Journal of Personality and Social Psychology
1982, Vol. 42, No. 3, 436-447

0022-3514/82/4203-0436$00.75

Attitude Centrality, Organization, and Measurement

Charles M. Judd and Jon A. Krosnick
Harvard University

This article examines the relationship between attitude centrality (or importance) and attitude organization (or structure). Various definitions of attitude involvement, importance, and centrality are reviewed, which suggest that more central attitudes should be more highly correlated as long as they derive from the same underlying values. There are at least four reasons for expecting more central attitudes to be more highly correlated than less central attitudes: (a) They may be more closely linked to underlying values; (b) they may be more polarized and hence exhibit more variance; (c) they may be measured with less random error; and (d) they may be less influenced by measurement methods. Examining political attitudes on five different national issues, we report analyses designed to tease apart these four hypotheses. A modified multitrait-multimethod matrix is examined with the use of a confirmatory second-order factor analytic model. The results suggest that more central attitudes are more polarized and measures of them are less influenced by question format. No evidence is found for the other two hypotheses.

Many theoretical approaches to the study of attitudes and attitude change make assumptions about the relationship between the centrality (or importance) of attitudes and the organization (or structure) of attitudes. Within social psychology, assumptions about this relationship are found in research on the effects of persuasive communications (Sherif, 1980; Sherif & Hovland, 1961), in research on modes of dissonance reduction (Festinger, 1957), and in work on the functions of attitudes (Katz, 1960). Sociologists and political scientists studying public opinion and the reliability of survey responses have also discussed the relationship between attitude centrality and structure (Converse, 1964, 1970; Schuman & Presser, 1981).

This article focuses on this relationship. We are particularly interested in attitudes on political issues and in how the organization of those attitudes varies with their centrality for the individual. To examine this issue, we begin by reviewing various definitions of attitude centrality, involvement, or importance. Although there are differences between these definitions, they all have similar implications for attitude organization. We then use national survey data and the technique of structural equation modeling with latent variables (Bentler, 1980) to examine these implications.

Attitude Involvement, Importance, and Centrality

A number of terms have been used to refer to the degree to which an attitude is important in an individual's daily life. Attitude involvement, importance, and centrality are three of the most widely used (for a more extensive discussion, see Schuman & Presser, 1981). Although these three concepts have their origins in different theoretical contexts, there are striking similarities across their definitions.

Within social psychology, the term *ego-involvement* has been used most frequently. According to the classic definition, ego-in-

Support for this research was provided by grants to the first author from the National Science Foundation (BNS 8005737) and from the Henry A. Murray Center of Radcliffe College.

We gratefully acknowledge the advice of David A. Kenny.

Jon A. Krosnick is now at the University of Michigan.

Requests for reprints should be sent to Charles M. Judd, who is now at the Department of Psychology, University of Colorado, Boulder, Colorado 80309.

volved attitudes are "attitudes that the individual identifies with and makes a part of himself; and that have affective properties of varying degrees of intensity" (Sherif & Cantril, 1947, pp. 126–127). Two properties seem to characterize ego-involved attitudes according to this definition. First, they are fundamental to the individual's self-definition. As such, they should be closely linked to the content of an individual's ego, defined as "a rather distinct constellation of social and personal values" (Sherif & Cantril, 1947, p. 117). Second, ego-involved attitudes have associated with them some degree of affective intensity or strength of feeling and, as such, are likely to express relatively extreme sentiment (Cantril, 1946).

Quite similar to this definition of involvement is the notion of "importance" used to characterize cognitive elements within cognitive dissonance theory (Festinger, 1957). According to that theory, more important elements are less likely to change because they are more firmly related to other cognitive elements. If one's goal is to maintain consistency across elements, then elements with more links should be less likely to change.

More recently, attitude theorists in political science and sociology have studied perceived attitude centrality (Converse, 1970; Schuman & Presser, 1981). Centrality has been measured by asking individuals how important a political issue is to them rather than asking them about their level of attitude involvement. According to Converse (1970), centrality as measured in this way refers to "the proportion of mental time which is occupied by attention to the attitude object over substantial periods" (p. 182).

Implications of Attitude Centrality for Attitude Organization

The definitions of ego-involvement and attitude importance given above seem nearly identical. While attitude centrality, as defined by Converse (1970), seems different from involvement and importance, its effects are probably similar to those of involvement or importance. We know that increased thought about some issue or domain leads to increased consistency or balance among the beliefs about that issue (Rosenberg & Abelson, 1960). Further, Tesser (1978) has shown that thought about an attitude object leads to increased affective intensity, attitude polarization, and evaluative consistency of beliefs. Hence, we might surmise that more central attitudes are both more intensely felt and more consistent with underlying values.

If we were to look at attitudes on a series of different issues that all derive from the same underlying value or set of values, the above discussion suggests that higher levels of attitude centrality should be associated with larger correlations between attitudes. In the terminology of Converse (1964), higher levels of attitude centrality should be associated with higher levels of attitude constraint. Schuman and Presser (1981) report evidence consistent with this hypothesis.

In fact, these higher correlations between attitudes on different issues may be due to either one of the two possible consequences. First, attitudes may be more highly correlated because they derive from or represent the underlying value or values more consistently. Second, attitudes may be more highly correlated because they are relatively more extreme or polarized. It is a well-known statistical fact that correlations are affected by the variances of the variables that are correlated. Correlations between different attitudes should be higher when computed across individuals with polarized attitudes than when computed in a less polarized group (Barton & Parsons, 1977).

