MEASUREMENT OF PERCEPTIONS OF MULTIPLE ATTRIBUTES OF COMMUNICATION SOURCES: A METRIC MULTIDIMENSIONAL ALTERNATIVE TO FACTOR ANALYTIC MODELS

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Introduction

Many of the constructs in the nomological networks that comprise communication theories are social perception constructs. Such multidimensional constructs as, for example, source credibility (Berlo, Lemert and Mertz, 1969), source valence (McCroskey, Jensen and Valencia, 1973) and homophily (Rogers and Shoemaker, 1971) are key constructs in our theory building. The present chapter is concerned with the general problem of "mapping" the relationships among interdependent components of such multidimensional constructs so as to yield "maps" which are functionally isomorphic or homomorphic with social behaviors and perceptions of reality.

Typically, to assess an object that is multidimensional, covariances among ratings on multiple unidimensional scales are factor analyzed and factor indices are constructed from these analyses. This procedure has led to advances in scientific inquiry into the nature and effects of complex and multidimensional constructs, particularly after the initiation of high speed computers.

Several problems, however, continue to be associated with this approach which can be illustrated by considering research concerned with the "source credibility" construct. First, the scales selected by the E determine the factors that will be obtained, and this does not insure relevance of the factors to the construct. Second, as McLaughlin (1975) has argued, it is not known whether the n-number of factors obtained are exhaustive of relevant factors. To overcome these problems, McLaughlin recommended locating a concept such as "Most Believable" or "Ideal Credible Source" into a multidimensional space of public figures. Credibility would then be a simple function of distance from this ideal point. This method would provide a good measure of credibility, but fails to resolve a third related problem, i.e. the identification of attributions which are critical to perceptions of credibility.

Utilizing a more traditional approach, McCroskey, Jensen and Todd (1973) attempted to answer this question by using factor scores to predict to Likert-type items that purport to tap "Communication-Related Behaviors." They obtained multiple correlations of only .5 to .7, which implies either that the criterion variables did not differentiate credibility, that some relevant dimension(s) may not have been tapped, or perhaps that a credible source is one who does not score consistently high on all factors. Heston (1973) demonstrated the viability of the argument that the "Ideal Credible Source" may not be the source who is perceived as demonstrating high levels of all attributes

associated with credibility. She reported the surprising results that the ideal source

> "...would be highly responsible, reliable, honest, just, kind, cooperative, nice, pleasant, sociable, cheerful, friendly, good-natured, and relaxed, and <u>only slightly</u> expert, virtuous, refined, calm, composed, verbal, mild, extroverted, bold and talkative" (p. 10, emphasis ours).

Taken together, these considerations lead to the conclusion that an alternative measurement model for the source credibility construct, and for other multidimensional constructs, should be developed. McLaughlin's model (1975) provides a global score which purports to reflect a multiplicity of receiver attributions to sources, but which provides no ready means of identifying either which attributions are made, or the relative saliency of those attributions. The factor analytic models allow identification of attributes salient to perceptions of credibility, but do not readily yield a meaningful index of credibility as one complex construct. The difficulties in indexing scores on credibility factors stem both from the fact that middle-range scores on some credibility-related attributes may indicated maximal credibility, and from limitations imposed on the attribute configuration in a factor space by assumptions of factor analysis and semantic differentiation. In this chapter an alternative model is developed conceptually which can combine the strengths and eliminate the weaknesses of the two models discussed above. Toward this end, it will be useful to examine the assumptions upon which the factor analytic model rests.

Assumptions of Semantic Differentiation and Factor Analysis

While the Semantic Differential has been extensively employed in communication research, several of the key assumptions underlying its use are questionable. Semantic differentiation assumes that bipolar scales are unidimensional, that there exists some (center) point of neutrality, and that the distances between each of the end points and the center are equal. Further, the lengths of each attribute scale are standardized. Thus, the distances between all pairs of bipolar adjectives are implicitly assumed to be equal, as are the intervals between them. Finally, it is necessarily implied that any scale is assumed to achieve some correspondence, either isomorphic or homomorphic between the numbering system in the scale with that inherent or latent in the psychological continuum.

One of the central limitations of unidimensional scales is that, by definition, they measure only one attribute, and factor analysis was developed precisely because objects of cognition are multidimensional in nature. Consider the typical factor analysis experiment: the <u>E</u> selects a set of attribute scales, presumably exhaustive of dimensions of judgment in a particular domain, or of components of some theoretical construct. <u>S</u>s evaluate a number of concepts on these scales, which generates a matrix of

scores and ultimately a correlation matrix. The correlation matrix is factor analyzed by any usual procedure to determine the projections of the stimuli on orthogonal axes. The goal of the procedure is to evolve a parsimonious representation of the data in terms of independent factors, or dimensions, of judgement.

The development of factor theory was dependent upon assumptions of a common origin, bipolarity, equidistance of scale anchors from origin, and standardization of scale metric.

The assumption of a common origin implies that (1) the centroid from which factors originate is a point of neutrality, and (2) all vectors originate from this meaningful neutral location; that is, all attributes intersect at a meaningful central location. A strong interpretation of this assumption holds that these implications reflect aspects of the measured social reality. Osgood, Suci, and Tannenbaum (1957) made this explicit and argued that intensity and direction are indicated by factor loadings. The weaker interpretation of this assumption is never fully discussed in factor analytic research. This weaker interpretation is that the centroid is not necessarily a meaningful point of neutrality, but rather that vectors are constrained to originate at the origin for mathematical convenience. Hence, the weaker interpretation of the assumption of common origin only asserts that all attribute-line segments iin the space intersect at the origin (or at some point, in the case of transformation), and not that there is any special significance to the centroid.

The "meaningful origin" interpretation of the assumption of common origin is directly related to the assumptions of bipolarity and equidistance from the origin:

> One of the difficult methodological problems we have faced - unsuccessfully so far - is to demonstrate that the polar terms we now use are true psychological opposites; i.e., fall at equal distances from the origin of the semantic space and in opposite directions along a single straight line through the origin. And why use the adjectives? We assume that it is the lexical (root) meanings of our polar terms that determine judgments; adjectives are merely the most general and natural qualifiers in English. (Osgood, et al., 1957, pp. 327-328)

Several studies have focused on this "difficult methodological" problem of bipolarity and equidistance. Wishner (1960) argued that one of the bipolar adjectives may be the grammatical opposite of the other, yet possess positive or negative implications of its own. In other words, the meaning of an adjective is not necessarily determined solely by its semantic opposition to its antonym, but by its set of formal relations of implicating similarities and dissimilarities, with all other traits and concepts.

More stringent tests of both bipolarity and equidistance assumptions have been offered by multidimensional scaling analyses. In testing the assumption of bipolarity, Anderson

(1970) and Danes and Woelfel (1975) argued that line segments drawn from the centroid to each of two bipolars should have an angle between them equal to 180°. The fact that neither study found angles of 180° between these line segments supports Wishner's contention that each trait adjective possesses its own unique set of formal relations with other traits since, in MDS, the location of a trait is dependent upon its perceived similarities with all traits. The grammatical opposite is only one of many traits used as a reference point in the location of a trait.

