Psychological Review
1974, Vol. 81, No. 5, 392–425

STRUCTURAL ANALYSIS OF SOCIAL BEHAVIOR[1]

LORNA SMITH BENJAMIN[2]

Department of Psychiatry, University of Wisconsin and Wisconsin Psychiatric Institute

A brief review of the literature on structural analysis of interpersonal behavior is followed by a proposal which draws heavily from prior models, especially those of Schaefer and of Leary. The proposed model goes beyond previous ones in that it has a highly explicit structure which defines behavioral opposites, complements, and antidotes. Built on two axes named affiliation and interdependence, the model describes dyadic social interactions in terms of complementary proportions of those underlying dimensions. Opposite behaviors appear at 180° angles whereas complementary behaviors appear at topologically similar positions on two separate planes. Antidotes are defined as opposites of complements. Using the questionnaire method, the proposed structure has been tested by the responses of normal as well as psychiatric subjects. Analysis of these data by the techniques of autocorrelation, circumplex analysis, and factor analysis supports the model.

The assumption that behavior is orderly and lawful is the basis of scientific psychology. If the assumption is valid, then it should be possible to develop a model for predicting which particular behaviors will tend to be associated with each other. Analysis of the basic structure of social behavior is one possible approach which might be expected to yield such predictions. The need for a structural model of social behavior has been emphasized by Foa and Turner (1970):

> . . . there has been some reluctance to recognize that specification of psychological components is likely to be as complex in construction and as revolutionary in consequence as the notion of structure has been in nuclear physics and in genetics [p. 246].

Efforts to describe the structure of social behavior can be viewed in terms of two major categories: the multidimensional approaches which include as many dimensions as are needed to meet a given mathematical criterion, and the approaches which confine the number of dimensions to two or three so that a model can be constructed in real space. The multidimensional approach is exemplified by Cattell's 16 Personality Factor analysis of personality, and the real-space modeling approach is exemplified by Leary's (1957) interpersonal circle.

In defense of the multidimensonal approach, Cattell notes:

> The busy psychometrist may sometimes feel that sixteen sub-scores is a lot, but such is the real complexity of human nature, and if, as studies show, the majority of these personality characteristics are involved in most criterion predictions, a much better multiple correlation is to be obtained by respecting the complexity than by indulging in a fools paradise of over-simplification [Goldberg & Hase, 1967, p. 3].

In response to the charge of oversimplification, the modeling approach can name the advantages of parsimony and the manipulative possibilities following from having a picture of the model in real space. This paper will be concerned with the second alternative, namely models which are simple enough to be pictured in two or three dimensions.

The development of parsimonious structural models has been pursued, sometimes independently, by theorists from psychiatry and sociology as well as from psychology. At times there has been remarkable overlap in conceptualization suggesting independent convergence on a common underlying structure. Such overlap is illustrated by Chance (1966, p. 133) and Biermann (1969, p. 339)

[1] Special thanks for encouragement and help with the development of this paper go to Marjorie H. Klein and James Greenley; the editors of *Psychological Review* also made helpful contributions to the final version.

[2] Requests for reprints should be sent to Lorna S. Benjamin, Department of Psychiatry, University Hospitals, Madison, Wisconsin 53706.

who separately proposed identical models for describing social behavior in general and the process of psychotherapy in particular. Each of these theorists reduced Leary's interpersonal circle to the four quadrants based on axes representing the two dimensions: positive-negative and active-passive. Leary's (1957) interpersonal circle itself was first described in a paper by Freedman, Leary, Ossorio, and Coffey (1951) and was built on four nodal points: Dominate and submit were located opposite each other on the vertical axis, whereas love and hate were oppositional nodal points on the horizontal axis. Each category in the circle was defined in terms of these nodal points, so that, for example, boast was placed on the hate side of dominate, while teach appeared on the love side of dominate.

An interpersonal circle applying specifically to parental behaviors has been proposed by Schaefer (1965). In his earliest model, the vertical dimension was defined by the points control–autonomy, whereas the horizontal dimension was defined by the points love–hate. This model was supported by factor analysis of ratings of interviews with mothers in the home, children's reports of parent behavior, and teacher ratings of classroom behavior. A later version included a third dimension: lax versus firm control, and data in support of this model have been obtained (Ranson, Schaefer, & Levy, 1968; Schaefer, 1971) in several cultures including Japan, Canada, Czechoslovakia, Germany, Iran, and India. Schaefer compared his model with several others and noted many points of convergence. A similar conclusion about extensive overlap among models of parent behavior resulted from a literature search by Goldin (1969).

Interpersonal models such as those proposed by Leary (1957) and Schaefer (1965) can also be related to classical psychiatric theory. For example, Carson (1969) effectively used four categories derived from Leary (hostile–dominant; friendly–dominant; hostile–submissive; friendly–submissive) and related his view of interpersonal process to the psychiatric theories of Harry Stack Sullivan. Chance (1966, p. 132) related her version of Leary's interpersonal circle to Freud, Adler, Horney, Jung, and Fromm.

Rinn (1965) attempted to expand Leary's interpersonal circle so that it would apply to the intrapsychic domains of cognition and feeling as well as to social interaction. He suggested that models in these domains could be constructed such that specific cognitive attitudes and specific feelings would parallel specific interpersonal behaviors. For example, the behavior "affectionate" would be accompanied by the attitude "sociable" and the feeling "pleasant." Rinn's model does not comprehensively cover cognition and feeling, but the idea that cognition and feeling might have a structure which parallels interpersonal behaviors deserves further development. The need for such efforts has been detailed by Bergin and Strupp (1970):

> There is a renewed appreciation that internal, intrapsychic or experiential processes, whether they be of a feeling or of a cognitive nature, have considerable power to influence bodily processes, behavior and the general state of the organism. . . . Massive denials of the problem since the time of J. B. Watson have not obviated its importance [p. 25].

In addition to developing an accurate model for the structure of interpersonal behavior and its associated cognitive and feeling states, there is a need for a methodology which allows the application of this model to a single individual, to a person as a whole. Carlson (1971) noted that most studies of personality involve between-subject rather than within-subject comparisons and concluded:

> Personality psychology would seem to be paying an exorbitant price in potential knowledge for the security afforded by preserving the forms of convenience and methodological orthodoxy. Must these important, unanswered questions be left to the literature and psychiatry? [p. 207–209].

The present paper presents an extensive elaboration of the models of interpersonal behavior developed by Schaefer and by Leary. The proposed model has explicit logical and mathematical properties and is supported by within-subject as well as between-subject analyses of questionnaire data. There is no attempt here to develop exten-

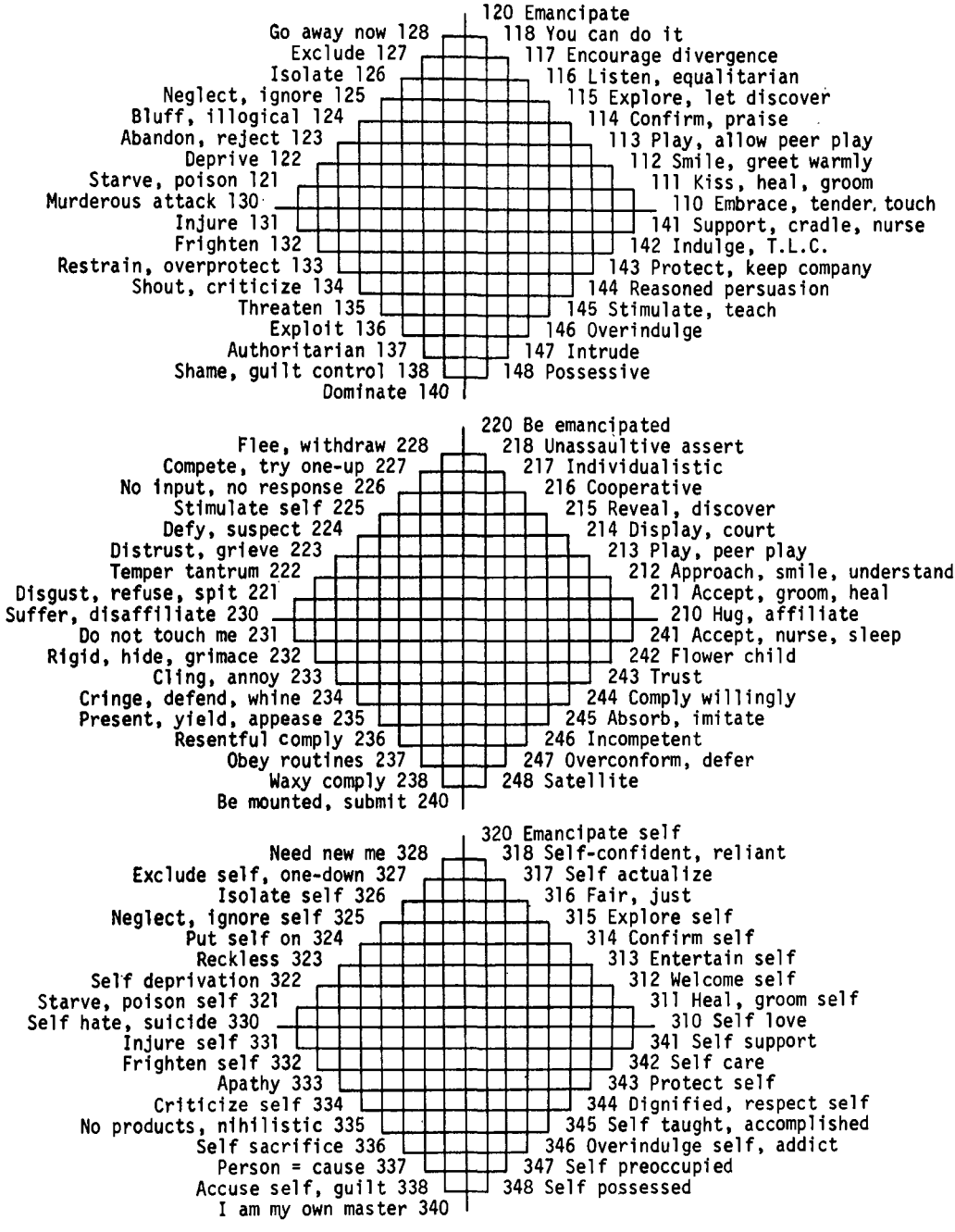


FIGURE 1. The chart of social behavior. (The first surface describes parentlike behaviors; the second, childlike; and the third, introjected attitudes from significant others. From "A Biological Model for Understanding the Behavior of Individuals" by L. S. Benjamin. In Jack Westman (Ed.), *Individual differences in children.* New York: Wiley, 1973, p. 220. Copyright 1973 by Wiley. Reprinted by permission.)

sions of the model to the domains of cognition or feeling.

A MODEL OF SOCIAL BEHAVIOR

The proposed model appears in a diamond shape on three planes or surfaces and is presented in Figure 1. The three surfaces are respectively named parentlike (top), childlike (middle), and introject (bottom). On the parentlike surface, behaviors which are prototypically characteristic of parents are entered, and, in general, these are active in nature and concerned with *what is going to be done to or for the other person.* On the second surface, the childlike plane, behaviors which are prototypically characteristic of children are listed; these are typically reactive and concerned with *what is going to be done to or for the self.* Thus the active–passive dimension of concern to Biermann (1969), Chance (1966), and Osgood (1957) is implicitly included by the presentation of the model in two planes: the first plane representing the active, concern-with-the-other domain, and the second plane representing the reactive, concern-with-the-self domain.

