also reflects variation in individuals' social roles or statuses at the start of the panel that were important in shaping their dispositions.

The second component, the amount of intrapersonal change people make during the panel, captures persisting changes in personal culture over time. This component captures the set of processes collectively called "persistent change" or "adaption" by Lersch (2023) and "active updating" by Kiley and Vaisey (2020). Lersch (2023) attributes these changes to social triggers such as moving into a new environment or adopting new social roles (although he does not measure these directly). They might also reflect the diffusion of new cultural forms or ideas across social networks, cues from political elites or otherwise culturally influential leaders, the emergence of issues in politics or culture, or large-scale social shifts.

A third component, which we might call "residual variance" or "fluctuation," accounts for the remainder of variance in peoples' responses. These non-durable changes emerge for a variety of reasons. For example, people might not have a clear disposition on a particular item as it is asked. Instead, they might internalize a broad set of considerations and construct an opinion in the context of the survey interview, with different considerations coming to the forefront of their cognition during each interview (Feldman and Zaller 1992; Tourangeau, Rips, and Rasinski 2000; Zaller 1992). This variance can also include measurement error, such as misinterpreted questions, erroneous response selections, or responses getting coded incorrectly. Although this third component at least partially reflects important processes of personal culture, it does not directly touch on the ongoing debate outlined here. Hence, we quantify this component but focus principally on the other two.

At a theoretical level, the coexistence of the sets of processes captured in the two main components, interpersonal differences and intrapersonal change, is undeniable, and they are linked in many ways. Any intrapersonal change during one's life will likely manifest as interpersonal differences by the time people enter a panel survey. Furthermore, unless people are entirely socialized early on and never deviate from these dispositions, we expect observing intrapersonal change in a segment of the population when surveyed over time.

Furthermore, these components are not necessarily useful in isolation or without context. If absolute change is about .07 standard deviations every 10 years, but the variance of starting points at age 18 is very high, then change over time will not produce significant differences among people, even over a long time frame. If, on the other hand, people tend to start at very similar positions and change at a rate of .07 standard deviations for every 10 years, then that change is very useful for understanding difference later in life. What is important for the theoretical debate is the relative contribution of these two components in explaining cultural differences in a population. In other words, when we look at a population of adults over some time frame, is there enough intrapersonal change relative to interpersonal difference to view it as an important process for why people differ from each other? Only through quantifying the two components we can get closer to a true answer.

Yet the true utility of the proposed quantification goes beyond settling past debates; it allows researchers to identify new questions. For example, classifying survey items based on whether they show durable change overlooks possibly important differences among those that do show such change. By quantifying the relative contributions of interpersonal differences and intrapersonal change, researchers can gauge their relative importance in explaining differences among survey items, between groups within a given population, across time, and across societies.

Formalization

The starting point for our quantity is Lersch's (2023) Life Course Adaption Model, which formalizes survey responses at time t as a function of individual-level random intercepts and slopes for survey age. In some contexts, this model is called a mixed-effects growth curve model. This model assumes a set of propositions about change that reflect the theoretical debate to this point. First, consistent with the SDM, it assumes that people start the survey with cultural differences, modeled as random intercepts for each respondent. Second, it assumes that people change over time, taking the form of random slopes for each respondent as a linear function of time. Third, it assumes that people deviate around this baseline randomly over time, reflecting "fluctuation" or short-term non-persistent change. Formally, this can be written as

$$y_{it} = \beta_0 + \alpha_{0i} + (\beta_1 + \alpha_{1i})\text{year}_{it} + \epsilon_{it}$$

$$\alpha_{0i} \sim \mathcal{N}(0, \tau_0^2)$$
$$\alpha_{1i} \sim \mathcal{N}(0, \tau_1^2)$$
$$\epsilon_{it} \sim \mathcal{N}(0, \sigma^2)$$

where β_0 is the average intercept, α_{0i} is the random intercept component for individuals, β_1 is the average yearly change in the outcome, α_{1i} is the random slope component for individuals, and ϵ_{it} is the random error term that captures fluctuations. The α_{0i} and α_{1i} terms are also allowed to covary.