Both Anderson (1970) and Danes and Woelfel (1975) also assessed the common origin and equidistance assumptions by computing the distance between each concept point and the origin. If the equidistance assumption is valid, the ratios of the distances of bipolars from the centroid would be 1.00. The obtained ratios, in both studies, failed to support this assumption. Thus, the theoretic assumption of equidistance of bipolars from a common origin does not conform to data collected to test it.

The failure of the strong interpretation of the assumption of a common origin to conform to data reflecting the social reality has therefore been demonstrated by: (1) locating individual points in the space rather than locating pairs of grammatical opposites in the space jointly; and (2) allowing the distances from each pair of grammatical antonyms to vary in length as a free parameter according to Ss' perceptions of dissimilarities rather than constraining all attribute line segments to equal and arbitrary length. It can be concluded that meaning is more accurately conceptualized as the result of the sum of compound reactions to all traits taken singularly and, secondly, that standard length and common differentiation of semantic differential scales impose severe and arbitrary constraints on measuring the meaning of a concept. In light of these conclusions, adoption of the "weaker version" of the assumption of the common origin for mathematical convenience must also be rejected. Rather a representation of semantic space which makes no assumptions, nor which makes assumptions more commensurate with available data, should be sought.

Finally, the assumed interval quality of semantic differential scales has been rendered doubtful by a number of other studies. Messick (1957) found high correlations between obtained and assumed intervals, but quickly pointed out that due to restrictions on variation of values, such a relationship by nature must be very high. Messick found that positive intervals were consistently larger than symmetric negative ones for all scales. Interval distortions may not only be based solely on the effects of positive ratings; there may also be "end effects", i.e., a tendency for extreme categories both positive and negative to be larger than the center ones.

Gulliksen (1958) pointed out that on many of the individual items in the Measurement of Meaning (Osgood, et al., 1957, p.127) the variance approached zero. Gulliksen asserted: "Clearly, it is not possible to determine accuracy of measurement when such a coarse grouping is used. For any measurement one needs a unit so

fine that a reasonable determination of error is possible" (p. 116). The two relevant implications are that a more precise scaling device is needed and that without accurate measurement there can be no accurate measurement of change. Additionally, it may be noted that low variances in scaled values of stimuli may result also from "ceiling effects" resulting from stimuli being perceived by Ss as having projections beyond the end point of the presented attribute scale. Factor analysis cannot empirically test this possibility because it constrains the arrangement of attributes such that a stimulus which projects on one attribute must project onto all attributes.

In sum, then, the validity of the assumptions upon which factor analysis of unidimensional scales rests is questionable. In the first place, both the meaningful origin and the equidistance from the origin of bipolars in a factor space are artifactual, stemming from the forced association of pairs of points and standardized lengths between end points. Second, the assumption that the meaning of a trait is solely determined by its semantic opposition to its grammatical antonym, and therefore conceptualizing meaning as a compound reaction to bipolar terms is questionable. Several studies (Wishner, 1960; Anderson, 1970; Danes and Woelfel, 1975) have provided evidence that the meaning of each individual trait is uniquely defined by its relations with all other traits.

Assumptions of the Multiple Attribute Measurement Model

The alternative representation of "semantic space" to be developed here might be described as a multi-dimensional array of linguistic elements (descriptor concepts, including unidimensional scale anchors). This configuration is stable in a space generated through metric multidimensional scaling procedures from aggregated data of a sample of Ss who share a common language. Such an array constitutes a single multidimensional scale, in contrast to "semantic spaces" derived through factor analytic techniques, which constitute constrained multidimensional arrays of unidimensional scales.

This alternative model rests upon the following assumptions:

1) Within a given cognitive domain, it is assumed that there exist a structure; i.e., a formal set of relations among the linguistic units used to describe objects residing in the domain.

2) It is assumed that the "meaning" of a linguistic unit is determined by its dissimilarity relations (physical separation in the spatial representation) to all other concepts in the domain.

3) Within a given domain, it is assumed that a subset of linguistic there may also be any number of attributes which are not exemplars of any dimension. Typically, non-exemplary attributes are purged from the interpretation of factor analytic solutions because they are not considered to be identifiably useful in the interpretation of dimensions of judgment in the domain.

However, a different logic operates in the analysis of multidimensional scaling configurations. Such configurations may be interpreted by use of property vectors, or by projection of

stiumuli on attributes. What is important is that the set of points be arrayed in as many dimensions as are empirically reliable. If a stable attribute is non-exemplar in the reliable dimensions, discarding the trait means that one is discarding highly reliable information. In the model proposed here, attributions of non-exemplar traits are considered to provide useful information about probable attributions of many other (exemplar) traits, and are therefore retained.

Before discussing the general assumptions of the model, it would be worthwhile to clarify assumption 3. Recall that in factor analysis one can sum across Ss, across concepts or both; thus eliminating confounding variance due to Ss or due to concepts. Evidence clearly exists which documents individual differences in perceptions of the semantic space (Wiggins and Fishbein, 1969; Talbot, 1969). However, the model proposed here is concerned primarily with assessing the relationship between linguistic units at a cultural level and the preception of public figures from the perspective of the aggregate.

The effect of variance in semantic spaces due to the scaled concepts is potentially problematic. Osgood et al. (1957) concluded that the nature of the concept being rated will influence the factor structure obtained: "...the more evaluative or emotionally loaded the concept being judged, the more the meaning of all scales shift toward evaluate connotation" (p. 187). Additional research by Green and Goldfried (1965) and Rosenbaum, Rosenbaum and McGinnies (1971) further documents concept effects. The proposed model does eliminate concept effects that may be artifacts of ratings on unidimensional scales which are factor analyzed, because the structure of the semantic space is defined by the relationship between all bipolar adjectives, rather than allowing the means and variances of concept ratings to define the structure of the space. Thus, in the proposed model, a concept of highly emotional connotation will not influence the structure of the semantic space.

Concept effects cannot be totally eliminated, however, because changing from concept domain to concept domain may elicit true, non-artifactual changes in the perceived structure of descriptors. It is for this reason, as will become clear below, that the domain specificity assumption has been made.

