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ABSTRACT

This study attempts to assess differences in the three aspects of cognitive complexity--differentiation, discrimination, and integration--as functions of information about and interest in the relevant domain. The two groups of subjects consisted of 20 members of a local sports car club and an equal number from a local garden club. Each group had high interest and information in one domain and, at most, average interest and information in the other domain. Each subject filled out a form on 20 flowers and a form on 20 cars. Multidimensional scalings revealed pronounced differences in integration, possible differences in discrimination, and virtually no differences in differentiation when the between-domain and within-domain judgments were compared. (TS)

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Schroder, Driver, and Streufert (1967) define cognitive complexity in terms of three components: differentiation, discrimination, and integration. In a multidimensional cognitive configuration, these would correspond to dimensionality, absence of clustering or polarization, and obliqueness of dimensions, respectively. Schroder, et al., suggest that complexity is a personality trait. An alternative approach is that it is at least partly related to interest and information in the stimulus domain in which judgments are made. Several studies have shown differences in dimensionality which support the latter view.

This study examines the domain-specificity of all three components, using a crossed "extreme-groups" design. Two groups, with high interest and information in their own domain and low interest and information in the other group's, make judgments in both domains. Multidimensional scalings reveal pronounced differences in integration, possible differences in discrimination, and virtually no differences in differentiation when the between-domain and within-domain judgments are compared.

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Cognitive complexity, as defined by Schroder, Driver and Streufert (1967), includes three components:

1. Differentiation - the number of elementary dimensions (i.e. stable and unique orders of stimuli) in a complex cognitive structure.
2. Discrimination - the fineness of the organization among stimuli ordered along a given dimension.
3. Integration - the complexity of the schemata which determine the organization of several dimensions within a cognitive structure.

Those whose cognitive structures are low in each of these components are said to function at a "concrete" level, characterized by the processing of information through compartmentalization in a relatively fixed hierarchy. Few decision alternatives are considered, and stimuli which do not fit the system are distorted or excluded. Information processing tends to be categorical, quickly done, marked by rapid "closure" and a tendency to overgeneralize any changes. The more complex, or abstract, individual can generate more varied schemata, and can relate, compare, or combine them as needed; the amount of information such a person can bring to bear on a problem is greater, and he is expected to be a superior decision-maker in complex situations.

Vannoy's (1965) factor analysis of twenty measures indicated that no general trait of complexity existed. Rather, three "classes of behavioral tendencies" appeared which seem to correspond to the Schroder, et al., components. The first tendency is to "emphasize one or a very few judgmental variables" or to be sensitive to many, analogous to differentiation. The second is to use only two or three positions on a dimension or to use many, analogous to discrimination. The third is to maintain a "narrow perspective" permitting "a highly ordered view of the world," which seems to correspond to low integration. This is not to say that these components give an exhaustive account of complexity, but merely that they are independent factors which seem to reflect the trait. Schroder, et al. (1967), propose a developmental approach to complexity, suggesting that concreteness-abstractness is in fact a personality trait, constant across stimulus domains. The alternative approach is to regard complexity as at least partially domain-specific, such that an individual could be complex in one area and simple in another, depending on interests and experience.

Scott (1969) reports that information about psychological tests increased response dimensionality and "articulation of attributes" on an instrument called the Rating of Tests. These seem similar to the concepts of differentiation and discrimination. In the same article, Scott also reports that a course in comparative government increased the dimensionality of students' judgments of nations. Similarly, Friendly and Glucksberg (1970) found that Princeton seniors view local slang in more dimensions that do freshmen, and Green and Carmone (1970) report that music majors rated musical groups on more dimensions than did business majors. Thus it is fairly clear that information about a domain leads to

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greater differentiation and possibly greater discrimination of objects within that domain. The domain-specificity of integration has received little or no attention in scaling studies, despite the fact that the concept of integration seems to correspond rather naturally to correlation between dimensions - an observable feature of scaling solutions.

This study seeks to assess differences in all three aspects of complexity as a function of information about, and interest in, the relevant domain. In order to properly separate individual differences from domain-related differences a crossed design, with two domains and two groups of Ss, is desirable. Each group has high interest and information in one domain, and at most average interest and information in the other. To the extent that complexity is domain-specific, each group will be more complex in its own domain and less complex in the other, although group and/or domain differences (i.e. "main effects") may be superimposed on this result.