There is a third reason why we might expect higher correlations between attitudes as attitude centrality increases, assuming that those attitudes tap the same underlying values. As thought about an attitude issue increases, it is likely that responses to attitude questions on that issue become more reliable (Converse, 1970). By reliability, we refer to the amount of error variance in responses to attitude questions. We can think of two types of error variance: purely random error and systematic error due to question wording or other factors. We might expect expressions of more central attitudes to contain less of both types of error. It is well

known that the presence of random error variance in measures tends to attenuate observed correlations. Hence, lower correlations between attitude questions might be expected among those for whom the attitudes are less central because of the increased presence of random error in responses.

The effect of systematic or method error variance upon correlations between attitude measures depends on whether those measures share a common method. If individuals who do not have central attitudes exhibit greater method variance in their responses than individuals whose attitudes are central, correlations between attitude measures may be higher in the first group than in the second if the measures use a common method. If the measures to be correlated use different methods, then correlations in the low-centrality group should be attenuated relative to those in the group with central attitudes.

In sum, then, differences in correlations between attitude measures as a function of attitude centrality may be due to one or more of the following differences in the organization of political attitudes:

1. More central attitudes may be more closely linked to or determined by underlying values.
2. More central attitudes may be more polarized.
3. More central attitudes may be measured with less random error.
4. The procedures used for measuring attitudes may affect those measures less if the attitudes are relatively central.

The purpose of this article is to tease apart these potential effects of attitude centrality. We know that more central political attitudes correlate more highly than less central ones, as long as they reflect the same underlying ideological values (Schuman & Presser, 1981). We now want to examine in more detail the structural or organizational differences associated with different degrees of attitude centrality. To do this, modified multitrait–multimethod matrices (Campbell & Fiske, 1959) of attitude measures from groups that differ in attitude centrality are examined. Attitudes on each of five different issues, measured in multiple ways, are subjected to a confirmatory second-order factor analysis (Alwin, 1974; Kenny, 1979). This allows us to estimate variance in responses due to four different sources: an underlying ideological value (the second-order factor), issue-specific factors, systematic or method error, and random or residual error. To facilitate comparisons of organization between groups that differ in centrality and to allow for differing extremity or variability of attitudes in the two groups, unstandardized structural coefficients are estimated (Blalock, 1967; Duncan, 1975).

Methods

Data

The data used in this study are taken from the 1970 American National Election Study conducted by the Center for Political Studies (CPS) at the University of Michigan. We chose this particular study because survey respondents were asked for both their attitudes on a number of issues and their judgments of the centrality of those issues.

Attitudes about five different national issues were examined: social protest, the war in Vietnam, civil rights, industrial pollution, and national health insurance. Three measures of the first attitude were used; the second and third attitudes were each measured in two different ways; and single measures of the last two attitudes were used. All nine attitude measures are reproduced in the Appendix. Six of these measures involved 7-point self-rating scales.

The centrality of each political attitude was measured by asking respondents "How important would you say this issue is to you?" Responses to these questions were taken on 4-point scales, with endpoints labeled "very important" and "not important."

Samples

A total of 1,694 respondents were interviewed in the 1970 CPS survey. The full sample constitutes a representative cross section of persons 18 years old and older in the United States. Of these 1,694 respondents, 1,088 had complete data on the nine attitude questions. This sample with complete data was divided into three groups depending upon the responses to the five importance-of-issue questions. Of the 1,088, 291 respondents indicated that all five issues were very important to them; 650 respondents said at least two issues but not all five were very important; and 147 respondents reported that at most one of the issues was very important. Because we wanted to contrast the attitude structures of groups that differed decisively on centrality, analyses were conducted initially on the data from the first and third groups of respondents. These two groups are subsequently referred to as the "high importance" and "low importance" groups, respectively. Once the structural differences between these two groups were identified, an analysis of the middle group (the "moderate impor-

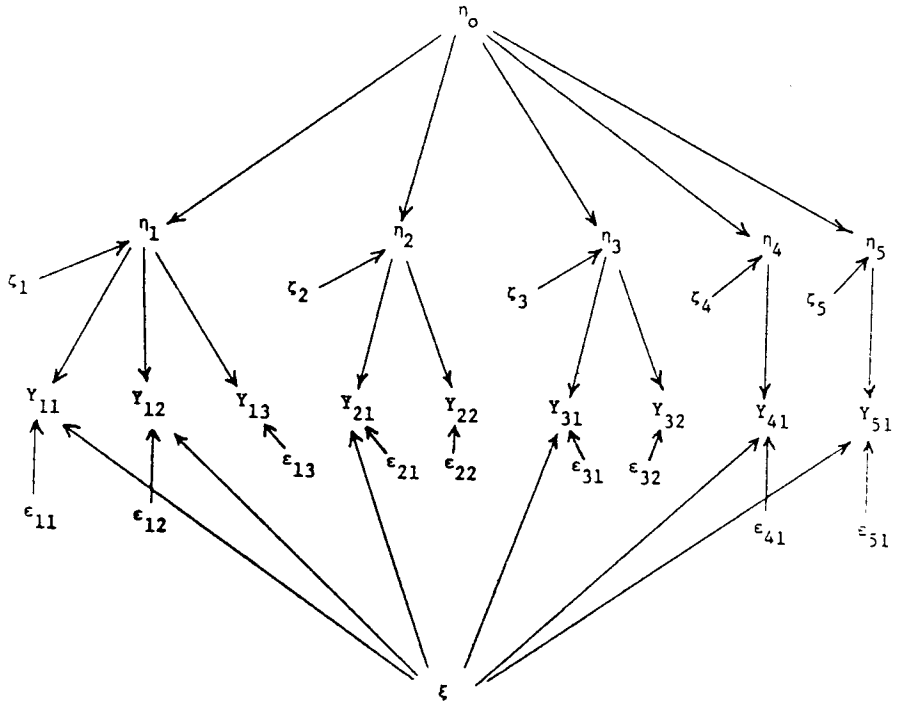

Figure 1. Second-order confirmatory factor model.

tance" group) was conducted to confirm that this sample "fell between" the two extreme groups.

