MEASURING VALUE CHOICES: ARE RANK ORDERS VALID INDICATORS?

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Theories across several substantive fields hold that value structures are a fundamental component of individual belief systems. But, empirical measurement of these value structures has always been a tricky endeavor. In fact, many (if not most) researchers in political science elicit feelings about core values by simply having survey respondents or experimental subjects rate individual values according to their subjective importance (e.g., Nelson, Clawson, Oxley 1997; Grant and Rudolph 2003). This data collection strategy avoids a number of practical problems, but raises additional questions about whether the empirical responses really do reflect value *structures*.

The recent development of internet surveys has revived a traditional measurement strategy for value structures— simply asking respondents to rank-order a set of values according to their subjective importance. Such rankings have generally been regarded as the "gold standard" in obtaining empirical representations of individual value structures. Surprisingly, however, there has been virtually no research carried out to investigate the degree to which value rankings really do reflect the ways that people think about basic values.

The current paper addresses this issue by laying out a simple— but testable— model of structure within individual value choices. The model is applied to some unique survey data obtained from the 2006 Cooperative Congressional Election Study. And, the model estimates are compared against rank-ordered values obtained from the same survey respondents. The empirical results suggest that people develop value structures by aggregating across pairwise value choices. Furthermore, these value structures appear to be represented quite accurately by the traditional rank-ordering procedure. Thus, the findings from this study validate an important strategy for measuring the ways that people think about core values.

VALUES AND VALUE STRUCTURES

As a theoretical concept, "values" are usually defined to be a person's abstract, general, ideas about the desirable and undesirable end-states of human life (Rokeach 1973). Values derive theoretical importance from their potential to provide guidance for the development of beliefs, attitudes, and behaviors. In effect, they function as general evaluative standards that

can be invoked in any situation where particular values have substantive relevance (Schwartz 1992).

But, specific values rarely (if ever) operate in isolation from other values. Instead, people maintain feelings about multiple values, with comparisons between values providing the main cues for how to behave with respect to a given stimulus (e.g., Schwartz and Bilsky 1987; Schwartz 1992; 1996; Verplanken and Holland 2002). The general idea is quite simple: Faced with a decision-making situation, an individual will pursue the course of action that is consistent with the values that he or she believes to be relatively important, while avoiding actions that promote values deemed to be less important.

In order for such a values-based decision-making system to work, people must have well-developed and consistent 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. 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. In summary, it is each person's rank-ordered array of values that is theoretically important, rather than their feelings about any specific value by itself.

MEASUREMENT ISSUES IN VALUES RESEARCH

A valid measurement procedure should generate empirical observations that reflect as accurately as possible the underlying concept that is being measured. Applying this general rule to the specific case of human values, it seems important to allow for the inherently comparative nature of individual reactions to values. This is necessary in order to obtain an empirical estimate of each person's overall value system which is, itself, based upon feelings about the relative importance of the respective values.

The pioneering work in the empirical measurement of values was carried out by psychologist Milton Rokeach (1973). His approach presented subjects with a set of values, and

had each person rank the values by their personal importance. The individual rank-orders showed quite robust test-retest correlations, precisely as should be the case with stable value orientations. And, the ranks assigned to specific values varied systematically with a wide variety of demographic, social, and political variables. As a result of such seemingly incontrovertible evidence, rank-ordered values are usually interpreted as empirical manifestations of individual value systems.

Over the years, the theoretical status of value rankings was seldom questioned. But, researchers have always recognized the practical difficulties that arise when value ranking items are included in public opinion surveys. For example, Alwin and Krosnick (1985) point out that value rankings: are difficult for survey respondents to complete; are time-consuming and expensive for interviewers to administer; are cumbersome (and, perhaps, impossible) to use in a telephone survey; comprise ipsative measures which create difficulties for subsequent statistical analyses.

In order to deal with such practical issues, several researchers advocate the use of rating scales, with which survey respondents make separate evaluations about the importance of individual values (Munson and McIntyre 1979; Rankin and Grube 1980; Reynolds and Jolly 1980; Maio, Roese, Seligman, Katz 1996). Each respondent is presented with a battery of values, and the variability in the rating scores that a respondent assigns to different values is interpreted as a reflection of the values' relative positions within that person's value structure. The scores assigned to the respective values are often interpreted as interval-level data which can be used easily as input to a variety of statistical modeling and data reduction techniques.

Of course, value ratings also have some problems of their own. For one thing, the very fact that they are reactions to single stimuli compromises their validity as an empirical indicator of the ways that people feel about values. As mentioned earlier, feelings about values are inherently comparative (at least, according to the predominant theory); rating scales of separate values simply do not get at this kind of thinking (Coombs 1964). At the same time, ratings generally do not differentiate among stimuli as fully as do rankings; the result is ties

among an individual's rating scores which, in turn, preclude using the scores to obtain a full ranking of the values for that person (Krosnick and Alwin 1988). Still another problem is the potential for response set biases, wherein people vary systematically in the ways they map their reactions toward the values onto the possible response categories in the rating scale (Russell and Gray 1994). The problems caused by nondifferentiation and response set are likely to be exacerbated when the stimuli under consideration are all considered to possess a positive valence, as is the case with core values.

A number of studies have made direct comparisons of value rankings and value ratings(Munson and McIntyre 1979; Rankin and Grube 1980; Reynolds and Jolly 1980; Miethe 1985; Alwin and Krosnick 1985; Russell and Gray 1994). And, while the overall results have been mixed, any problems with latter do not appear to be sufficiently serious to preclude the use of rating scales as a data collection method. Furthermore, several recent works have proposed "corrections" that can be applied to values rating batteries (or to the resultant data) in order to produce results that come very close to those obtained from ranking procedures (Krosnick and Alwin 1988; McCarty and Shrum 2000). Thus, the practical advantages of rating scales seem to trump any theoretical leverage that would be provided by rankings.

A RECONSIDERATION OF VALUE RANKINGS

It is important to emphasize both components of the preceding conclusion: "practical advantages" and "theoretical leverage." There has, to my knowledge, never been any claim that value ratings are *theoretically* superior to value rankings. While not stated explicitly, the consensus seems to be that, given sufficient time during an interview, space within a survey instrument, levels of respondent cooperation, and appropriate analytic procedures, rank-ordered values would be better than ratings precisely because they come closer to the fundamental idea of individual value structures. It is just the *practical* difficulties that prevent us from using rank orders.

But, recent innovations in survey research technology and statistical methods may well render the difficulties moot. Internet surveys with adaptive item content (i.e., the content of

any given question can be adjusted on the basis of responses to earlier questions) make it very easy for respondents to rank a set of stimuli. And, there is a variety of scaling methods that can use rank-order data to model the underlying structure of individuals' reactions toward a set of stimuli (e.g., Borg and Groenen 2005). Similarly, there are several variants of logistic regression and structural equation models that have been designed to deal with dependent variables that consist of rank-orders (Allison and Christakis 1994; Maydeu-Olivares and Böckenholt 2005). Therefore, the fact that rank-ordered values are ipsative measures is no longer a serious methodological impediment For these reasons, it seems useful to reconsider the use of value rankings in empirical research.

