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Culture out of attitudes: Relationality, population heterogeneity and attitudes toward science and religion in the U.S.☆

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ABSTRACT

Attitude data can reveal culture's secrets, but only if analysts acknowledge and transcend two problematic forms of heterogeneity. The first, *relational heterogeneity,* reflects the fact that the meaning of a response to a survey attitude question emerges from its relation to other attitudes: considered singly, the same response may mean different things to different respondents, depending upon the meanings with which they associate it. The second, *population heterogeneity,* a common problem in survey analysis, reflects the fact that attitudes may be related to one another in systematically different ways for different respondent subsamples. To overcome these challenges, we must use analytic methods that (a) focus on relations among attitude responses rather than on single responses and (b) partition survey samples into subsets based on patterns emergent from those relations. We use two such approaches, Latent Class Analysis and Relational Class Analysis, to examine Americans' attitudes toward science and religion in the late 20th century, at the onset of a period of acute cultural contention between religious conservatives and secular liberals. Employing an unusually rich data set that enables us to take into account spiritualism (supernatural experience not sanctioned by formal religious institutions), as well as science and religion, we find that both LCA and RCA identify large subsets of respondents for whom science and religion are allied, rather than opposed. Moreover, RCA enables us to examine how the determinants of attitudes toward science, religion, and spiritualism are conditioned upon respondents' construals of the relationships among them. This diversity of opinion among religious Americans and the presence of a previously overlooked religious constituency of science supporters, has important implications for science policy and science advocacy.

1. Introduction

Surveys that measure the attitudes, beliefs, and sentiments of population samples are staples of sociological research. Given how relevant beliefs, sentiments and attitudes are to culture, it is surprising that cultural sociologists rarely use attitude data and that public opinion scholars rarely write about culture. There are good reasons for caution: attitude items, even those based on interviews

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to capture native wording, are blunt instruments for understanding how collectivities construct meanings. Nonetheless, we believe that such surveys can be useful tools for sociologists of culture who employ methods that address two chronic problems in survey analysis.

In this paper we discuss these problems, describe two solutions, and apply them to an important substantive issue, the relationship between science and religion in the United States. We demonstrate that attitude data, if its use is informed by cultural theory, casts new light on this topic, revealing patterns that conventional methods do not discern.

To recruit attitude data to cultural research, we must first reframe them. Attitude research emerged out of public opinion surveys, a genre deeply connected to the self-understanding of political elites in western democracies. Public opinion surveys were meant to *represent* the views of the general public, at once efforts to take the pulse of the body politic and performative rituals affirming the value of the citizen and his or her opinions (Igo, 2007; Perrin & McFarland, 2011). Over time, social surveys incorporated questions on many social and personal issues, adding rich arrays of demographic predictors and producing scales as well as individual attitudes. Nonetheless, attitude research retains a focus on individual constructs, expressed either through single items or sets of items that serve as multiple indicators, understood as produced primarily through social-psychological mechanisms. Analysts look to responses to attitude items to tell us about individuals and the shaping effects of their social backgrounds, structural positions, media environments, or social networks, rather than viewing attitude surveys as windows into supra-individual culture.[1]

Put another way, social psychologists and public opinion researchers treat the individual as both unit of observation *and* unit of analysis. For sociologists of culture, the individual is the unit of observation, but the collectivity is the unit of analysis. To repurpose attitude surveys for culture research requires a twofold break with tradition, based on two foundational principles of cultural sociology: *relationality* and *multiplicity*.

By *relationality,* we refer to the principle that meaning emerges not from single entities but out of relations among them. The same survey response may mean different things to different respondents. If, for example, two survey respondents endorse an item supporting immigration restriction, should we presume that they hold similar beliefs? No, because one may oppose immigration because he is racist and identifies immigrants with nonwhites, whereas the other may view immigrants as competitors for jobs, and oppose immigration out of economic anxiety. Not until we examine their responses to items tapping racial and economic attitudes can we begin to infer the broader belief systems of which their opposition to immigration is a part.

The principle of *multiplicity* follows from the principle of relationality: If different meaning systems are characterized by different relationships among survey items, and if these relationships form a limited number of patterns, then for any meaning domain, the population will often include two or more subpopulations who organize their attitudes in different ways. If so, statistical operations on a full sample will generate misleading results, because results will average varying associations from different groups. This dilemma − the problem of *population* heterogeneity (Xie, 2013) − is common to many kinds of research. But it may be especially acute in the study of social attitudes and belief. Associations among behavioral variables are constrained by material factors − *e.g.,* the link between education and foreign travel will be stronger for people with lots of money than for people with few resources − such that heterogeneity can often be captured through disaggregation along common sociodemographic dimensions (*e.g.,* by including interaction terms in regression models). By contrast, cultural belief systems have greater relative autonomy from structural factors − the association between valuing novelty and *interest in* foreign travel is probably as strong for the poor as for the rich − so that thought communities (Fleck, 1936) are less readily identified through sociodemographic indicators.

From the principles of relationality and multiplicity emerge two *desiderata* for an analytic approach to identifying cultural patterns from attitude-survey data. First, such methods should be relational, identifying structure on the basis of relations among attitudes, beliefs, or practices, rather than appraising such measures singly and associating them with respondents' characteristics. Second, such methods should be able to identify population subgroups who construct opinion domains in different ways (i.e., with varying relations of affinity, entailment and opposition among beliefs, attitudes and practices); and they should do without reference to demographic or biographical information about respondents, but based on attitudes alone.

We employ two methods, Latent Class Analysis (LCA) and Relational Class Analysis (RCA), which satisfy these conditions. We use Latent Class Analysis (LCA) to partition cases into *classes that share similar patterns of response* (i.e., people who are in substantive agreement). LCA multiplies conditional probabilities of particular responses to observed variables by the probability of the observation belonging to a given level (class) of the latent variable. The goal is to describe latent variables that eliminate dependence between observed variables, so that observed variables become "locally independent" or uncorrelated within each class, conditional on belonging to the class. Maximum likelihood estimation is used to calculate conditional latent class probabilities and the Bayesian Information Criterion is employed to identify the optimal number of classes.

Relational Class Analysis (RCA) partitions cases into classes whose members *share similar patterns of relationship among pairs of responses* (i.e. who organize domains according to similar relational principles, as illustrated by networks of association among the variables) (Goldberg, 2011). Put another way, RCA seeks to aggregate people who do not necessarily agree on the substance of issues, but who agree on what the argument is about (i.e., which beliefs are relevant to one another). In so doing, it identifies subgroups of respondents who employ similar principles for organizing meaning in a particular social domain. At RCA's core is a method for identifying relational similarity, by which we mean similarity in the relationships of inter-item differences summed across pairs of survey responses between respondents − and *similarity in the perceived relations of relevance, entailment and opposition* of which such mathematical relationships are indicators. To produce classes, RCA uses a popular community-detection algorithm (Newman, 2006). We employ a gap statistic method (see Appendix A), in addition to the Newman algorithm's criterion, to validate the number of

[1] The exceptions, comparative studies of organizational and national cultures (Hofstede, 2001; Inglehart & Baker, 2000) equate culture with "values."