The Model

To tease apart the hypothesized effects of perceived attitude importance, a confirmatory second-order factor analysis model was used. The model is portrayed in Figure 1 and is defined by the following equations:

$$Y_{ij} = \Lambda_{ij}\eta_i + \Gamma_{ij}\xi + \epsilon_{ij} \quad (1)$$

$$\eta_i = \beta_{io}\eta_o + \zeta_i. \quad (2)$$

The first equation specifies what is called the first-order measurement model: how measured variables load on the first-order latent factors. The second equation specifies the second-order measurement model.

In Equation 1, Y_{ij} is an attitude measure on the i^{th} issue using the j^{th} question on that issue. Subcript i thus varies from one to five, and subscript j has a maximum value of three (i.e., on the first issue). Variation in any Y_{ij} is assumed to be due to three components:

1. η_i, a latent factor representing the respondent's attitude on the i^{th} issue. Each Y_{ij} is assumed to be an indicator of one of these five latent constructs.

2. ξ, a latent factor representing shared variance due to method in the six measures using the 7-point self-rating scale format.[1] This method factor is assumed to be uncorrelated with all η_i and with the Y_{ij}s that were not measured using the 7-point scale format.

3. ϵ_{ij}, residual or error variance that is assumed to be uncorrelated across measures and is also uncorrelated with η_i and ξ.

The coefficients Λ_{ij} and Γ_{ij} are structural coefficients or factor-loading coefficients of Y_{ij}s on the η_i and ξ factors, respectively. When any given Y_{ij} does not use the 7-point scale format, Γ_{ij} is assumed to equal zero.

Equation 2 specifies the second-order measurement model. Variance in each latent attitude construct (η_i) is decomposed into two sources: a single second-order latent construct η_o, and residual variation ζ_i. Since ζ_i is assumed to be issue-specific variance (i.e., uncorrelated across issues), it is assumed that η_o explains all of the covariance between issues. In other words, the model assumes that all of the latent attitude constructs, η_i, exhibit a single second-order factor structure. This single second-order factor, η_o, represents an underlying ideological predisposition or value, much like the single first-order latent construct in Judd and Milburn's (1980) model, where each attitude was only measured once.[2] The β_{io} coefficients are structural coefficients or second-order factor loadings.

To examine whether attitude organization differs in the high- and low-importance groups, different coefficients in the model are compared. Differences in the consistency or ideological base of the attitudes should be found by examining the β_{io} coefficients. Differences

[1] No method factor was included for the two thermometer scales because loadings on it are not identified in the present model. See our later discussion of identification.

[2] This second-order model is a distinct advance over the first-order model of Judd and Milburn (1980), since here method variance in the indicators is not confounded with true score or "trait" variance. In Judd and Milburn (1980), the first-order latent ideology incorporates common method variance, since common methods were used for the single measures of each of the five attitudes.

in random measurement error should be found by examining the variances of the residuals to the Y_{ij} (i.e., $\sigma_{\epsilon_{ij}}^2$). Differences in systematic measurement error or method variance should be found by examining the Γ_{ij} structural coefficients. Finally, differences in the polarization of attitudes should be indicated by differences in the variances of the latent constructs: both the second-order ideological construct (η_o), and the residual or issue-specific variances of the first-order latent constructs.

Estimation

The unknown parameters of the model were estimated in the samples simultaneously using the LISREL procedure (Jöreskog & Sörbom, 1978; Version 4).[3] This procedure generates maximum likelihood parameter estimates under the assumption of multivariate normality. The following unknown parameters were estimated: (a) the structural coefficients of the first-order latent attitude constructs on the Y_{ij} (Λ_{ij}); (b) the structural coefficients of the latent method factor on the Y_{ij} (Γ_{ij}); (c) the disturbance or residual variances to the Y_{ij} ($\sigma_{\epsilon_{ij}}^2$); (d) the structural coefficients of the second-order latent ideology construct on the η_i (β_{io}); (e) the disturbance or residual variances to the η_i ($\sigma_{\zeta_i}^2$); and (f) the variance of the second-order latent ideology construct ($\sigma_{\eta_o}^2$).

Estimation of the coefficients of the model is possible only if the model is identified. This means that sufficient information must exist in the sample variance-covariance matrices to solve for the unknown coefficients. The present model is identified only if two assumptions are made. First, to estimate the six coefficients from the latent method factor (Γ_{ij}), the variance of that factor was fixed at unity in both groups and all Γ_{ij} coefficients were constrained to be equal within groups. In essence, we are assuming that all six attitude measures employing the 7-point self-rating format reflect systematic error variance to the same degree.

The second assumption that must be made for the model to be identified involves fixing one structural coefficient from each latent construct at unity in order to derive the variances of the latent constructs (Kenny, 1979). In essence, this amounts to fixing the measurement metrics of the latent constructs. For the first-order latent attitude construct (η_i), the structural coefficient of the first measure of each attitude (Y_{i1}) was so constrained. In all cases, this involved setting the metrics of the latent attitude factors equivalent to that of a 7-point self-rating measure. To estimate the variance of the second-order ideological factor, one of its structural coefficients to the first-order attitude factors (β_{io}) also must be constrained at unity. The structural coefficient to the first latent attitude construct (i.e., β_{1o}) was so fixed.