Before doing so, however, it seems useful to consider the theoretical validity of the value rankings. Rokeach and many others advocate their use because rankings seem to provide a convenient summary of individuals' choices across a potentially large set of values. But, the rank-orders may be problematic in themselves: Survey respondents will generally provide answers to the questions posed to them, regardless whether those answers are truly based upon "real" psychological orientations or not (Schuman and Presser 1981).

This is a potentially serious problem, because recent recent research on ambivalence and indifference suggests that many people may not be able to provide meaningful rankings (e.g., Maio and Olson 1998; Alvarez and Brehm 2002; Bernard, Maio, Olson 2003; Goren, Federico, Kittilson 2006). On the one hand, some may experience conflict about salient, but contradictory, core principles (i.e., ambivalence). On the other hand, some may not recognize or care about differences or contradictions between fundamental ideas (i.e., indifference). Even if people really do recognize distinctions between values, rankings are susceptible to methodological problems such as response set (Klein, Dülmer, Ohr, Quandt, Rosar 2004) and a tendency to create artificial differences between stimuli that respondents do not really differentiate from each other (Alwin and Krosnick 1985). For all of these reasons, it seems prudent to bring value rankings into closer scrutiny, in order to make sure that they do provide accurate representations of individual value structures.

A MODEL OF INDIVIDUAL VALUE STRUCTURES

It seems very unlikely that most people go through life with fully-articulated rank-orders of values existing in their heads. And, Rokeach himself merely argued that the rankings summarize a person's choices across the set of values. But, neither he nor anyone else seems to have given much attention to the psychological processes that produce those choices. As a result of this very surprising omission, it is not clear how (or even *if*) value structures are constructed from value choices. And, without such an understanding, it is difficult to argue that rank-ordered values really are superior to other data collection strategies for individual feelings about values, such as batteries of rating scores. Therefore, it is important to lay out an explicit theory of value choices, and the way that these choices are combined into an overall structure.

Drawing heavily from previous work (Jacoby 2009), let us begin with a set of p values, designated $Val_1, Val_2, \ldots, Val_p$. Given a specific individual, each value has some level of personal importance; that is, the degree to which the person believes that the specified value really is a desirable state of existence. For value i, the importance would be shown as $\mathrm{I}(Val_i)$.[1]

There will also be some amount of measurement error associated with any overt expression of value importance. For the i^{th} value, the error would be shown as e_i. If a person is asked about the importance of value i, the response will not be based upon $\mathrm{I}(Val_i)$ alone; instead, it will reflect both the importance and the associated error. We will assume that the functional form of this expression is $\mathrm{I}(Val_i) + e_i$. The two components of this expression are fundamentally different from each other: $\mathrm{I}(Val_i)$ is assumed to be a constant, while e_i is a random variable with an expected value of zero and some finite variance, σ_i^2.

If asked to choose between two values (say, i and j), a person would select the one to which he or she apportions a higher level of subjective importance. But, the actual choice would be generated as follows:

$$\text{Choice}(Val_i, Val_j) = \begin{cases} Val_i & : \ \text{I}(Val_i) + e_i \ > \ \text{I}(Val_j) + e_j \\ Val_j & : \ \text{I}(Val_i) + e_i \ < \ \text{I}(Val_j) + e_j \end{cases} \tag{1}$$

Again, the error cannot be separated empirically from the actual sense of importance associated with any particular value. Therefore, it is entirely possible that a person could make a choice which is *not* an accurate reflection of his or her feelings about the values' relative importance levels. Such "contradictory" value choices could occur for anyone, given an appropriate random draw of values for e_i and e_j. But, the error terms will play a particularly important role in the choices of those individuals for whom the difference between $\text{I}(Val_i)$ and $\text{I}(Val_j)$ is very small, or zero. And, that will occur for people who are either ambivalent about, or indifferent toward, values i and j.

If a person makes only a single choice between i and j, it is impossible to say whether it reflects the underlying importance levels or the errors. But, if the choice between the two values is replicated, say, m times, then we can gain some leverage on the situation. We can define the *dominant pairwise choice* between Val_i and Val_j as that value which is chosen more than $m/2$ times across the replications. It is obtained by taking the mean (or summing) across the m separate replications:

$$\text{Choice}(Val_i, Val_j)_{\text{Dom}} = \begin{cases} Val_i & : \ \text{I}(Val_i) + \bar{e}_i \ > \ \text{I}(Val_j) + \bar{e}_j \\ Val_j & : \ \text{I}(Val_i) + \bar{e}_i \ < \ \text{I}(Val_j) + \bar{e}_j \end{cases} \tag{2}$$

In expression (2), $\bar{e}_i$ is the sample mean of the errors for value i, calculated across the m replications; $\bar{e}_j$ is defined exactly the same way. Now, $\bar{e}_i$ should tend to be closer to the expected value of zero than any individual manifestation of e_i.[2] Accordingly, $\text{Choice}(Val_i, Val_j)_{\text{Dom}}$ should more accurately reflect the comparison of the values' relative importance levels than any individual replication of the choice between i and j.

Equally important for present purposes, individuals who feel ambivalent or indifferent about values i and j should be more likely than those people with crystallized feelings to

be inconsistent in their choices across the m replications. This occurs because, for such individuals, $\mathrm{I}(Val_i) = \mathrm{I}(Val_j)$. Therefore, all of the replicated choices represent the effects of random errors, rather than stable feelings of importance. In contrast, for someone who really does believe that the values are differentially important, it should be the case that:

$$|\mathrm{I}(Val_i) - \mathrm{I}(Val_j)| > |\bar{e_i} - \bar{e_j}| \tag{3}$$

Moving from pairwise value choices to overall value structure, the orderly, hierarchical arrangement of values posited by traditional theories of human values is only possible if all subsets of dominant pairwise choices are transitive. Let us assign each value a score corresponding to the number of times it is the dominant pairwise choice over another value. For each individual, there will be a vector of p scores, all of which will be integers ranging from a possible maximum of $p-1$ (for a value that is chosen over all other values) to a possible minimum of zero (for a value that is never chosen over any other value). If a person's choices are fully transitive, then his or her vector of scores will contain the full set of unique integers from zero to $p-1$. If there are any intransitivities, then there will be tied scores, so the number of unique scores will be less than p.

To summarize the argument so far: Modern theories of human values assert that people choose between values based upon the values' respective levels of subjective importance, and these choices can be represented accurately as a rank-order of the values under consideration. Given a set of p relevant values, information on replicated pairwise choices between the values would enable a very strong test of this theory. Specifically, consistent choices across the replications should occur if people really do feel that values vary in their levels of personal importance. Ambivalence or indifference would not induce any consistency across replicated choices. And, dominant pairwise value choices should be transitive; only if that is the case will it be possible to rank-order the values according to each person's feelings of importance.