We then use these models to derive two measures of the components we outlined above: pre-existing interpersonal differences and intrapersonal change over time.

We estimate these using a form of variance decomposition. First, to measure stable interpersonal differences, we calculate $V(D)$ according to the equation below, where $\widetilde{year}_i$ is the midpoint of the observed years for each respondent for that particular item.[2]

$$V(D) = 1 - \frac{\sum_{i=1}^{N}\sum_{t=1}^{T}[y_{it} - (\hat{\beta}_0 + \hat{\alpha}_{0i} + (\hat{\beta}_1 + \hat{\alpha}_{1i})\widetilde{\text{year}}_i)]^2}{\sum_{i=1}^{N}\sum_{t=1}^{T}[y_{it} - \bar{y}_{it}]^2}$$

This effectively models respondents' responses under the assumption that they make no systematic change over time, or that the expected value at any time point is the same as the expected value at any other. Therefore, this measure—V(D)—gives us the proportion of total variance in an item attributable to stable interpersonal differences.

To calculate the second component, which is the variance attributable to systematic intrapersonal change, we calculate $V(C)$ as follows:

$$V(C) = 1 - \frac{\sum_{i=1}^{N}\sum_{t=1}^{T}[y_{it} - (\hat{\beta}_0 + \hat{\alpha}_{0i} + (\hat{\beta}_1 + \hat{\alpha}_{1i})\text{year}_{it})]^2}{\sum_{i=1}^{N}\sum_{t=1}^{T}[y_{it} - \bar{y}_{it}]^2} - V(D)$$

This is the incremental proportion of variance accounted for when we allow the model predictions to change over time for each person, allowing us to quantify the explanatory power of change.

The third component, which is the proportion of variance attributable to measurement error or transient fluctuations, is what's left, such that these three numbers sum to 1. As we discussed above, this component is not of core interest here, so we set it aside in our analysis.

Together, $V(D)$ and $V(C)$ reflect the total systematic variance of the outcome that the LCAM can attribute to either differences between people or linear intrapersonal change[3] over the course of the panel. Our principal measure of interest is the proportion of systematic variance accounted for by intrapersonal change, which we calculate as

$$\omega = \frac{V(C)}{V(C) + V(D)}$$

[2]We use the model estimate from the midpoint year, rather than the value at the first wave, because this is the best measure of "baseline" available under the assumption that the person does not change. The first wave measure alone contains an unknown amount of measurement error and transient fluctuations.

[3]The decomposition of variance is agnostic to this choice. One advantage is that the modeling assumptions can be relaxed to accommodate non-linear terms or splines, but the decomposition will follow the same procedure.

We can think of ω as a type of Intraclass Correlation Coefficient focused only on the systematic components of the model while ignoring residual variance that might be attributable to measurement error or non-persisting change (see also the variance decomposition of period and cohort by Vaisey and Lizardo 2016). The higher this proportion is, the more systematic variance in responses is attributable to intrapersonal change during the panel. From now on, we use ω to stand for *the proportion of systematic variance attributable to intrapersonal change*.

Because this quotient summarizes variance proportions and therefore has no natural referent, it is hard to say at which values we observe "a lot" of intrapersonal change. But summarizing questions in this way allows us to compare the relative importance of our two broad processes across a range of questions that might have different levels of non-systematic variance. This gives us a sense of the relative prevalence of these two processes for each question, which is not achievable under the tournament of models approach. This also allows us to compare which kinds of questions show more or less intrapersonal change relative to interpersonal differences. While the tournament of models approach allowed researchers to say whether questions in general showed *any* evidence of updating, this approach allows us to make more specific claims about the prevalence of these theoretical processes for particular questions relative to each other.

Bootstrapping for Quantifying Sampling Variability

Of course, the ω measure is itself variable—most particularly due to sampling variability—such that the composition of durable changers and stable respondents in a particular sample might affect the systematic components $V(D)$ and $V(C)$. It is thus important to establish confidence intervals to reflect the uncertainty in the ω. We achieve this by incorporating nonparametric bootstraps with case resampling. In doing this, we first resample the respondents with replacement and assign a new identifier to the set of new *respondents*, allowing us to change the composition of level-2 units in our data. Second, we estimate the LCAM in this slightly perturbed sample, and calculate the ω. We then replicate this procedure N times and establish confidence intervals around our measure.