The horizontal axis in Figure 1 is named affiliation and compares to the horizontal axis in the models of Schaefer (1965) and Leary (1957) who were in agreement that one dimension should be defined by the poles of hate and love.

Leary named dominate and submit as opposites on the vertical axis whereas Schaefer indicated that in this dimension autonomy is the opposite of control or dominate. Each definition seems reasonable, but the resulting classifications are quite different. The model presented in Figure 1 resolves this dilemma by defining submit as the *complement* of dominate while calling emancipate (allow autonomy) the *opposite* of dominate or control. Thus the vertical dimension in the parentlike plane of Figure 1 ranges from dominate to emancipate, while the vertical dimension in the complementary childlike plane ranges from submit to be emancipated. This vertical dimension is named *interdependence.*

In general, opposite behaviors appear in Figure 1 at 180° angles on each plane, and complementary behaviors appear at topologically similar positions in the parentlike and childlike planes of Figure 1. For example, submit is the complement of dominate, and be emancipated is the complement of emancipate. Each successive point on the first (parentlike) surface of Figure 1 is matched by one in the same topological location on the second (childlike) surface, the two being complementary. Beginning with the point at 12 o'clock and moving clockwise, complementary pairs respectively shown on the parentlike and childlike surfaces of Figure 1 are *emancipate–be emancipated; you can do it–unassaultive assert; encourage divergence–individualism; equalitarian–cooperate; explore, let discover–reveal, discover.* Moving clockwise to a different quadrant starting at the point dominate (270°) the complementary pairs are *dominate–submit; shame, guilt control–waxy comply; authoritarian–obey routines; exploit–resentful comply; threaten–present, yield, appease; shout, criticize–cringe, defend, whine,* and so on around the model for a total of 36 complementary pairs.

The idea of specifying complements has also been put forward by Parsons (in Baldwin, 1967), Feffer (1970), Mueller (1969), Mueller and Dilling (1968), Schaefer (1971), Foa (1966), and Carson (1969). Although they mention the importance of the concept of complementary and reciprocity, these theorists have not yet developed the idea in depth.

The most explicit development of the idea of complementarity has been offered by Carson (1969) who states:

> When a person "offers" behavior falling within any of the quadrants of the interpersonal circle, he is, in effect, "inviting" the other person to adopt a complementary stance in respect to both of the principle dimensions within the circle [p. 147].

In Carson's terms, this means, for example, that the hostile–submissive person invites relations with a hostile–dominant person; and the friendly–submissive person invites response from a friendly–dominant person. Turning to developmental data, Carson fur-

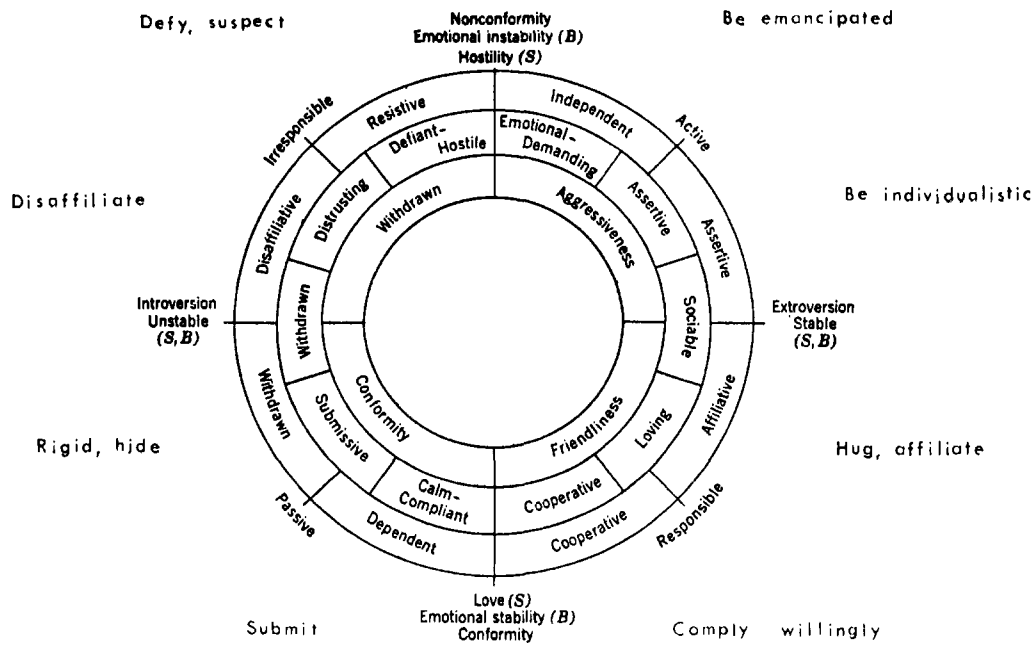


FIGURE 2. Maccoby and Masters' (1970) summary of two-factor child behavior models compared to the childlike surface of Figure 1. (The inner ring is Schaefer's model—axes indicated by S; the middle ring is from Becker and Krug's model—axes indicated by B; and the outer ring is from Baumrind and Black. Added points outside the three rings are from Figure 1. Adapted from "Attachment and Dependency" by E. Maccoby and J. C. Masters. In P. Mussen (Ed.), *Carmichael's manual of child psychology*. New York: Wiley, 1970, p. 119. Copyright 1970 by Wiley. Reprinted by permission.)

thers the point about complementarity: "Almost uniformly, studies . . . have come up with the same conclusion: hateful behavior in the parents begets hateful behavior in the child, and loving in the parents begets loving behavior in the child. [p. 151]."

The naming of the surfaces began with the fact that the first was based on Schaefer's (1965) factor analyses of parent behavior. Since the second surface was intended to complement the first, it seemed logical to assign it the name childlike. The naming of the second surface as childlike has validation in its resemblance to empirically based models of child behavior. For example, Maccoby and Masters' (1970) comparison of three different models of child behavior are reproduced in Figure 2, and representative points from the childlike surface of Figure 1 have been added. Figure 2 shows that the childlike surface of Figure 1 is quite consistent with existent models of children's behavior.

Behaviors charted on the first surface as parentlike are not necessarily more responsible or blameworthy than those classified on the second surface as childlike. The theory of Figure 1 suggests that persons occupying topologically similar positions on the first two surfaces are in complementary relation, but, as Carson suggests (1969), one member of a complementary pair is not more "responsible" for the combination than the other. Bell (1968, 1971) has recently urged the rejection of the popular frame-of-reference which assigns primary responsibility to the parentlike member of a dyad. The usefulness of regarding the parent and the child as equally responsible has recently been validated by stochastic analysis of mother–child interactions (Harper, 1971).

Nor do the complementary relations between the parentlike and the childlike surfaces describe permanent, fixed character traits or roles. An individual (parent, child, therapist, patient, boss, or employee)

could, for example, be characteristically and rigidly submissive but need not be. He might be dominant in some situations and submissive in others. Figure 1 is intended to describe the structure of dyadic interactions at any given moment, but the prototypic names parentlike and childlike are not intended to imply rigidity of role. However, it is possible to use Figure 1 to understand any consistent trends in behavior which do characterize a given adult. For example, an individual characteristically relating to those in authority with marked deference may be continuing a role begun with parents during early childhood. Or a person who is characterologically dominating may be identifying with a chronically controlling parent. Variations on this theme of the relation between adult behavior and experience with significant others during childhood are explored elsewhere (Benjamin, 1973, p. 237). The idea of relating adult behavior to childhood experience with parents is, of course, a basic principle of psychoanalysis, and it has recently been convincingly extended to include siblings as an influential early cause of consistencies in adult behavior (Toman, 1971).

All points in Figure 1 are represented in terms of complementary proportions of the basic dimensions: affiliation and interdependence. The points can be described by the equation $|X| + |Y| = 1$, where X refers to points on the abscissa, and Y to those on the ordinate. For example, on the parentlike surface, the point *stimulate, teach* has $+4/9$ affiliation and $-5/9$ independence. The absolute values of these coordinates sum to 1. If the square of X and Y had been used, then Figure 1 would appear as a circle rather than as a diamond. Use of absolute values of X and Y instead of the squares is conceptually more parsimonious and allows the poles of the axes to be more salient than they would be if the surfaces were circles. The poles of the axes represent primitive, "basic" behaviors which could, loosely speaking, be named sexuality, power, murder, and separate territory. Points located progressively further and further from these poles are less primitive; those midway between the poles are the most "civilized." For example, on the top surface of Figure 1, at about 45°, the points *confirm, praise* and *explore, let discover* appear; at about 315°, the points *stimulate, teach* and *reasoned persuasion* appear. These are quite "balanced" and genteel by comparison with sheer power, murder, sexuality, and autonomy located at the poles.

Debating the relative merits of using diamond or circular shapes for the planes in Figure 1 is less important than testing the basic logic of arranging behaviors on a closed continuum which allows definitions of opposites and complements. The most critical tests of the basic logic of Figure 1 are the within-subject autocorrelations and the between-subject factor analyses appearing later in this paper.

Whereas the parentlike and the childlike surfaces describe *inter*personal behaviors, the third or introject surface describes *intra*personal behaviors or attitudes, that is, behaviors directed toward the self rather than toward others. Points on the introject surface were named by deducing what would happen if parentlike behaviors charted on the first surface were directed toward the self. For example, starting at 270° on the first and third surfaces, dominating behavior turned inward results in the point *be my own master. Shame, guilt control* turned on the self results in *accuse self, guilt; shout, criticize* turned inward results in *criticize self.* This logic for naming third-surface points applies for every topologically similar set of points on the first and third surfaces, respectively.

The idea that attitudes toward the self represent introjection of the way one has been treated by significant others has precedent in both the clinical and research literature (e.g., Herbert, Gelfand, & Hartman, 1969). Sullivan (1953, p. 16) was a major clinical exponent of the point of view that from early infancy, a child's self-concept reflects the way others thought of him and treated him. The psychoanalytic idea of introjection has also been formulated in sociological terms (Cottrell, 1971): "The self emerges and is perceived by the individual

only through the responses of reference—others whose role he takes toward his own acts [p. 552]." Cottrell credits this formulation to George Herbert Mead who first described "taking the role of the other." Foa (1961, 1966) and Parsons (in Baldwin, 1967) are two other theorists who also endorse the idea that self-concept reflects experience with significant others. Recent surveys (Coopersmith, 1967) have confirmed the relation between parent–child interactions and children's self-concepts and have demonstrated a relation between self-concept and behavior (Felker & Thomas, 1971).

The points on all three surfaces of Figure 1 are assigned a code number which reflects the structure of the chart. All points on the first surface begin with a 100s digit; those on the second surface, with a 200s digit; and those on the third surface, with a 300s digit. The 10s digit of the respective code numbers is assigned according to the conventions of geometry: 1, 2, 3, and 4 for the respective Cartesian quadrants. The 1s digits range from 0 (for points on the poles of the axes) to 9, describing the 9 successive subdivisions of each quadrant. The main advantage of the coding system is that it facilitates finding points on the model. For example, the point *neglect, ignore* is identified by the code number 125 as being on the parentlike surface, second quadrant, fifth subdivision. A discussion of some implications of the code numbering system and illustrations with everyday examples appears elsewhere (Benjamin, 1973).