DATA

In order to test the preceding theory of individual value structures, it will be necessary to obtain data on replicated choices between pairs of values. Such information is not commonly available in public opinion surveys. However, the 2006 Cooperative Congressional Election Study (CCES) does contain an appropriate set of items. The component of the CCES used here involves a nationally representative sample of 1000 American adults.[3] The survey is actually a panel study, with the first wave of responses obtained in October 2006, and the second wave during the two weeks after the November 2006 midterm elections.

In the pre-election wave, the method of triads is used to provide replicated paired comparisons among five politically relevant values: Freedom; equality; economic security; social order; and morality. This relatively small set of values clearly does not represent the full range of terminal values in Rokeach's theory of values. Nor does it reflect the fully articulated system of universal values proposed more recently by Schwartz. Nevertheless, these five values are firmly rooted in American political culture, and they have direct relevance to current political controversies. Therefore, it seems likely that they will be meaningful to the survey respondents and be related to their other political orientations.

The exact question wordings from the CCES instrument are shown in the Appendix. Briefly, the survey respondents are first shown a screen containing short definitions for each of the five values. Then, they are shown a series of ten screens containing all possible subsets of three values (i.e., "triads") from the full set of five. The ordering of the triads and the ordering of the three values within each triad is randomized across the respondents.

For each triad, the respondents are instructed to select the value they believe to be the most important of the three, and the value they believe to be least important. These selections imply pairwise comparisons across the three values. So, for example, assume that a triad contains values i, j, and k. A respondent says i is most important and k is least important. This implies three pairwise choices: i is more important than j; i is more important than k; and, j is more important than k.

Across the full set of ten triads, each pair of values occur together within a triad three times. So, the triads provide three replications of each pairwise value comparison. Of course, this information can be used to examine consistency in value choices. And, for each of the ten distinct pairs of values, the value that is chosen two or three times over the other is the dominant choice for that pair. For each value, we calculate the number of times it is the dominant choice over any of the other four values. As explained above, the resultant set of five scores allows us to observe whether each respondent's value choices are transitive. Thus, the method of triads provides an efficient strategy for obtaining exactly the type of data required to test the model of individual value structures presented earlier (Gulliksen and Tucker 1961).

While the method of triads provides a great deal of information about value choices, the approach still requires a lengthy battery of survey items each of which probably requires a great deal of cognitive effort on the part of the respondents. Furthermore, the number of triads increases geometrically with the number of values. The repetitive nature of the triads may induce response sets or have other detrimental effects on respondent cooperation. Therefore, it is very unlikely that they could be used as a standard method of collecting data on value choices.

Having respondents simply rank-order a set of values avoids all of the preceding issues. But, a single set of ranked values would not enable any tests of consistency or transitivity. Therefore, it is important to determine whether the simpler value ranking strategy provides the same results as would be obtained from the more basic pairwise value comparisons.

To this end, the post-election wave of the 2006 CCES asked respondents to rank-order the same five values that were used in the pre-election triad items.[4] Again, the exact question wording is shown in the Appendix. But, the general approach presented respondents with the full set of values (along with their brief definitions) and asked them to select the one they thought was most important. Then, the next screen presented the remaining (i.e., non-chosen) values and asked respondents to choose the most important from this set. This

is continued down through the full set of values, until there is only one non-chosen value remaining. In this manner, we obtain a full rank-ordering of the values for each respondent that completed the items. The value rankings can be compared directly to the individual vectors of choice scores (obtained from the triad data) to make sure that they are producing similar information about the individual respondents' value orientations.

EMPIRICAL RESULTS

Of the total 1000 CCES respondents, 812 people provided complete answers to all ten triads; the empirical analysis will be limited to this subset of respondents. From the triads, the replicated comparisons for each pair of values are used to calculate the choice scores for each value. Again, these scores give the number of times each values is the dominant choice over another value. With five values, the scores range from zero to four.

Consistency and Transitivity in Value Choices

Figure 1 shows histograms for the choice scores on all five values. Freedom appears to be the most popular value: 43% of the respondents choose freedom over the other four values while only about seven percent choose all of the other values over it. Morality shows a bimodal distribution of choices, with about 23% choosing it over all others, and 26% not choosing it over any of the other values. Social order is relatively unpopular; only about eight percent choose it over everything else, and it is in last place for about one-fourth of the respondents. The remaining two values have large numbers of moderate scores, although economic security seems to be considered a bit more important than equality. Perhaps the most telling feature of Figure 1 is the wide variability in the dominant value choices. Each value shows up at every position within the distribution of choice scores for a non-trivial number of the CCES respondents.

If people really do differentiate among values in the manner described by previous theory, then they should have a good sense of which values are more important and which values are less important. And, this would be manifested empirically as a person making the same

choice each time he or she is presented with a specific pair of values and asked to identify which one is more important than the other.

When a person says that the same value is more important across all three replications of a specific pair of values, we can say that the pairwise choice is "fully-consistent." Again, five values produce ten distinct pairs. Thus, a person could show anywhere from zero through ten fully-consistent value choices.

Figure 2 shows the histogram for the number of fully-consistent choices given by each of the CCES respondents. Looking first at the extremes, nobody is fully-consistent across all ten pairs of values. At the same time, everyone is fully-consistent on at least one pair. There is a fairly pronounced mode at six fully-consistent choices, leaving the distribution with some degree of negative skewness. It is the case that a clear majority of the respondents (83.5%) are fully-consistent on more than half (i.e., five or more) of the pairwise choices.

The second requirement for the traditional conceptualization of individual value structures is that the pairwise choices between values are transitive. In other words, for any subset of three values (which can be used to construct three pairs of values), the choices on any two pairs drawn from that subset can be used to predict the choice on the third pair. This property must hold for all possible subsets of three values in order to aggregate the pairwise choices into a fully-ordered ranking of the values. In the CCES data, slightly more than two-thirds of the respondents (69.58%) show fully transitive choices. The remaining 30% of the respondents have ties in their choice scores, making it impossible to obtain a complete rank-order based upon their feelings about the respective values' degrees of importance.

It is difficult to draw any firm conclusions from these results. On the one hand, the data are generally supportive of the traditional view of individual value structures. Most people are consistent across the replications on most of their pairwise value comparisons. Similarly, the dominant pairwise choices are fully transitive for most respondents. On the other hand, these patterns in the data are relatively weak, both in absolute terms and in comparison to other data. A 2005 internet survey conducted by Knowledge Networks and supported by the

Time-Sharing Experiments in the Social Sciences (TESS) program also used the method of triads to examine individual choices among a similar set of values (Jacoby 2009).[5] In that dataset, 93% of the respondents were fully-consistent on five or more of the ten pairwise choices. In fact, 13% were fully consistent on all ten value pairs (recall that nobody was consistent across all ten pairs in the CCES data). At the same time, almost 88% of the TESS respondents had fully transitive sets of dominant pairwise choices. The correlation between the number of consistent choices and the presence of fully transitive dominant choices is also weaker in the CCES data ($r = 0.18$) than in the TESS data ($r = 0.48$). So, while the current dataset provides some evidence that ordered value structures exist within the mass public, the attenuated patterns and weak relationships in the data impose some qualifications on this conclusion.

