IS THERE A CULTURE WAR?
HETEROGENEOUS VALUE CHOICES
AND AMERICAN PUBLIC OPINION

William G. Jacoby
Michigan State University
jacoby@msu.edu

August 2012

Prepared for presentation at the 2012 Elections, Public Opinion
ABSTRACT

This paper examines the “culture war” hypothesis by examining American citizens’ choices among a set of core values. Specifically, a geometric model is developed to represent differences in the ways that individuals rank-order seven important values: freedom, equality, economic security, social order, morality, individualism, and patriotism. The model is fitted to data on value choices from the 2006 Comparative Congressional Election Survey. The empirical results show that there is an enormous amount of heterogeneity among individual value choices; the model estimates directly contradict any notion that there is a consensus on fundamental principles within the mass public. Further, the differences break down along political lines, indicating that it probably is not inappropriate to describe the American public’s feelings about values as a culture war.
The concept of culture is highly multifaceted. But, one approach that has achieved some prominence in political science defines “culture” as the set of values that are salient within a given society. Building upon this idea, a heterogeneous nation like the United States could easily generate a variety of distinct and different value orientations within its population. If these differing value structures imply mutually exclusive social arrangements and societal goals, they could produce the kinds of fundamental disagreements and conflicts that have been characterized as “culture wars” in recent scholarly and popular commentary. This paper provides an empirical investigation of these ideas, using some unique data obtained from the 2006 Cooperative Congressional Election Study.

Specifically, the analysis below will use individual-level value choices as the raw material to create a structural model of the predominant value preferences that exist within the American mass public. The model, itself, is a geometric representation with features that are fairly intuitive and easy to interpret in substantive terms. Furthermore, the elements of the model are amenable to systematic analysis using a set of statistical tools that are designed for use with angular data.

The results from the empirical analysis provide strong evidence for the culture wars hypothesis. Americans’ value choices are highly heterogeneous and the variability breaks down along social and political lines. These findings have important implications for understanding the nature of conflict and disagreements within the contemporary American political system.

BACKGROUND

Culture is critically important to an understanding of public opinion because it provides the context within which political beliefs and attitudes exist (e.g., Bennett 1980). In effect, culture delimits the “boundaries” of legitimate opinions within a society (Wildavsky 1987). While such statements emphasize the importance of culture, they beg the question of what culture really is. One perspective that is popular within political science holds that culture is defined largely by the values that are salient in society at any given point in time (Inglehart 1990; Abramson and Inglehart 1995). Values, themselves, are defined at the individual level as each person’s abstract, general conceptions about the desirable and undesirable end-states of human life (Rokeach 1973; Schwartz and Bilsky 1987; Schwartz 1996).

The predominant feelings within a nation’s population about desirable goals and situations to be avoided reveal a great deal about the character of that society. However, when culture is
conceptualized in this manner, it implies more than a simple listing of certain values. Instead, it involves the relationships between separate values— which values “go together” and which ones imply contradictory end-states. Thus, political culture could be viewed as the general framework or structure of values that characterizes the orientations of a nation’s citizens.

In addition to revealing some fundamental characteristics of a political system, culture is also an important source of the issues that arise and evolve in day-to-day political life. Within the bounds defined by current cultural standards, there is likely to be conflict between values. The problem is that the desirable end-states implied by values are, themselves, a limited commodity. They are in short supply, and there is not enough to go around. Therefore, attainment of one value (e.g., freedom) will almost certainly restrict or inhibit the degree to which some other desirable end-state is achieved (e.g., equality).

The preceding basic tenet of societal interaction explains why values are of fundamental importance to politics. Philosophers, collective action theorists, and policy analysts seem to agree that issue conflict inherently involves clashes of competing value systems (e.g., Berlin 1969; Chong 2000; Stone 1997). As stated in the well-known phrase from David Easton, politics inherently involves disagreements about the “authoritative allocation of values” (Easton 1965, emphasis added).

But, it is important to impose a caveat on the preceding view: Despite the potential for widespread conflict and disagreement based upon values, the traditional view is that the United States has been characterized by a general consensus on fundamental orientations. For example, McClosky and Zaller (1984) state that “the ideals to which the nation’s Founders appealed— values such as freedom, equality, individualism, and private property— are, for the most part, still prized by Americans (pg. 290).” This agreement on basic principles creates a context within which day-to-day political disagreements are limited in scope and intensity. Again, McClosky and Zaller summarize this idea very nicely by saying that “to a striking degree, ideological conflicts have taken place within the boundaries of the democratic and capitalist traditions” (1984, pg.4). The bounded nature of political disagreements, in turn, contributes directly to the stability and longevity of the American democratic system (Devine 1972; Dahl 1989).

Recently, however, the existence of a fundamental societal consensus in the United States has been called into question. Various commentators have suggested that a “culture war” exists, in which “... Americans are taking sides in a civil war between incompatible views of the American
way of life (Baker 2005, p. 65).” Sociologist James Davison Hunter provided one of the first systematic statements of the culture wars hypothesis: “The divisions of political consequence today are ... the result of differing worldviews. ... (The conflict revolves) around our most fundamental and cherished assumptions about how to order our lives—our own lives and our lives together in this society. (1991, p. 42).” Thus, Hunter succinctly points out that the culture war is disagreement about basic value orientations and also that it has immediate political consequences.

The idea of a culture war definitely has had great resonance in American electoral politics over the past twenty years. In his famous speech to the 1992 Republican National Convention, former speechwriter, political commentator, and erstwhile presidential candidate Patrick Buchanan stated:

There is a religious war going on in this country. It is a cultural war, as critical to the kind of nation we shall be as the Cold War itself. For this war is for the soul of America.

While more recent candidates have not used the specific term as freely, they have certainly focused directly on many of the themes associated with cultural conflict, such as abortion, contraception, gay rights, global warming, and traditional lifestyles. As evidence of this, the 2012 primary battles within the Republican party were often heralded by the press as a direct manifestation of the culture war.1 Journalists continued using this theme on into the general election campaign, emphasizing that President Obama and Democrats probably gain some advantage by focusing on culture war issues while Mitt Romney and other Republicans try to shift public attention away from them and onto the economy.2 Going even further, a prominent *New York Times* article declared that the culture war has now moved in “from the fringe” to become a central issue in American electoral politics (Nagourney 2012)

Moving outside the specific electoral setting, the rapid rise of the Tea Party movement can be seen as another manifestation of themes often associated with the culture war. For example, Meckler and Martin (2012) suggest that the motivations behind Tea Party activism stem from a belief that American society has moved away from the values espoused by the founders. Skocpol and Williamson (2012) have a similar view, but they also emphasize that Tea Party activists often support policies and legislation that are not necessarily associated with conservatives (e.g., Social Security, Medicare, and generous benefits targeted toward identifiable needy groups in society). Instead, they are dissatisfied with the rise of undeserving freeloaders whose lifestyles are inconsistent
with the individualism and self-achievement that are required to achieve the American dream. In general, the Tea Party perspective evokes the idea of a distinctive worldview among a subset of American society, organized largely around opposition to other subgroups that they believe to be fundamentally inconsistent with traditional American values and culture— in short, precisely the same idea that is subsumed within the current usage of the term, “culture war.”

While there has been a substantial literature devoted to the culture war hypothesis, the empirical evidence that has been mustered and the scholarly interpretations that have been offered are highly mixed. For example, some psychologists, sociologists, and political scientists identify fundamental, deep contradictions in the moral and religious orientations of subgroups within the American population. These differences are rooted in basic conceptions about the nature and objectives of human life (e.g., Hunter 1991; Guinness 1993; Lakoff 2002; Barker and Tinnick 2006; Barker, Hurwitz, Nelson 2008). Similarly, a number of political scientists have pointed to sharp increases in the polarization of recent American political discourse and attitudes within the mass public (e.g., Abramowitz and Saunders 2008; Carsey and Layman) as symptomatic of unusually profound disagreements about the direction in which American society should be moving. Barker and Carman (2012) make an even broader argument that the culture war has profound effects on basic orientations toward politics: They show sharp culture-related differences in preferences for representational styles, with traditionalists supporting the trustee role and progressives favoring instructed delegates.