Example 1: Cross-Question Comparisons

To demonstrate the utility of ω, we provide two examples. In the first, we compare the proportion of systematic variance explained by intrapersonal change across a broad array of questions.

Data and Analysis

We use data from seven nationally representative panel surveys from Australia, Germany, Great Britain, Switzerland, and the United States (summarized in Table 1), combining all the data files used in previous work (Kiley and Vaisey 2020; Lersch 2023).[4] These studies cover a long period of time (the range of surveys spans from 1968 to 2021), with 610 personal culture items capturing attitudes, beliefs, values, self-assessments, self-descriptions, and behaviors (Alwin 2007). We restricted the sample such that individuals between the ages of 18 and 79 are included without further elimination, and in all surveys, we used all possible cases for which respondents provided responses. In the end, the analyses that follow rely on a cross-national sample with a cross-domain set of items to capture a broad range of individual personal culture. We document the list of all variables used in the upcoming analyses in the Appendix.

[4]For more information on these data sources, see the relevant panel files (Goebel et al. 2019; Income Dynamics 2013; Smith et al. 2022; Summerfield et al. 2011; Taylor 1996; University of Essex and Research 2019; Voorpostel et al. 2016).

Table 1: The Description of the Data Sources

Country	Survey	Period	Outcomes
Australia	Household, Income and Labor Dynamics in Australia (HILDA)	2001-2021	30
Germany	Socio-Economic Panel Study (SOEP)	1984-2020	122
Great Britian	British Household Panel Survey (BHPS)	1991-2008	83
Great Britian	Understanding Society/UK Household Longitudinal Study (UKHLS)	2009-2020	66
Switzerland	Swiss Household Panel (SHP)	1999-2019	77
United States	General Social Survey (GSS)	2006-2012	183
United States	Panel Study of Income Dynamics (PSID)	1968-2019	49

As a first step in our analysis, we fit this LCAM to each of the 610 measures of personal culture outlined above. We then derive ω for each of these items using the procedure above.

Results

Figure 1 plots the proportion of systematic variance attributable to interpersonal differences and intrapersonal change for each of the 610 questions, plotted separately by panel survey. To broadly summarize the results, all panels show a similar range of the proportion of systematic variance attributable to intrapersonal change. Across panels, the median value of ω is .053 (mean of .056), with an interquartile range of .032 to .077. All panels include questions where ω is essentially 0, and some panels include questions with ω values greater than .20. The maximum ω value is .23.

Across all questions and all surveys, interpersonal differences account for a much larger share of the systematic variance in responses than intrapersonal change. Again, this is to be expected. Interpersonal differences capture not just pre-adult socialization, but all accumulated experiences up to the start of the panel that might influence personal culture.

To the extent that there are differences across the panels, the PSID has the highest ω values with mean .068 and median .076. While we cannot disentangle features of the sample from features of the questions asked to each sample, the specific samples for many PSID questions have lower average ages than those from other panels. To the extent that younger respondents might be more likely to make durable changes of opinion, these higher estimates of intrapersonal change might reflect the distinct age profile of respondents in this sample. At the other end, the SHP has the lowest range with mean .042 and median .037, followed by GSS, with mean .044 and median .043.

While there are some differences between panels, these differences are small compared to the differences within panels. For about 9 percent of items, ω is greater than .10. These questions tend to ask about objectively changing external referents (e.g., confidence in specific government leaders or political parties), life satisfaction, or current financial position. At the other end, questions about religious identification, views on gender roles, and support for civil liberties tend to have very low estimates of intrapersonal change, suggesting that core preferences might be less variable.

In contrast to the tournament of models approach, quantifying change this way allows us to explore variation in the relative importance of intrapersonal change across questions that all show evidence of change. For example, Kiley and Vaisey (2020) found that confidence in the press and confidence in religious leaders were both characterized by active updating. Our results show that intrapersonal change is much more important for explaining variance in confidence in the press (0.091) than confidence in religion (0.051), even though in both cases people are updating their beliefs.