Assuming that the model is identified, LISREL performs an overall goodness-of-fit test (chi-square) to determine whether the resulting model is consistent with the sample variance-covariance matrix. A nonsignificant chi-square indicates that the model and the data are consistent. This test can either be performed on each group separately or simultaneously in two or more groups. By using simultaneous estimation in our importance groups and an overall chi-square test, we are able to examine whether the parameters of the structural model differ between groups. Suppose we wanted to ascertain whether the Λ_{ij} coefficients were invariant across groups. The parameters in the groups would first be estimated with no between-group equality constraints. Then the parameters would be re-estimated, forcing all Λ_{ij} to be equal between groups. Each of these solutions has an associated chi-square statistic. The difference between these two chi-squares is itself a chi-square and can be used to determine whether the model without equality constraints fits significantly better than the model in which parameters are forced to be equal between groups.

Results

We start by examining the structural effects of centrality in the high- and low-importance groups. Prior to estimating the coefficients of the hypothesized model, we examined the correlations among the nine attitude measures in the two groups. These correlations, along with the groups means and standard deviations, are presented in Table 1. If all five of the attitudes measured by these nine variables share a single underlying value or ideology, then we would expect the correlations between measures of different attitudes to be higher in the high-importance group than in the low-importance group. For the high-importance group, the average of the 31 correlations between variables measuring different attitudes is .26. For the low-importance group, these correlations average .15. Although these two average correlations are not significantly different, the trend toward higher correlations in the high-importance group is quite striking. Of the 31 correlations, 27 are higher in the high group than in the low group.[4] We turn to our model to understand

[3] Others before us (Weeks, 1980) have estimated higher order factor models using LISREL. However, they have gone to considerable lengths in modifying LISREL to perform the estimation. It turns out that second-order models can be efficiently estimated simply by defining one or more latent constructs having no indicators. These second-order factors are then allowed to affect whatever first-order factors are thought to load upon them. We thank David A. Kenny for confirming our original hunches concerning this estimation procedure.

[4] If these 31 correlations were independent of each other (which they are not), the probability of 27 of them being larger in one group than in the other (given the null hypothesis of no difference) is extremely small ($p < .00005$).

Table 1
Variable Means, Standard Deviations, and Correlations: High- and Low-Importance Groups

Variable and group	*M*	*SD*	$Y_{1,1}$	$Y_{1,2}$	$Y_{1,3}$	$Y_{2,1}$	$Y_{2,2}$	$Y_{3,1}$	$Y_{3,2}$	$Y_{4,1}$	$Y_{5,1}$
$Y_{1,1}$											
High	3.77	2.23									
Low	3.68	1.80									
$Y_{1,2}$											
High	5.09	2.09	.59								
Low	5.20	1.83	.48								
$Y_{1,3}$											
High	10.54	20.80	.29	.39							
Low	10.12	19.03	.29	.28							
$Y_{2,1}$											
High	3.80	2.38	.42	.48	.23						
Low	3.96	2.09	.31	.37	.22						
$Y_{2,2}$											
High	1.90	0.82	.36	.39	.17	.70					
Low	1.98	0.79	.28	.25	.12	.72					
$Y_{3,1}$											
High	4.01	2.35	.56	.54	.30	.33	.30				
Low	4.19	1.97	.46	.43	.20	.28	.18				
$Y_{3,2}$											
High	65.58	25.50	.39	.39	.27	.18	.17	.45			
Low	60.47	22.88	.34	.35	.09	.15	.15	.36			
$Y_{4,1}$											
High	2.09	1.85	.08	.10	.05	.10	.17	.09	.10		
Low	2.75	1.85	−.16	.08	.10	−.02	−.12	−.13	−.08		
$Y_{5,1}$											
High	3.20	2.39	.26	.30	.12	.20	.16	.37	.17	.15	
Low	3.94	2.21	.06	.21	.13	.18	.11	.17	.21	.18	

the structural differences responsible for this trend.

Table 2 presents the unstandardized parameter estimates generated by the LISREL procedure separately for the two groups. For both groups the goodness of fit chi-square is nonsignificant, indicating that the model is consistent with the data. This result supports the following two conclusions: First, on the level of the first-order measurement model, it appears that in each group the various indicators of any given attitude measure *that* attitude and not a different one. Second, on the level of the second-order measurement model, it appears that in each group the five attitude constructs derive from a single underlying ideological value. The presence of a single underlying ideology in attitudes like these is consistent with earlier research (Judd & Milburn, 1980).

There are a number of differences between groups in the parameters of Table 2 that deserve comment. First, the structural coefficients from the latent-method factor in the high-importance group are zero, while in the low-importance group there appears to be more substantial method variance in the indicators employing the 7-point self-rating format. This difference in error variance due to measurement method is consistent with the theoretical notion that those for whom the attitude is less central should be more influenced by survey question format.