In contrast to these findings of conflict, a number of sociologists find a great deal of consensus in basic orientations and little in the way of fundamental disagreement, thereby raising pointed questions about the validity of the culture war hypothesis (e.g., Williams 1997; Wolfe 1998). For example, Evans (1996) argues that traditional theories about differences among status groups account for patterns of opinion disagreement more accurately than do accounts of fundamentally conflicting worldviews across polarized segments of society. Similarly, both DiMaggio, Evans, and Bryson (1996) and Davis and Robinson (1996) provide evidence that the extent of polarization has been overstated, with sharp disagreements confined only to specific issues like abortion and other social concerns with explicit religious implications. From a somewhat different perspective, Baker (2005) uses data from the World Values Survey to show that Americans are relatively united on fundamental principles and he concludes that “. . . the culture war is largely a fiction (pg. 109).”
Some political scientists also emphasize the continued importance of centrism for understanding American public opinion. Fiorina, Abrams, and Pope (2006; 2008) probably have been the most visible advocates of this position:

(Allegations of a culture war in America) . . . range from simple exaggeration to sheer nonsense. . . . The myth of a culture war rests on misinterpretation of election returns, a lack of comprehensive examination of public opinion data, systematic and self-serving misrepresentation by issue activists, and selective coverage by an uncritical media more concerned with news value than with getting the story right (2006, pg. 8).

Gelman (2008) similarly questions the validity of dividing the United States into a dichotomy of “red states” and “blue states.” He argues that a more accurate picture of electoral conflict would emphasize the intermediate and mixed orientations that characterize virtually all parts of the country.

Scholars definitely express strong disagreements about the existence of a culture war. But, I would contend that none of the previous efforts have really gotten to the heart of the issue, for several reasons: First, it is difficult to deny that some polarization exists in public opinion and political preferences. And while this could, perhaps, be a manifestation of a culture war, it may also have arisen from other causes. For example, Levendusky’s (2010) theory of partisan “sorting” provides an explanation for the existence of greater ideological clarity in the Democratic and Republican ranks that does not require stronger contrasting views on the two sides. It is also possible that a culture war may not be manifested clearly in political issues. Skocpol and Williamson (2012) show that Tea Party activists often support policies and legislation that are not necessarily associated with conservatives (e.g., Social Security, Medicare, and generous benefits targeted toward identifiable needy groups in society), despite their distinctive views about the problems of American society and the political system. Thus, it is not entirely clear that disagreements about specific policy issues map cleanly onto the divisions that should be associated with a culture war.

Second, the works that have approached the culture war hypothesis from a perspective based on values may have conceptualized and measured the latter in ways that are not fully consistent with the ways that values impinge on human behavior. Much of the research on values and public opinion that has been conducted in sociology and political science is based upon data in which people rate the importance of individual values (e.g., Feldman 1988; Goren, Federico, Kittilson 2009). Applying a variant of this approach in the culture war context, Baker (2005) uses measures of values developed
by Inglehart and Baker (2000), in which factor analysis is employed to find dimensions underlying individual responses to survey questions about a variety of fundamental orientations (e.g., the importance of God in everyday life, whether abortion can ever be justifiable, a sense of national pride, personal happiness, etc.). While the common factor model extracts correlational structure from such data, the fact remains that the survey respondents make assessments of one value at a time, without explicit comparisons to other values.\(^3\)

The problem with the preceding approach is that longstanding psychological theories hold that specific values do not operate in isolation from other values. Instead, people maintain feelings about multiple values, with comparisons between values providing the important cues for how to behave in any situation where the values have relevance (e.g., Rokeach 1973; Schwartz and Bilsky 1987; Schwartz 1992; 1996; Verplanken and Holland 2002). It is also important to emphasize that this latter view has been adopted by some political scientists as well (e.g., Sniderman, Fletcher, Russell, Tetlock 1996; Peffley, Knigge, Hurwitz 2001; Davis and Silver 2004; Jacoby 2006).

In order for values to provide such guidance, people must have feelings about about the relative importance of different values. And, since it is assumed that people have feelings about multiple values, this leads naturally to the idea that they possess rank-ordered value structures in which values are mentally arrayed from most important to least important. Of course, the exact ranking of the values differs from one person to the next (Rokeach 1973). This is precisely what leads to variability in human behavior, as individuals engage in activities that promote values near the top of their own personal hierarchy and avoid activities associated with values near the bottom of their respective hierarchies (Schwartz 1996).

Extrapolating from individuals to the societal level, a nation’s political culture is characterized by the value structures that predominate within its society. To the extent that these structures are similar from one person to the next, the political culture will be consensual. But, if structures vary markedly so that there are serious disagreements about which values are important and which values are note, then it could signal the kind of fundamentally conflicting worldviews that are believed to characterize a culture war. Again, however, none of the previous research on this topic has examined directly the structure of value choices that exists in the American public. That is the task that will be taken up in the remainder of the present analysis.
A VALUES-BASED MODEL OF POLITICAL CULTURE

In order to construct a model of political culture (or at least that component of political culture that is rooted in values), we must have information about the individual value structures that exist within the society under investigation. So, assume that we have \( n \) individuals’ importance rankings of \( k \) values, contained within the \( n \) by \( k \) matrix, \( X \). The rows of \( X \) correspond to individuals, the columns of \( X \) correspond to the values, and the cell entry, \( x_{ij} \), contains individual \( i \)’s rank-ordered importance score for value \( j \). The importance scores range from zero to \( k - 1 \) within each row of \( X \) and any specific score, \( x_{ij} \), gives the number of values that \( i \) believes to be less important than value \( j \). Stated differently, larger scores correspond to more important values and vice versa. It is important to emphasize that these scores only give ordinal information about each person’s ranking; they are not directly comparable across rows of \( X \) and they do not provide any information about the degree to which a person prefers one value over another.

A Geometric Model of Individual Value Choices

The problem at hand is to represent the information contained in \( X \) in a compact and comprehensible manner. In order to accomplish this objective, I will take a geometric approach: The values and the individuals will be shown as \( k \) points and \( n \) vectors, respectively, within a common space. The dimensionality of this space (indicated by the value, \( m \)) is an empirical question. However, if the model is to be useful, \( m \) should be a very small number (no larger than three, at most) so the space can be shown as a single picture. Within the space, the points and vectors are arranged so that, to the greatest extent possible, each vector points toward the values that the individual believes are most important, and away from those that he or she considers to be least important. To be more precise, each person’s vector will be oriented such that his or her importance ratings for the values are monotonically related to the order in which the value points project onto his or her vector.

Figure 1 shows a very simple example of such a model, based upon hypothetical information about two individuals’ (labeled “1” and “2”) feelings about three values (labeled “A”, “B”, and “C”). The 2 by 3 data matrix, \( X \), is shown in the top half of the figure. From that information, we can see that individual 1 says value A is most important, value C is second-most important, and value B is least important. In contrast, individual 2 rates B, A, and C, from most- to least-
important. The bottom half of the figure shows a two-dimensional geometric space that is consistent with the information in $X$; the space contains three points representing values A, B, and C along with two vectors for individuals 1 and 2. The dotted line segments running from the value points to the two vectors show the perpendicular projections. Notice that, starting from the terminal point of each vector (i.e., the end with the arrowhead), the order of the projections corresponds to the cell entries in $X$. On individual 1’s vector, the projection for value A comes first, followed by C and then B. On individual 2’s vector, the projection for value B is closest to the tip, followed by those for values A and C, respectively.

Of course, any real model will contain far more than two vectors and probably more than three points. In fact, a much larger dataset than this simple example is necessary in order to fix the positions of the vectors and points relative to each other. But, the basic principle for locating these geometric elements remains the same: The vector orientations relative to the point locations should be consistent with the individuals’ rankings of the values. As we will see, this kind of model has several features that facilitate analysis of value preferences.