Antidotes are specified in terms of the complement of the opposite. In other words, the antidote for a given behavior is found at the point complementary to its opposite. For example, the antidote to *defy, suspect* (224) is found by first noting the opposite point, *comply willingly* (244), and then finding its complement, *reasoned persuasion* (144). Figure 1 specifies that if a person is in the interpersonal posture described by the point *defy, suspect* (224), he is perceiving the other member of the dyad as behaving according to point *bluff, illogic* (124). Thus, the member who is being defied and suspected must change from −5/9 affiliation to +5/9 affiliation (i.e., *be more friendly*); and from 4/9 emancipation to 4/9 domination (i.e., *assume more interpersonal power*). If he can do this, then his *reasoned persuasion* (144) should elicit *comply willingly* (244). In practice, the switch from disaffiliation to genuine affiliation and from hostile emancipation (negligence) to moderate power, is not always easily done; the figure specifies what is needed as an antidote to *defy, suspect* (224) but does not indicate how to do it. The first two surfaces of Figure 1 describe 36 such sets of behaviors and antidotes.

The model in Figure 1 could be elaborated upon in terms of its relation to other literature (clinical, infrahuman primates) as well as in terms of clinical within-subject applications. Available examples of the latter include (*a*) measurements of patient change, (*b*) measurements of changes in the interpersonal style of therapists in training, (*c*) descriptions of developmental changes in parent–child interactions, and (*d*) comparisons of memory of childhood relations with parents to adult relations with significant others. These possibilities will be presented elsewhere, and the present paper will be devoted to the available formal statistical tests of the validity of the model.

ANALYSIS OF THE MODEL

Data have been obtained through a series of questionnaires labeled A, B, and C. The Series A questionnaire allowed rating of individuals in terms of the points on the first two surfaces of Figure 1. For example, the item describing the point *dominate* (140) read:

> My _____ is the boss of our relationship, always "on top," in control of, in charge of how we use the available time, space and supplies. He/she insists I comply with him/her quickly and quietly "just because he/she said so."

The rater was asked to read into the blank the name of significant others such as spouse, parent, boss, or therapist. For the most

part, items were worded[3] in concrete behavioral terms and required no sophisticated reasoning for interpretation. Years of clinical experience are not required to understand the relation between the above item and the concept "dominate." Such direct rating of behaviors has recently been shown to be more effective in predicting behavior (Goldfried & Kent, 1972) than the procedure of predicting behavior from indirect measures of hypothetical personality constructs.

Each item was rated on a scale ranging 0–100 with 10-point intervals marked and anchor points labeled NOT AT ALL (descriptive of the person being rated) at 0; MODERATELY at 50; and PERFECTLY at 100. Use of this simple single-stimulus procedure for measurement rather than the more prestigious forced-choice format (Cronbach, 1960) is supported by Scott's (1968) investigation of major personality tests given under different formats with comparable results. The rationale for forced-choice format has usually been that it reduces the possibility of defensive distortion, but Scott's results challenge this assumption.

The ratings are interpreted as measuring the subject's *view* of his relations with significant others in both his present and his past. It is assumed that these ratings of perceptions (e.g., memory of how mother behaved) relate more importantly to the rater than do the actual behaviors of the people being rated (e.g., how mother actually behaved). Stated another way, the assumption is that one is moved by how one sees the world more than by how the world really is.

An alternate series of questions, Series B, reworded the Series A items so that the rater was rating himself in relation to the other person rather than simply rating the other. For example, the self-rating Series B item for the point *dominate* (140) was

I am the boss of my relationship with my _____. I am always "on top," in control of, in charge of how we use the available time, space and supplies. I insist he/she comply with me quickly and quietly "just because I said so."

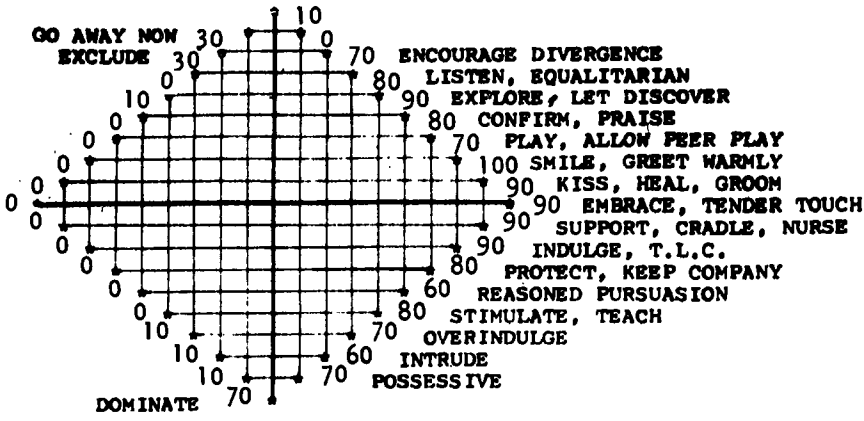
Self-reports have been criticized on the grounds that defensiveness precludes accuracy, and the inference usually is (e.g., McClelland, 1972) that indirect methods such as the Thematic Apperception Test or the Rorschach are needed to get at the truth. However, at least one recent study (Scott & Johnson, 1972) has shown that self-reports can correlate better with peer ratings than do the indirect, more "sophisticated" personality measurements. There is, then, no pretense of outsmarting the subject by penetrating defenses with subtle items and complicated expert inferences. The approach is simply consistent with the old medical axiom: "If you want to know what is the matter with the patient, ask him." It is understood that the subject's answer is not the whole story, but it appears to provide an excellent starting point for inquiry.

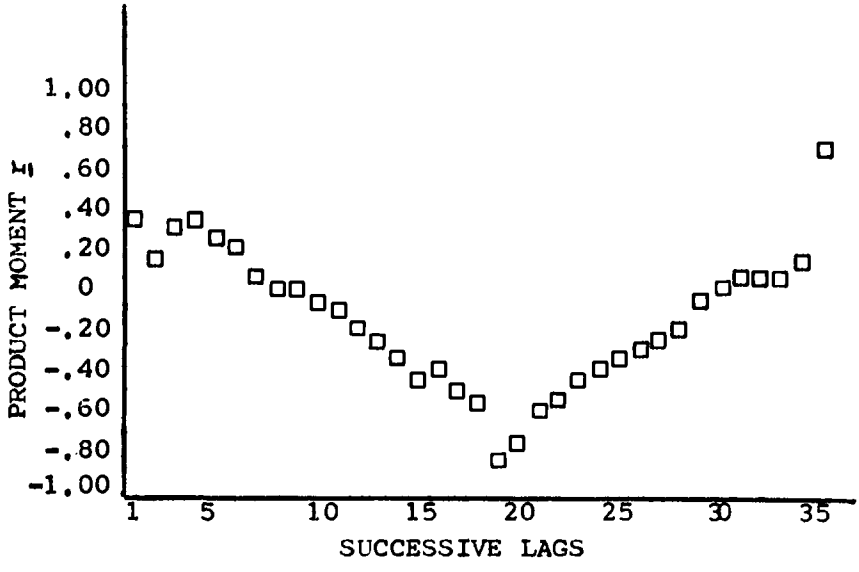
A third questionnaire, Series C, allowed raters to score themselves in general terms on each of the 108 points in Figure 1. The wording was so general that results of Series C ratings might be interpreted as measuring traits, or habitual ways of relating. For example, the wording for the point *dominate* (140) was "I control, am responsible for what happens to others. Both the good and the bad which happens to others is related to something I have done, or have not done." The wording for the point *I am my own master* (340), representing domination turned inward, was "I am responsible for, in control of, what happens to me. I plan ahead, look back, set my bearings and set sail. I am the captain of my ship, the master of my fate."

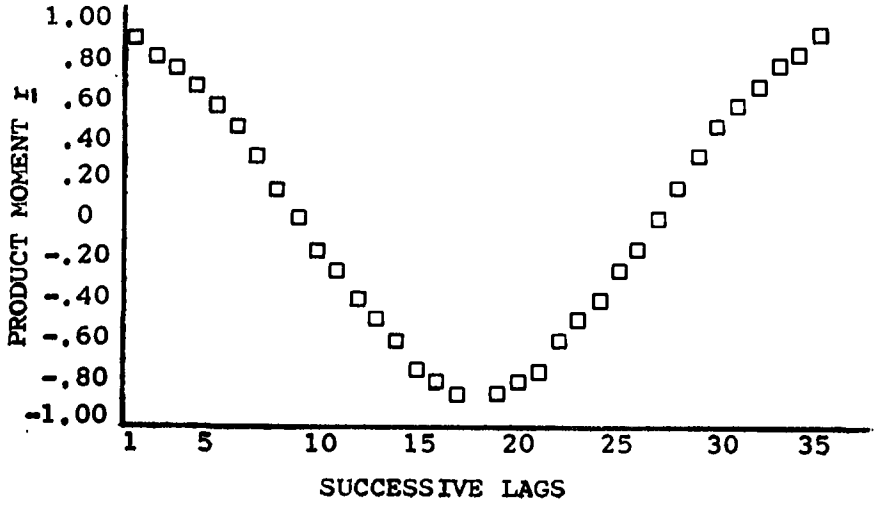
Statistical tests reported in the remainder of this paper are based on the following samples.[4] (*a*) Maternal ratings of their nor-

[3] The wording of the items was refined during many meetings with interested psychiatric residents. Special thanks go to James Guerro, Glen Schurette, Nancy Caine, Russell Caine, and Bruce Holtzman.

[4] I would like to acknowledge the generous cooperation of Thomas V. Geppert and his colleagues at the Dean Clinic of Madison, of Marc Hansen and his colleagues at the University of Wisconsin Family Health Service, of Mourad Arganian of the University of Wisconsin Child Psychiatry Section, and of innumerable psychiatric residents at the University of Wisconsin Department of Psychiatry.


GO AWAY NOW
EXCLUDE
ENCOURAGE DIVERGENCE
LISTEN, EQUALITARIAN
EXPLORE, LET DISCOVER
CONFIRM, PRAISE
PLAY, ALLOW PEER PLAY
SMILE, GREET WARMLY
KISS, HEAL, GROOM
EMBRACE, TENDER TOUCH
SUPPORT, CRADLE, NURSE
INDULGE, T.L.C.
PROTECT, KEEP COMPANY
REASONED PURSUASION
STIMULATE, TEACH
OVERINDULGE
INTRUDE
POSSESSIVE
DOMINATE


PRODUCT MOMENT r
1.00
.80
.60
.40
.20
0
-.20
-.40
-.60
-.80
-1.00
1
5
10
15
20
25
30
35
SUCCESSIVE LAGS


PRODUCT MOMENT r
1.00
.80
.60
.40
.20
0
-.20
-.40
-.60
-.80
-1.00
1
5
10
15
20
25
30
35
SUCCESSIVE LAGS

mal children (Series A) and of themselves in relation to these children (Series B) were obtained through pediatrics outpatient clinics ($n = 171$). (*b*) Maternal ratings of children brought to a child psychiatry clinic (Series A) and of themselves in relation to these children (Series B) were obtained ($n = 51$). (*c*) Undergraduate students (mostly female) in a class on family life rated themselves on Series C ($n = 200$). (*d*) There was a sample of persons willing to rate an entire battery of questionnaires including ratings of themselves in general (Series C), of a significant other person (Series A), and of themselves in relation to that significant other person (Series B); their memory of their mother in early and middle childhood (Series A) and of their relation to her at that time (Series B); their memory of their father in early and middle childhood (Series A) and of their relation to him at that time (Series B). (There were 110 subjects, including 60 normal and 50 psychiatric subjects.) (*e*) The battery of questionnaires mentioned in *d* usually took 4–8 hours for completion and has recently been replaced by a *short-form* series. In the short-form series, each chart point is represented by a brief phrase presented in randomly selected order. For example, the phrase describing chart point *dominate* (140) is "controls, is in charge of me." In the short-form series, ratings are made on a 5-point scale labeled 0, 25, 50, 75, and 100; only odd-numbered chart points are sampled in one form (Short Form 1), whereas even-numbered chart points are measured in the other (Short Form 2). The short-form battery can be completed in less than an hour, and early returns suggest results are comparable to the long-form procedure. (The subjects were 36 medical students, 6 psychiatric patients, and 50 psychiatric residents and their supervisors rating each other.)