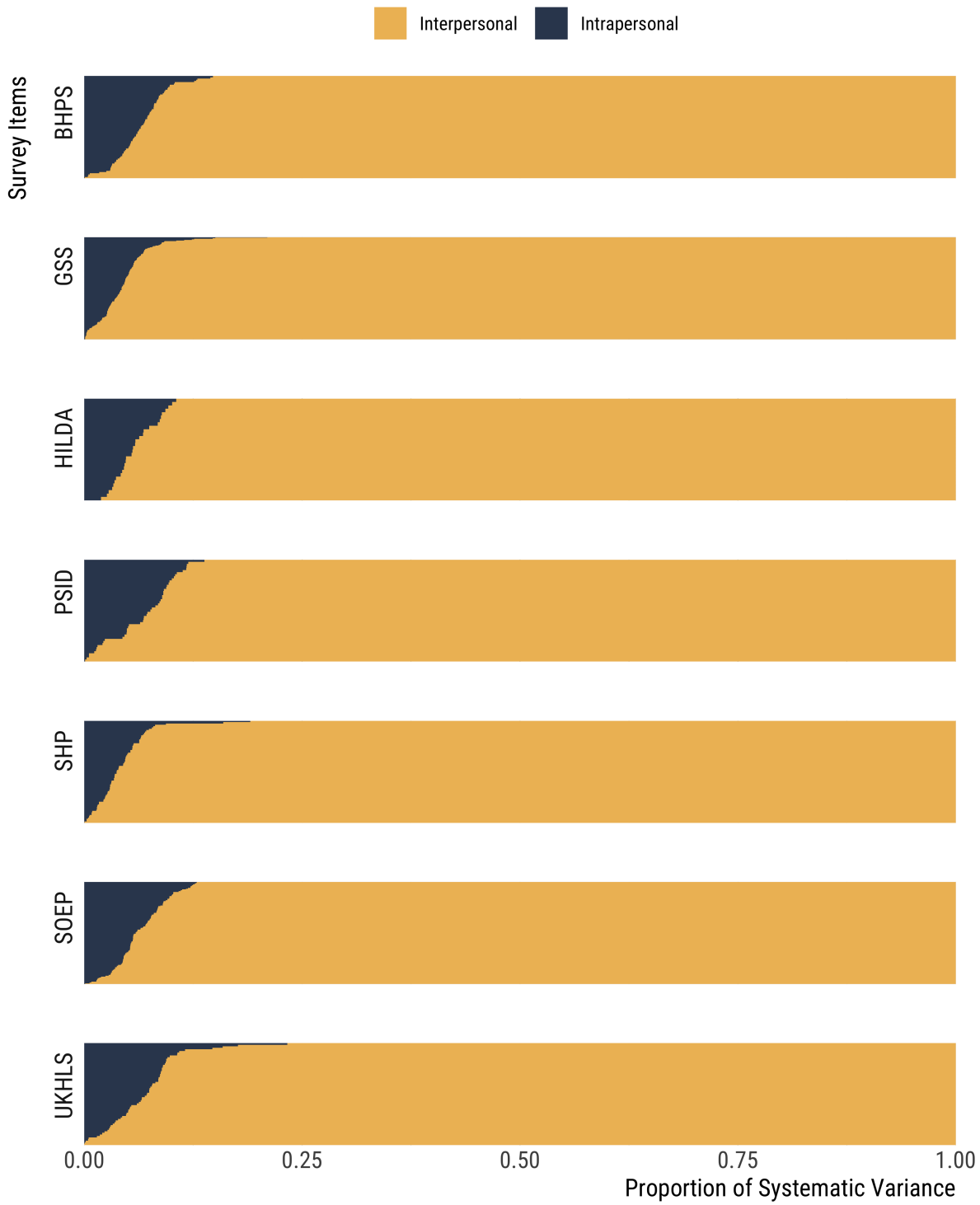

Figure 1: Proportions of Systematic Variance in Personal Culture

Notes: The figure shows ω and 1 - ω as the proportion of systematic variance attributable to intrapersonal change and interpersonal differences. See the Appendix for the full set of item values.