Value Choices and Ranked Values

A major objective of this study is to determine whether individual value structures can be represented accurately by value rankings. With the advent of internet surveys, it has once again become feasible to obtain the latter from respondents. But, ranking tasks do not allow any investigation of consistency or transitivity. So, it is important to determine whether they provide information that is consistent with the results obtained from the pairwise value choices.

As explained earlier, the 2006 CCES included a battery of value ranking items in the post-election wave of the survey. 652 people responded to the full set of items, and the histograms for the importance ranks of the values are shown in Figure 3. Overall, the distributions of ranks attributed to the separate values appear to be fairly similar to the distributions of choice scores obtained from the triads. Once again, freedom is regarded as most important by the largest number of respondents. And, the bimodal distribution for morality shows up here as well, although a larger proportion of respondents regard it as least important than was the case with the pairwise choices. Social order seems to be a bit more important in the rankings than it was with the choices, and the distributions for economic security and

equality once again indicate that people generally accord those values intermediate levels of importance in their individual hierarchies. Just as with the results from the triads, there is a great deal of variability in the importance that people assign to the respective values.

In order to assess the correspondence between the value rankings and the value choices, we will estimate a series of regression equations. There is one equation for each value, and the dependent variable is the number of values that are *lower* than this value within the person's ranking. Thus, the dependent variable in each equation has the same range and a similar interpretation to the choice scores calculated from the responses to the triads. In principle, the independent variables in each regression equation should consist of the choice scores for all five values, since the position of each value within the ranking is affected by the positions of all the other values. But, the choice scores are ipsative measures (as are the rank scores), which means that they sum to a constant value for all observations. Hence, one of the equations is actually redundant, given the others. And, one value must be omitted from the independent variables in each equation in order to avoid perfect collinearity with the intercept. For simplicity and ease of interpretation, we will estimate linear regressions, which predict the mean rank score conditional on the choice scores; in effect, we are using ranks (based on the dominant pairwise choices) to estimate other ranks (obtained from the direct ranking task). Note that ordinal logistic regressions produce results that are substantively identical to those shown here.

Table 1 presents the OLS estimates for the five equations. In the first four, the choice score for morality is omitted from the independent variables; in the fifth equation (predicting the rank for morality), the omitted variable is the score for economic security. Looking first at the variance explained in each equation, the figures are quite reasonable for public opinion data, with R-squared ranging from 0.198 (for social order) to 0.531 (for morality). And, in each equation, the coefficient for the choice score on the value corresponding to the dependent variable is statistically significant, positive, and much larger than the other coefficients in that equation. For example, in the equation that predicts the ranking assigned to freedom,

the coefficient on the choice score for freedom is 0.640 while the other three choice scores have coefficients of only 0.110, 0.071, and 0.055, respectively. Similar differences in the coefficients occur in the other four equations, too. Notice also that in every equation, at least two of the choice scores (and usually more) have significant effects on the value ranking. This shows that beliefs about value importance are interdependent across separate values and, in so doing, provides some indirect evidence for treating values as integrated systems, rather than discrete individual orientations. More generally, the results in Table 1 suggest that the value rankings do, in fact, produce information that is consistent with the pairwise value choices.

The regression results could be interpreted as aggregate-level evidence regarding the consistency between the data from the triads and those from the value rankings. But, how consistent are *individual-level* choices and rankings? This question can be answered very easily, by calculating— for each respondent— the Spearman correlation between the vector of choice scores and the set of value ranks.

The histogram for the respondent-specific correlations is shown in Figure 4. The most prominent feature of the distribution is its very pronounced negative skew. Precisely as we would expect if the choices and rankings are generating consistent information, the vast majority of the CCES respondents show strong positive correlations between their choice scores and the value rank-orders. The median correlation is 0.700, and 29% of the respondents have coefficients of 0.900 or higher, including 9% with perfect correlations of 1.000).

At the same time, we cannot ignore the fact that the lower tail of the distribution in Figure 4 really does extend a long way beyond the zero point. In fact, 80 people (or about 12% of the sample) have negative correlations between their choices and rankings. The minimum value, exhibited by six people, is -.900; for these individuals, the two estimates of value structure are almost mirror images!

It is not entirely clear why there is such extreme variability in the correlations. The size of an individual's Spearman coefficient is only very weakly related to that person's level of education ($r = 0.132$). It does show weak to moderate relationships with the existence of fully

transitive dominant choices ($r = 0.086$) and the number of fully consistent pairwise choices ($r = 0.230$). All of these correlations may be manifestations of a very weak sophistication effect.

It is also possible that some real changes in individual orientations occurred over the relatively short period between the two waves of the study; if so, this would also drive down the correlation between the two sets of value scores for the affected individuals. Any "real" changes would probably show up in other orientations besides feelings of value importance. The CCES used a one-hundred point scale to measure ideology, with scores ranging from zero for extreme liberals to 100 for extreme conservatives, with 50 as a neutral midpoint.[6] This variable was included in both the pre- and post-election waves of the study. So, we can see whether temporal consistency in the values' ranks is related to consistency over time in the person's ideological position.

The absolute difference in an individual's ideology score across the waves shows a correlation of -0.124 with the Spearman correlation between the choice scores and the value rankings. Thus, people who changed their ideological position from October through November 2006 also tend to change their feelings about the relative importance of the respective values. But, while the correlation is statistically significant, the numerical value is very small. It is also interesting that a similar relationship does *not* occur for party identification (which was also measured in both waves of the survey). So, it appears likely that the negative correlations are probably due more to measurement error, than to any systematic process that leads to major differences in the ways that people feel about values.

Value Structures and Other Political Orientations

The theoretical importance of basic values stems mainly from their potential to affect a broad variety of other beliefs, attitudes, and behavior. But, the ability to evaluate such connections is dependent upon the quality of the available empirical indicators. So, it is important to see how the two different measurement approaches developed here affect the

empirical relationships between our estimates of individual value structures and other important political orientations.

One fortuitous feature of the CCES survey instrument is that it included separate, but identical, questions about party identification and ideology in the two waves of the study. Therefore, we can relate the choice scores for the values to these two orientations in the pre-election wave, and we can separately look at the relationship between the value ranks and the same two variables in the post-election wave. As already explained, ideology is measured on a zero-to-one hundred point scale. Party identification is measured with the usual seven-point index.[7] The pre-election versions of these two variables are regressed on the choice scores for four of the values (economic security is omitted to avoid perfect collinearity), while the post-election versions are regressed on the ranks for four of the values (again, omitting economic security).

The OLS estimates from these regressions are shown in Table 2. One feature in the results is immediately apparent: The variance explained is higher when the value rankings are used as predictors than when the choices scores are used, although the difference is much greater for party identification (R-squared values of 0.226 and 0.345, for choices and rankings, respectively) than for ideology (R-squared values of 0.334 and 0.359, respectively). In all four equations, the largest coefficient occurs for morality. The more values over which morality is chosen in the pre-election wave, and the higher it falls within a person's post-election ranking, the more Republican or conservative the self-placement. The same is true of social order, although the size of the effect is much smaller in every equation.