It should be noted that while the majority of research on "implicit personality theory" supports assumptions 1 and 3 of the model (see next section), wo studies (Hanno and Jones, 1973; Doherty, 1973) found changes in the structural array of traits by changing the individual or concept being evaluated. The obtained changes did not include order changes of concepts in the structure. Indeed, cannonical correlations were quite high, e.g. .989 and .881 for a two factor structure obtained by Hanno and Jones (1973). The exact nature of the changes in the semantic structure when Ss were required to evaluate different "reference persons" were reflected in changes in the distances between some of the adjectives. When concepts such as "hypocrite," "astronaut," "surgeon" and "killer" were scaled, the obtained changes in the structure were expansions or contractions of distances between attribute end points that are relevant or

irrelevant to the concept being evaluated. Doherty's (1973) results and discussion implied that "adequate" and "capable" were further apart in the "hypocrite" and "killer" structures than in the "astronaut" and "surgeon" structures. Further, "cruel" and "kind" were closer together in the "astronaut" and "surgeon" structures than in the other two.

Doherty (1973) concluded that "...when the multidimensional scaling solutions are compared for different references, they appear to be very similar. However, systematic changes may be induced, resulting in a change in the relative length of the capability dimensions for one of the negative references" (p. 78). Thus, while the order or adjectives in the structure are similar, some variations in the distances between some concepts are obtained. (Unfortunately, Doherty did not have any independent criteria for demonstrating that attribute relevance or irrelevance is the explanatory variable for the expansion or contraction of attributes. The model proposed here includes an attribute saliency measure, discussed below, which potentiallyprovides such a criterion).

Note that the "reference persons" used in these studies are not people but are terms that constitute classes of people. Assuming that the domain "class of all individuals" is too broad a domain to be used to avoid concept effects, one may wish to break "domain" into a hierarchical set of domains of others. Therefore, it would be advisable to provide the following definition: A cognitive domain is a set of objects or concepts that are perceived by Ss to possess some naturalistic classificatory characteristic in common. In a hierarchical clustering analogy, a domain at one level may be the set of all human beings. At another level, the set of personal acquaintances, or the set of current American politicians. Within each domain, attributes will vary in terms of relevance and irrelevance. Thus, as specified iin assumption 3, stable structures should occur within domains, and there will be variations in lengths of attributes from domain to domain.

Research Related to the Assumptions of the Proposed Model

Obviously, one would like to raise the question as to whether the above four assumptions, upon which the model rests, are tenable. Evidence concerning the ability to make ratio judgments of separation specifically (assumption 4) is scarce. The most recent evidence concerning individuals' abilities to use metric MDS with descriptor concepts was presented by Gordon (1976). Gordon found that varying the criterion pair across nine independent samples
produced statistically identical structures. Gordon, however, cautioned against generalizing these findings to data sets where Ss were required to make distance estimates among heterogeneous concepts. For the present, it is considered necessary to use a homogeneous set of concepts in accordance with the assumption of domain specificity.

Fortunately, a plethora of research can be referenced in relation to the first three assumptions. For example, assumption

2 is commonly made in the MDS literature (see Shephard et al., 1972), as well as in the research on the analysis of meaning (Miller, 1969). As such, this assumption needs no further explication and support here. However, it would be profitable to review additional literature relevant to assumptions 1 and 3. This research literature has typically been subsumed under the category of "implicit personality theory" research. The next three subsections will define this construct, present research evidence which bears upon the generality by which "implicit personality theory" is applied by individuals as they perceive and evaluate others, and discuss questions which pertain to the nature of the phenomenon.

Definition of "Implicit Personality Theory"

Some of the early conclusions of person perception research (Hastorf et al., 1958) were (1) people use a rather limited number of perceptual categories even when describing very different kinds of people; (2) there is a strong positive relationship between categories which people use in describing others and themselves; and (3) a person has both a core of generally consistent categories which depend on situational factors. Further, a common, explicit assumption underlying all studies in person perception has been that the perceiver's judgments of a stimulus person are a function of both (a) the information available about the stimulus person's characteristics, and (b) the perceiver's past experience with people. This experience which presumably leads to the establishment of the "implicit personality theory," which, in turn, structures the individual's judgments of others.

"Implicit personality theory" is the set of perceived formal relations among trait adjectives. The history of research in person perception has replicated the common finding that a person expects certain traits to "go together." Research on the "halo effect" (Hays, 1958) and "centrality" (Asch, 1946; Kelly, 1951, Wishner, 1960), as well as the "implicit personality theory" (Cronbach, 1955, 1958; Rosenberg and Sedlak, 1972) are examples of investigations into perceptions of trait co-occurrence.

The "implicit personality theory" concept was first introduced as a means of correcting for response bias in computing accuracy scores (Bruner and Tagiuri, 1954). A more general discussion was provided by Cronbach (1955) Secord and Berscheid (1962). Cronbach noted that the rater's bias deserved attention in its own right, beyond consideration as a source of constant error, and suggested that a judge's implicit personality theory could be described by the means, variances and covariances of the judge's ratings of a large number of others. Only a few studies have used Cronbach's operational definition (Crow and Hammond, 1957; Gross, 1961). Gross found some evidence for bias in means and variability in ratings of 30 heterogeneous others - each presented under conditions of minimal information transmission (30-second films of each person at a park bench). However, the response bias accounted for a negligible portion of the variance

while stimulus factors, in spite of the limited information available, accounted for the major portion of the variance.

Koltuv (1962) criticized the Gross study because the rating scales were few, and did not represent relevant dimensions in perceiving others - "This method of choosing dimensions for the perception of others may partially explain the finding that perceiver predispositions account for little of the variance in social perception..." (p. 5). Nonetheless, while intrajudge consistency of means across scales was found, Gross felt that the "generalized other" had little validity and the "...cultural similarity in the experience of the judges resulted in their drawing upon commonly held stereotypes" (p. 608).

Bruner, Shapiro and Tagiuri (1950, as well as Hays (1958), have used the term "implicit personality theory" in reference to the network of relations among personality traits. According to Bruner et al., a certain set of traits can be input into a matrix of "lay personality theory" from which other traits can be predicted. Their research on trait combination was based on the following presupposition:

> The fact of consistency of behavior, the backbone of personality theories, is represented in language by commonly described. It is characteristic of trait words like honest, brave or clever that they do more than denote specific acts of a person; that, indeed, they summarize or "package" certain consistencies of behavior (p. 278)

Hays (1958) presented a similar account: "...a person must have some relatively stable scheme of expectations and anticipations about others....This scheme may be thought of as a set of inferential relationships among experienced attitudes and traits which exist for the individual" (p. 289). He recommended two models for describing the formal relations among traits, the implication model and the similarities model. The second model, the similarities model, has not generated much research and will not be discussed.

Todd and Rappoport (1964) identified three problems with the implication model, however: there exists no analytic criteria to limit the number of dimensions to be extracted; there exists no criteria for determining the relative importance of the dimensions obtained, and, no convention exists for deciding what consitutes "significant" loadings on dimensions. Even more importantly, the factor analytic and implication models provided differences in terms of the number of dimensions obtained. Todd and Rappoport concluded that neither of the models provides satisfactory dimensions of cognitive structure.