**Model Estimation**

The geometric structure laid out in the previous section is sometimes called the MDPREF model, an acronym for “multidimensional preference scaling” (e.g., Carroll 1972; Weller and Romney 1990). The analytic task is to use the information in $X$ to estimate $\phi$, the $k \times m$ matrix of coordinates for the value points and $\Gamma$, the $n \times m$ matrix of coordinates for the individual vectors’ terminal points; each vector will emanate from the origin of the space. The individual vectors are linear functions of the value points, and the model produces the following relationship:

$$\hat{X} = \Gamma \phi'$$

(1)

In equation (1), the $\hat{X}$ on the left-hand side is a matrix of predicted importance ranking values that is generated from the estimated model parameters. That is, the entries in any row of $\hat{X}$, say $\hat{x}_i$, give the projections from the $k$ value points onto $i$’s vector within the $m$-space. Of course, $\Gamma$ and $\phi$ are constructed in a way that makes $\hat{X}$ as similar as possible to the original data matrix, $X$.

Let us assume for the moment that $X$ contains interval-level data. In that case, Carroll (1972) shows that the model can be estimated very easily, using a singular value decomposition. Begin
by standardizing the entries within each row to zero mean and unit variance, producing $X_{std}$. While not absolutely necessary, this preliminary step is useful because it places the origin of the space at the centroid of the points and vector terminii. Next, factor $X_{std}$ using the Eckart-Young decomposition:

$$X_{std} = UDV' \quad (2)$$

On the right-hand side of equation (2), $U$ is the $n$ by $q$ matrix of left singular vectors, $D$ is the $q$-order diagonal matrix of singular values (arranged from largest to smallest), and $V$ is the $k$ by $q$ matrix of right singular vectors. Note that $q$ is the rank of $X_{std}$, which typically will be $k - 1$ (assuming that $k < n$, as will generally be the case), since the scores add to a constant within each row.

The next step is to determine $m$, the dimensionality of the model space. This is specified by the analyst, but the general objective is to choose $m$ so that it is as small as possible, while still producing a model that provides a sufficiently good fit to the empirical data. Some guidance can be obtained from the fact that the squared singular values give the sums of squares in $X_{std}$ that are “explained” by each pair of singular vectors. A goodness-of-fit measure for the model in $m$ dimensions can be defined as follows:

$$R^2 = tr(D_m^2)/tr(D^2) \quad (3)$$

Where $tr$ is the matrix trace, or sum of the diagonal elements, and $D_m^2$ is the diagonal matrix containing the squares of the first $m$ singular values. As with a linear regression model, $R^2$ is interpreted as the proportion of variance in $X_{std}$ that is explained by the $m$-dimensional model. Alternatively, it is the squared correlation between the entries in $X_{std}$ and the entries in the $\hat{X}$ that is produced by the points and vectors in $m$-space.

After determining the appropriate value of $m$, it is a simple matter to obtain $\phi$ and $\Gamma$. Simply take the first $m$ singular vectors and singular values and use them to define the following:

$$\phi = V_m \quad (4)$$
$$\Gamma = U_mD_m \quad (5)$$
These values for $\phi$ and $\Gamma$ comprise the “best” solution in the least-squares sense, because they generate the largest $R^2$ that is possible for an $n$-dimensional representation of the data.

As already mentioned, the preceding estimation procedure assumes that $X$ contains interval-level data. This implies that, for $i = 1, 2, \ldots, n$, the projections from the $k$ value points onto $i$’s vector, or $\hat{x}_i$, are linearly related to the entries in the corresponding row of the data matrix, $x_i$. But, the entries within each row of $X$ only give the rank-order of each individual’s importance judgments about the values. It seems very unlikely either that the differences in importance across successive ranks are always constant, or that these differences are identical from one individual to the next. Therefore, it is more appropriate to specify a model in which the projections from the value points onto the individual vectors are idiosyncratic and row-specific monotonic functions of the importance ratings.\(^5\) This is equivalent to an assumption that each row of $X$ provides strictly ordinal information about a person’s value preferences.

In order to address this issue, a strategy called “alternating least squares, optimal scaling” or ALSOS (Young 1981; Jacoby 1999), is used to perform a nonmetric version of the singular value decomposition. ALSOS does not carry out the analysis on the original data matrix. Instead, the ALSOS routine uses a transformation of $X$, designated $X^*$, that contains optimally-scaled versions of the original data values. This means that the entries within any row of $X^*$, say $x_i^*$, are a monotonic transformation of the entries in the corresponding row of $X$, or $x_i$. The specific monotonic transformation is allowed to vary across the $n$ rows of $x_i^*$. The monotonic transformations are chosen so that they maximize the model’s $R^2$ in a given dimensionality, $m$. The only real difference from the interval-level situation is that this $R^2$ is now the squared correlation between the entries in $\hat{X}$ and the entries in $X^*$ (rather than $X_{std}$). Briefly, the steps in an ALSOS version of multidimensional preference scaling are as follows:

1. At the outset, specify $m$, the dimensionality of the space, initialize $R^2$ to zero, and initialize $X^*$ by setting it equal to the original $X$ matrix. Standardize within rows of $X^*$ to obtain $X^*_{std}$

2. Carry out the singular value decomposition on the current version of $X^*_{std}$ to obtain $U_m$, $D_m$, and $V_m$. Use these matrices to calculate current estimates of $\hat{X}$ and $R^2$.

3. If the current $R^2$ is larger than the previous value, then continue. If $R^2$ has not changed from the previous iteration (i.e., its value has converged) then terminate the procedure and go to step 6.
4. For \( i = 1, 2, \ldots, n \), use Kruskal’s monotonic regression (1964) to find a new estimate of \( \hat{x}_i^* \), containing values that are maximally correlated with the current model-based predicted values (that is, the entries in the \( i^{th} \) row of \( \hat{X} \), or \( \hat{x}_i \)) but always weakly monotonic to the entries in the original \( x_i \).

5. Return to step 2 and carry out another iteration of the estimation procedure on the new version of \( X^* \) that was obtained in step 4.

6. When \( R^2 \) converges, construct the \( \Phi \) and \( \Gamma \) matrices from the singular vectors and values, and use the final \( R^2 \) as the goodness-of-fit.

Thus, the nonmetric approach simply estimates the MDPREF model on a transformed (i.e., optimally-scaled) version of the data matrix. In practice, the procedure works very well. It usually converges quickly and it optimizes the appropriate monotonic, rather than linear, correspondence between the model elements and the original data values. The ALSOS model still represents the original data, since the various \( \hat{x}_i^* \) are linear functions of the \( x_i^* \), while the latter are monotonic functions of the \( x_i \). And, since the monotonic function can vary from one row of \( X^* \) to the next, the procedure explicitly recognizes that the entries in the original data matrix, \( X \), are not comparable across the rows. Hence the model provides the best-fitting (in the least-squares sense) \( m \)-dimensional representation of the \( n \) individuals’ rank-ordered importance ratings of the \( k \) values.

**DATA**

The vector model of value choices will be fitted to data drawn from the 2006 Cooperative Congressional Election Study (CCES), an internet survey carried out by Polimetrix, Inc. The component of the survey used here involves a nationally representative sample of 1000 American adults.\(^6\) The CCES interview schedule contains items that elicit information about respondents’ general political orientations, issue attitudes, and sociodemographic characteristics. But, more important for present purposes, the post-election wave of the 2006 CCES asked respondents to rank-order the importance of seven values: Freedom; equality; economic security; morality; social order; individualism; and patriotism. This these particular values were used because of their relevance to the philosophical foundations of the American political system along with their salience in contemporary political discourse.

During the internet survey, the CCES respondents first were presented with a screen showing the following statement:
On the next few screens, we will show you a list of values, such as freedom, equality, and so on. Nearly everyone agrees that all of these values are important. However, sometimes we have to choose one value over another. From the list of values, please select the single value that you think is the most important.