The results for equality and freedom are particularly interesting. Starting with the former, the coefficient for equality is always negative, although it is only significant in those equations using scores based upon the dominant pairwise choices. With that important caveat, it is always the case that the more important a person believes equality to be, relative to other values, the stronger that person's Democratic identification and liberal self-placement. Conversely, the coefficient for freedom is always positive, but it is only significant

in the equations using the value rankings. Note, too, that the sizes of the coefficients for freedom and equality "trade off" across the two measurement strategies for value structures: Consistent with the differences in statistical significance, the magnitude of equality's effect is larger in the equations based upon the choices, while the magnitude of freedom's impact is greater in the ranking equations. This variability in effects is particularly striking because the impact of the other two values remains fairly stable across the equations.

While these patterned differences involving freedom and equality probably are not a mere coincidence, it is unclear what might be causing them. The broader finding from this part of the analysis is that feelings about values are related to party identification and ideology, regardless of the measurement strategy that is employed for the former. That being said, the goodness of fit is better in the equations that use the value rankings. So, by that standard, we are actually observing "better" results with the measurement strategy that is simpler to administer in an internet survey.

CONCLUSIONS

Most previous research on human values has assumed that ranked values are superior to other methods— especially rating scales— of ascertaining individual feelings about the relative importance of core principles like freedom, equality, and the like. Such value rankings seem to come closer to the inherently comparative nature of value orientations than do reactions toward separate values, taken one at a time. But, there has never been any direct evidence to support such a position. The current study has tried to provide exactly that kind of evidence and, in so doing, confirm that value rankings are a valid representation of individual feelings about value importance. This task is particularly important in light of recent research on phenomena like value ambivalence and indifference, both of which could easily prevent the development of fully-ordered value structures.

The approach taken here is to construct a model that specifies what *should* occur if people really do make meaningful and orderly distinctions about the relative importance of different values. First, they should make consistent choices across replicated presentations of

a given value pair. And second, the dominant choices for the full set of value pairs should be transitive. Analysis of the triad data from the 2006 CCES shows that these conditions are generally met within the American mass public. This is strong evidence for the existence of individual value structures, at least with respect to the five politically-relevant values under consideration here.

The results from this analysis also have important practical implications, by showing that straightforward value rankings produce results that are highly consistent (for most people) with the results constructed from the responses to the more cumbersome triads. Value rankings have a long tradition in research on values. But, for practical reasons, they are not feasible for use with telephone surveys. And, given that the latter have dominated most public opinion research over the past thirty years or so, value rankings have experienced a period of extended dormancy. This is changing, however, with the increased use and scholarly acceptance of high- quality internet surveys where it *is* possible to construct items that ask respondents to rank a set of stimuli. Therefore, evidence like that presented here regarding the validity and quality of value rankings should encourage further substantive efforts using that item format.

The preceding optimistic interpretations must be tempered a bit by some of the other features revealed in the empirical analysis. The data contain a nontrivial number of inconsistent and intransitive choices, along with some very weak correlations between the value choices and several criterion variables. Similarly, the differences in the effects of freedom and equality on party identification and ideology across the two measurement strategies potentially is a matter of concern. All of these phenomena may be due to the pervasive effects of random measurement error. If so, the fact that they persist even though the method of triads attempts to control for the effects of error is troubling. Therefore, it may be best to fall back on a conclusion that, while unsatisfying, is at least prudent: More research, probably involving additional data collection, is necessary in order to confirm that individuals maintain orderly value structures as a prominent component of their political belief systems.

APPENDIX

QUESTION WORDING FOR ITEMS IN THE 2006 COOPERATIVE CONGRESSIONAL ELECTION STUDY

I. Items in the Pre-Election Wave of the Survey

All respondents were shown the following two screens to introduce the values:

(Beginning of Screen 1)

We'd like to ask you about some things that are important for our society, such as freedom, equality, economic security, morality, and social order. First, here is what we mean by these ideas:

> By FREEDOM we mean the widest liberty possible for everyone to act and think as they consider most appropriate.
>
> By EQUALITY we mean making sure that everyone has the same chance to get ahead in life.
>
> By ECONOMIC SECURITY we mean making sure that everyone has a steady job, a decent income, and a reasonable standard of living.
>
> By MORALITY we mean people living according to the rules that most people agree constitute decent human behavior.
>
> By SOCIAL ORDER we mean being able to live without fear, in a safe, peaceful society where the laws are respected and enforced.

(End of Screen 1)

(Beginning of Screen 2)

All five of these ideas are important, but sometimes we have to choose between what is more important and what is less important. And, the specific choices we make sometimes depend upon the comparisons we have to make.

On the next few screens, we will show you these ideas in sets of three. For each set, please use the mouse to indicate the idea that you think is **most** important of the three, and also the idea that you think is **least** important of the three. In some cases, you might think all three of the ideas are very important, but please try to indicate the ones you think are **most** and **least** important if you had to choose between them.

If you need to review what we mean by freedom, equality, economic security, morality, and social order please click *here*.

(End of Screen 2)

After viewing the two preceding introductory screens for the values, respondents moved on to another screen which presented the first value triad in a format like the following.

(Beginning of Screen 3)

The **MOST IMPORTANT** idea from these three is:	The **LEAST IMPORTANT** idea from these three is:	
☐	☐	Freedom
☐	☐	Equality
☐	☐	Economic Security

If you need to review what we mean by freedom, equality, and economic security please click *here*.

(End of Screen 3)

Respondents used the mouse to click on one box within each column, in order to indicate their choices for the most and least important values within the triad. The remaining nine triads were then presented using an identical format. Each triad appeared on a separate screen. The order of the triads, and the order of the values within each triad were randomized. Respondents were not permitted to move backward and revisit previously-completed triads.

The full set of value triads is as follows:

Freedom, Equality, Economic security

Freedom, Equality, Social order

Freedom, Equality, Morality

Freedom, Economic security, Social order

Freedom, Economic security, Morality

Freedom, Social order, Morality

Equality, Economic security, Social order

Equality, Economic security, Morality

Equality, Social order, Morality

Economic security, Social order, Morality

II. Items in the Post-Election Wave of the Survey

All respondents were shown the following introductory screen:

(Beginning of Screen 1)

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.

(End of Screen 1)

Starting with the next screen, respondents used radio buttons to select the most important value from those that appeared on the screen. The order of the values in the list is randomized for each respondent.

(Beginning of Screen 2)

Again, please select the single value that you think is the most important.

> 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.
>
> SOCIAL ORDER, that is being able to live without fear, in a safe, peaceful society where the laws are respected and enforced.
>
> INDIVIDUALISM, that is everyone getting ahead in life on their own, without extra help from government or other groups.
>
> PATRIOTISM, that is looking beyond our own personal interests and doing things that honor, respect, and protect our nation as a whole.