In the Appendix, we show the distribution of $V(D)$, $V(C)$ and the residual variance $V(E)$ for each question across panels. Interpersonal differences are almost always the largest component of the total variance and tend to account for between 50 and 66 percent of total variance, while intrapersonal change is always the smallest, typically accounting for between 2 and 5 percent of total variance. Residual variance tends to account for between 30 and 46 percent of variance, though on several questions residual variance is greater than 50 percent. This might indicate survey items with low reliability or ones that capture genuinely rapid fluctuations.

Example 2: College and Change in Political Culture

These results mostly re-frame and align previous findings, but the value of our approach lies in its ability to extend the debate to a broader set of theoretical questions. As a second empirical application of ω, we explore the relative importance of intrapersonal change and interpersonal difference for explaining cultural variation by level of education.

Previous work has established a positive relationship between education and attitude stability, especially on issues related to American politics. This stability is often attributed to education facilitating "chronic information" – a general understanding of and attention to the domain of American politics, including the positions held by major parties and political figures and how issues relate to one another at a logical or socio-logical level (Alvarez and Brehm 2002; Boutyline and Vaisey 2017; Zaller 1992). These perspectives argue that because college graduates have more knowledge of American politics, they are better able to consistently connect the considerations in their cognition with the answer choices they are presented with in a survey.

This work has tended to focus on the fact that college-educated Americans give responses that are less likely to be affected by measurement error or short-term influences than the rest of the population (Alwin 2007; Zaller 1992). But this focus on the non-systematic or residual component of variance across groups lumps the two systematic forms of difference together. That is, it obscures the fact that the amount of interpersonal differences and intrapersonal change might also differ across these groups.

There are theoretical reasons to believe that education might be associated with either more or less intrapersonal change over time. On one hand, because college graduates are more connected to mainstream discourse and elite signals, they might be more likely to make durable changes in response to the emergence of new information, new issues, or political realignments, while those without chronic information might display more variance around an unchanging baseline (Zaller 1992). Conversely, because people with less education appear more likely to engage in automatic cognition in social situations (including survey interviews) than people with more education (Brett and Miles 2021), they might be more influenced by changes in the social environment, producing more temporary change and more durable change. It could be that the observed stability of the college educated also reflects the fact that they have already formed durable opinions across various issues and are relatively closed off to new information. If this is true, college could be understood as a formative experience that solidifies some dimensions of personal culture. Perhaps for those who do not attend college, later life experiences might prove more important in forming or changing personal culture, as these experiences potentially provide information that college-educated peers have already received.

Data

To compare these competing propositions, we calculate ω values separately for people with at least a bachelor's degree and people with less than a bachelor's degree at wave 1 of the three General Social Survey's panels.[5] We focus on the GSS because it contains the largest number of questions tapping general political dispositions, which is the domain where education has proven particularly relevant for understanding attitude stability. The GSS also covers a turbulent window of American politics from 2006 to 2014. This window covers the start of the Great Recession, debates about federal intervention in and regulation of Wall Street, the election of Barack Obama as the first black U.S. president, debates about the role of the federal government in the health care sector, the emergence of the Tea Party, and political realignment and clarification on the issue of gay marriage, among other topics.

Results

Figure 3 plots the distribution of differences in ω values between people with at least a bachelor's degree and people with less than a bachelor's degree at wave 1 of the panel for 183 GSS items. Values greater than 0 indicate that intrapersonal change accounts for more systematic variance among college graduates than among those without a college degree, while values less than 0 indicate the opposite.

There is a clear pattern in Figure 3: for more than 80 percent of these GSS items, intrapersonal change is a larger component of systematic variance for people without a college degree. While most of these differences are small in absolute terms (less than 2 percentage points), several are greater than 5 percentage points. Given the distribution observed in Figure 1 showing that the systematic variance attributable to intrapersonal change averages around 0.09, a 5 percentage point difference between groups is quite substantial.