Starting with the next screen, respondents used radio buttons to select the most important value from the list that appeared on the screen. The order of the values in the list was randomized for each respondent. But, the contents of the list for the full set of seven values is shown in Table 1. After selecting the most important value from the list of seven, the respondents were shown another screen that started with the question, “Now, of the values that remain, which one would you say is the most important?” The question was followed by a list of the six values that were not chosen on the preceding screen. This process was repeated, successively eliminating chosen values from the list, until respondents were asked to choose from a list of only two values. Of course, the final, non-chosen value falls at the bottom of each respondent’s rank-order.

The empirical analysis will be confined to the 775 CCES respondents who gave complete rank-orders. Among these, there are 623 distinct orderings of the values that show up in the data. Thus, there is a great deal of heterogeneity in value choices across individuals. Table 2 provides some initial descriptive information. Specifically, the table gives the distribution of importance scores for each of the values. Recall that the importance score gives the number of values that are ranked lower than a given value in an individual’s full rank-order. Freedom appears to be the most popular value, with the highest percentage of placements in the most important position (25.81%) and the fewest in the least important position (only 8.9%). In contrast, individualism is the least popular value, with the largest percentage of least important placements (by a wide margin, at 33.55%) and the smallest number of placements in the most important position (only 4.9%). It is difficult to perceive any clear patterns in choices among the values that fall between these two extremes. Instead, it is probably most accurate to say simply that non-trivial percentages of the CCES respondents placed each of the values at each of the possible positions within the rank-order hierarchy. Is there any systematic structure within the full set of individual value choices? This is where the multidimensional preference model should provide useful insights, through its ability to represent succinctly the large amount of information contained in the 775 rank-orders.
EMPIRICAL RESULTS

Preliminary analysis indicated that a two-dimensional model would be appropriate for the CCES data on value choices. The $R^2$ for the two-dimensional representation is 0.804, showing that the model accounts for four-fifths of the total variance in the optimally-scaled value importance rankings. The goodness of fit is much lower for a unidimensional solution ($R^2 = 0.454$) and the improvement in fit for a three-dimensional solution is not great enough to justify the increased complexity ($R^2$ for three dimensions is 0.876, an increase of only 0.072 or about seven percent of the total variance). The great advantage of the two-dimensional model is that it is amenable to visual inspection. In order to facilitate interpretation, the individual vectors are adjusted to a length of one. Hence, the vector terminal points will all fall along a unit circle. This adjustment has no substantive effect since the order in which the value points project onto the vectors is the same, regardless of the vector lengths.

Values and Individual Importance Rankings

The model, itself, is shown in Figure 2. Looking first at the value point configuration (shown by the labeled, solid points), the general rule for interpretation is that the distances between the points are related to the similarity with which the corresponding values are rated by the CCES respondents. Points that are close together represent values that receive similar importance rankings; those that are far apart tend to fall at markedly different positions in the importance ranks. From the figure, it appears that the seven values fall into three clusters (although one of these clusters is composed of a single point). First, freedom, equality, and economic security form a group near the right side of the central region. This is perfectly reasonable, since the first two values comprise the central elements in the American creed, while economic security is increasingly recognized as a vital precondition for achieving the maximum benefits from American society.

A second group falls in the lower-left area, with patriotism and morality falling quite close to each other, and social order a little farther away, but still part of this cluster. This grouping, too, is understandable. Patriotism and morality are themes that play a prominent role in conservative rhetoric. And while social order is generally desirable for most people, it probably is a more salient concern on the political right than on the left.
Finally, the point for individualism is widely separated from the others, in the upper left of the space. This distinct positioning is due to the low rankings that it received from most of the individual respondents. Nevertheless, it is slightly closer to the first group of points than to the second, perhaps reflecting the fact that individualism is also an important element of American cultural symbolism.

Figure 2 also shows the terminal points for the vectors representing the individual respondents. Again, they are arrayed around a unit circle in the same space as the value points. Each vector terminus is shown as a small open circle; note that the terminal points are jittered to break up the exact plotting locations. This makes it easier to discern the variations in the concentrations of vectors around the space.

Substantive interpretation of the vectors focuses on their angular separation. The smaller the angle between any two vectors, the more similar the value rankings of the two individuals and vice versa. In fact, the cosine of the angle between any two vectors is equal to the correlation in the predicted value rankings for those two people. Hence, vectors separated by angles less than 90 degrees represent positively correlated rankings while those separated by angles greater than 90 degrees correspond to negatively correlated rankings. Two collinear vectors pointing in the same direction (i.e., an angle of zero) would indicate a correlation of 1.0, while two collinear vectors pointing in opposite directions (i.e., an angle of 180 degrees) would indicate a perfect negative correlation, -1.0. To reiterate, the value ranking associated with any vector is given by order of the perpendicular projections from the value points onto that vector.

The most prominent feature in the figure is the extreme variability in value choices, represented by the spread of vectors around the entire circumference of the circle. Far from consensus on basic values, the estimates in this model suggest that there is widespread disagreement about which values are more or less important. Looking closely at the jittered vector terminal points, there appear to be three areas that have relatively dense clusters of vectors. One of these occurs in the upper right quadrant of the unit circle, around the “2:00 position.” People represented by vectors in this area rank freedom, equality, and economic security highest, followed by social order, and then some combination of individualism, patriotism, and morality. A second concentration of vectors falls in the lower right quadrant, between the 4:00 and 5:00 positions. While there is quite a bit of variability within this group, these people tend to rank social order highest, followed by
morality and economic security. Patriotism and equality come next, with freedom just below that, and individualism once again appearing at the lowest position within most of their rank orders. The third cluster of vectors falls in the lower left quadrant; again, there is some variation within this general concentration, with one group near the 7:00 position and others spread out almost to the 9:00 position. The individuals in this general cluster are distinctive in that they rank morality, patriotism, social order, and individualism over the other three values.

Values, Culture, and the Culture War

If culture is defined by the predominant value choices of a society, then how can this be operationalized in the geometric model of value importance rankings? Here, the analysis relies on statistical tools designed specifically for directional data (e.g., Mardia 1972, Schiffman, Reynolds, Young 1981). And, since the vectors are normalized to unit length, they are frequently called “circular” data (e.g., Gill and Hangartner 2010). The approach I will use is to summarize the myriad value choices represented in Figure 2 by taking the mean direction of the individual vectors. As with any other average, the mean direction is intended to provide the single orientation that “best” reflects the orientations of the full set of vectors.

The length of the mean direction vector (called the “mean resultant length” and denoted $\bar{R}$) is also important because it is inversely related to the amount of angular separation in the set of vectors over which the mean is calculated. If there is no variation in the directions, then the vectors will all be perfectly collinear, and the mean resultant length will be equal to that of the vectors themselves, or 1.0. Conversely, there are a number of situations that will result in a mean resultant length of zero; for example, $\bar{R} = 0$ when half of the vectors have mirror image vectors that point in exactly the opposite direction. In order to summarize the variability in the vector directions, an “index of angular variation” analogous to the variance of a set of numerical values is defined as $\bar{S} = 1 - \bar{R}$. $\bar{S}$ ranges from zero to one, with larger values indicating wider angular separation within the set of vectors.

Figure 3 repeats the full geometric model of value choices; but it also shows the mean vector for the full set of CCES respondents. The value points project onto this mean vector (or, more precisely, onto the line collinear with the mean vector) in order with economic security first (i.e., most important), followed fairly closely by social order. Equality comes next, followed by freedom, morality, and patriotism; note that these three project very closely to each other, making their
relative positions nearly indistinguishable. Individualism falls in last place, by a wide margin. This ordering of the mean importance ranks suggests that the values component of American culture is dominated by the kinds of practical concerns of an orderly society, in which peoples’ material needs are met, rather than lofty principles, codes of conduct, or feelings of obligation to society.