(End of Screen 2)

After finishing the selection on Screen 2, 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.

NOTES

1. Of course, the importance of any given value varies from one individual to the next. So, the expression for the importance should have another subscript indexing people. For example, the j^{th} person's judgment about the importance of value i could be shown as $\mathrm{I}(Val_i)_j$. Here, however, it should be clear that the discussion is referring to a single individual, so the second subscript is omitted to keep the notation as simple as possible.

2. Specifically, the average difference between $\bar{e}_i$ and its expected value (of zero) is equal to $\sigma_i/\sqrt{m}$.

3. The 2006 is a large collaborative project involving 36 research teams comprised of scholars from 39 universities. Each research team contributed a separate set of items to the survey; each team's set of items was administered to separate national samples of 1000 respondents. Along with the respective teams' items, there was a set of "common content" items (e.g., sociodemographic characteristics, general political orientations, etc.) that was administered to all respondents. A more complete description of the 2006 CCES is provided by Vavreck and Rivers (2008).

4. In fact, the CCES respondents were asked to rank-order a set of *seven* values. Along with the five values from the pre-election wave, individualism and patriotism were also added to the list. The analyses reported below only use the relative positions of the five values; basically, the presence of the two extra values is ignored for purposes of this study.

5. The set of values used in the TESS data is slightly different from the one used here. It used "liberty" rather than "freedom," and the definition of "equality" was different.

6. The wording of the question is as follows: "One way that people talk about politics in the United States is in terms of liberal, conservative, and moderate. We would like to know how you view the parties and candidates using these terms. The scale below represents the ideological spectrum from very liberal to very conservative." Respondents viewed a line segment, with "Very liberal" at the left end, and "Very conservative" at the right side. They were asked, "Where would you place yourself on this line?" Respondents used the mouse to respond, by clicking a position along the line. The location was measured, using a zero to one hundred scale.

7. The wording for the party identification items was adapted from the standard questions used in the ANES interview schedules. Respondents were first asked "In general, do you think of yourself as a Democrat, a Republican or Independent?" This item was followed by three additional questions: "If Democrat or Republican, how strongly do you feel about your party?" (answers were recorded as "Strong D/R" or "Weak D/R") and "If Independent, do you lean toward one of the parties? If so which one? (answers were recorded as "D" or "R.").

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Table 1: Value ranks as a function of value choice scores.

	Freedom	Equality	Economic Security	Social Order	Morality
Freedom	0.640	0.201	0.037	-0.171	0.043
	(0.047)	(0.040)	(0.044)	(0.043)	(0.043)
Equality	0.110	0.658	0.215	-0.195	-0.037
	(0.045)	(0.038)	(0.043)	(0.042)	(0.045)
Economic Security	0.071	0.128	0.547	0.006	—
	(0.044)	(0.037)	(0.041)	(0.040)	
Social Order	0.055	0.158	0.111	0.274	0.154
	(0.050)	(0.042)	(0.047)	(0.046)	(0.044)
Morality	—	—	—	—	0.751
					(0.037)
Intercept	0.076	-0.352	0.197	2.510	0.059
R^2	0.279	0.325	0.237	0.198	0.531

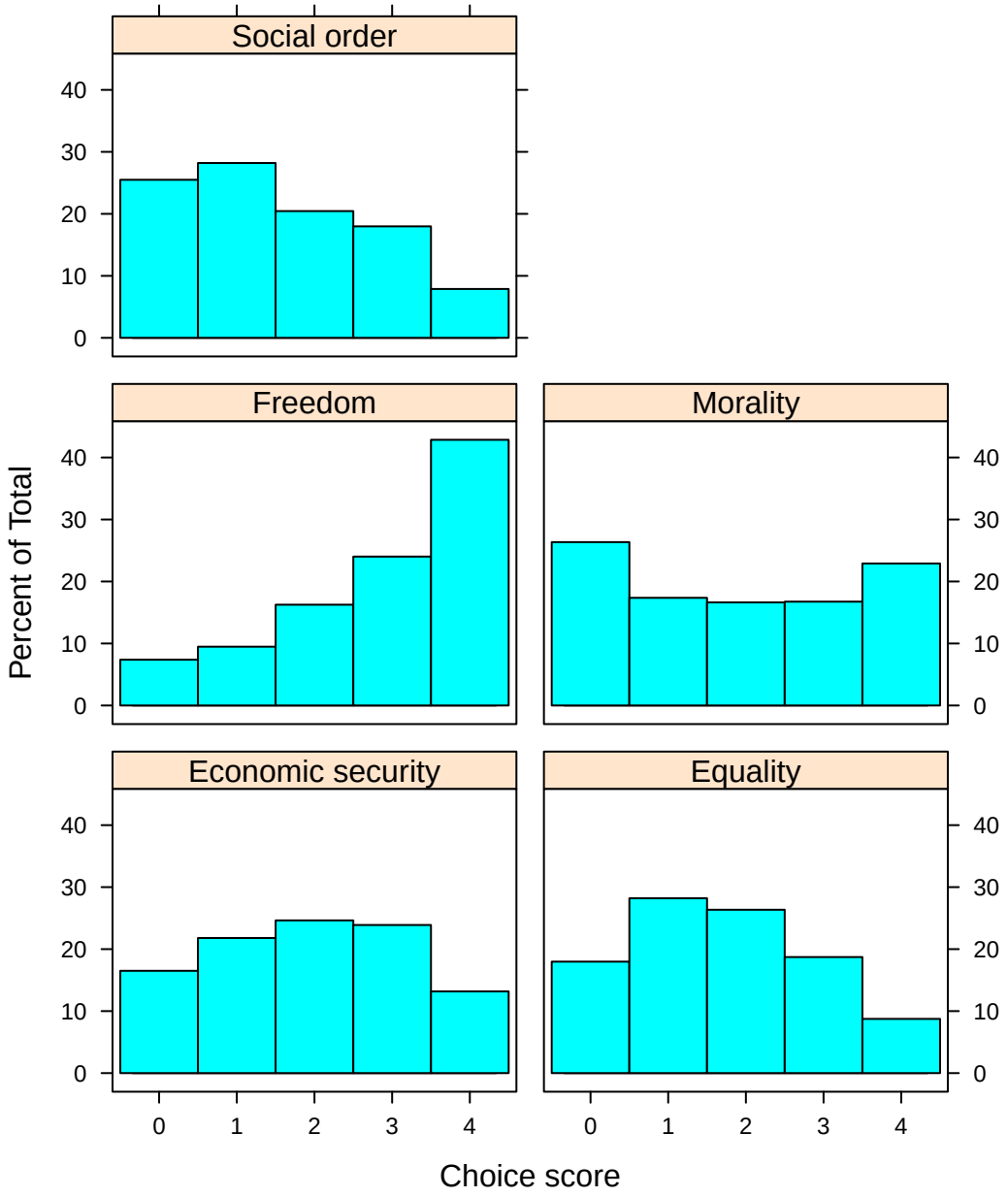
Note: Entries in table are OLS regression coefficients; figures in parentheses are standard errors. Rank scores and choice scores both sum to 10 for each respondent. Therefore, one equation is redundant with the other four, and one value must be omitted from the predictors in order to avoid perfect collinearity. The number of observations in each regression is 652.