To test whether there is significant method variance in the responses of the two groups, we estimated the model in each case under the respecification that all Γ_{ij} equal zero. In the case of the high-importance group, there was absolutely no evidence that the model fit better allowing for method variance, dif-

Table 2
Maximum Likelihood Estimates of Unstandardized Parameters: Second-Order Latent Factor Structure (No Between-Group Constraints)

Parameter	High importance	Low importance
$\Lambda_{1,1}$	1.00[a]	1.00[a]
$\Lambda_{1,2}$	.99	.92
$\Lambda_{1,3}$	5.43	6.02
$\Lambda_{2,1}$	1.00[a]	1.00[a]
$\Lambda_{2,2}$	.29	.35
$\Lambda_{3,1}$	1.00[a]	1.00[a]
$\Lambda_{3,2}$	7.60	9.69
$\Lambda_{4,1}$	1.00[a]	1.00[a]
$\Lambda_{5,1}$	1.00[a]	1.00[a]
Γ_{ij}	.00	.53
$\sigma_{\epsilon_{1,1}}^2$	2.18	1.62
$\sigma_{\epsilon_{1,2}}^2$	1.62	1.71
$\sigma_{\epsilon_{1,3}}^2$	350.31	308.68
$\sigma_{\epsilon_{2,1}}^2$	.90	.71
$\sigma_{\epsilon_{2,2}}^2$	.28	.20
$\sigma_{\epsilon_{3,1}}^2$	2.00	2.03
$\sigma_{\epsilon_{3,2}}^2$	446.66	371.94
$\sigma_{\epsilon_{4,1}}^2$	.00[a]	.00[a]
$\sigma_{\epsilon_{5,2}}^2$	.00[a]	.00[a]
$\beta_{1,o}$	1.00[a]	1.00[a]
$\beta_{2,o}$	.74	.70
$\beta_{3,o}$	.93	.93
$\beta_{4,o}$	.15	−.37
$\beta_{5,o}$	.50	.28
$\sigma_{\zeta_1}^2$	−.23[b]	.01
$\sigma_{\zeta_2}^2$	3.11	2.65
$\sigma_{\zeta_3}^2$	.93	.33
$\sigma_{\zeta_4}^2$	3.36	2.86
$\sigma_{\zeta_5}^2$	4.93	4.46
$\sigma_{\eta_o}^2$	3.02	1.47
$\chi^2(23)$	29.94*	31.56**

Note. n = 291 for the high-importance group; n = 147 for the low-importance group.
[a] These coefficients are constrained for identification purposes.
[b] This negative variance probably indicates a misspecification in the model. However, the misspecification appears to be slight, since the overall fit of the model is good and since this negative residual variance was not found to differ significantly from zero.
* p = .151. ** p = .110.

ference $\chi^2(1) = .00$. However, in the low-importance group, the respecified model was marginally less consistent with the sample data than the model that allowed errors of measurement due to method, difference $\chi^2(1) = 3.65$, $p < .10$. Hence, we have marginally significant evidence that attitude responses in groups with low centrality are more susceptible to response-format errors. In the remainder of the results we discuss, where we examine differences between groups in the coefficients of the model, method variance in responses is allowed in the low-importance group. However, in all subsequent models, all Γ_{ij} in the high group are set at zero.

Another difference between groups in the coefficients of Table 2 seems to be in the β_{io} coefficients. These coefficients are the second-order factor loading coefficients and represent the extent to which the attitude constructs derive from or are consistent with the underlying ideological value. While most of these coefficients seem to be roughly equal in the two groups, $\beta_{4,o}$ shows different signs. As we have discussed, we might well expect differences in the β_{io} coefficients or in the ideological consistency of individual attitudes as a function of attitude centrality.

To test for differences in the β_{io} coefficients, it is first necessary to ascertain whether the first-order factor loadings, the Λ_{ij}, are equivalent in the two groups. If they are not, then the first-order attitude constructs (the η_i) differ in the two groups, and comparisons of their structure between groups are exceedingly difficult to interpret. Hence, the model was estimated under the specification that each Λ_{ij} be equal across the two groups. The difference in the goodness of fit between this respecified model and the model with no between-group constraints did not approach significance, difference $\chi^2(4) = 1.60$, $p > .750$. Hence, the first-order attitude constructs in the two groups, the η_i, are equivalent.

With equivalent first-order loading coefficients in the two groups, we can now ask whether the loading coefficients of the attitude constructs on the underlying ideological value differ in the two groups.[5] To assess this, the parameters of the model were re-

[5] Unless the measurement models for the first-order latent constructs are equivalent, comparisons of the higher order loadings and variances will yield differing results depending on the variable used to set the metric of the first-order latent constructs. If equal loadings are shown, the results of comparisons between groups are invariant across different latent construct metrics (Judd, Krosnick, & Milburn, 1981).

estimated under the specification that each β_{io} be equal in the two groups. This model was compared to the model in which between-group constraints were placed only upon the Λ_{ij} coefficients. Again, the more constrained model did not fit less well than the model in which the β_{io} coefficients were allowed to differ between groups, difference $\chi^2(4) = 5.76$, $p > .250$. Hence, it appears that the effects of the underlying ideological value on the individual attitudes are equal in the high- and low-importance groups. There is no evidence in these data that an underlying value is more influential in determining individual political attitudes among those for whom the attitudes are more central.

While the impact of the underlying ideological value seems to be equivalent in the two groups, it is possible that the residual or disturbance variances to the first-order attitude constructs differ. These disturbance variances ($\sigma_{\zeta_i}^2$) represent the extent to which variance in the individual attitudes is issue-specific. In other words, differences in them would reflect differences in the degree to which attitudes are independent of each other.[6] Consistent with our findings that the β_{io} do not differ between groups, there is no evidence that the disturbances to the first-order constructs differ between groups when the model is respecified so that each $\sigma_{\zeta_i}^2$ is constrained to be invariant across groups, difference $\chi^2(5) = 1.20$, $p > .900$.