To more clearly illustrate some of these differences, we highlight eight questions designed to tap general political dispositions: partisan identification (Democrat vs. Republican) and ideological identification (liberal vs. conservative) on seven-point scales; four questions about the government's role in improving the condition of the poor, paying people's medical bills, giving special treatment to black people, and doing things that private businesses could do, measured on five-point scales; a question about whether the government should do more to reduce income differences, measured on a seven-point scale; and one question about whether black people should be given preferences in hiring, measured on a five-point scale. We present estimates of ω for these eight questions, for both education groups, in Figure 4.

On all eight questions presented in Figure 4, ω values are smaller for people with a college degree, meaning intrapersonal change is less important for explaining variation among them. There are also large differences in ω values across questions for both groups. For example, on the question of whether the government should try to solve more problems or leave those problems to be solved by private businesses ("government do more or less"), less than 1 percent of the systematic variance is attributable to intrapersonal change for both groups. In other words, while people might vacillate on this question at random (37 percent of variance is residual for this question), there is functionally no evidence that people make systematic changes of opinion on this issue during the GSS panel.

[5] A small number of respondents report different highest degrees at wave 1, wave 2, and wave 3. Some of this is due to measurement error, and some of it is due to a small number of people obtaining a higher degree during the four years of the panel. Estimating the panel with highest at wave 1 or highest degree reported across the panel produces functionally identical results.

In contrast, partisan identification and political ideology both show larger values of ω than most other questions, as well as a larger absolute difference by degree status. Compared to the other questions, intrapersonal change plays a much larger role in accounting for variation in partisan identification and political ideology. And this is particularly true for respondents who do not have a college degree; the ω value for ideological identification among non-college educated respondents is almost four times that of college-educated respondents.

It is worth pointing out that this meaningful difference in ω values across education groups and across questions would not have been detectable using previous methods. For partisan identification and political ideology, both college-educated respondents and people with less than college degree would likely favor the AUM or LCAM over the SDM because these questions both show evidence of some members of the population making *some* intrapersonal change. In other words, the tournament of models obscures the fact that the relative importance of intrapersonal change differs across these two groups, that intrapersonal change explains more systematic variance for ideological identification and partisan identification for people without a college degree, and that there appears to be more durable change on questions of affirmative action than on questions of government aid to black Americans.

We believe these patterns shed new light on the mechanisms underlying differences in attitudes and behavior across groups. Something about college attendance seems to affect the role played by change in explaining variance. It could to this in either two ways: by creating greater variation in baseline views or by reducing change over time relative to people without college degrees. While these results should not be interpreted as causal effects of attending college – they are potentially confounded by age, social class, race, gender, and other factors that explain selection into higher education – they open up a set of new questions and dynamics to explore.

Discussion and Conclusion

The primary objective of this paper is to introduce a new quantity that can advance debate on whether people change their personal culture—their attitudes, beliefs, values, and practices—as they move through their adult life. Instead of falling back on a "tournament of models" approach (Lersch 2023:228) to proclaim a yes or no answer to this question, or only quantifying individual components of cultural difference to show how much people change, our metric contextualizes the amount of observed systematic variance that is attributable to intrapersonal change over the duration of a panel. In doing so, it provides a tool to identify questions, groups, or periods where change is a more meaningful explanation of cultural difference.

We demonstrated the utility of this measure in two ways. First, applying our proposed measure, ω, to 610 survey items from the panel datasets previously studied in this debate revealed a consistent pattern. Nearly all questions show evidence of people making some durable, intrapersonal change over time. Some show notably high amounts of intrapersonal change. However, intrapersonal change is often substantially less pronounced than interpersonal differences, accounting for less than 10 percent of systematic variance on average across all datasets. On some questions, systematic variance attributable to intrapersonal change is essentially zero. For these questions, it seems there is not enough cultural change during adulthood to warrant attributing the differences we observe to experiences and social transitions; instead, the primary source of the observed differences appears to stem from experiences in childhood, adolescence, and early adulthood.