Table 2: Predicting party identification and liberal-conservative ideology from value structures.

	Pairwise Value Choices		Rank-ordered Values	
	Party Identification	Ideology	Party Identification	Ideology
Freedom	0.086	0.297	0.295	2.319
	(0.069)	(0.833)	(0.065)	(0.760)
Equality	-0.160	-3.757	-0.098	-0.719
	(0.072)	(0.871)	(0.074)	(0.858)
Social Order	0.243	2.322	0.404	3.380
	(0.070)	(0.853)	(0.075)	(0.872)
Morality	0.602	8.615	0.791	9.656
	(0.058)	(0.704)	(0.059)	(0.689)
Intercept	2.552	40.466	1.163	25.231
R^2	0.226	0.334	0.345	0.359
Number of obs.	798	770	649	626

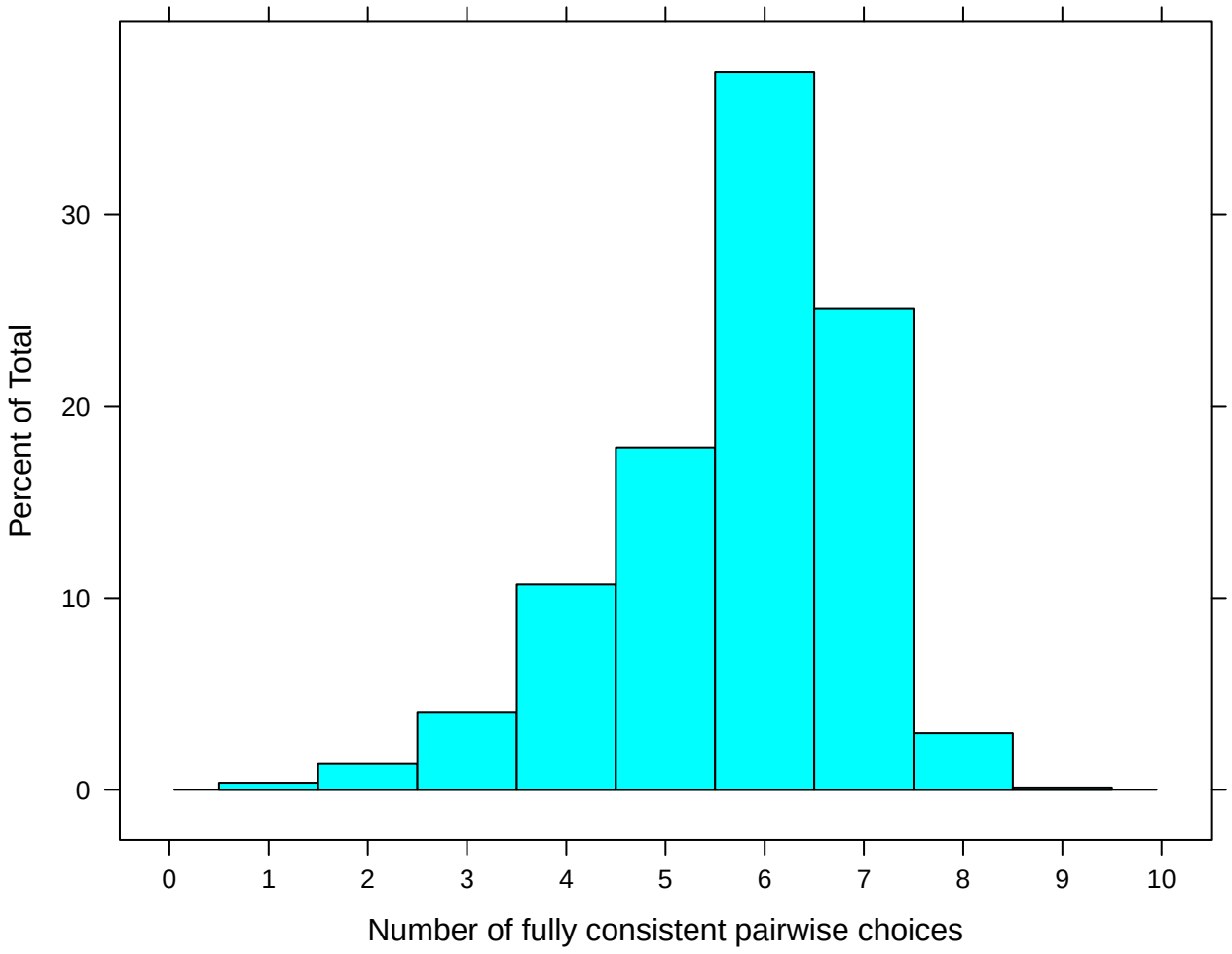
Note: Entries in table are OLS regression coefficients; figures in parentheses are standard errors. Rank scores and choice scores both sum to 10 for each respondent. Therefore, one value (economic security) is omitted from the predictors in order to avoid perfect collinearity.

Figure 1: Distribution of choice scores for each value.