It may be helpful to summarize briefly the results to this point. First, we have found marginally significant evidence for errors due to method in the low-importance group, while none has been detected in the high group. Second, the first-order attitude constructs are equivalent in the two groups, since we have shown that the Λ_{ij} coefficients are invariant across groups. Third, the unstandardized loadings of the attitude constructs on the second-order latent value are equal in the two groups. Finally, issue-specific or residual variance to the various attitudes does not differ by group. The model is at this point a relatively highly constrained one. Only the variance of the second-order construct ($\sigma_{\eta_o}^2$) and the disturbances to the indicators ($\sigma_{\epsilon_{ij}}^2$) differ between groups. Even so, the model is quite consistent with the data from the two samples: simultaneous goodness of fit in the two groups, $\chi^2(60) = 70.05$, $p = .176$.

Are there differences between the groups in the extent to which attitude measures reflect random error? We have already seen that centrality seems to be related to the amount of method error in measures. Now we wish to see if residual errors in the measures ($\sigma_{\epsilon_{ij}}^2$) differ between groups. A model in which between-group constraints are put on all the $\sigma_{\epsilon_{ij}}^2$ was found to fit equally as well as one in which the residual variances to the indicators were unconstrained, difference $\chi^2(7) = 7.82$, $p > .300$. Once again, the second-order factor structures seem virtually identical in the two groups.

Besides the difference in the method variances (the Γ_{ij}), the only remaining difference between the two groups is the difference in the variances of the second-order latent value ($\sigma_{\eta_o}^2$). In Table 2, this variance was almost twice as large in the high-importance group as in the low group. With both the first- and second-order measurement models equal between groups, we are in a position to evaluate whether the difference in these variances is significant. A final estimation was done, forcing the variance of the second-order factor to be equal between groups. This respecification was significantly less consistent with the data from the two samples, difference $\chi^2(1) = 9.69$, $p < .005$. In other words, the latent ideological value underlying all the individual attitudes (that in turn are reflected in the variables) is significantly more variable in the high-importance group. Individuals whose attitudes are central tend to be more polarized in the latent ideological value that is expressed in their attitudes.

In conclusion, the most parsimonious model is one in which only $\sigma_{\eta_o}^2$ and Γ_{ij} (the second-order factor variances and the loadings of variables on the method factor) are different between the two groups. The first- and second-order loading coefficients of this model and the variances of the second-order factor are presented in Table 3. As can be

[6] It should be emphasized that these disturbance variances do not represent error in the usual sense of that word. Because the η_i represent error-free attitude constructs, disturbance variance in them is simply "true-score" variance that is uncorrelated across attitude issues.

seen, the model is simultaneously consistent with the data from the two samples, $\chi^2(67) = 77.87$, $p = .171$.

To be sure that both the variance of the second-order factor and the loadings of variables on the method factor differ reliably across various levels of attitude centrality, the coefficients of the hypothesized model were estimated on the data from the third sample, that is, the moderate importance group. For this group, the average correlation between measures of different attitudes is .22, which falls between the average correlations from the high- and low-importance groups, as we would expect.

While the hypothesized model was consistent with the data from the two extreme groups, there are significant discrepancies between the model and the data from the moderate group, $\chi^2(23) = 42.58$, $p = .008$. This apparent difference in the model's quality of fit is due to the differences in sample size among the three groups. The moderate group is more than twice the size of either of the extreme groups. Hence, discrepancies between the data and the model are substantially easier to detect in the moderate-importance group. Bentler and Bonett (1980) have proposed an index of quality of fit in maximum likelihood models, ρ, that is relatively unaffected by sample size. This index varies between zero and one, with the latter value indicating that the model explains all of the covariance among the variables. For our three samples, ρ equals .985 in the high-importance group, .977 in the moderate-importance group, and .950 in the low-importance group. Thus, in all three cases the fit is quite good. Little justification exists for rejecting the model in the moderate group while accepting it in the extreme groups.

If the differences we found between the two extreme groups are structural differences arising from differing degrees of centrality, then the relevant coefficients from this moderate group should lie between the coefficients from the extreme groups. Table 4 presents the estimated structural coefficients from the moderate group with no constraints imposed between groups. Comparing these coefficients with the unconstrained coefficients from the extreme groups presented in Table 2, we see that both the variance of the second-order factor, $\sigma_{\eta_o}^2$, and the loadings on the method factor, Γ_{ij}, lie between the respective coefficients from the extreme groups. Thus, the data from the moderate group are consistent with the centrality differences found between the extreme groups. Method variance in attitude measures decreases monotonically with increasing centrality, while polarization in the second-order factor increases monotonically.[7]

Table 3
Maximum Likelihood Parameter Estimates: Final Fully Constrained Model

Parameter	High importance	Low importance
$\Lambda_{1,1}$	1.00	1.00
$\Lambda_{1,2}$	1.01	1.01
$\Lambda_{1,3}$	5.52	5.52
$\Lambda_{2,1}$	1.00	1.00
$\Lambda_{2,2}$	.29	.29
$\Lambda_{3,1}$	1.00	1.00
$\Lambda_{3,2}$	7.83	7.83
$\Lambda_{4,1}$	1.00	1.00
$\Lambda_{5,1}$	1.00	1.00
$\beta_{1,o}$	1.00	1.00
$\beta_{2,o}$	.75	.75
$\beta_{3,o}$	.93	.93
$\beta_{4,o}$	.10	.10
$\beta_{5,o}$	.49	.49
$\sigma_{\eta_o}^2$	2.95	1.69
$\chi^2(67)$	77.87*	

* $p = .171$.

Discussion

This article has examined differences in attitude organization as a function of attitude centrality. We have argued that more central attitudes may differ from less central ones in one or more of the following ways:

1. More central attitudes may be more strongly based upon or determined by the underlying values.
2. More central attitudes may tend to be more extreme or polarized.