The other prominent feature in Figure 3 is the short length of the mean vector, \( \bar{R} = 0.321 \), producing \( \bar{S} = 0.679 \). This figure just confirms the previously-noted existence of broad heterogeneity in feelings of value importance. It reiterates that there is little in the way of overall consensus about what is most important and what is least important in basic value orientations. Instead, it appears that American society is characterized by extreme levels of value disagreement rather than broad adherence to a set of common fundamental principles.

But, do these obvious differences in value choices provide evidence of conflict in fundamental value orientations? In other words, is this evidence of a culture war in American society? If so, then the value rankings should vary along systematic and identifiable lines. Some possible axes of conflict include demographic categories (e.g., race, gender), social class (e.g., income, education), religion (both denomination and degree of commitment), and political orientations (party identification and ideology). In order to investigate these possibilities, we can examine the mean vectors of various subgroups defined by the preceding variables. And we can also exploit the properties of the index of angular separation to generate criteria for evaluating the statistical significance of the subgroup differences. The angular variation in a set of vectors can be divided into additive within-group and between-group components; these components can be used to perform an “analysis of angular variation” or ANAVA, that is directly analogous to a typical analysis of variance (or ANOVA).\(^9\)

The results for these subgroup comparisons are shown in Figures 4 through 8. Each panel of the respective figures shows the mean vectors for a particular set of subgroups (e.g., racial and gender groups in Figure 4). Operational definitions for all variables used to create the subgroups are provided in the Appendix. Just as with the vectors for individuals, the differences of the mean value preferences across the groups are summarized in the angle between the respective groups’ vectors; correlations in the mean rankings are still shown as the cosines of the angles between the mean vectors. And, the mean resultant length of each subgroup vector is inversely related to the heterogeneity of the value choices within the subgroups. Note that each of the figures shows exactly the same geometric space. But, the arrowheads of the group vectors and the terminal points of
the individual vectors are omitted, and the value points are made less prominent (and sometimes omitted to eliminate overplotting) in order to emphasize the positions of the subgroup vectors in each panel.

Beginning with Figure 4, we can see that race and gender play very limited roles in differentiating Americans’ value choices. The first panel of the figure shows that the orientations of African Americans and Hispanics on the one hand are distinct from those of whites and people who place themselves in the “other” category. The difference is statistically significant with an observed probability value from the ANAVA of 0.006. Hence, the differences across racial groups are probably not due to sampling error. But, even though the value rankings of the racial groups differ, it is not entirely accurate to say that they conflict. Even the largest angle between a pair of vectors is still less than 90 degrees, showing that the mean rank-orders in all of the groups are positively correlated. For example, the correlation between the means for African Americans and whites is 0.862. So, there is quite a bit of common ground in the value orientations of individuals across these two racial categories. Note, however, that the differences in the vector lengths show that African Americans and Hispanics are much more homogeneous in their value choices than are people in other racial groups.

Turning to the gender breakdown shown in the second panel of Figure 4, males and females hardly differ at all in their value orientations. The angle separating the two vectors is very small and the difference between the two groups is not statistically significant (the observed probability value from the ANAVA is 0.084). The correlation of the mean value importance rankings across genders is very high, at 0.967. And, while females seem to be a bit more homogeneous than males, the difference in the two vector lengths is just not that great. Taken together, the evidence in Figure 4 suggests that, to the extent that fundamental differences in value orientations exist within American society they are definitely not due to demographic characteristics like race or gender.

Figure 5 shows the mean vectors for two social class indicators, education and family income. In each case, there is some systematic variation. Both increasing education and higher income levels correspond to lower importance ranks for social order, morality, and patriotism, and higher ranks for economic security, equality, and freedom. Both sets of results show statistically significant differences across groups. The ANAVA observed probability values are 0.000 for education and 0.044 for income. Still, here once again, the class-related differences do not really produce sharp
enough differences that they could be characterized as contrasting value orientations. Thus, any culture war that exists is not rooted in social class differences.

Figure 6 moves on to examine religion. The first panel shows denominational differences in the mean vector orientations. Here, self-identified Protestants and Christians ranks social order, economic security, and morality at the high end. In contrast, the mean vector for people with no religious affiliation shows greater emphasis on equality and freedom, along with economic security. Catholics, Jews, and people who placed themselves in the “Other” category fall in between these patterns, with the former two denominations more like Protestants and other Christians, and the latter more like the non-affiliated. Like the previous results, religious denominations show statistically significant differences (the ANAVA observed probability value is 0.000), but they do not correspond to opposing individual value structures. The angles between the mean vectors for all groups are less than 90 degrees. And, the weakest correlation in average value rankings is still 0.290 for Protestants and those with no affiliation. Thus, even the biggest differences in value orientations across religions are just not that pronounced.

The differences show up more starkly when we turn to religious commitment in the second panel of Figure 6. This variable measures the salience of religion in the respondents’ lives, and for purposes of the figure, it has been collapsed to four categories. The resultant mean vectors show clearly that value orientations change systematically across different levels of commitment. People who report little involvement with religion place equality, economic security, and freedom at the top of their importance hierarchies, with individualism, patriotism, and morality near the bottom. In contrast, heavily committed individuals tend to rank morality and social order highest (by a substantial margin) with freedom and especially individualism at the lowest levels importance, also widely separated from the other values. The differences across the groups are definitely significant (ANAVA observed probability value of 0.000). But, the most contrasting average value hierarchies are more accurately characterized as unrelated, rather than actively opposed: the correlation between the mean vectors for people with the lowest and highest levels of religious commitment is -0.061.

The results in Figure 6 are particularly interesting, because religious orientations are frequently identified as the basic foundation of the culture war in modern America. Based upon this evidence, such an interpretation seems to be overstated. It is certainly the case that people with different
religious backgrounds value different things. But, it would be an exaggeration to say that their values are fundamentally opposed to each other.

Figures 7 breaks down the individual value hierarchies according to symbolic political orientations. This is where the real evidence of opposing value hierarchies comes to the forefront. In both cases, the differences are statistically significant (in fact, the observed probability values for the ANAVA F statistics are effectively zero). The mean vectors for the opposing political groups are separated by angles that are substantially greater than 90 degrees, showing that their average value rankings are negatively correlated with each other. Specifically, the correlation between the mean value hierarchies for Republicans and Democrats is -0.446, while that for liberals and conservatives is -0.380. Notice, too, that independents and moderates fall in between the respective opposing groups. But, independents are much more like Democrats than Republicans, and moderates are more like liberals than conservatives. So, it seems that the clearest evidence for value conflict is associated with differences in political loyalties and orientations.

Another interesting feature of the two graphs in Figure 7 is the fact that the vectors for Democrats and liberals are both longer than those for Republicans and conservatives, respectively, showing that the former groups are more unified in their value choices than are the latter. At first, this may seem surprising since the Democratic party is often characterized as a coalition of diverse interests, in contrast to a unified Republican party. Nevertheless, the value heterogeneity revealed by the relatively short vector for Republicans in Figure 7A could perhaps be a precursor to the extended competition between the conservative and moderate wings of the Republican party during the 2012 presidential primary campaign. Similarly, the conventional understanding holds that liberals are much more likely to experience value conflict than conservatives (Feldman and Zaller 1992). But, Ellis and Stimson (2012) show that “symbolic” conservatives are actually very heterogeneous in their “operational ideologies,” with many expressing preferences for liberal policy stands on specific issues. The value heterogeneity among conservatives shown in Figure 7B may, in fact, provide a foundation for the varied issue attitudes of self-styled conservatives.

The subgroup comparisons presented so far provide some interesting initial evidence about the ways that various social, economic, and political characteristics are related to value orientations. But, they are not sufficient in themselves because they represent bivariate relationships. Furthermore, the subgroups used to break down value choices in Figures 4 through 7 are, themselves,
correlated. Therefore, it is important to examine the simultaneous effects of these variables in order to determine whether some combination of these characteristics operates jointly to differentiate individual value structures.