Thus, "implicity personality theory" is defined as a stable structure of the interrelatedness of attitudes and traits that are perceived to exist in others. Over time, after multiple experiences with heterogeneous and multiple others in multiple and heterogeneous situations, people build up certain expectations of what traits "go together" in others. These expectations are incorportated into the language people use to

describe others. Hence, there is some overlap between shared, common experiences that determine one's "implicit personality theory" and one's own individualistic experiences. For this reason, Gross (1960) attributed the obtained response bias to the fact that Ss drew upon commonly held stereotypes when rating heterogeneous others. A number of models have been developed to measure the formal perceived relations among traits, culminating in Todd and Rappoport's (1964) recommendation that multidimensional scaling be utilized. It should be pointed out that while Hays and Bruner et al. presented the above definitions of "implicit personality theory", their analysis fell short of adequately representing any complex structure, or of assessing the stability of such a structure. Bruner et al. demonstrated that the kinds of inferences Ss made from single trait-names yielded an accurate prediction of the kinds of inferences drawn from combinations of trait-names, but no assessment was made of structure per se. Hays' (1958) iinvestigation of structure was limited to only eight traits, but was suggestive.

Wishner (1960) and Koltuv (1962) presented the first studies that explicitly investigated structure. Wishner (1960) questioned the methodology by which "central" traits were investigated (Asch, 1956; Kelly, 1951) and illustrated that any trait on the stimulus list might be perceived as central given appropriate manipulation of the items on the check list or rating scale. The issue of "central" traits has not been resolved, but Wishner defined the methodological difficulty of its resolution. Nonetheless:

> ...the most important feature of Wishner's analysis is that he has provided us with a working model of the "implicit personality theory." It is simply a correlation matrix among traits, a matrix we all carry around with us. Each of us has an idea of what traits are closely related to each other. (Hastorf, Schneider, and Polekfa, 1970, p. 41).

Koltuv (1962) conceptualized "implicit personality theory" as a pattern of nonzero intercorrelations which people assume to exist between traits in others. She demonstrated that this pattern remains nonzero when the halo effect is controlled through partial correlation.

In sum, "implicit personality theory" is defined as a stable network of relations among traits (and probably other categories and attributes) that (1) function for the individual to summarize or characterize the behaviors of others, and (2) to enable the individual to anticipate the future behaviors of others. Further, evidence exists that indicates that "implicit personality theory" structures our recall of others (D'Andrade, 1970, cited in Schneider, 1973).

Generality of "Implicit Personality Theory"

Demonstrating that such a structure exists and that it is a determinant of a person's descriptions of others is a good first

step; however, the structure will be of value only if generality can be demonstrated - that is, only if the formal relations among traits are applied for different categories of persons such as men-women, blacks-whites, teachers-students, etc. Secord and Berscheid (1962) addressed this question. They asked whether strong affect toward the stimulus person being judged would change the perceptual processes - that the biases of "implicit personality theory" take a different from for those person-concepts of high or low affect, and concluded that the associations between stimulus traits and judged traits remained remarkable consistent whether the stimulus person was Black or White. They argued that "...the concept of implicit personality theory may be presumed to have survived this relatively stringent test of generality" (p. 77).

Additional support for the generality of "implicit personality theory" was offered by Koltuv (1962), who found that trait intercorrelations among traits were stronger for unfamiliar acquaintances than for more familiar ones. Thus, differences in "implicit personality theory" for close or distant acquaintances differ only in degree, not kind. Passini and Norman (1966) found high factor loadings for close friends and lower factor loadings for strangers, but the factor structure remained the same. This latter study is highly suggestive, since it indicates that people not only carry around a matrix of trait intercorrelations that applies to acquaintances, but that it also applies to strangers. These results indicate that people tend to assume that a trait x is <u>in general</u> associated with a trait y. (See also Jones and Nisbett, 1971).

In general, the results of the above studies clearly support the robustness of the perceived formal relations among traits. It appears, as noted by Koltuv (1962), that changes in reference persons result only in subtle changes in degree of perceived co-occurrence, and not in changes in the structure itself.

The Nature of the Phenomena

The generality issue is highly related to the issue of the nature of "implicit personality theory." The traditional explanation for the existence of "implicit personality theory," expressed by Bruner et al. (1958), is that the individual has many different types of experiences with many different types of persons. Through these experiences the individual learns what traits "go together." The results of the Passini and Norman (1966) study, that a similar factor structure was obtained for close acquaintances and for strangers <u>in virtual absence of prior acquaintance</u> demonstrated that the dimensions of perceiving others rest implicitly in the perceiver and are (presumably) activated with very superficial information and observable cues. They argued that the "implicit personality theory" operated as the basis by which raters arrived at <u>nearly consensual</u> judgments of strangers and that increased acquaintanceship increased the loadings on these factors.

Muliak (1964) and D'Andrade (1965) offered strong criticisms to the position that raters learned from experience how traits go

together in others. Instead, they argued that the "implicit personality theory" represents the relationship between trait adjectives according to the meaning of the words and not according to how the traits co-occur in others. Muliak developed a trait-rating instrument using 76 trait adjectives (from an original pool of 200). Three sets of Ss rated, in three separates studies: (1) 20 personalities -- 10 famous persons and 10 persons the Ss knew; (2) 20 stereotypes (ex., "intelligent person"); (3) the meaning of 20 traits -- traits which were randomly selected from the list of 200. Summing across raters and things rated, each matrix of intercorrelations was factor analyzed. The results suggest that it is not necessary to rate actual people in order to determine the "personality factors" that would be associated with a set of trait words. The typical conceptualization of implicit personality theory holds that the raters have learned from experience which traits go together in actual persons, and that this "packaging" or summarization of the generalized other is represented in the factor structure. Muliak (1964) argued against this:

> This is a pertinent objection in the case of ratings of stereotypes. But it seems to require accepting many assumptions without evidence in the case of the study of ratings of the meanings of trait words. The Ss of this study were not asked to rate the traits on the degree to which traits went together in persons. They were asked simply to rate the trait words at the top of the rating scale according to how close they were to one or the other poles of the bipolar trait-ratings scales in meaning. It was assumed therefore that the Ss did what they were asked to do. But the author would be willing to consider the above objection as valid if someone would produce evidence that the raters of the meaning of trait words make such ratings according to their knowledge of how traits go together in persons and not according to their knowledge of meanings as such. (pp. 509-510).

D'Andrade (1965) further supported the linguistic explanation:

> ...the hypothesis proposed here is that correlations and factors obtained in Norman's study are derived because sets of these terms partially overlap in meaning. This type of partial overlap in meaning appears to be a general linguistic phenomena, resulting from the fact that most lexical items in a language are composed of a cluster or bundle of meanings which recombine in sets to form different words. The meaning units which compose such bundles may be referred to in linguistics as "sememes" or sememic components... (pp. 216-217) ...From this point of view, the meaning of words are composed of a bundle of dimensional values. (p. 222).