Data have been gathered over a period of four years, and the analyses presented are representative but by no means exhaustive. Analyses presented include (*a*) autocorrelations among items corresponding to points on Figure 1 confirming its structure; (*b*) a circumplex table of correlations confirming the structure of Figure 1; (*c*) factor analysis yielding the proposed underlying dimensions and generating a reasonable facsimile of Figure 1; (*d*) the principle of complements being confirmed by correlations between surfaces; (*e*) reliability being high in normal samples and being used to characterize subjects; and (*f*) rating in terms of social desirability being shown to characterize normal subjects and endorsements of socially undesirable items being more likely in psychiatric subjects.

Autocorrelations Among Items: Within-Subjects Analysis

Autocorrelations among items corresponding to points on Figure 1 confirm its structure. Individual subjects, their spouses, therapists, or other relevant persons can be shown the computer analysis of the ratings in the form shown in Figure 3. This is an analysis of a single subject, and it allows a formalized examination of relations among memories of early childhood experience and adult behavior. The format of Figure 3, to be discussed in detail below, allows individuals to compare their perceptions among relations with their parents, spouses, and children. There have been many dramatic moments when subjects have viewed the computer analysis of their ratings and convincingly made or accepted observations such as "I'm treating my son just like my father treated me"; "I choose boyfriends who are mean to me in the same way my mother was"; "I'm just exactly the opposite of everything my father was"; "My husband treats me just like my mother did, and I react to him just as I did to her." The exposition of the clinical implications of this

FIGURE 3. Maps and autocorrelations. (Data are from a mother's ratings of her own parent-like behavior in relation to her 18-month-old son. The map at the top of the figure shows chart points receiving above-median endorsement and presents the raw data for each respective item. The middle figure presents 18-point autocorrelations performed on these ratings, and the bottom figure, the 36-point autocorrelations.)

procedure is beyond the scope of the present paper which is to be confined to formal testing of the structure of Figure 1.

Data for Figure 3 were from a mother's ratings of her own parentlike behavior in relation to her 18-month-old son. The top part of the figure presents a *map* of this part of her responses to the Series B questionnaire. In constructing a *map*, the computer program finds the subject's median rating of all items of the questionnaire (i.e., not just the parentlike items) and prints out the name of the chart points receiving above-median endorsement along with the score actually assigned to the corresponding item. Thus the map presents the chart points whose items were judged to be relatively more characteristic of the person being rated and gives a phenomenological impression of the nature of the relationship. The map at the top of Figure 3, for example, has most above-median endorsements falling on the affiliative side of the chart, suggesting a basically friendly mother–son relationship. Such friendliness is typically obtained in normal populations and from subjects asked to rate the questionnaires in terms of their ideal of what a good relationship should be. The map in Figure 3 deviates slightly from the normal and the ideal in that there is more than usual endorsement of friendly power (overindulge = 70, intrude = 60, possessive = 70) and of unfriendly allowing of autonomy (go away now = 30, exclude = 30). It might be noted in passing, however, that excessive endorsements of friendly power (intimacy, symbiosis) alternating with the opposite tendency to exclusion is quite common between mother and child when the child is in the age range 18–24 months; the data on this theme are completely consistent with the clinical observations of Mahler (1968).

The bottom third of Figure 3 presents a set of 36-pair autocorrelations (*df* for each $r = 34$) computed for the data appearing in the map in the top third of Figure 3. For example, the r at Lag 1 was obtained by pairing the scores for adjacent points on Figure 1. In other words, the score for the item describing the point *encourage divergence* (70) was paired with the score for *listen, equalitarian* (80); the score for *listen, equalitarian* was paired with the score for *explore, let discover* (90). At Lag 2, rs were among points two steps apart. For example, the score for *encourage divergence* (70) was paired with the score for *explore, let discover* (90); the score for *listen, equalitarian* (80), with that for *confirm, praise* (80), and so on. At successive lags, pairings were among points hypothesized to be further and further apart until at Lag 17, near opposites were paired: *encourage divergence* (70) was paired with *shame, guilt control* (10); *listen equalitarian* (80) was paired with *authoritarian* (10), and so on.

The bottom third of Figure 3 shows that when adjacent points were paired, rs were high and positive; when orthogonal points were paired (Lag 9), rs were near zero; when opposite points were paired, rs were large and negative. The smooth, nearly continuous transition from lag to lag shown for the single subject in Figure 3 was highly characteristic of individuals from normal populations. Typically, the autocorrelations appeared in the inverted-normal curve form shown at the bottom of Figure 3. To document the generality of that finding, it was convenient to select a single number representing the degree to which each subject's autocorrelation approximated the inverted-normal curve shape. Such a number was found in the product-moment correlation coefficient (r) between each autocorrelation curve and an inverted normal Z curve (Grant, 1962). The right-hand side of the autocorrelation curve shown in the bottom of Figure 3 appears in mirror image to the left-hand side because of the statistical redundancies which will become apparent to the reader who computes a few sample rs using the raw data from the top of Figure 3. The 36 pairs involved in computing the r at Lag 1 were identical to those involved in the r at Lag 35; those for Lag 17 were identical to those for Lag 19, and so on. Because the 36-point autocorrelations appeared in mirror image, only half of the points in the autocorrelation curve (Lags 1–17) and half of the points in the normal Z curve

($Z = 3.70$ to $Z = 0$) were used, yielding $df = 15$ for each test of goodness of fit.

The r (15) between the inverted-normal curve and the autocorrelation curves can be regarded as a coefficient of internal consistency since it reflects the degree to which raters gave similar ratings to items sampling chart points hypothesized to be adjacent; the degree to which they gave opposite ratings to items sampling points hypothesized to be opposites; and the degree to which they showed no relation among items hypothesized to sample orthogonal points. Typically, the r (15) measuring internal consistency was near .90 in the long-form questionnaires. For example, for 15 different analyses, the range of average rs in a sample (sample 4) of 60 normal subjects was .83–.98, and the average of the average was .92. Such internal consistency was obtained to a slightly lesser degree in the short-form questionnaires. A group of 36 medical students showed an average coefficient of internal consistency of .89, when averaging across ratings of self and of relations with significant others (range .79–.93).

Autocorrelations such as those shown at the bottom of Figure 3 were invulnerable to changes of the order of the items in the questionnaire. Results suggest that at least the language of the questionnaires (if not also the actual behaviors described by that language) conforms to the structure proposed in Figure 1.

To avoid the mirror imaging involved in the 36-point autocorrelations, an even harsher test of the structure of Figure 1 was constructed using two series of 18-pair correlations rather than one series of 36-pair correlations; the results appear in the middle of Figure 3. Here, there were no mirror images. The first 18 lags of the middle part of Figure 3 were obtained by taking the 18 points on the disaffiliative side of the chart (i.e., Chart Points 140, 138, 137, 136, . . . 128) and computing lags by "spilling over" into the affiliative side of the chart as needed. For example, Lag 1 paired data for Points 140–138, 138–137, 137–136, . . . 128–120; Lag 2 paired Points 140–137, 138–136, . . . 128–118, . . . ; Lag 17 paired Points 140–128, 138–120, 137–118, . . . 128–147. The final 17 lags were obtained by taking the 18 points on the affiliative side of the chart (120, 118, 117, . . . 148) and "spilling over" into the disaffiliative side, as needed. For example, Lag 19 paired Points 120–138, 118–137, 117–136, . . . 148–120. Lag 35 paired Points 120–118, 118–117, 117–116, . . . 148–140. Thus, the 18-pair autocorrelations shown in the middle of Figure 3 involved 35 rather than 17 different autocorrelations. Because they had less than half the degrees of freedom ($df = 16$ rather than $df = 34$), these 18-point autocorrelations were much less orderly than the 36-point autocorrelations. Lags 1–17 and 18–35 of the 18-point autocorrelations did not involve mirror images and therefore were each independently compared to an appropriate part of the normal curve. The average of the separate halves of these 18-point autocorrelations was the final number used to represent the degree to which successive 18-point autocorrelations approximated the inverted-normal curve shape.

Developmental norms for 18- and 36-point autocorrelations are presented in Figure 4. Data are from sample (sample 1) maternal ratings of pediatric outpatients. Inspection of the figure reveals at least four features of autocorrelation curves as described by their correlations with an inverted-normal Z curve: (*a*) The 36-point autocorrelations consistently appeared in close approximation to the inverted-normal curve. From Age Group 7–9 through Age Group 14–21, the average rs were near .90 for both parentlike and childlike behaviors. The practice of sampling at points closer in real time during the first five years of life (shown on the abscissa of Figure 4) is based on tradition within developmental pediatrics; this, in turn, is based on the fact that most of the physical development of the brain and head occurs within the first five years of life (see Tanner, 1970, p. 85). (*b*) The 36-point correlations for *childlike* behaviors correlated about .90 with an inverted-normal Z curve beginning with the first five months of life and continuing through the entire age range studied. It appears that child-

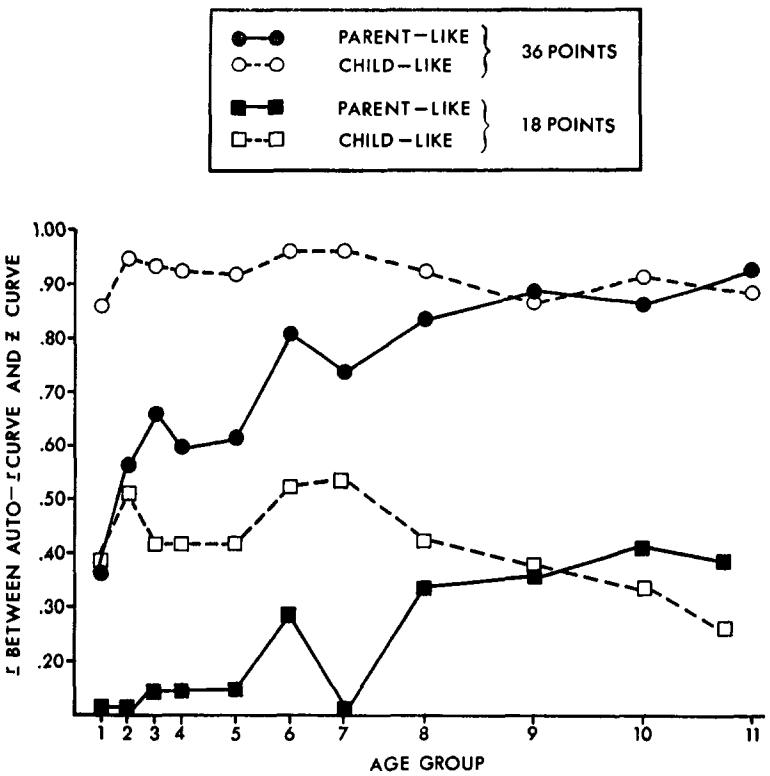


FIGURE 4. Comparison of developmental trends in 36-point and 18-point autocorrelations. (Each individual's respective autocorrelation curves—see Figure 3—were correlated with an inverted-normal-Z curve to measure goodness of fit, $df = 15$. Sample was of 171 normal children. Group 1 = age 0–5 months; Group 2 = 6–11 months; Group 3 = 12–17 months; Group 4 = 18–23 months; Group 5 = age 2; Group 6 = age 3; Group 7 = age 4; Group 8 = age 5–6; Group 9 = age 7–9; Group 10 = age 10–13; Group 11 = age 14–21.)