In order to evaluate this possibility, I will employ a circular regression model which explicitly takes into account the fact that the important information about the dependent variable is the angular separation of the respective vectors around the unit circle. This approach was developed by Fisher and Lee (1992) and it is presented in a political science context by Gill and Hangartner (2010). Circular regression uses a generalized linear model in which the model specification is as follows:

$$\mu_i = \mu + g^{-1}(x_i \beta)$$ (6)

Where $\mu_i$ is the position of the $i^{th}$ observation’s vector around the unit circle (in radians, moving counter-clockwise from the 3:00 position), $\mu$ is an intercept, $x_i$ is the set of independent variable values for observation $i$, $\beta$ is a set of coefficients, and $g^{-1}$ is a link function mapping from the values of the linear predictor ($x_i \beta$) into the interval from zero to $2\pi$. The parameters of the circular regression model are estimated by maximizing a likelihood function based upon the Von Mises distribution.

Table 3 contains the maximum likelihood estimates for the circular regression model predicting the orientation of the individual vectors as a function of a set of explanatory variables (again, definitions for all of the independent variables are provided in the Appendix). Initially, the model included all of the variables shown in Figures 4 through 7, plus dummy variables for geographic region. But, preliminary estimates showed that gender, race, family income, religious denomination, and region have no effect once the other variables are taken into account; therefore, they are omitted from the reported model.

The coefficient estimates are interpreted in a manner similar to any other regression model. $\mu$ is the intercept, so it shows the mean vector orientation (in radians) when all of the independent variables equal zero. Given the coding of the variables, this would be a nonleaning independent with moderate ideology, of average age, with no college, and the lowest level of religious commitment. The exact values of the other coefficients are not immediately interpretable, but positive values indicate movement in a counter-clockwise direction from $\mu$ around the unit circle, while neg-
ative values indicate that the variable moves the dependent variable vector around in a clockwise
direction. Statistical significance is evaluated in the usual way: the parameter estimate divided by
the standard error forms a test statistic that can be compared against the quantiles of the normal
distribution. Smaller observed probability values mean that it is less likely that the difference
between the coefficient value and zero is due strictly to sampling error.

The empirical results from the circular regression make a great deal of sense in substantive
terms. The baseline, $\mu$, is -0.95. This corresponds to a vector pointing toward the lower-right, close
to the 5:00 position. Turning to the regression coefficients (all of which are statistically different
from zero at the 0.01 level in a nondirectional test), those for the two education variables both have
positive values. This shows that any education beyond high school corresponds to counter-clockwise
movement in the mean vector, or higher importance rankings for economic security, equality, and
freedom relative to social order, morality, and patriotism. The remaining four coefficients are all
negative, meaning clockwise movement in the mean vectors. Based upon the coding of the variables,
this means that older people, those with greater religious commitment, stronger Republican (or
weaker Democratic) identifications, and more extreme conservative (or less liberal) self-placements
all tend to place greater importance on social order, morality, and patriotism rather than any of
the other values.

The independent variables are measured in different units, and education consists of two dummy
variables. Therefore, it is tricky to measure the sizes of the respective variables’ effects on value
rankings. The easiest way is to simply take the coefficient value times the range for each variable as
an estimate of the maximum possible difference in vector orientations due to that variable. Using
that strategy, the effect sizes are -0.53 for age, 0.43 for education (i.e., the coefficient for college
graduates, which represents the maximum difference from the omitted reference category of high
school graduates or less education), -0.24 for religious commitment, -0.65 for party identification,
and -0.84 for ideology. Notice that the variable associated with religion—often identified as the
main source of the culture war in America—actually has the weakest net relationship to individual
value choices. In contrast, the explicitly political variables, party identification and ideology, have
the largest effects, followed by age and education.

While the preceding variables contribute to heterogeneity in feelings about values, are the differ-
ences really large enough to justify the claim of a culture war in American society? It is difficult to
answer such a question using only the information in Table 3, since the coefficients are not directly interpretable. Instead, we can look at the predicted mean vectors for hypothetical individuals defined by interesting combinations of the independent variables. Specifically, we will begin with the vectors for the two most extreme cases. On one side, there is the youngest strong Democrat, extremely liberal, college graduate with the lowest level of religious commitment; such an individual should produce the largest value for the predicted vector orientation. On the other side, there is the oldest strong Republican, extremely conservative, with a high school education (or less), who is maximally committed to his or her religion; this person would produce the smallest predicted value. After finding these two most extreme vectors, we can take the bisector between them. Then we can take the mean direction of the actual vectors that fall on either side of this bisector. There definitely is a certain degree of arbitrariness in this procedure. Nevertheless, it does provide an easy way to summarize the extent to which social and political characteristics result in differing value choices.

Figure 8 shows the configuration of value points with the two most extreme vectors and their bisector shown in gray and the mean vectors on each side of the bisector shown as heavy black line segments. Obviously, the two mean vectors point in very different directions; the angle between them is very large, at 130.28 degrees. The projections from the value points onto the two vectors can be interpreted as each value’s average importance for the respective subsets of people. On the right side of the bisector, the mean vector lies approximately in the “2:30” direction; equality projects first on this vector, followed closely by economic security and freedom. Social order falls at an intermediate position, while the projections from individualism, patriotism, and morality all intersect at much lower positions. On the left side of the bisector, the mean vector points in approximately the “7:00” position. Here, morality, patriotism, and social order come first, with the remaining four values projecting at much lower positions. The correlation between the two sets of projections is -0.646. It is not an exaggeration to say that the most important values for one of these subgroups tend to be the least important for the other subgroup.

Note that the subgroup mean vectors are both quite long: The vector to the right of the bisector has length 0.735 and the one to the left of the bisector has length 0.682. Recall that the overall mean vector was quite short, with $\bar{R} = 0.321$. This is important because mean resultant length is inversely related to the angular separation among the vectors used to calculate the mean. So,
these results show that the two subgroups exhibit far less variability in their value importance rankings than does the public as a whole. In terms of the culture war hypothesis, this suggests that American public opinion contains two fairly unified sides characterized by value orientations that average out to be near mirror images of each other.

CONCLUSIONS

In this paper, I have developed a geometric model to represent the structure of Americans’ choices among a set of core values. The empirical results create a picture of extreme heterogeneity that contradicts any notion of widespread agreement on a set of fundamental principles. The situation does not merely represent differences of degree; instead, the variability in the value rankings is great enough to represent differences in kind. There are widely-distributed, almost diametrically opposing views about which values are important and which are not. It does not seem unreasonable to characterize such sharp differences in feelings about fundamental values as the existence of a culture war.

For the most part, the sides in this apparent war break down exactly as one would expect. But, the fact that heterogeneity in values is consistent with various social and political lines does not mean that the connection is causal in nature. And, when subjected to multivariate analysis, several elements of the “conventional wisdom” about an American culture war do not stand up to scrutiny.

For one thing, value orientations are not tightly connected to religious affiliations. And, they are only weakly related to the fervor with which individuals commit themselves to religion. To be sure, religious commitment does vary across denominations, with self-identified Christians and Catholics showing higher levels than Jews, Protestants, and people with other affiliations. But, even this relationship is very weak. So, the empirical evidence just does not signal the presence of a culture war that emanates from a religious divide between fundamentalists and the rest of the American population.

At the same time, race— the focus of enormous attention in the political world for many years— does not lead to clear divisions in value choices. This is surprising precisely because there definitely are broad racial differences in opinions on political issues and public policy (e.g., Kinder and Winter 2001). At the same time, there are distinct ideological orientations that exist within the African
American community (e.g., Dawson 2001). Nevertheless, basic ideas about the relative importance of core values do not seem to be at the heart of these racial differences.

Several other characteristics that are often believed to correspond to political divisions also show little or no connection to values. Stated simply, there are no systematic differences in the value orientations of males and females, despite ongoing evidence of a gender gap in various elements of American electoral politics. And, any differences corresponding to income levels or geographic regions disappear once controls are introduced for other factors. These findings offer a strong counterpoint to recent work that suggests the existence of class warfare (Murray 2012) or profound differences due to regional political cultures (Chinni and Gimpel 2010).