This controversy also has a third side, which considers the issue to be moot since it is not clear how the underlying processes of judgments of similarity of meaning and judgments of perceived trait covariations are separable. The "similarity of meaning" hypothesis is argued to be inconceivable without a foundation in perceived trait covariation or implication, since language itself is associatively and experientially determined. For example, Friendly and Glucksberg (1970) offer some insight into how new linguistic items are incorporated into the semantic space. At Princeton there existed a specific student slang. Friendly and Glucksberg had freshmen and seniors sort both slang terms and adjectives. Their results, which indicated a two-dimensional configuration for freshmen and three dimensions for seniors, are compatible with "the notion that the acquisition of a specific subcultural lexicon involves, at least in part, the acquisition of semantic dimensions relevant to the specific values of that sub-culture" (p. 59). Further, the seniors differentiated more along the slang terms. Friendly and Glucksberg (1970) asserted that: "In order to use the terms appropriately, it is necessary to learn which attributes of their referents are critical, for example, what distinguishes between 'wonk' and 'non-wonk'" (p. 63).

Hence, it can be argued that as one learns to use labels (traits) of a language, one necessarily learns to differentiate along the attributes relevant for the sub-culture or culture. Generalizing such findings to a cultural level, one would expect strong consensus in perceptions of relations among traits, given that the nature of meaning is consensual (Wittgenstein, 1953; Barnett, 1975).

In sum, "implicit personality theory" is a general cultural phenomenon expressed in the normative use of language. Resolution of the dispute over the nature of "implicit personality theory" is unnecessary to the presentation of semantic space person perception models. If meanings of trait labels (and the formal relations among traits) were not congruent with the way traits are <u>perceived</u> by the individual as covarying in actual others, then the meaning of traits as such would change. Bruner et al. (1958), in presenting the third, "realist", position, asserted that consistency of behavior is incorporated into the language by which people are commonly described. While "consistency of behavior" is a problematic assumption, especially after Mischel's (1968) work on the relations between personality tests and behavior, one can at least argue that people perceive more consistencies in the relations among traits because of informational biases; people see x types of people only in y types of situations. Hence, perceived consistencies are maintained.

It would appear, then, that the assumptions of the propsed model are fairly well supported by research in person perception. Two qualifications, however, are in order. First, a good deal more research must be conducted on the question of individuals' abilities to make ratio judgments. Second, it is obviously the case that the stability of the array of traits in the semantic space will be affected by the number of person-concepts which are

included in the analysis. We have argued that the location of each concept in the multidimensional space depends upon its similarities and dissimilarities with all other concepts in the space. If most concepts are traits, then there would be an excellent chance that one is tapping the true relationship between the set of traits sampled from the "implicit personality theory" because the location of each trait is "anchored" primarily by its assessment with other traits. However, in the case where only a few traits are included, the location of each trait would be determined by person-concepts. It is not known how locating traits in a space based on distances from person-concepts will affect the stability of the perceived relationships between traits.

Application of the Multiple Attribute Measurement Model

In addition to the general characteristics of metric MDS spaces discussed elsewhere in this volume, three others are particularly relevant to the comparison of the proposed scale and factor analytic models.

First, no assumptions are made in the MMDS space about the semantic meaningfulness of the centroid. Consequently, no assumptions need be, or are, made as to attribute end point equidistance from, or bipolarity with regard to, the origin. Attributes are not constrained to intersect at a common point (which is selected mathematically but may not accurately represent subject perceptions of the relationship of attributes as they occur unrestrained), and stimuli which are not perceived " respondents to project on an attribute are not constrained to do so. Therefore, ceiling effects are eliminated.

Second, since mapping of dissimilarities represents an example of fundamental ratio measurement, no standardization is involved in the MMDS routine. As a result, attribute lengths and differentiation are not imposed by the researcher for mathematical rather than theoretic reasons, but may be represented as expressed by respondents. The result is high precision of scaling and increases in absolute amounts of reliable variance in scaled perceptions of stimuli (Danes and Woelfel, 1975).

Third, attributes in the space need not be exemplars of any dimensions. Interpretability of the MMDS space rests, in fact, on the distances of scaled stimuli from the trait adjectives which constitute the scale. Consequently, purging of non-exemplary attributes, which has the effect of reducing the total spatial volume near semantically meaningful points, reduces interpretability,and is not called for. Unlike factor analytic representations, which seek simplicity of representation through division into mathematically independent parts, the MMDS semantic space seeks an accurate and theoretically useful representation of <u>interdependence</u>.

Comparability of MMDS spaces across administrations depends not on the orthogonality of semantically meaningful axes, as with factor analytic spaces, but on the stability of the configuration of descriptors in the aggregate space. Rotation of aggregate

spaces to a least-squares best-fit of theoretically expected stable concepts (Woelfel, Saltiel, McPhee, Danes, Cody, Barnett and Serota, 1975) has been shown empirically to yield highly stable configurations (Danes and Woelfel, 1975), thus establishing the comparability of scales of the type proposed here.

Application of the MMDS scale to measure individuals' perceptions of stimulus attributes involves the generation of semantic spaces for individual respondents in which the aggregate configuration of stable descriptors is maintained. Thus, a scale generated from the aggregate NxN matrix ($\mathbf{S}_{ij}$) may be applied to M stimuli by requiring respondents to apply the arbitrary standard dissimilarity ($\mathbf{S}_{xy}$) in making ration judgments of the dissimilarity between all possible pairs of the M stimuli, and between each of the M stimuli and each of the N descriptors. This procedure generates a new (N+M)x(N+M) dissimilarity matrix $\mathbf{S}_{ij}^{*}$. The space generated from this supermatrix respresents the respondent's perception of stimuli (objects of the domain) relative to semantically meaningful points which the respondent (or any speaker of the language) might use to describe the stimuli. The location of any stimulus in such a space therefore represents the "meaning" of that stimulus for the respondent, defined in terms of a quantifiable relationship to known points whose meaning is shared by the respondent and other speakers of the language.

In the semantic space generated by procedures suggested above, the result would be a "scale" as represented in Figure 1, in which a stimulus person (P) has been located relative to the stable configuration of trait descriptors.

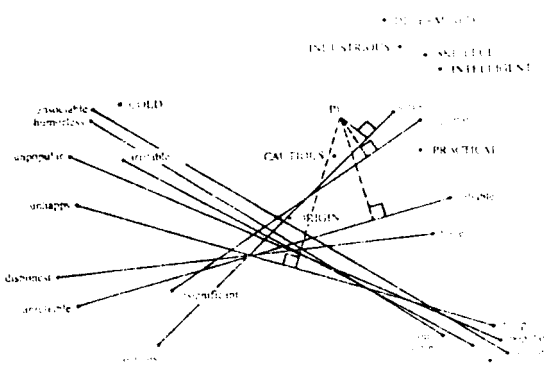


FIGURE 1

Hypothetical Illustration of Multiple Attriibute "Scale". From Rosenberg, Nelson and Vivekananthan (1968).