like behavior conforms to the structure of Figure 1 from the earliest years. (*c*) Autocorrelations of ratings of children's *parentlike* behavior became progressively more orderly with increases in age. For Age Group 0–5 months, the r between 36-point autocorrelations and the inverted-normal Z curve was below .40; it showed nearly progressive increases with each successive age group until parentlike behavior reached an adult level in the age range 7–9. It appears that parentlike behavior requires developmental time and/or experience to approximate the structure proposed in Figure 1. (*d*) The 36-point autocorrelations always appeared in closer approximation to the inverted-normal curve than did the 18-point autocorrelations performed on the same data. In Figure 4, the average rs between the 36-point autocorrelation curves for childlike behavior and the inverted-normal curve rarely dropped below .90 whereas those for the 18-point autocorrelations did not exceed .55. Not shown in Figure 4 were the rs for mothers rating their own parentlike behavior in relation to their children; the average of these 36-point rs for any of the age groups shown in Figure 4 never dropped below .90. Such high-average rs were also obtained in the sample of 110 individuals rating the entire battery. Because the 36-point autocorrelations typically correlated so highly with the inverted-normal curve, failure to obtain r in the .90

range is considered remarkable whereas it would not be so noteworthy in the case of 18-point *r*s. Clinical applications of failures to obtain *r*s in the .90 range for 36-point autocorrelations curves are discussed subsequently in High Reliability in Normal Samples, and subsequent references to autocorrelation curves will refer exclusively to the 36-point type.

Circumplex Table of Correlations: Between-Subjects Analysis

A circumplex table of correlations confirms the structure of Figure 1. Most personality tests consist of one or more dimensions, with many items on the test measuring each dimension represented. Thus the Minnesota Multiphasic Personality Inventory (MMPI) has many items on the schizophrenia scale, many on the depression scale, and some belonging to both scales. The usual procedure in personality measurement is to have many items repeatedly sampling within one or more dimensions. However, the questionnaires testing Figure 1 sampled two underlying dimensions but did not attempt to develop two sets of homogeneous scales, one representing pure affiliation, and the other, pure interdependence. Rather, the questionnaires used items hypothesized to simultaneously measure both dimensions to systematically varied degrees. Thus, the item for *stimulate, teach* (145) theoretically sampled relationship in the amount of 5/9 affiliation and 4/9 domination and was not intended to belong either to a set of homogeneous items measuring the behavior trait called dominance or to a dimension called affiliation. There is little precedent in the literature for attempting measurement of behaviors not clearly assigned to specific scales, but the possibility and need for such an approach has been recognized (Horst, 1968).

> It may be desired to evaluate the ability to react appropriately to interrelated stimulus elements. In that case, a stimulus situation must be defined as a set of interrelated elements to which the appropriate response is one which recognizes these interrelationships. Such types of stimulus patterns imply a highly sophisticated type of measurement and very little research has been done with them. We shall not go further into this apparent contradiction of the rule that stimulus elements should be independent [p. 6].

The existing exception for the philosophy of having sets of homogeneous items measuring independent dimensions is the circumplex method which has been used in personality measurement research to systematically sample points thought to lie in varying degrees between two underlying dimensions. The circumplex method is an outgrowth of Guttman's (1966) facet theory which defines variables systematically in terms of their component facets. Foa (1961) explains his application of Guttman's facet theory:

> It seems indeed that a circular arrangement can always be described on two dimensions. On the other hand, not every two-factor structure will necessarily produce a circumplex. The circumplex requires the existence of an interrelationship between the factors. A sufficient condition for a circumplex is that the factor loadings of every Variable *i*, belonging to the set, stand in the relationship:
>
> $$c^2a^2_i + k^2b^2_i = h^2,$$
>
> where c, k, and h are arbitrary constants, and a_i and b_i are the loadings of Variable i on the first and second factors, respectively.
>
> This is the well known equation of the ellipse, When this relationship between factor loadings exists, the predicted correlation coefficients, $r_{ij} = a_ia_j + b_ib_j$ can be ordered in a circumplex pattern [p. 346].

In application, (Guttman, 1966) a circumplex will yield a matrix wherein ". . . the higher correlations are found near the main diagonal; moving away from the diagonal cell the coefficients decrease and then increase again [p. 455]." Although Figure 1 is based on absolute values rather than squares of the components, the circumplex rationale can be applied because the sequencing of points is the same in a diamond as it would be in a circle.

Table 1 presents the intercorrelations among maternal ratings of 221 children (171 normal, 50 psychiatric; Samples 1 and 2 combined) in terms of the 36 points on the childlike surface of Figure 1. The circumplex pattern is confirmed; loadings near the diagonal are high and positive (in the .40–.50 ranges; $df = 219$, $r = .14$, signifi-

TABLE 1—CORRELATIONS AMONG CHART

Chart points	210	241	242	243	244	245	246	247	248	240	238	237	236	235	234	233	232	231
210		28	13	26	06	14	10	0	06	12	0	−04	−14	12	−10	08	−23	−22
241			49	51	33	38	0	10	10	21	09	05	−24	−03	−20	04	−37	−27
242				42	29	42	−15	08	07	24	24	10	−21	11	−23	01	−39	−37
243					29	44	08	16	21	23	15	20	−06	15	−11	14	−30	−19
244						36	−02	28	23	34	26	35	−01	31	−03	−05	−14	−11
245							05	32	29	13	17	22	−09	10	−02	27	−16	−14
246								20	21	04	07	23	43	25	45	34	26	28
247									40	23	36	39	22	34	21	30	01	04
248										24	30	21	13	26	14	25	−01	0
240											36	17	09	23	02	0	−16	−14
238												09	21	31	−02	09	−05	−09
237													24	24	27	14	16	17
236														35	37	19	40	39
235															20	19	06	10
234																25	40	45
233																	05	05
232																		73
231																		
230																		
221																		
222																		
223																		
224																		
225																		
226																		
227																		
228																		
220																		
218																		
217																		
216																		
215																		
214																		
213																		
212																		
211																		

Note. Total subjects (N = 221) include 50 child psychiatry patients and 171 normal children.

cant at the .05 level), and those in the middle range are distinctly negative (quite a few are significantly negative). Proceeding away from the diagonal, there is a gradual return of the rs to the original high-positive range. This same circumplex pattern was obtained in other samples for both the parentlike and the childlike surfaces. In no analysis was there any shuffling of the points in Figure 1 to obtain a better circumplex. The arrangement of the Figure was on an a priori basis, and Table 1 followed directly. Ultimately Figure 1, as well as the questionnaire, may be refined on the basis of such post hoc rearrangements, but the order in Table 1 was not due to any such "trial and error" manipulating.

The circular ordering shown in Table 1 was consistent with the circular ordering suggested by the autocorrelations of Figures 3 and 4. However, the data in Table 1 were based on between-individual comparisons. Thus, the structure hypothesized in Figure 1 is confirmed by both within-individual, and between-individual comparisons.

Factor Analysis: Between-Subjects Analysis

Factor analysis yields the proposed underlying dimensions and generates a reasonable facsimile of Figure 1. Factor analysis is

POINTS ARRANGED IN CIRCUMPLEX ORDER

230	221	222	223	224	225	226	227	228	220	218	217	216	215	214	213	212	211
−12	−19	−10	−18	−14	02	−19	−11	−17	−24	14	16	20	08	14	15	34	22
−21	−36	−12	−28	−22	−04	−28	−13	−21	−22	25	39	34	39	34	39	43	44
−26	−31	−34	−24	−27	−05	−28	−16	−22	−27	25	21	38	30	28	38	40	50
−21	−20	−07	−15	−11	0	−17	−08	−20	−20	16	24	25	29	40	34	38	43
−06	−12	−19	04	−18	04	−04	14	−11	−09	25	27	48	33	28	16	15	15
−07	−16	07	−10	−01	0	−12	−04	−11	−12	19	24	27	28	46	40	38	48
28	30	24	29	30	26	35	24	28	16	−15	−10	−17	−06	07	−12	−02	−03
09	09	10	15	08	0	0	16	05	04	18	03	23	11	27	09	14	09
07	−02	10	17	03	04	05	20	02	02	09	01	13	09	16	02	10	11
−10	−14	−24	04	−11	−15	−04	07	−08	−15	06	07	20	05	03	16	18	06
03	−01	−12	08	−09	−04	06	10	−02	−06	01	−02	20	13	06	0	02	16
12	19	14	23	20	20	16	21	16	11	19	17	31	15	30	12	13	03
34	43	28	37	42	20	47	28	41	32	−03	−14	−04	−09	−03	−15	−15	−24
07	15	−11	15	12	15	21	13	11	07	09	−02	24	04	05	−04	10	04
43	46	39	37	39	24	46	25	40	27	0	−04	−03	01	01	−08	02	−10
12	09	26	12	16	16	04	16	16	01	−10	−10	01	−07	13	03	18	18
51	66	39	41	48	27	56	33	53	52	−09	−14	−14	−10	−14	−28	−27	−31
61	67	38	34	47	31	57	36	57	49	−07	−05	−10	−04	−07	−21	−21	−29
	53	31	44	36	21	46	30	52	32	0	−09	−08	−03	−11	−16	−17	−13
		41	40	53	27	54	34	43	53	−03	−02	−08	−10	−04	−14	−17	−24
			25	46	33	30	23	33	29	0	0	−18	−02	05	01	−11	−04
				30	22	53	49	41	34	−04	−06	−10	−05	−10	−19	−15	−30
					26	46	21	44	30	−02	−06	−11	−07	02	−09	−04	−11
						29	16	38	27	−08	−05	−08	−01	−02	−15	−07	01
							41	53	43	−06	−04	−14	−08	−14	−18	−12	−26
								30	23	10	03	01	04	04	−10	−08	−10
									42	−02	−12	−16	−08	−13	−20	−12	−20
										01	06	−08	−0	−03	−15	−23	−29
											53	43	45	36	41	32	14
												46	55	39	36	33	14
													54	46	41	44	17
														54	39	33	19
															51	45	27
																57	31
																	44

commonly used to test and/or construct personality theory on an empirical basis, and when used in this way usually results in many dimensions (e.g., 16 personality factors). However, some critics (e.g., Armstrong, 1967) feel that such empirical use of factor analysis ". . . may be misleading as far as the development of theory is concerned. The use of comprehensive and explicit a priori analysis is proposed so that there will be independent criteria for evaluation of factor analytic results [p. 17]."