In contrast, the analysis shows several ways that values do respond to socialization. There are fairly pronounced differences in value choices across ages and education levels. While it is only possible to speculate about the exact causes of these effects, it does seem reasonable to suggest that the time period during which a person “comes of age” has an impact on what he or she believes to be the most important ideas to pursue in life. The significant effects of the variables gauging schooling beyond high school indicate that higher education does more than merely provide substantive information and knowledge; apparently, it also instills distinctive ideas about the relative importance of different values.

Perhaps the most striking findings involve the strong effects of party identification and ideology. This confirms that personal value hierarchies can serve as structuring principles to organize political ideas. In the past, values were regarded as an alternative to ideology, providing organizational parsimony for political attitudes among people who did not conceptualize the world in abstract terms (Feldman 1988). In contrast, the present findings suggest that value orientations actually reinforce ideological distinctions. At the very least, they provide a substantive foundation for what Ellis and Stimson (2012) call “symbolic” ideology; in other words, the consistency between feelings about value importance and liberal-conservative self-placements shows that the latter are not mere labels, unconnected with other orientations.

The results obtained here also reiterate the explicitly partisan nature of political differences in American society; it appears that the two major parties truly do serve as the focal points for the polarization that many observers have identified in recent American politics (e.g., Bafumi and Shapiro 2009). In fact, the close association between individual values and political orientations
may help explain why the polarization, itself, is so pronounced. Stated simply, there is a lot at stake if people connect their partisan affiliations and issue preferences to their basic beliefs about what is good and bad in the world. The results obtained here suggest that may be exactly what is occurring.

Finally, it is reasonable to ask why this study produced such strong evidence for the existence of serious value conflict when a number of other analyses have reached the opposite conclusion, that the culture war is a myth, or at least, largely exaggerated. I believe the main reason for this important departure from previous work lies in the measurement of value choices. The individual rank-orders used in this analysis come much closer to the theoretical concept of personal value structures than do the approaches used by most other researchers. And, psychological theories of values have long asserted that it is structured choices among competing values, rather than individual values considered singly, that make the difference for human behavior. The results presented here bear out that theoretical stance very nicely.

In conclusion, the geometric model developed in this paper relies upon relatively complete depictions of individual value choices to produce an empirical representation of a central component in American political culture. In the past, researchers were hesitant to examine rank-ordered value choices because of the apparent difficulties involved in analyzing such data. But, the model here shows that individual differences in value structures can be represented in a very parsimonious manner by the varying orientations of the individual vectors in the value space. It is precisely the wide spread of the individual vectors that provides forceful empirical evidence for the existence of a culture war in American public opinion.
This Appendix gives the operationalizations used for all explanatory variables used in this study to examine differences in value orientations. The list below includes several variables with nonsignificant effects, which are not included among the figures or the circular regression reported in the paper. Additional analyses showing the relationship between those variables and the individual vector orientations within the geometric model are available from the author upon request.

Race: Respondents to the CCES internet survey identified themselves as White, Black, Hispanic, Asian, Native-American, mixed, other, and Middle Eastern. The latter five designations were collapsed into one category.

Gender: Respondents identified themselves as males or females.

Age: Respondents gave their year of birth; that value was subtracted from 2006 to give the age. For the regression analysis, the age variable was centered by subtracting the mean age from each value.

Region: Categorized from the respondent’s geographic location as midwest, northeast, south, and west.

Education: Respondents placed themselves into six categories for not completing high school, high school graduate, some college, a two-year college degree, a four-year college degree, and a post-graduate degree.

Family income: Respondents located themselves within 14 yearly family income categories, from “less than $10,000” through “$150,000 or more.” Categories were assigned values corresponding to the center of the income range for that category (in $1,000’s, with all respondents in the highest category assigned the value 150). Those who responded “Prefer not to say” are assigned the mean income value.

Religious affiliation: Respondents identified themselves as Protestant, Catholic, Jewish, no religion, other Christian, other, and Muslim. Dummy variables were created for the first five denominations. Since there were only two Muslims in the CCES sample, the last two categories are combined.

Religious commitment: A summary variable is created by fitting a nonparametric IRT model (i.e., a Mokken scale) to five survey items. The first asked, “Is religion an important part of your life or not?”, the second asked “How many times per week do you pray?”, the third asked “Which of the following statements comes closest to your feelings about the Bible?” (with three possible responses, varying between “The Bible is a book written by human beings” and “The Bible is the actual word of God”), the fourth asked “Do you attend religious services beyond weddings, baptisms, and funerals?”, and the fifth asked “How frequently do you go to religious services?”. The commitment variable takes on integer scores from zero to 12, with larger scores indicating stronger commitment. The full version of the variable is used for the circular regression, but it is collapsed into four categories for the bivariate graphical presentation.
Party identification: Branching questions were used to create the standard seven-point party identification variable with successive integers assigned to categories from -3 = strong Democrat to 3 = strong Republican. For the bivariate graphical presentation, the variable is collapsed to three categories, with partisan leaners coded as independents.

Ideology: Respondents located themselves along a 0 to 100 scale (presented as a number line on the computer screen) ranging from 0 for “extremely liberal” to 100 for “extremely conservative. The variable is used in its relatively continuous form for the circular regression (recoded to range from -3 to +3), but it is collapsed into three categories for the graphical presentation, with liberals as anyone coded 40 or less, moderates from 41 to 59, and conservatives from 60 to 100.
NOTES

1. For example, Nia-Malika Henderson stated in *The Washington Post* that “Rick Santorum has opened up a new and provocative front in the political culture wars as he boldly tries to cast the race for the White House as a battle between the secular and the religious. And, in a U.S. News and World Reports opinion piece, Robert Schlesinger argued that the “new culture war will help Rick Santorum (and) Barack Obama.” These are only two examples out of dozens of references to the term “culture war” that appear in the media coverage of the 2012 election.

2. From one perspective, *Washington Post* writer Michael Gerson stated that “President Obama’s decision to lead with social issues in his reelection campaign . . . makes some political sense. . . . Cultural battles inspire the liberality of liberal donors . . . (and they) coincidentally, are an alternative to discussing the state of the economy.” Sam Stein and Amanda Terkel present the alternative view in their *Huffington Post* article, “Mitt Romney’s Culture War Distraction,” where they state that, “Indeed, an election that was supposed to be tied to the monthly job numbers has, for the time being, become a litmus test on social issues. It’s caused more than a few bouts of heartache for the Republican establishment . . .”.

3. There is one exception to this general statement: Among the items included in the Inglehart and Baker’s (2000) factor analysis is a four-item index created from respondents’ relative preferences for post-material versus materialist values. While the latter are based upon direct comparisons of the two general value orientations, the resultant variable is just one item out of the ten that are factor analyzed to construct two general value dimensions. And, all of the other items are responses about single values.

4. The entries within any row of $X$, say $x_i$, will be composed of the successive integers from zero to $k − 1$ if individual $i$ provides a complete ordering of the values. But, if $i$ gives an incomplete ranking of the values, then tied, and possibly non-integer, scores would occur within $x_i$. Note that this does not occur in the dataset that will be used in the present analysis, although the model and the estimation methodology can handle the situation with no difficulties.

5. Assume that $x_{ia}$ and $x_{ib}$ are two elements of $x_i$, while $\hat{x}_{ia}$ and $\hat{x}_{ib}$ are the corresponding elements of $\hat{x}_i$. If $\hat{x}_i$ is monotonically related to $x_i$ then, for all pairs of elements, $a$ and $b$, if $x_{ia} < x_{ib}$ then it must be the case that $\hat{x}_{ia} \leq \hat{x}_{ib}$. Thus, monotonicity implies that the ordering of the elements in $\hat{x}_i$ never contradicts the ordering of the elements in $x_i$.