Interpretation of respondent attributions of traits to stimuli as located in the space would appear at first glance to be straightforward. If an attribute is represented as the line segment connecting the linguistic units which would bound a unidimensional scale for the measurement of that attribute or property, then the scaled value of that attribute in the MMDS

representation would be determined by the point at which the stimulus projected onto the attribute in the MMDS space. Thus, in Figure 2, the relative amount of "goodness" attributed to an object or person Q would be given by the difference in distances between Q_p (the projection of Q on the good-bad attribute) and good, and between Q_p and bad.

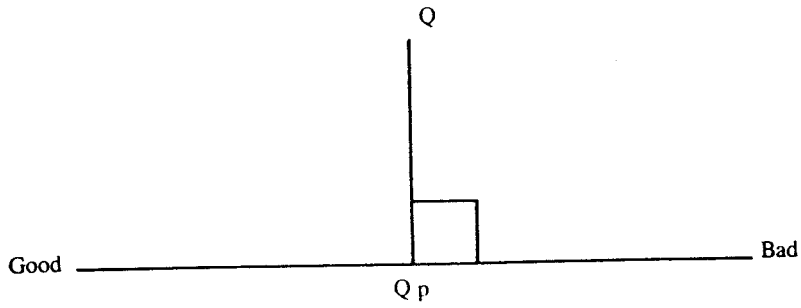


FIGURE 2

Such an interpretation follows traditional utilization of factor analytic spaces, in which stimuli are located such that their projections on an arrangement of orthogonal vectors correspond to unidimensionally-scaled values of those properties for the stimulus. Since all distances in the MMDS space are ratios of the standard dissimilarity (S_{xy}), quantifications of attributions in this manner are continuous, and therefore represent an increase in precision over the ordinal or assumed interval levels of measurement typically achieved in factor analytic spaces.

In the semantic space generated by procedures suggested above, however, a configuration such as that illustrated in Figure 3 (in two dimensions for illustrative clarity) is also possible.

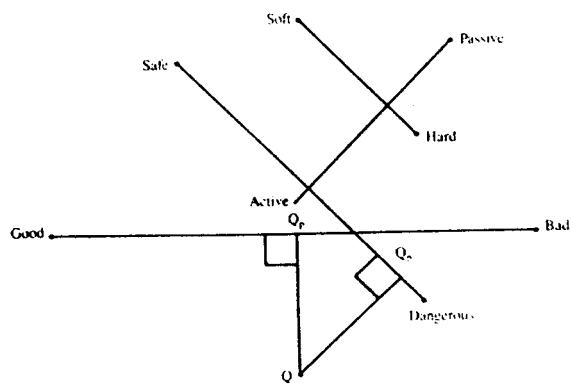


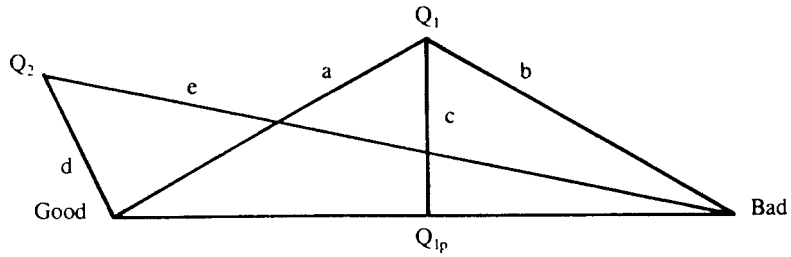
FIGURE 3

In this hypothetical example, the respondents attribution of "goodness" to stimulus Q could be quantified through the procedure discussed above, resulting in a neutral value. Similarly, we could expect from the configuration that the respondent would scale Q at the "dangerous" end of a semantic differential scale anchored by the adjectives "dangerous" and "safe." Since Q does not project onto either the "active-passive" or "hard-soft" attributes, however, quantification of the respondent's attribution of these properties to Q is not possible by the procedures discussed above. Two interpretations are possible, both of which may be plausibly illustrated if we assume for the moment that Q is a gun. In this instance, a respondent might well place an X at the "hard" end of a "hard-soft" semantic differential scale, since "hardness" is an obvious, if unimportant, property of a gun. Asked to scale Q (the gun) on an "active-passive" scale, however, the respondent might well be stymied by the conflicting perceptions of actual passivity and potential activity. Faced with this ambiguous perception, such a respondent might well decide that the "active-passive" continuum is irrelevant to his primary perception that the gun is dangerous, and thus mark the neutral point in the semantic differential to indicate his perception that the scale is inapplicable. The point, of course, is that neither hardness nor activity are salient attributes in the respondent's perception of the gun.

A semantic space generated through factor analysis would fail to represent this lack of salience. In such a space, as noted previously, all concepts are constrained to project on all attributes (exemplary or non-exemplary) which are constrained to intersect at a semantically meaningful origin. But the example above illustrates the ambiguity of the origin's "meaning," and the constraint that every concept must project on every standardized attribute makes differentiation of salient from non-salient attributes impossible. Consequently, a factor analytic representation of the example above would either represent the correlation between "active-passive" and "good-bad" as artifically high (if scaled perceptions of the gun were submitted to factor analysis), or result in an indeterminate location of Q (the gun) in the semantic space (if the arrangement of attributes had been determined previously by factor analysis of scaled perceptions of other stimuli).

In the MMDS model, however, the ambiguity of interpretation of the example is resolvable. A ratio measure of respondent attribution of activity-passivity to Q, for example, is given by the difference in the distance from the stimulus Q to "active," and Q to "passive." The range of possible values of this measure is + or - the length of the attribute in the space. A value of zero indicates neutrality, and occurs when S has a projection onto the midpoint of the attribute. A ratio measure of the salience of an attribute to the respondent's perception of a stimulus may be obtained by subtracting the distance from the stimulus to the attribute from some arbitrarily large constant. In the case where a stimulus can be projected onto an attribute,

the distance between them is the distance between the stimulus (Q) and its point of projection (Q_p). Where projection is impossible, as in the above example, the distance between the stimulus and the nearest end point of the attribute is the distance between Q and the attribute. Thus, in Figure 4, the quantified attribution of "goodness" to stimulus Q_1 is given by (a-b). The salience of the good-bad attribute to the respondent's perception of Q_1 is (k-c), where K is any large constant. Similarly, the "goodness" of Q_2 is given by (d-e), and the salience of the good-bad attribute to perceptions of Q_2 is (k-d).



a, b, c, d, e. = lengths of respective lines as ratios of standard distances S_{ss}

FIGURE 4

By salience is meant the degree to which a concept is defined by an attribute. Conceptually, it is the same as attribute <u>prominence</u> (Zajonc, 1969) or attribute <u>relevance</u> (Shrauger and Patterson, 1974). Prominence was defined by Zajonc as the ability of an attribute by itself to represent or characterize the referent (p. 329). He operationalized the concept in terms of rank orders of what attributes were most characteristic of the referent. Even the crude rank orders of attributes used as weights increased correlations between simple average of the individual attribute valences and overall attitude from .22 to .66 for the weighted average.