It may not be necessary to choose between the extremes of constructing a model on a purely rational basis and testing it empirically or having no model at all and reporting a complex of empirically derived factors. Such a compromise in approach is illustrated by Schaefer (1965) who empirically derived factors for describing parent behavior, constructed a rational model (circumplex) using these factors as a basis, and then tested the model further with factor analyses of different samples. His factor analytically based model was, as indicated above, the basis for the parentlike surface of Figure 1. Schaefer's preference was to use the principal components analysis with varimax rotation of three factors (acceptance versus rejection; autonomy versus control; lax versus

TABLE 2

FACTOR LOADINGS FROM PRINCIPAL COMPONENTS ANALYSIS FOLLOWED BY VARIMAX ROTATION

Disaffiliative chart point	Loading					Affiliative chart point	Loading				
	Code	1	2	3	4		Code	1	2	3	4
Go away now	128	40	−31	45	39	Emancipate	120	−06	14	−06	61
Exclude	127	35	−11	26	52	You can do it	118	−34	42	−37	31
Isolate	126	47	−11	40	27	Encourage divergence	117	−40	51	−39	39
Neglect, ignore	125	60	−23	21	35	Listen, equalitarian	116	−57	46	−27	15
Bluff, illogical	124	77	−17	30	22	Explore, let discover	115	−54	62	−15	29
Abandon, reject	123	35	−53	18	48	Confirm, praise	114	−67	57	−05	10
Deprive	122	56	−28	43	32	Play, allow peer play	115	−20	73	−09	−05
Starve, poison	121	61	−55	13	13	Smile, greet warmly	112	−12	69	−39	−05
Murderous attack	130	68	−12	12	02	Kiss, heal, groom	111	−32	85	−06	−02
Injure	131	45	−32	44	12	Embrace, tender touch	110	−13	83	−03	−20
Frighten	132	69	−28	27	15	Support, cradle, nurse	141	−46	73	−20	04
Restrain, overprotect	133	69	−08	23	−20	Indulge, TLC	142	−44	71	−04	17
Shout, criticize	134	66	−35	26	−06	Protect, keep company	143	−09	68	−19	−38
Threaten	135	75	−26	30	26	Reasoned persuasion	144	−68	32	06	02
Exploit	136	78	−20	23	13	Stimulate, teach	145	−66	37	05	−02
Authoritarian	137	11	−07	80	05	Overindulge	146	−04	34	33	−51
Shame, guilt control	138	33	−35	57	−20	Intrude	147	63	−12	50	−11
Dominate	140	08	−22	76	−11	Possessive	148	31	06	66	10

Note. The 110 adults rated their memory of their mother's parentlike behavior. The first factor is named disaffiliation; the second, affiliation; the third, power; and the fourth, emancipation.

firm control) and a typical analysis (e.g., Schaefer, 1965) accounted for 66% of the variance.

Applications of principal components analysis with varimax rotation to the different samples testing Figure 1 generally yielded results consistent with the figure. An example is presented in Table 2; data were from the 110 individuals who rated the entire battery of questionnaires (Sample 4), the part reported in the table being from recall of mother's parentlike behavior when the raters had been in age range 5–10 years. The table presents items in a format isometric with Figure 1; affiliative items appear on the right-hand side of the table; disaffiliative items appear on the left-hand side. The top of the columns represent items close to the independence pole, and the bottom of the columns represent the domination pole. The balance of the items are arranged between these poles in order of the degrees to which they represent the respective poles. Factor 1 has high-positive loadings on the disaffiliative side of the table, and distinctly negative loadings on the affiliative side; this factor is named "disaffiliation." The second factor is just the opposite: negative loadings appear on the disaffiliative side, and positive loadings appear on the affiliative side; this factor is named "affiliation." On the right-hand side of the table, the third factor has negative loadings for items representing the emancipation pole, and loadings shift to positive at the dominance pole. This trend is not so clear for the third factor on the left-hand side of the table, but the factor is nevertheless named "power." On both the right- and left-hand sides of the table, the fourth factor shows high-positive loadings at the emancipation pole and negative loadings at the dominance pole. It is named "emancipation." Thus four factors emerged which correspond to the four poles of Figure 1, and these four factors accounted for 64% of the variance. These same four factors almost always emerged in the different samples studied. The degree of factor similarity among two samples as measured by the Wrigley and Newhaus coefficient of congruence (Harman, 1960) was .95 for the disaffiliation factor, .89 for the emancipation factor, .90 for the affiliation factor, and .85 for the

power factor. This comparison of factor similarity was between an analysis of adults rating their memory of their mother's parentlike behavior (Sample 4, $n = 110$) and an analysis of mother's rating their own parentlike behavior in relation to their children (Sample 1, $n = 171$).

Disagreements about how many factors to extract from a factor analysis are widespread, and the arguments appear to be of importance because, in principal components analysis (Cooley & Lohnes, 1962, pp. 151–153), the number of factors extracted is supposed to be a measure of the true dimensionality of the domain under study. For example, in factor-analyzing results of intelligence tests, the number of factors extracted is often interpreted as an indication of how many different abilities comprise intelligence. Thus, whether the analysis yields 2 or 12 factors can make a difference in the resulting description of intelligence.

If the number of factors to be extracted from the data testing Figure 1 was to be determined by the rule that each be associated with a latent root greater than or equal to 1, slightly less than 20 factors usually emerged, and they accounted for slightly more than 70% of the variance after varimax rotation. The reduction of the number of factors to 4 was done on the basis of the observation that the first 4 factors emerging related logically to Figure 1 and accounted for almost as much variance as could be accomplished by rotating a much greater number of factors.

Convention would suggest that the emergence of four factors associated with the four poles on the surfaces in Figure 1 necessarily means that there are four orthogonal dimensions, not two. However, the view that factor analysis uncovers "true" dimensionality has been challenged by Guttman (1966) who reviewed the multiple factor analytic efforts of many investigators and remarked:

> In these algebraic approaches the notion of order among variables is absent. More seriously, the approximate computational procedures used actually have blinded researchers from seeing simple order patterns in their own data which may have important psychological implications [p. 444].

Guttman proceeded to make his point by reanalyzing the data from a published study of number ability which had yielded 10 common factors by the centroid method (a simplified approximation to the principal components solution according to Cooley & Lohnes, 1962, p. 153) and showed how 5 out of the 10 factors could be plotted in a simple two-dimensional scheme. He described his method of finding order among many factors as "a simple trial-and-error-graphic method" which plots the correlations in terms of the approximate rank order of the sizes of the r. Guttman (1966) comments on the two-dimensional figure he generated:

> Perhaps the most striking feature . . . is that it succeeds in portraying in two dimensions the structure of the interrelations of seventeen observed tests despite that fact that the conventional factor analysis originally made of the data prescribes five dimensions (or common factors) for these same tests. If the number of dimensions is regarded as a criterion for parsimonious analysis then surely the two dimensional portrayal is more parsimonious than the five-dimensional [p. 450].

Later, Guttman (Schlesinger & Guttman, 1969) published a computer program designed to plot such a two-space for several factors to "show how a certain definitional structure of the test variables is reflected in a two-space [p. 95]" and called his approach "smallest space analysis."

Guttman approaches factor analysis with considerably less reverence and more matter-of-factness than writers who view it as the key to underlying dimensionality. He notes (Guttman, 1966): "As has been pointed out elsewhere a 'factor' in the sense of conventional factor analysis is essentially but a weighted average of the observed tests and can be regarded simply as an additional test [p. 447]."

With a similar approach to factor analysis, it is possible to take the factors of Table 2, and on any reasonable basis (it need not be Guttman's simple trial-and-error-graphic method) reduce them to a simpler two-space to see whether the final result will correspond to Figure 1. This is easy to accomplish by a singular transformation, T, which subtracts the vector of factor loadings for disaffiliation from the vector of factor load-

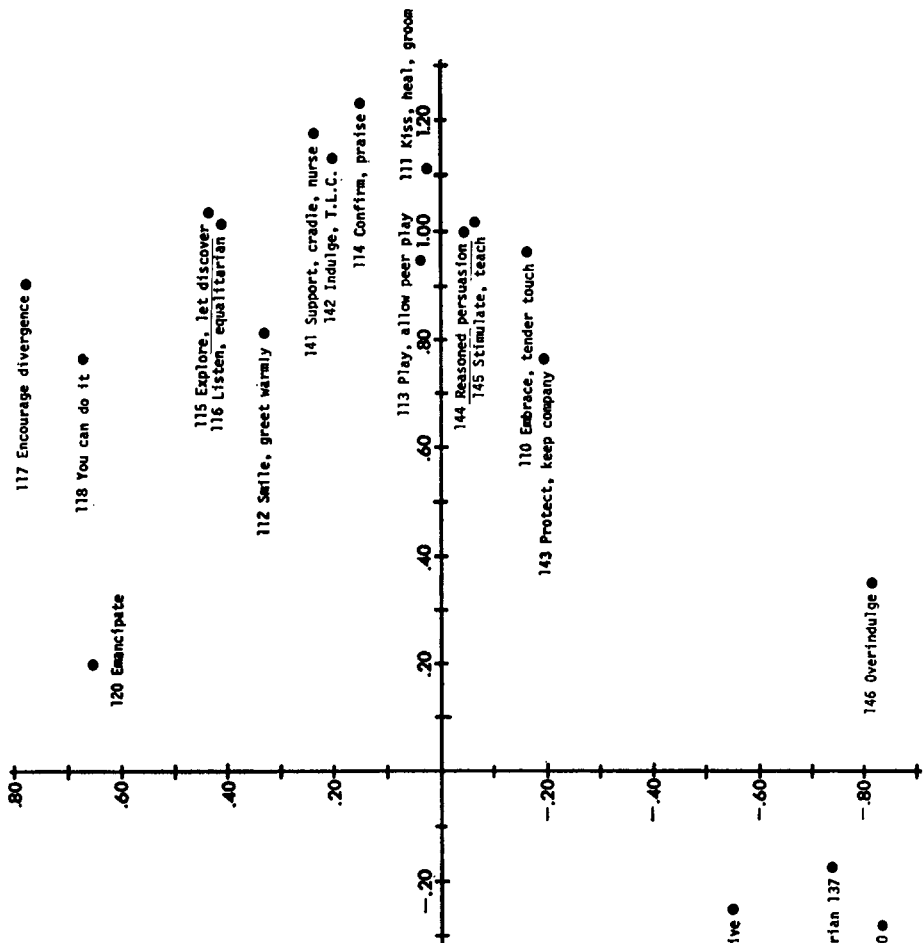


FIGURE 5. Two-space resulting from application of the transformation T to the factors in Table 2. (The figure, based on 110 adults recalling their mother's behavior, is a reasonable facsimilie of the parentlike surface of Figure 1.)

ings for affiliation to yield net affiliation (in Table 2, this would be Factor 2–Factor 1), and which subtracts the vector of factor loadings for power–helplessness from the vector of factor loadings for emancipated–be emancipated to yield net emancipation (in Table 2, this would be Factor 3 from Factor 4).