6. The 2006 CCES is a large collaborative project involving 36 research teams comprised of scholars from 39 universities. Prior to the data collection, a complex procedure was used to draw a representative sample of respondents from a huge panel of potential survey interviewees. Matching procedures were then employed to insure that the CCES sample conforms to the demographic profile of the American adult population. The full CCES sample has 38,443 respondents. The data used in the current analysis comprise a randomly-selected subset of size 1,000 from the overall sample. Vavreck and Rivers (2008) provide a detailed discussion of the design, content, and sample characteristics of the 2006 CCES. The website for the CCES is located at [http://projects.iq.harvard.edu/cces/](http://projects.iq.harvard.edu/cces/).

7. As Table 1 shows, respondents were also given a brief definition of each value. Obviously, these values represent very complex and multifaceted ideas; it is almost certainly impossible to encap-
sulate a complete understanding of any one of these values into a single short phrase. Therefore, individuals could vary widely in their personal ideas about the meanings of specific value terms. And, such variability in interpretation could be confounded with variability in the feelings of personal importance about the values. In order to avoid this problem, it has become accepted practice in values research to provide definitions for values, in order to reduce extraneous variability in the responses (Sears, Huddy, Schaffer 1983).

8. This is accomplished very easily, simply by dividing the entries in each row of $\mathbf{r}$ by the sum of squared entries in that row.

9. Schiffman, Reynolds, and Young give a very succinct explanation of ANAVA (1981, pp. 306-308) while Mardia (1972) provides more rigorous and theoretical foundations for the methodology.

10. When religious commitment is regressed on dummy variables for the religious denominations, the coefficients on “Christian” and “Catholic” are both positive and statistically significant. This shows that individuals of these denominations are more committed, on average, than “Protestants” (the omitted reference category). However, the model fit is very weak, with $R^2 = 0.059$. 

REFERENCES


Table 1: Values and definitions shown to respondents in post-election wave of the 2006 Cooperative Congressional Election Study. In the actual administration of the survey, the order of the values was randomized across respondents.

FREEDOM, that is the widest liberty possible for everyone to act and think as they consider most appropriate.

EQUALITY, that is making sure that everyone has the same chance to get ahead in life.

ECONOMIC SECURITY, that is making sure that everyone has a steady job, a decent income, and a reasonable standard of living.

MORALITY, that is people living according to the rules that most people agree constitute decent human behavior.

INDIVIDUALISM, that is everyone getting ahead in life on their own, without extra help from government or other groups.

SOCIAL ORDER, that is being able to live without fear, in a safe, peaceful society where the laws are respected and enforced.

PATRIOTISM, that is looking beyond our own personal interests and doing things that honor, respect, and protect our nation as a whole.
Table 2: Distribution of importance ranks for the seven values.

<table>
<thead>
<tr>
<th>Rank Score</th>
<th>Freedom</th>
<th>Equality</th>
<th>Economic Security</th>
<th>Morality</th>
<th>Individualism</th>
<th>Social Order</th>
<th>Patriotism</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td>8.90</td>
<td>13.55</td>
<td>12.39</td>
<td>13.16</td>
<td>33.55</td>
<td>5.16</td>
<td>13.29</td>
</tr>
<tr>
<td>1</td>
<td>10.06</td>
<td>12.26</td>
<td>13.29</td>
<td>15.74</td>
<td>19.87</td>
<td>8.77</td>
<td>20.00</td>
</tr>
<tr>
<td>2</td>
<td>11.87</td>
<td>13.94</td>
<td>12.90</td>
<td>11.87</td>
<td>16.77</td>
<td>13.81</td>
<td>18.84</td>
</tr>
<tr>
<td>3</td>
<td>14.06</td>
<td>14.84</td>
<td>13.42</td>
<td>13.29</td>
<td>9.81</td>
<td>17.94</td>
<td>16.65</td>
</tr>
<tr>
<td>5</td>
<td>15.74</td>
<td>17.29</td>
<td>14.97</td>
<td>15.10</td>
<td>6.71</td>
<td>19.61</td>
<td>10.58</td>
</tr>
<tr>
<td>6</td>
<td>25.81</td>
<td>11.87</td>
<td>16.52</td>
<td>16.52</td>
<td>4.90</td>
<td>16.13</td>
<td>8.26</td>
</tr>
</tbody>
</table>

Note: Cell entries in table are column percentages. The number of observations is 775. For each value, the rank score indicates the number of values that were ranked lower than that value in an individual’s importance ranking for the full set of seven values.
Table 3: Circular regression showing the effects of social and political characteristics on individual preference vector orientations.

<table>
<thead>
<tr>
<th></th>
<th>MLE Coefficient</th>
<th>Standard Error</th>
<th>Observed Probability</th>
</tr>
</thead>
<tbody>
<tr>
<td>Respondent’s Age</td>
<td>-0.008</td>
<td>0.002</td>
<td>0.000</td>
</tr>
<tr>
<td>College</td>
<td>0.148</td>
<td>0.051</td>
<td>0.002</td>
</tr>
<tr>
<td>College Graduate</td>
<td>0.429</td>
<td>0.065</td>
<td>0.000</td>
</tr>
<tr>
<td>Religious Commitment</td>
<td>-0.020</td>
<td>0.006</td>
<td>0.000</td>
</tr>
<tr>
<td>Party Identification</td>
<td>-0.109</td>
<td>0.016</td>
<td>0.000</td>
</tr>
<tr>
<td>Lib-Con Ideology</td>
<td>-0.140</td>
<td>0.026</td>
<td>0.000</td>
</tr>
<tr>
<td>Intercept (μ)</td>
<td>-0.951</td>
<td>0.044</td>
<td>0.000</td>
</tr>
</tbody>
</table>

Note: Cell entries are maximum likelihood coefficient estimates, standard errors, and probability values for one-sided test of $H_0 : \beta_j = 0$, obtained from circular regression procedure developed by Fisher and Lee (1992) and presented by Gill and Hangartner (2010).
**Figure 1:** Hypothetical example of geometric model to represent value importance rankings.

**Part 1:** Data matrix, $X$. Cell entries are importance rankings for values, with larger numbers corresponding to more important values.

<table>
<thead>
<tr>
<th></th>
<th>A</th>
<th>B</th>
<th>C</th>
</tr>
</thead>
<tbody>
<tr>
<td>Individual 1:</td>
<td>3</td>
<td>1</td>
<td>2</td>
</tr>
<tr>
<td>Individual 2:</td>
<td>2</td>
<td>3</td>
<td>1</td>
</tr>
</tbody>
</table>

**Part 2:** Geometric model of information from $X$. Value points project onto the lines collinear to the individuals’ vectors in the order corresponding to each person’s importance rankings.
Figure 2: Full model of value preferences. Value points are shown as solid circles. Only the terminal points of the individual respondent vectors are shown (as open circles). Vector terminal points are jittered to facilitate visual perception of relative concentrations of vectors around the unit circle.
Figure 3: Full model of value preferences, showing mean direction of individual vectors. The mean direction vector is oriented about 34 degrees below the horizontal (or -0.594 radians) and the mean resultant length is 0.321.
**Figure 4:** Geometric model of value preferences, showing mean vectors for racial and gender subgroups.

A. Mean vectors for racial subgroups

B. Mean vectors for males and females
Figure 5: Geometric model of value preferences, showing mean vectors for education and income.

A. Mean vectors for education subgroups

B. Mean vectors for family income subgroups
**Figure 6:** Geometric model of value preferences, showing mean vectors for religious affiliations and levels of religious commitment.

A. Mean vectors for subgroups defined by religious affiliation

B. Mean vectors for subgroups defined by levels of religious commitment
Figure 7: Geometric model of value preferences, showing mean vectors for party identification and ideology.

A. Mean vectors for subgroups defined by party identification

B. Mean vectors for subgroups defined by levels of religious commitment
**Figure 8:** Geometric model of value preferences, showing mean vectors on either side of the bisector between the two most extreme predicted vectors from the circular regression of vector positions on social and political characteristics.

**Note:** In this figure, the two most extreme vectors and the bisector between them are shown in gray. The two vectors shown in black are the mean vectors of all individual vectors positioned on either side of the bisector.