The two groups consisted of twenty members of the local sports car club and an equal number from the local garden club. Donations were made to the club treasuries in return for participation. Each S filled out a form on twenty flowers and a form on twenty cars. The first part required preference judgments on all possible pairs (with ten pairs, containing each stimulus once, repeated to allow a reliability check). The second part asked for ratings of each stimulus on six bipolar adjectival scales (e.g. "sluggish-responsive" for cars; "hardy-delicate" for flowers).

The preference data were submitted to the multidimensional scaling procedure proposed by Bechtel, Tucker, and Chang (1971). The expected differences in dimensionality (i.e. differentiation) were not evident. The patterns of eigenvalues suggested three dimensions in both domains for the garden club; two for the car club. When the six bipolar adjective scales were regressed onto the preference scaling configurations, however, they lay almost entirely in the plane of the first two dimensions for both clubs and both forms. The third dimension was in no case readily interpretable, so all further analyses were done in two dimensions. The two-dimensional solution for the car club and car form did account for the most variance and the car club-flower form solution the least, but the two garden club solutions were midway between and virtually identical in variance accounted for.

Stimuli evenly spread along a dimension, as opposed to clustered or even polarized, would reflect high discrimination. Large differences on this component did not appear. The between-domain solutions look more "clustery" than the within-domain when judged blind, but the effect is not pronounced. Techniques for meaningful quantification of discrimination in the context of the scaling solution are still being explored.

It has been suggested that integration should correspond to obliqueness among the dimensions used to judge the stimuli. Here the results were unequivocal. While the six bipolar rating scales lay mainly in the two-space for both groups and both forms, they had substantially greater intercorrelation in the within-domain solutions.

In connection with the multidimensional scalings, two statistics were calculated which indicate the extent to which judgments are distance-like or "scalable." As expected, these were better within-domain for both groups. An interesting but unexpected result, however, was a superimposed "main effect" favoring the car club. Other things being equal, this group apparently made more distance-like comparisons. These data do not allow much investigation of the phenomenon, but it is tempting to speculate that the car enthusiasts tend to employ a more trait-like mental model, while the garden enthusiasts tend toward a typological model more appropriate to the natural sciences. If this were the case, the latter's cognitive complexity might be better reflected in a hierarchical clustering than in a multidimensional scaling.

Domain-specificity, then, has been demonstrated for the integration component of cognitive complexity, and possibly for the discrimination component. Although the domain-specficity of differentiation has been shown in several other studies, it was not discernable here.

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TABLE 1

Stress from TORSCA

Club	# of dimensions	Form: CAR	Form: Flower
CAR	6	.083	.084
	5	.099	.105
	4	.128	.136
	3	.165	.174
	2	.224	.236
GARDEN	6	.093	.078
	5	.111	.094
	4	.136	.121
	3	.189	.157
	2	.264	.225

Note: Group dissimilarities matrix derived by:

$$\frac{\left|([\#SS \text{ preferring stimulus on left}] - [\#SS \text{ preferring stimulus on right}])\right|}{\text{Total } \# \text{ of S's}}$$

Expression = 0 if 1/2 Ss preferred each; 1.0 if all Ss preferred one of the two.

Table 2

Percent Triangular Inequality Violations

CLUB	Form: Car	Form: Flower	
Car	29.6	34.6	32.1
Garden	49.0	45.5	47.3
	39.3	40.0	

Table 3

Percent Variance Accounted for by First Two Dimensions of the Scaling Solution

		Form: Car	Form: Flower
Club	Car	77	60
	Garden	62	62

Table 4

Analysis of Mean Values of Gamma Over 20 Car and 20 Flower Stimuli by Car Club and Garden Club Scaling Solutions

		Club: Car	Club: Garden	
Form	Car	.193	.146	.169
	Flower	.148	.145	.146
		.170	.145	

Note: Gamma can range from -1 to +1. Root mean square transformations were taken over dimensions.

Club Main effect: $F = 9.7$, $df = 1, 38$; $p < .01$
Form Main effect: $F = 7.0$, $df = 1, 38$; $p < .025$
Interaction effect: $F = 8.5$, $df = 1, 38$; $p < .01$

Table 5

Variance of cosines of Scales 1 - 6
with Dimension I in 1 - 2 Plans

Form

Club		Car	Flower
Club	Car	.018	.585
	Garden	.305	.238