Shrauger and Patterson (1974) obtained attribute salience measure for the "self" by having <u>S</u>s select out of 57 attributes the ten which were "most relevant and important," and the ten which were "least relevant and important." Results clearly indicated that attributes which were highly relevant for the self were used more frequently in describing other than non-relevant attributes.

The importance of attribute salience cannot be understated. In addition to sets of attributes associated with a theoretical construct (e.g., credibility), the salience of each attribute is an indicant of the weight placed on that attribute. While a stimulus may have a score on (either exemplar or nonexemplar) attributes w, x, y, and z, one or more of those attributes may be totally irrelevant and non-salient in perceiving that stimulus. In Figure 1, the attributes of serious-frivolous, and important-insignficant are much more salient in the <u>S</u>s' perceptions of P than reliable-unreliable and sociable-unsociable; yet P does have a score on all four of the attribures.

An assessment of attribute salience is critical when one considers the design of messages intended to manipulate

credibility. Note that there is prescriptive utility in using the concept "Ideal Credible Source" (McLaughlin, 1975; Heston, 1973). The location of this point in the space provides information concerning the desired level (or score) on each attribute such that the set of scores represent maximum credibility. Once the salience of each attribute in the perception of the "Ideal Credible Source" is determined, manipulations of key attributes should result in the greatest amount of change towards (or away from) the location of the point representing "Ideal Credible Source."

Previous research on the manipulation of source credibility, stemming from factor analytic research, has centered on manipulating one or more factors. Most illustrative of this point is the manipulation of expertise (Hovland, Janis and Kelly, 1953; Aronson and Golden, 1962). Such manipulations had significant impact on the degree of attitude change. But a problem exists with the manipulation of an absolute low credible source. The most carefully conducted research on this point is Greenberg and Miller (1966). After a series of experiments, the investigators concluded:

> Even though audience members were given information that should have prompted them to question severly the competence and trustworthiness of their sources, a number of respondents failed to rate the source's credibiliy low in any absolute sense. While this reluctance to respond negatively may have been partially due to the quality of the message, the investigators believe that some additional variable is involved. Specifically, as mentioned earlier, a normative standard may operate in such a manner that audience members give a source the benefit of a doubt (i.e., in the absence of personal experience with the source, audiences may respond to sources in a somewhat positive manner).

However, several plausible alternative explanations are also possible. First, instead of a "normative standard" there may exist a reluctance to use the negative end points of the seven point scale. Second, the question can be raised as to the degree to which "character" as operationalized by Greenberg and Miller (1966) is salient to credibility, which was operationalized in terms of competence and trustworthiness.

Further, it is not clear to what degree positive induction and negative induction messages have been comparable. For example, Kelman and Hovland (1953) attributed a persuasive speech to a respected judge (positive induction) and to a man who was described in such a way as to give "the impression of being an obnoxious, self-centered individual with a shady past and present" (p. 329). Such credibility inductions clearly have had impact on the amount of attitude change obtained. However, it is difficult to argue for a "normative standard" by which members of

the audience give the source a benefit of a doubt when there are several alternative explanations.

With the proposed model, the movement of a stimulus to a desired point may be accomplished by the design of a message that moves the stimulus through (potentially) several dimensions. A new technique proposed for political communication (Woelfel, Fink, Holmes and Cody, 1976, see Chapter 13, this volume), is directly applicable here. The technique provides the best solution for obtaining the shortest path between the location of the stimulus in the space and the desired location ("Ideal Credible Source"). The procedure takes into consideration all bipolar end points in the space, and, based on vector addition, computes either single vectors or n-vector resultants for moving the target to the ideal point. Thus, the technique provides information concerning what attributes should be associated with the target, which should be disassociated and the degree to which each attribute should be weighted in the message.

Conclusion

In sum, the assumptions of the semantic differential, and factor analysis of semantic differentials, are weakly supported. A new measurement model has been proposed that is both more commensurate with scaling assumptions and does not restrict every concept to have a projection on every attribute. The new model also possesses pragmatic advantage in the measurement of saliency of attributes.

REFERENCES

Anderson, A.B. Structure of semantic space. In E.F. Borgatta and G.E. Bohrnstedt (eds.), Sociological Methodology 1970, San Francisco: Jossey-Bass, Inc., 1970, pp. 308-325.

Anderson, A.B. Brief Report: the effect of aggregation on non-metric multidimensional scaling solutions. Multivariate Behavioral Research, July 1970, pp. 369-373.

Asch, S.E. Forming impressions of personality. Journal of Abnormal and Social Psychology, 1946, 41: 258-290.

Barnett, G.A. A Paradigm for the Measurement of Meaning. Unpublished manuscript, Department of Communication, Michigan State University, 1975.

Berlo, D., Lemert, J., and Mertz, R. Dimensions for Evaluating the Acceptability of Message Sources. Public Opinion Quarterly, 1969, 33, 563-576.

Bruner, J.S. and Taguiri, R. The perception of people. In G. Lindsey (ed.), Handbook of Social Psychology, Vol. 2, Cambridge: Addison-Wesley, 1954, pp. 634-654.

Bruner, J.S., Shapiro, D., and Taguiri, R. The meaning of traits in isolation and in combination. In R. Taguiri and L. Petrullo (eds.), Person Perception and Interpersonal Behavior. Stanford: Stanford University Press, 1958, 121-147.

Cronback, L.J. Processes affecting scores on 'understanding of others' and 'assumed similarity.' Psychological Bulletin, 1955, 52, No. 3: 177-193.

Cronback, L.J., and Glesser, G.C. Assessing similarity between profiles. Psychological Bulletin, 1953, 50, No. 6: 456-473.

Crow, W.J., and Hammond, K.R. The generality of accuracy and response in interpersonal perception. Journal of Abnormal and Social Psychology, 1957, 54: 384-390.

D'Andrade, R.G. Trait psychology and componential analysis. In E.A. Hammel (ed.), Formal American Semantic Analysis. Anthropologist Special Issue, 1965, 67 (5, pt. 2): 215-228.

Danes, J., and Woelfel, J. An Alternative to the Traditional Scaling Paradigm in Mass Communication Research: Multidimensional Reduction of Ratio Judgments of Separation. Paper presented at the annual meeting of the International Communication Association, Chicago, Illinois, April 1975.

Doherty, L.M. The Relationship of Multidimensional Scaling Spaces of Trait Adjectives for Different Reference Persons. Unpublished dissertation, Department of Psychology, University of Southern California, 1973.

Friendly, M.L., and Blucksberg, S. On the description of subcultural lexicons: a MDS approach. Journal of Personality and Social Psychology, 1970, 14: 55-65.