While these findings generally echo the general consensus that has emerged from previous work, it

adds two dimensions. First, it quantifies the relative importance of change across these questions, providing more resolution within what were mainly piles of questions either showing evidence of change or no evidence of change. This allows for greater comparison across questions and it provides a benchmark for researchers exploring new questions. Second, our metric might help contextualize the quantities identified in the LCAM. Is .07 standard deviations of change every 10 years a lot of change? For some questions or groups, our metric will say this change explains a large component of variance, and for others it will not.

In a second application of our metric, we showed how an analysis of ω can open up new lines of inquiry. We showed how the amount of cultural difference explained by intrapersonal change varies substantially not just by survey item but also by individuals' characteristics such as their education. While age and other factors related to college completion might confound this pattern, it suggests that college completion may crystallize personal culture to an extent that renders later adult experiences on political dispositions less influential in explaining overall differences.

Limitations

Although we believe the approach we outline here advances previous work, it has important limitations. We allocate all systematic variance to one of two sets of theoretical processes: intrapersonal change and interpersonal differences at baseline. Our approach does not quantify the proportion of people who "change," nor can we be sure that the amount of interpersonal change we detect is driven by many people making small changes or a few people making large changes.

Our results and interpretations also hinge on how we have defined change. As does the LCAM, our analysis here treats cultural trajectories as varying linear slopes for each respondent, thus assuming that change is a linear function of time. This assumption simplifies reality in which change likely also takes non-linear and discontinuous forms. People might jump from one "stable" disposition to another or experience a "turning point" in their lives that upsets an otherwise stable trajectory. In parts, our assumption of linearity is a limitation of the data, as most questions are only observed for three to six waves. However, our overall approach does not require modeling change as a linear function of age. Change can be modeled in non-linear forms, such as the splines used by Lersch (2023), and accordingly incorporated into the calculation of variance explained.

This is in fact one of the strengths of our approach. When change over time is modeled non-linearly, it can be difficult to summarize its relative importance. With our metric, researchers can quantify the additional explanatory power of modeling change using splies, polynomials, or other non-linear approaches relative to a linear trend.

Similarly, our approach assumes that durable change is unidirectional. This is a sensible assumption on short panels where classifying change that lasts less than two years as durable seems unreasonable. Practically, it means that the variance produced by people making durable changes in their cultural dispositions to then return to a previous state later in life is classified as residual variance, rather than intrapersonal change. Longer panels and more flexible definitions of "change" might allow us to account for such trajectories. Again, while we model change in a single way, the general variance decomposition approach we outline accommodates different functional forms.

Finally, we had chosen to examine the broadest array of measures of personal culture available to us, ranging from religious beliefs and core values, to policy preferences, and even to the importance of different features when buying a new car across five countries (Australia, Germany, Switzerland, the United Kingdom and the United States). Nevertheless, our findings remain limited to the kinds

of questions that are asked in panel surveys and in the contexts they were administered, reflecting issues of general (national) politics, gender roles, immigration and race relations, and general well being. Although we have no reason to believe results to be different, our findings do not directly speak to other dimensions of culture such as artistic tastes, leisure activities, and time use.

Implications for Cultural Sociology

Despite these limitations, we believe our method and findings have implications for social science research. Sociologists interested in understanding cultural differences have largely asked about the *existence* of cultural change in adults (e.g., Kiley and Vaisey 2020; Lersch 2023; Vaisey and Kiley 2021). In any population, *some* degree of adult cultural change is inevitable. Although ideal types like the settled dispositions and active updating models are useful, no theoretical perspective would expect either early life socialization or adult intrapersonal change to be the sole source of one's personal culture. Our results reinforce this point, showing the relevance of both factors and allowing their precise quantification for the explanation of cultural differences.

This and other recent findings (Quinn et al. 2023, 2024; Stewart and Berkman 2023) suggest that it is theoretically more productive to measure the relative importance of these two components in concrete, substantive cases. Drawing a unified conclusion from survey items measuring various cultural forms on different scales and across different time frames is challenging. Nevertheless, the general pattern suggests that, for most items, intrapersonal change in adulthood is not the primary reason for the differences we see between people in the world.