[7] It may seem odd that a sample that included blacks was asked about their attitudes toward "Negroes." We conducted one final set of analyses to examine differences in the model when blacks were excluded from the samples. No differences relative to the hypotheses we are examining emerged.

Table 4
Maximum Likelihood Estimates of Unstandardized Parameters: Moderate Importance Group (No Between-Group Constraints)

Parameter	Moderate importance
$\Lambda_{1,1}$	1.00[a]
$\Lambda_{1,2}$	.98
$\Lambda_{1,3}$	6.94
$\Lambda_{2,1}$	1.00[a]
$\Lambda_{2,2}$	.28
$\Lambda_{3,1}$	1.00[a]
$\Lambda_{3,2}$	6.93
$\Lambda_{4,1}$	1.00[a]
$\Lambda_{5,1}$	1.00[a]
Γ_{ij}	.31
$\beta_{1,o}$	1.00[a]
$\beta_{2,o}$	.83
$\beta_{3,o}$	1.02
$\beta_{4,o}$	.23
$\beta_{5,o}$	.67
$\sigma_{\xi_1}^2$	.30
$\sigma_{\xi_2}^2$	2.93
$\sigma_{\xi_3}^2$	.58
$\sigma_{\xi_4}^2$	3.19
$\sigma_{\xi_5}^2$	4.63
$\sigma_{\eta_o}^2$	1.63
$\chi^2(23)$	42.58*

Note. $N = 650$.
[a] These coefficients are constrained for identification purposes.
* $p = .008$.

3. More central attitudes may be measured with more random error.

4. More central attitudes may be less susceptible to measurement error due to questionnaire format or method.

To tease apart these differences between more and less central attitudes, a modified multitrait–multimethod matrix was examined with a second-order confirmatory factor analysis procedure. The results of this analysis are consistent with the second and fourth of the above predictions. No evidence for the first or third was found. More specifically, a highly significant difference was found in the polarization of the ideological value underlying the political attitudes we examined. In addition, marginally significant evidence was found to support the notion that the measurement of less central attitudes is more susceptible to question format than the measurement of more central attitudes. Contrary to predictions, less central attitudes did not seem to be measured with greater random error. Nor was evidence found to support the notion that more central attitudes derive from or are linked to the underlying ideological value to a greater degree.

The polarization differences we found may not be surprising, since the attitude measures we used measure intensity as well as evaluative direction. In a sense, asking respondents how important an issue is to them may be tantamount to asking them how extremely they rate themselves on a rating scale that measures intensity.

The results that are perhaps more intriguing are those suggesting that more central or important attitudes are not more closely linked to underlying values. If this is a reliable finding, then cognitive consistency notions concerning the increased resistance to change of more important attitudes may need refinement. In a strict sense, our results suggest that a change in any given attitude should not render it less consistent with the underlying value in the case of more central attitudes than in the case of less central ones. A unit shift in an attitude is associated with the same number of units of difference in the underlying value, regardless of the centrality of the attitude. What differs between central and noncentral attitudes is their polarization or extremity rather than the extent to which they reflect an underlying value.

Of course, it is likely that a unit difference between two attitudes on some scale means more occurring near the endpoints of the scale than near the midpoint. In other words, affective intensity may not be a linear function of scale extremity. Hence, while a unit difference in the underlying value is associated with equal differences in a specific attitude regardless of its centrality, scale units may mean different things for more polarized or extreme positions. The attitudes of two individuals who rate themselves 1 or 2 on a 9-point scale may seem less consistent than the attitudes of two individuals who rate themselves 3 and 4 on that scale. Inconsistency, then, may not be a linear func-

tion of the discrepancy of two positions on some attitude scale. Rather, phenomenologically, it may be a curvilinear function of that discrepancy. This conclusion is, of course, consistent with research indicating that individuals with more extreme attitudes have larger latitudes of rejection than individuals with less extreme attitudes (Sherif & Hovland, 1961).

The results we have reported concerning the magnitude of error due to method suggest that attitude researchers need to be especially sensitive to instrumentation biases when measuring less central attitudes. Multiple indicators or measurement procedures seem to be especially important when assessing attitudes that have been given little thought (as perhaps is the case in most public opinion polls).

While the results we have presented are intriguing, they should be regarded as suggestive rather than conclusive for a number of reasons. First, differences in respondents have been confounded with differences in attitude centrality. It would be informative to examine differences in attitude organization within respondents as a function of centrality. Second, our measure of attitude centrality is fairly crude. Nearly 20% of the survey respondents indicated that all five attitudes were central. Perhaps a more discriminating measure of centrality would yield different results. Schuman and Presser (1981) present evidence to suggest that different centrality measures lead to different results. Finally, attitudes on a relatively select set of national political issues were examined. Studies of more diverse issues, representing more than a single underlying ideological value, may result in different conclusions.

In spite of these reservations, it seems to us that our results have intriguing implications for attitude theories. Reliable structural differences have been demonstrated as a function of attitude centrality, yet fewer differences were found than expected or predicted. More research on centrality and on attitude structure seems called for. We hope to have suggested both some starting points and some procedures for that research.

References

Alwin, D. F. Approaches to the interpretation of relationships in the multitrait-multimethod matrix. In H. L. Costner (Ed.), *Sociological methodology 1973–1974*. San Francisco: Jossey-Bass, 1974.

Barton, A. H., & Parsons, R. W. Measuring belief system structure. *Public Opinion Quarterly*, 1977, *41*, 159–180.

Bentler, P. M. Multivariate analysis with latent variables: Causal modeling. In M. R. Rosenzweig & L. W. Porter (Eds.), *Annual review of psychology* (Vol. 31). Palo Alto, Calif.: Annual Reviews Inc., 1980.