The results of the transformation, T, applied to the factors of Table 2 are shown in Figure 5. For example, the location of the point *emancipate* in Figure 5 was determined by T: .14 − (−.06) = .20; .61 − (−.06) = .67. Thus the values from the four-space shown in Table 1 for the point *emancipate* are reduced to the values for the two-space in Figure 1, and the coordinates for the point are (.20, .67). Similarly, the location of the point *dominate* in Figure 5 comes from Table 1: −.22 − (.08) = −.30; −.11 − .76 = −.87; result: (−.30, −.87). The transformation, T, was applied to factor loadings for each item and in the resulting Figure 5, many points conformed quite closely to theory (140, 137, 148, 147, 138, 133, 134, 123, 120, 117, 118, 115, 116, 111, 110, and 143); a few points were not reasonably close to expectation (124, 136, 126, and 128), and the rest were moderately close to expectation. Inspection of Figure 5 reveals a tendency for clustering to occur around the poles rather than for the points to spread themselves evenly in circumplex order. This may be due to the fact that the varimax rotation tends to yield high factor loadings for as few variables as possible (Cooley & Lohnes, 1962, p. 162). In other words, the varimax rotation is structured to maximize the loadings of a few variables on each factor and let the rest of the variables have loadings which approach zero. This would tend to force the points toward the poles of the figure. In summary, despite some imperfections, Figure 5 is judged to be a "reasonable facsimile" of the first surface of Figure 1.

A reasonable facsimile of the childlike surface of Figure 1 is presented in Figure 6 and was obtained by principal components analysis of maternal ratings of childlike behavior of 171 normal children (Sample 1) using varimax rotation followed by the transformation, T. This analysis rotated ratings of 72 items from both the parentlike and the childlike surfaces, but similar figures are obtained by separately rotating the 36 items from each surface. This invulnerability to whether parentlike or childlike items were rotated separately or together is due to the fact that varimax procedure is not affected by the number of variables rotated (Cooley & Lohnes, 1962, pp. 162–163).

An alternative means of reducing the data to two dimensions which could be related to Figure 1 might be to ipsatize scores before factoring for two factors. Accordingly, in Samples 1 and 4, each individual subject's score was first standardized to his/her own mean and sigma, and then principal components analysis was followed by a varimax rotation of two factors. This procedure applied to data describing memory of mothers' parentlike behavior (reported in Table 2 and Figure 5) yielded the two factors shown in Figure 7. The first factor to emerge showed high positive loadings for points on the affiliative side of Figure 1 and large negative loadings on the disaffiliative side. The bow shape of the curves suggests that loadings were greater for points near the poles of the affiliation axis (110 and 130), and the factor is named affiliation. The second factor tended to show progressively larger loadings for points nearer the dominance pole (140) of the interdependence axis and is named power. These two factors do correspond to expectations based on Figure 1 and respectively accounted for 24.0% and 9.1% of the variance. Since the initial procedure of extracting four factors and applying T accounted for nearly twice as much variance, this ipsatizing procedure was not pursued further.

In small samples, factor analyses of ratings in terms of the parentlike and childlike surfaces consistently conformed to Figure 1. However factor analyses of the part of the Series C questionnaires (Samples 3 and 4) measuring generalized attitudes toward the self in terms of the introject surface did not conform well to Figure 1. Such factor analytic reconstructions of the third surface of

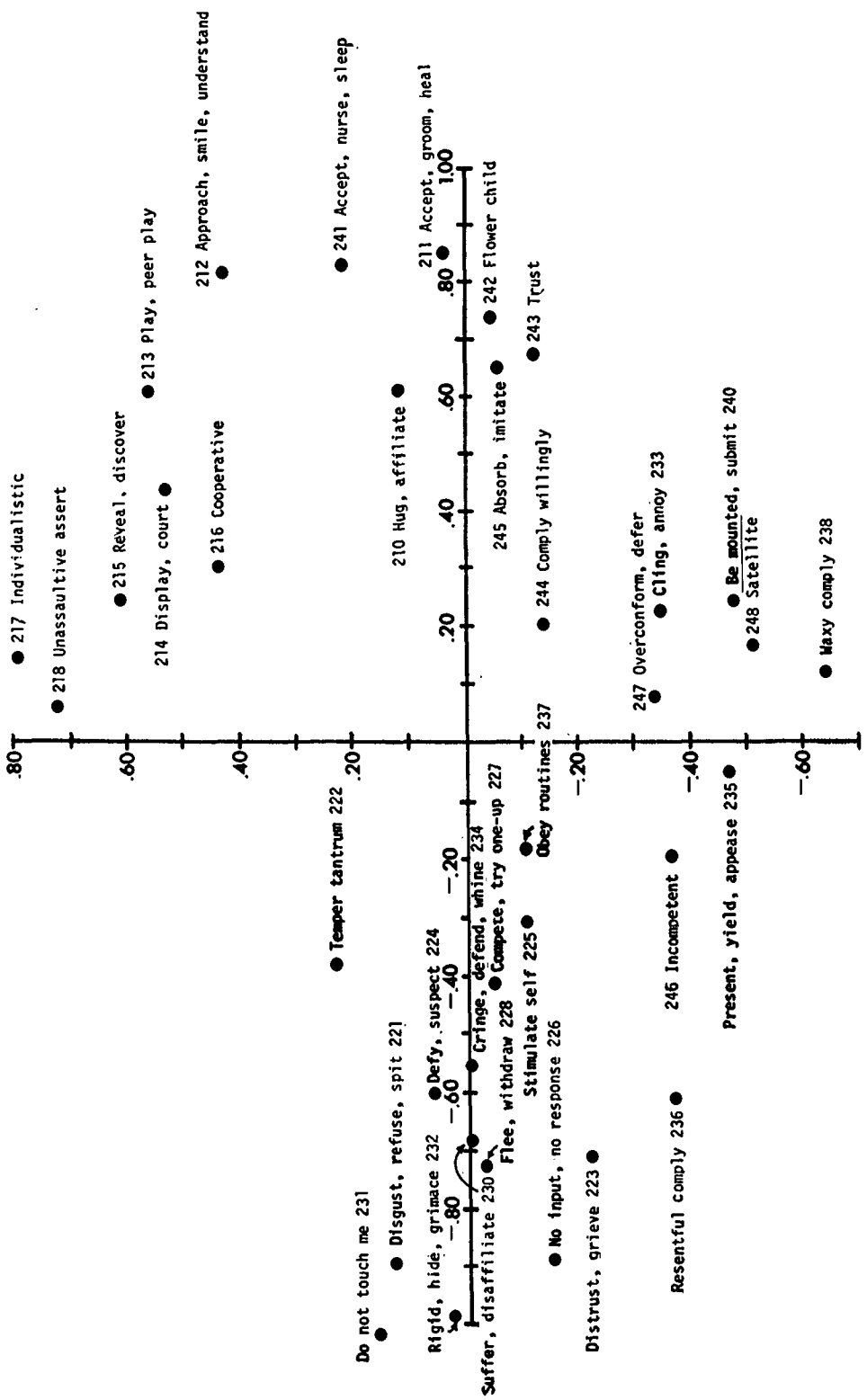


FIGURE 6. Two-space resulting from factor analysis of maternal ratings of childlike behavior of 171 normal children. (It compares reasonably to the childlike surface of Figure 1).

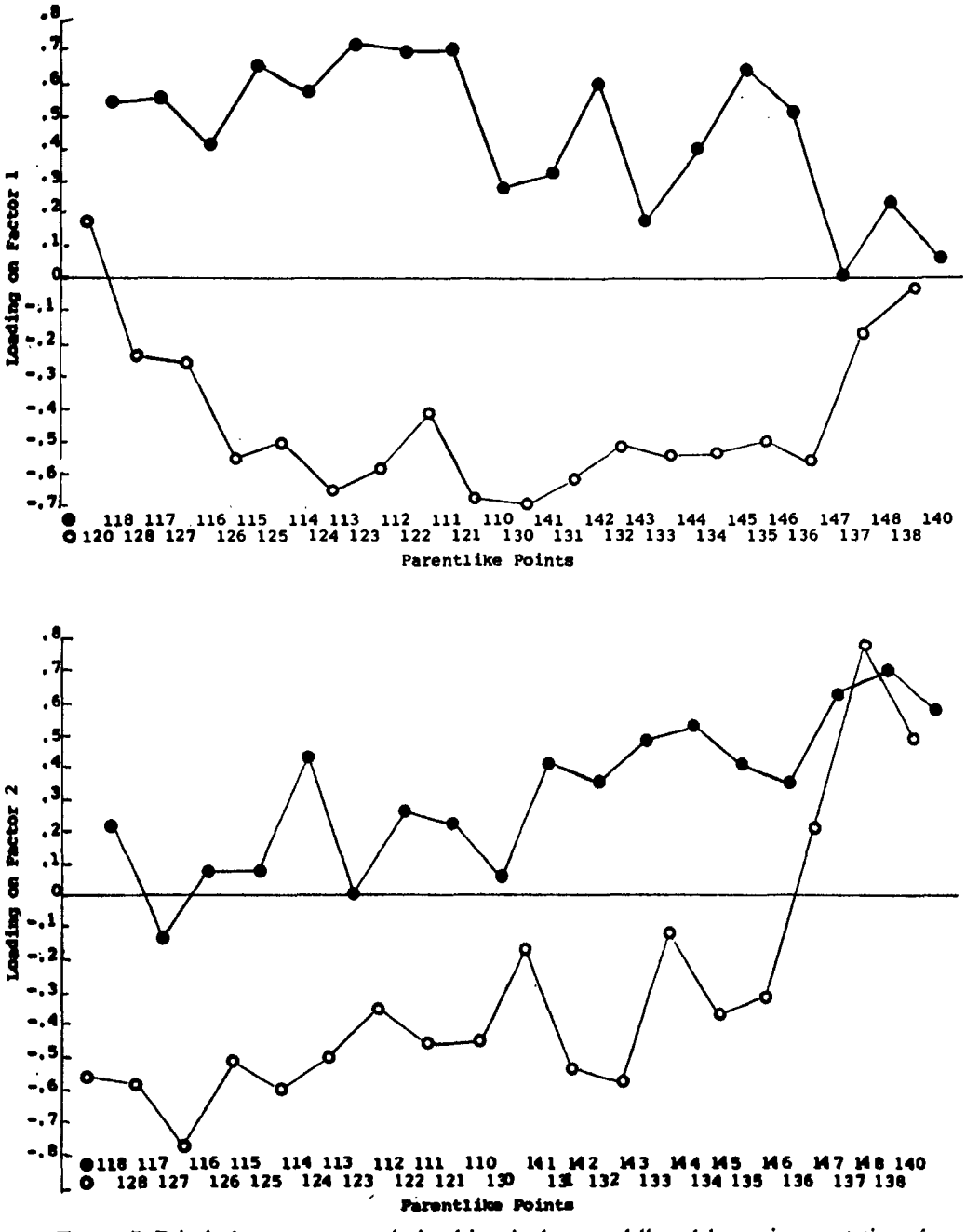


FIGURE 7. Principal components analysis of ipsatized scores followed by varimax rotation of two factors. (Two factors named affiliation and power respectively accounted for 24.0% and 9.1% of the variance.)