Our findings suggest that understanding variation in personal culture requires examining the conditions and experiences of early life. While sociological research often focuses on transitions between social roles, changes in social networks, or the experience of organizational environments, these factors seem to account for a smaller proportion of adult differences than early-life experience. Simply put, we need more work on early-life socialization (Guhin, Calarco, and Miller-Idriss 2020).

This conclusion aligns with a range of recent causal inference work suggesting that selection effects, rather than treatment effects, predominantly account for personal cultural differences among individuals in varied social roles and positions (Campbell and Horowitz 2016; Wodtke 2018). While some people clearly change as they transition into new roles or environments, this change seems to be insufficient in magnitude and duration to explain what are often pronounced differences among people in diverse roles. These and our results suggest that when observing differences in personal culture across social roles, such as parenthood, education, or professional authority (Longest, Hitlin, and Vaisey 2013), or across occupations (Weeden and Grusky 2005), selection likely plays a large role in explaining these difference, though exceptions always exist.

Our analysis does not provide an answer as to why intrapersonal change seems to have limited impact on understanding cultural differences among adults. The situations that promote durable change in personal culture might simply be rare during adulthood. Alternatively, it is possible that adults do encounter opportunities, necessities, and incentives for change, but their ability or willingness to change decreases as a function of age. All the more it is important to research when and how social situations can provoke durable change in adults.

Related to this, our results regarding education and political views suggest that the importance of processes that lead to such change can vary by group. Aligning with life course theories, the significance of experiences for cultural change may be contingent on other, prior experiences. For example, factors that shape cultural dispositions may likely differ for college and non-college

graduates; the latter might be more profoundly influenced by mid-life experiences than the former in this regard. In trying to understand cultural differences, sociologists should pay more attention to the heterogeneous effects that various factors including social events and encounters can have.

Implications for Survey Research

Our findings underscore the value of extended panel surveys to advance theories of culture. On average, non-systematic fluctuations in responses account for more than four times as much variance as intrapersonal change, measured as linear change. Differentiating between the two is therefore crucial for understanding cultural differences and cannot be done with cross-sectional data. Instead, we should extend panels beyond two waves and longer time periods to gain more leverage to understand when and in what form personal culture changes.

Perhaps most important, we need more panel studies on youth. It is very likely that the majority of adult differences in personal culture are rooted in different experiences before age 18. By empirically constraining our analyses to adult experiences, social scientists may inadvertently concentrate on topics and questions that, while important, might not be able to help explain major cultural differences in adult populations, and the reasons why people believe in some things but not others.

Conclusion

We believe the approach we outlined here can push past the "needless dichotomy" implicit in the question of whether people change or not. Characterizing questions as displaying change or not can only take researchers so far, but the question of whether some questions demonstrate more change than others, or whether some groups are characterized by more stability than others, has the potential to weigh in on a broader range of theoretical debates. We hope researchers find our approach useful as they investigate these questions across a variety of problems.

Data Note

This paper uses unit record data from Household, Income and Labour Dynamics in Australia Survey [HILDA] conducted by the Australian Government Department of Social Services (DSS). The findings and views reported in this paper, however, are those of the authors and should not be attributed to the Australian Government, DSS, or any of DSS' contractors or partners. DOI: 10.26193/0LPD4U. The SOEP is administered at the German Institute for Economic Research (DIW Berlin) and funded by the Federal Ministry for Education and Research (BMBF) and the state governments under the umbrella of the Leibniz Association. The BHPS data were made available through the UK data archive. The data were originally collected by the ESRC research center on micro-social change at the University of Essex, now incorporated within the Institute for Social and Economic Research. The authors bear full responsibility for the analyses and interpretation of the data presented in this article. Understanding Society is an initiative funded by the Economic and Social Research Council and various Government Departments, with scientific leadership by the Institute for Social and Economic Research, University of Essex, and survey delivery by NatCen Social Research and Kantar Public. The research data are distributed by the UK Data Service. This study has been realized using data collected by the Swiss Household Panel (SHP), which is based at the Swiss Centre of Expertise in the Social Sciences FORS. The project is supported by the Swiss National Science Foundation. This study also uses data from The General Social Survey (GSS), which is a project of the independent research organization NORC at the University of Chicago,

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