Bentler, P. M., & Bonett, D. G. Significance tests and goodness of fit in the analysis of covariance structures. *Psychological Bulletin*, 1980, *88*, 588–606.

Blalock, H. M. Path coefficients versus regression coefficients. *American Journal of Sociology*, 1967, *72*, 675–676.

Campbell, D. T., & Fiske, D. W. Convergent and discriminant validation by the multitrait-multimethod matrix. *Psychological Bulletin*, 1959, *56*, 81–105.

Cantril, H. The intensity of an attitude. *Journal of Abnormal and Social Psychology*, 1946, *41*, 129–135.

Converse, P. E. The nature of belief systems in mass publics. In D. E. Apter (Ed.), *Ideology and discontent*. New York: Free Press, 1964.

Converse, P. E. Attitudes and non-attitudes: Continuation of a dialogue. In E. R. Tufte (Ed.), *The quantitative analysis of social problems*. Reading, Mass.: Addison-Wesley, 1970.

Duncan, O. D. *Introduction to structural equation models*. New York: Academic Press, 1975.

Festinger, L. *A theory of cognitive dissonance*. Stanford, Calif.: Stanford University Press, 1957.

Hovland, C. I., Harvey, O. J., & Sherif, M. Assimilation and contrast effects in communication and attitude change. *Journal of Abnormal and Social Psychology*, 1957, *55*, 242–252.

Judd, C. M., Krosnick, J. A., & Milburn, M. A. Political involvement and attitude structure in the general public. *American Sociological Review*, 1981, *46*, 660–669.

Judd, C. M., & Milburn, M. A. The structure of attitude systems in the general public: Comparisons of a structural equation model. *American Sociological Review*, 1980, *45*, 627–643.

Jöreskog, K. G., & Sörbom, D. LISREL: *Analysis of linear structural relations by the method of maximum likelihood*. Chicago: National Educational Resources, Inc., 1978.

Katz, D. The functional approach to the study of attitudes. *Public Opinion Quarterly*, 1960, *24*, 163–204.

Kenny, D. A. *Correlation and causality*. New York: Wiley, 1979.

Rosenberg, M. J., & Abelson, R. P. An analysis of cognitive balancing. In C. I. Hovland & M. J. Rosenberg (Eds.), *Attitude organization and change*. New Haven, Conn.: Yale University Press, 1960.

Schuman, H., & Presser, S. *Questions and answers: Experiments on question form, wording, and context in attitude surveys*. New York: Academic Press, 1981.

Sherif, C. W. Social values, attitudes, and involvement of the self. In H. E. Howe & M. M. Page (Eds.), *1979 Nebraska Symposium on Motivation*. Lincoln: University of Nebraska Press, 1980.

Sherif, M., & Cantril, H. *The psychology of ego-involvements*. New York: Wiley, 1947.

Sherif, M., & Hovland, C. I. *Social judgment, assimilation and contrast effects in communication and attitude change*. New Haven, Conn.: Yale University Press, 1961.

Tesser, A. Self-generated attitude change. In L. Berkowitz (Ed.), *Advances in experimental social psychology* (Vol. 11). New York: Academic Press, 1978.

Weeks, D. G. A second-order longitudinal model of ability structure. *Multivariate Behavioral Research*, 1980, *15*, 353–365.

Appendix

Attitude Measures Used in the Analysis

Variable $Y_{1,1}$

There is much discussion about the best way to deal with the problem of urban unrest and rioting. Some say it is more important to use all available force to maintain law and order—no matter what results. Others say it is more important to correct the problems of poverty and unemployment that give rise to the disturbances. Where would you place yourself on this scale? (7-point scale)

Variable $Y_{1,2}$

Some people are pretty upset about rioting and disturbances on college campuses and in high schools. Some feel sympathetic with the students and faculty who take part in these disturbances. Others think the schools should use police and the national guard to prevent or stop disturbances. Where would you place yourself on this scale? (7-point scale)

Variable $Y_{1,3}$

People who riot in cities. (rating of such people on 100-point "feeling thermometer" scale)

Variable $Y_{2,1}$

There is much talk about "hawks" and "doves" in connection with Vietnam, and considerable disagreement as to what action the United States should take in Vietnam. Some people think we should do everything necessary to win a complete military victory, no matter what results. Some people think we should withdraw completely from Vietnam right now, no matter what results. Where would you place yourself on this scale? (7-point scale)

Variable $Y_{2,2}$

Which of the following do you think we should do now in Vietnam? (Pull out of Vietnam entirely; keep our soldiers in Vietnam but try to end the fighting; take a stronger stand even if it means invading North Vietnam.)

Variable $Y_{3,1}$

Some people feel that the government in Washington should make every possible effort to improve the social and economic position of Negroes and other minority groups. Others feel that the government should not make any special effort to help minority peoples but they should be expected to help themselves. Where would you place yourself on this scale? (7-point scale)

Variable $Y_{3,2}$

Negroes. (rating on 100-point "feeling thermometer" scale)

Variable $Y_{4,1}$

There are many sources of air and water pollution; one of them is private industry. Some say the government should force private industry to stop its polluting. Others believe industries should be left alone to handle these matters in their own way. Where would you place yourself on this scale? (7-point scale)

Variable $Y_{5,1}$

There is much concern about the rapid rise in medical and hospital costs. Some feel there should be a government health insurance plan which would cover all medical and hospital expenses. Others feel that medical expenses should be paid by individuals and through private insurance like Blue Cross. Where would you place yourself on this scale? (7-point scale)

Received February 23, 1981
Revision received June 1, 1981 ■