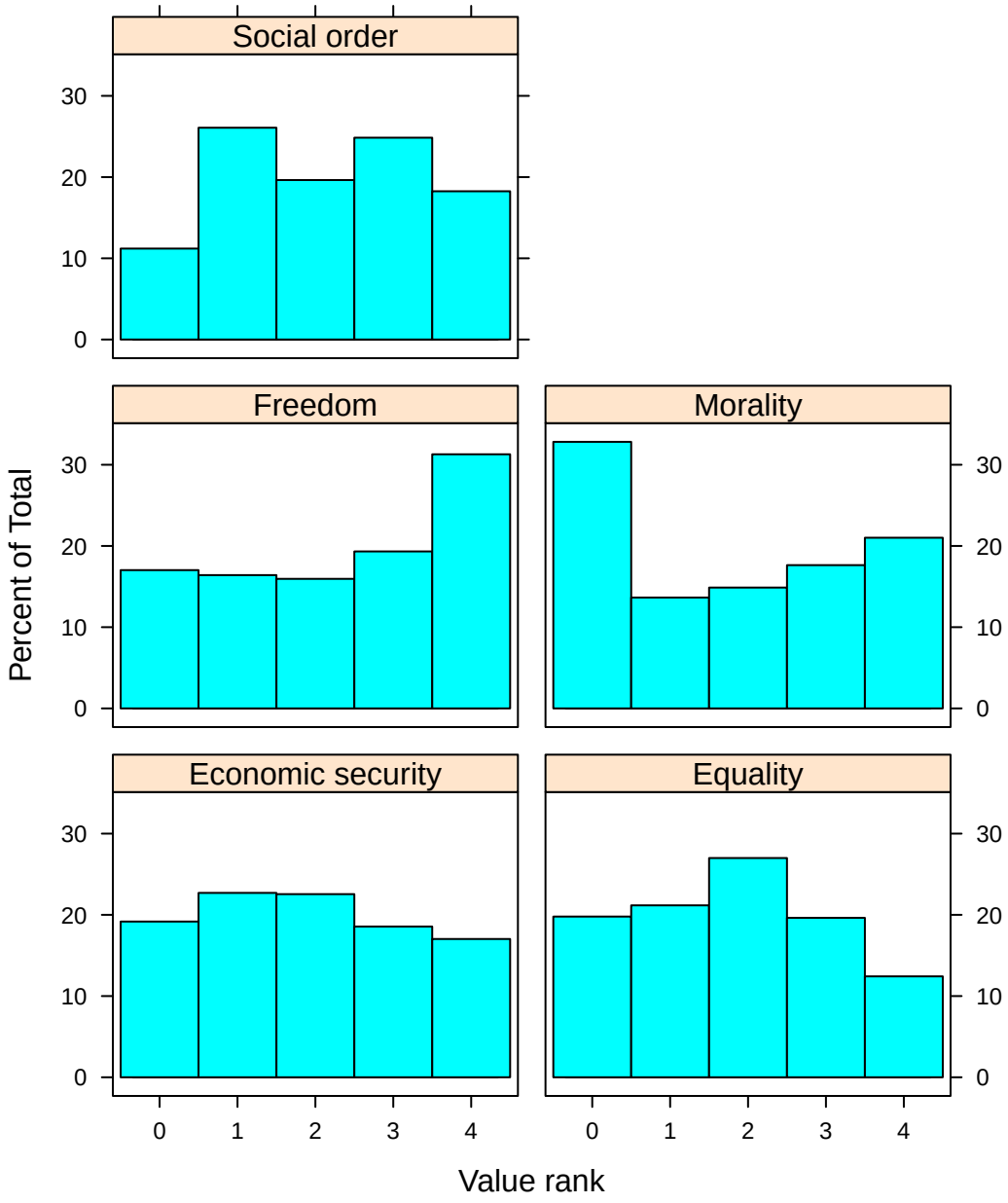
Note: Choice scores give the number of times a value is the dominant choice over another value. The data come from the pre-election wave of the 2006 Cooperative Congressional Election Study and the number of observations for each histogram is 812.

Figure 2: Histogram of the number of fully consistent pairwise value choices given by each respondent.



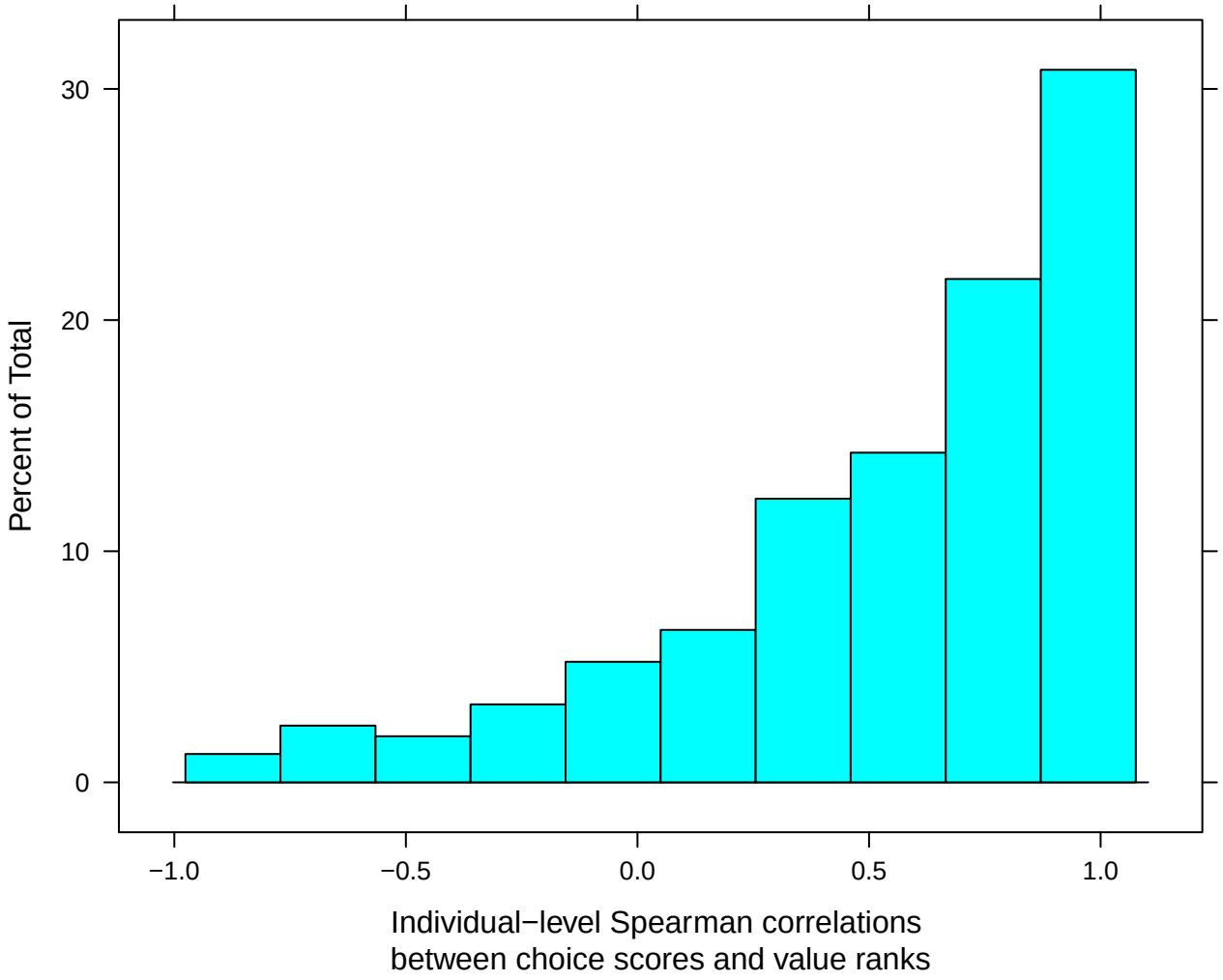
Note: Fully consistent choices are those in which the respondent makes the same choice across all three replications of a given value pair. The data come from the pre-election wave of the 2006 Cooperative Congressional Election Study and the number of observations is 812.

Figure 3: Distribution of rank scores for each value.



Note: Rank scores give the number of values that fall below the given value in an individuals full rank-order of the five values. The data come from the post-election wave of the 2006 Cooperative Congressional Election Study and the number of observations for each histogram is 652.

Figure 4: Individual-level Spearman correlations between choice scores and value ranks.



Note: Choice scores are calculated from responses to the triads, and represent the number of times each value was the dominant choice over another value. Value ranks are obtained by from the direct ranking items included in the post-election wave of the 2006 Cooperative Congressional Election Study. The number of observations is 652.