Gordon, T.F. Subject Abilities to Use Metric MDS: Effects of Varying the Criterion Pair. Paper presented at International Communication Association Convention, Portland, Oregon, April 1976.

Gulliksen, H. How to make meaning more meaningful. Contemporary Psychology, May 1958, III, 5: 115-119.

Green, R.F., and Goldfriend, M.R. On the bipolarity of semantic space. Psychological Monographs, 1965, 79, 6, #599: 1-131.

Gross, C.F. Intrajudge consistency in ratings of heterogeneous others. Journal of Abnormal and Social Psychology, 1960: 605-610.

Hanno, M.S., and Jones, L.E. Effects of a change in reference person on the multidimensional structure and evaluations of trait adjectives. Journal of Personality and Social Psychology, 1973, 28, 3: 368-375.

Hastorf, A.H., Schneider, D.J., and Polekfa, J. Person Perception. Menlo Park, California: Addison-Wesley, 1970.

Hastorf, A.H., Richardson, S.A., and Dornbush, S.M. The problem of relevance in the study of person perception. In R. Taguire and L. Petrullo (eds.), Person Perception and Interpersonal Behavior, Stanford: Stanford University Press, 1958, pp. 54-62.

Hays, W.L. An approach to the study of trait implication and trait similarity. In R. Taguiri and L. Petrullo (eds.), Person Perception and Interpersonal Behavior, Stanford: Stanford University Press, 1958, pp. 289-299.

Heston, J. Ideal Source Credibility: A Re-examination of the Semantic Differential. Paper presented at International

Communication Association convention, Montreal, Canada, April 1973.
Hovland, C., Janis, F., and Kelley, H. Communication and Persuasion. New Haven: Yale University Press, 1958.
Jones, E.E., and Nisbett, R.E. The actor and the observer: divergent perceptions of the causes of behavior. In E.E. Jones et al. (eds.), Attribution, Morristown, N.J.: General Learning Press, 1971.
Kelly, H.H. The warm-cold variable in first impressions of persons. Journal of Personality, 1951, 18: 431-439.
Kelly, G.A. The Psychology of Personal Constructs. New York: Norton, 1955.
Koltuv, B. Some characteristics of intrajudge trait intercorrelations. Psychological Monographs, 1962, 76 (ee, Whole No. 552): 1-33.
McCroskey, J., Jensen, R., and Todd, C. The Generalizability of Source Credibility Scales for Public Figures. Paper presented at Speech Communication Association convention, Chicago, Illinois, December 1972.
McCroskey, J., Jensen, T., and Valencia, C. Measurement of the Credibility of Peers and Spouses. Paper presented at International Communication Association convention, Montreal, Quebec, April 1973.
McLaughlin, M.L. Recovering the structure of credibility judgments: an alternative to factor analysis. Speech Monographs, 1975, 42: 211-228.
Messick, S.J. Metric properties of the semantic differential. Educational and Psychological Measurement, 1957, 17: 200-206.
Miller, G.A. A psychological method to investigate verbal concepts. Journal of Mathematical Psychology, 1969, 6: 169-191.
Mischel, W. Personality and Assessment. New York: Wiley, 1968.
Muliak, S.A. Are personality factor's raters conceptual factors? Journal of Consulting Psychology, 1964, 28: 506-511.
Newcomb, T. An experiment designed to test the validity of a rating scale. Journal of Educational Psychology, 1931, 22: 279-289.
Osgood, C.E., Suci, G.J., and Tannenbaum, P.H. The Measurement of Meaning. Urbana, Illinois: University of Illinois Press, 1957.
Passini, F.T., and Norman, W.T. A universal conception of personality structure? Journal of Personality and Social Psychology, 1966, 4: 44-49.
Rogers, E.M., and Shoemaker, F.F. Communication of Innovations. New York: Free Press, 1971.
Rosenbaum, L.L., Rosenbaum, W.B., and McGinnies, E. Semantic differential factor structure stability across subject, concept and time difference.
Multivariate Behavioral Research, October 1971: 451-469.
Rosenberg, S., Nelson, C., and Vivekananthan, P.S. A multidimensional approach to the structure of personality impressions. Journal of Personality and Social Psychology, 1968, 9: 283-294.

Rosenberg, S., and Sedlak, A. Structural representations of perceived personality trait relationships. In R.N. Shepard, A.K. Romney, and S. Nerlove (eds.), Multidimensional Scaling: Theory and Applications in the Behavioral Sciences, Vol. 11, New York: Seminar Press, 1972, pp. 133-162.

Schneider, D.J. Implicit personality theory: a review. Psychological Bulletin, 1973, 79, 5: 294-309.

Secord, P.F., and Berscheid, E. S. Stereotyping and the generality of implicit personality theory. Journal of Personality, 1962, 31: 65-78.

Shepard, R.N. A taxonomy of some principal types of data and of multidimensional methods for their analysis. In R.N. Shepard, A.K. Romney, and S.B. Nerlove, Multidimensional Scaling: Theory and Applications in the Behavioral Sciences, Vol. I, New York: Seminar Press, 1972.

Shrauger, J.S., and Patterson, M.B. Self-evaluation and the selection of dimensions of evaluating others. Journal of Personality, 1972, 42, 4: 569-585.

Talbott, A.D. A Study of the Generality of Dimensions of Source Evaluation. Unpubished Dissertation, Department of Communication, Michigan State University, 1968.

Thorndike, E.L. A constant error in psychological rating. Journal of Applied Psychology, 1920, 4: 25-29.

Todd, F.S., and Rappoport, L.A. A cognitive structure approach to person perception: a comparison of two models. Journal of Personality and Social Psychology, 1964, 68, 5: 469-475.

Wiggins, N., and Fishbein, M. Dimensions of semantic space: a problem of individual differences. In J.R. Snider and C.E. Osgood (eds.), The Semantic Differential Technique, Chicago: Aldine, 1969, pp. 183-193.

Wishner, J. Re-analysis of 'Impressions of Personality.' Psychological Review, 1960, 67: 96-112.

Wittgenstein, L. Philosophical Investigations. G.E.M. Anscombe and R. Rhees (eds.). G.E.M. Anscombe (trans.). Oxford: Blackwell Press, 1953.

Woelfel, J., Fink, E., Holmes, R. and Cody, M. A Mathematical Procedure for Optimizing Political Campaign Strategy. Paper presented at political division, International Communication Association convention, Portland, Oregon, April 1976.

Woelfel, J., Saltiel, J., McPhee, R., Serota, K., Barnett, G., Danes, J., and Cody, M. Orthogonal Rotation to Theoretical Criteria: Comparison of Multidimensional Spaces. Paper presented at the annual convention of the Mathematical Psychology Association, Purdue, Indiana, 1975.

Zajonc, R.B. Cognitive theories in social psychology. In G. Lindzey and E. Aronson (eds.), Handbook of Social Psychology, Vol. I, Reading, Mass: Addison-Wesley Press, 1969.