Figure 1 correctly placed most affiliative attitudes toward the self on the right-hand side of the figure and disaffiliative attitudes on the left-hand side; but the vertical dimension was not as predicted. Self-emancipating attitudes did not consistently appear in the upper half of the figure, nor did self-controlling attitudes consistently

appear in the lower half. This failure to reconstruct the third surface in the interdependence (vertical) dimension was consistent across samples. Possibly it reflects a fault in the theory, in the wording of the questionnaire items, or a generalized confusion in people's attitudes about their own autonomy from or interdependence with introjected significant others. Factor analysis of an expanded sample of short-form ratings of self will, it is hoped, determine whether the problem was in the wording of the long-form items. Clinical interviews of subjects in Sample 4 provided extensive subjective support for the hypothesis that attitudes toward the self do relate directly to treatment received from significant others (spouse, mother, father, important siblings). More formal testing of the third surface of Figure 1 will be forthcoming elsewhere.

Principle of Complements

The principle of complements is confirmed by correlations between surfaces. The principles of complementary relations (and of antidotes) should be tested by an experimental setting wherein one behavior (e.g., shout, criticize—134; or confirm, praise—114) is exhibited by the experimenter, and then independent observers reliably rate the subject's response and find a high incidence of the predicted behavior (e.g., cringe, defend, whine—234; or display, court—214). This needed rigorous test of Figure 1 has not yet been performed. However, enthusiastic if unscientific reports from psychiatric residents, medical students, and patients have supported the hypothesis about complementary relations and antidotes. An annotated sequence of family interactions illustrating these principles is available elsewhere (Benjamin, 1973, pp. 231–236).

Correlations between maternal ratings of their own behavior and of their children's behavior (Sample 1, $n = 171$) are consistent with the principle of complementary relations. Two examples are shown in Figure 8. The left-hand side of the Figure shows the relation between maternal ratings of children for Point 210, hug, embrace, and maternal ratings of themselves for points on the parentlike surface. As the parentlike points closer to the complement of Point 210 (i.e., Point 110—embrace, tender touch) are approached, the rs become larger and more positive. The right-hand side of Figure 8 shows the relation between ratings of children on Point 218, unassaultive assert, and maternal self-ratings of parentlike behavior. Inspection of this part of Figure 8 shows that correlations between childlike assertiveness (218) and parentlike points tend to become more positive as the complementary parentlike Point 118 (You can do it) is approached. Thus, Figure 8 is consistent with the principle of complementary relations between the parentlike and childlike surfaces of Figure 1. The left-hand and right-hand sides of Figure 8 show that affection begets affection and independence begets independence (and vice versa); these principles have been repeatedly confirmed in the child development literature (e.g., Baumrind, 1967; Schaefer & Bayley, 1963).

Not every pair of complementary points conformed as closely to theory as the two pairs (110 and 210; 118 and 218) shown in Figure 8. In the total analysis from which the examples presented in Figure 8 were selected, many other points showed results close to expectations based on Figure 1; a few did not, and the rest were moderately close to expectation. The r between the 36 maternal parentlike points and the 36 predicted complementary behaviors for children was significant in $28/36 = 78\%$ of the possible complementary pairings. A harsher test of theory was to determine whether the r between a given pair of complementary points was greater than all other rs between that particular parentlike point (mother rated herself) and all possible childlike points (mother rated child). The maximum r occurred exactly as predicted for the following pairs: Mother (M) 118–Child (C) 218, M 116–C 216, M 114–C 214, M 113–C 213, M 112–C 212, M 110–C 210, M 143–C 243, M 134–C 234, and M 148–C 248. The maximum r suggestive of complementary relation held within one point for Pairs M 120–C 218, M 115–C 214, M 111–C 210, M 132–C 233, M 142–C 241, M 135–C 234,

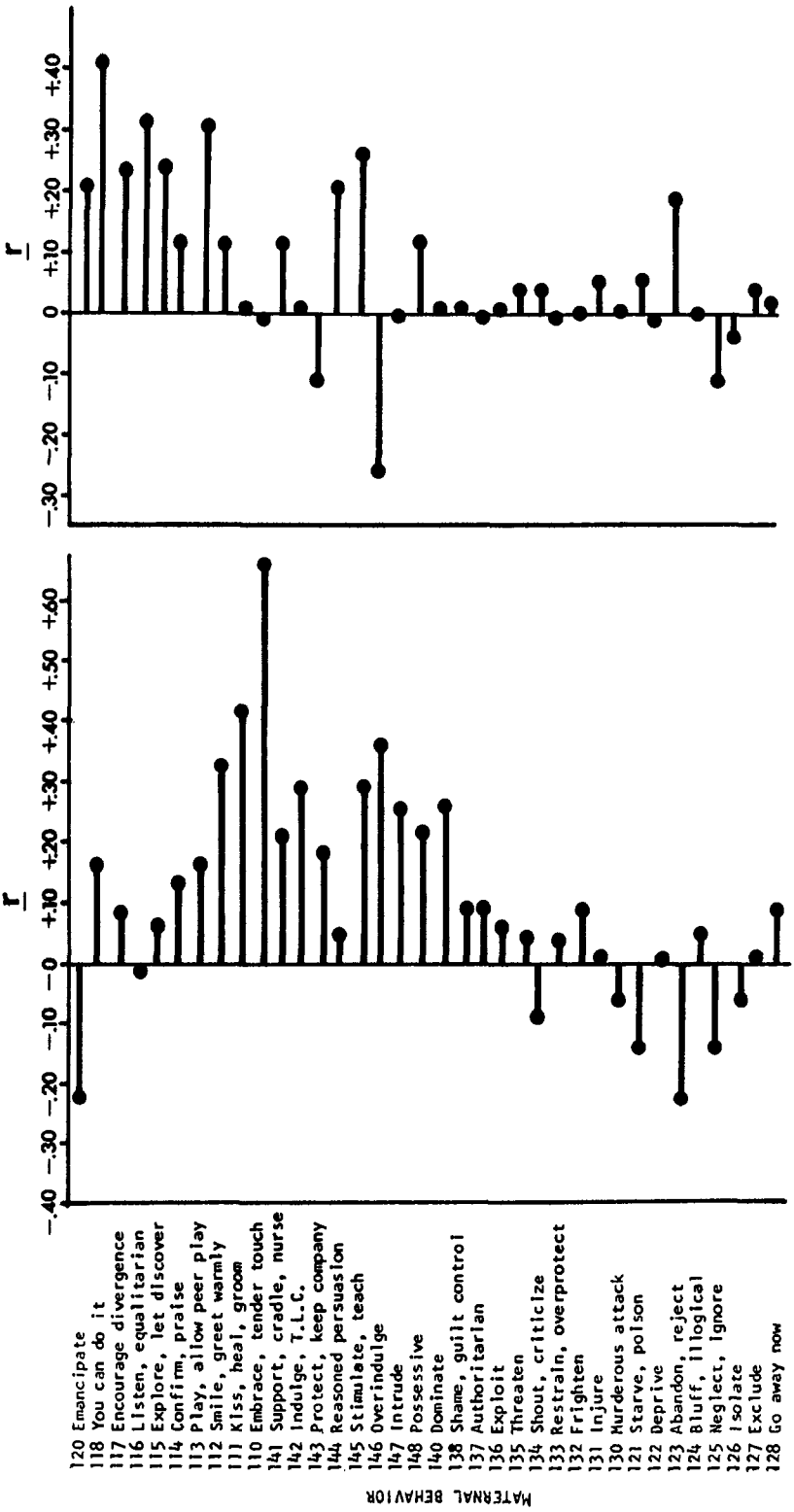


FIGURE 8. Correlations between maternal ratings of their own behavior and of their children's behavior ($n = 171$). (The left-hand side of the figure shows the relation between maternal ratings of children for Point 210, hug, embrace, and of themselves for all points on the parent-like surface. The right-hand side of the figure shows the relation between maternal ratings of children for Point 218, unassaultive assert, and of themselves for all points on the parentlike surface.)

and M 148–C 247; it held within two points for M 127–220, M 126–C 228, and M 136–C 234. This represents 9 + 7 + 3 = 19/36 = 53% of the pairs conforming closely to the complementary prediction as measured by location of maximal *r*. The random expectation of having the maximum *r* occur within two steps (either direction) of the exact complement is 5/36 = 14%. A simple chi square contrast of observed and expected value is significant beyond the .001 level, $\chi^2 = 42.34$, $df = 1$.

When maternal ratings of children's parentlike behavior were compared to maternal ratings of their own parentlike behavior, results suggested a strong imitative tendency. A significant *r* occurred in 25/36 = 69% of the imitative pairings, and the maximal *r* occurred at the exact point of imitation for Pairs M 118–C 118, M123–C 123, M 113–C 113, M 122–C 122, M 112– C 112, M 110–C 110, M 131–C 131, M 133–C 133, M 134–C 134, and M 137–C 137; it occurred within one point for Pairs M 127–C 128, M 117–C 118, M 111–C 112, and M 141–C 110, and within two points for Pairs M 120–C 117, M 116–C 118, M 121–C 131, and M 142–C 110. This represents 11 + 4 + 4 = 19/36 = 53% of the pairs conforming closely to the imitative expectation. A chi square test is significant beyond the .001 level.

In summary, the results are not perfect but are nevertheless fairly consistent with expectations based on Figure 1. The variables involved in whether a child imitates the mother, and/or assumes a complementary role, or does something else are not specified, but some relevant clinical observations in terms of Figure 1 appear elsewhere (Benjamin, 1973, pp. 236–237).

High Reliability in Normal Samples

Reliability is high in normal samples, and failure of reliability can characterize subjects. Since the purpose of this paper is to expose the theory of Figure 1 and to present tests of its validity as a construct rather than to propose a set of new personality questionnaires, a formal examination of the reliability of the questionnaire is not required here. For this reason, there will not be extensive reference to technical aspects of the problem of reliability.

In Autocorrelations Among Items, a coefficient of internal consistency was developed and offered as support for the construct validity of Figure 1. Such a coefficient of internal consistency is one measure of reliability. Normally in instances where internal consistency is high, stability over time is also high (Fiske & Rice, 1955). A large sample of test–retest *r*s could confirm this principle that a coefficient of internal consistency is related to a coefficient of stability such as test–retest *r*. Support for the idea that internal consistency implies day-to-day consistency or stability was found in a series of over 70 interviews[5] with both normal and psychiatric subjects. Ratings yielding orderly autocorrelations such as those shown in Figure 3 to be associated with a high coefficient of internal consistency also described behaviors reported to be consistent and stable over time.

During the interviews, maps and autocorrelations in the format of Figure 3 were shown to each individual, and implications were discussed. Results suggested that if the internal consistency was greater than or equal to .90, then the domain of behaviors being described could be regarded as stable, predictable, and consistent from day to day. Autocorrelations which did not look so orderly appeared as shown in Figure 9 and usually referred to a domain of behaviors phenomenologically described as unpredictable or changeable. For example, the data shown in Figure 10 were based on the self-ratings of the childlike behavior of a middle-aged male in relation to his wife. The couple's psychotherapist confirmed the subject's description of himself in relation to his wife as tending to vascillate between submissiveness and assertiveness, between accepting and refusing interpersonal postures, thus confirming the hypothesis of unpredictability in instances where internal consistency fails. Another example of this principle is offered by the medical student

[5] The assistance of my colleague and friend Steven Troner is gratefully acknowledged.

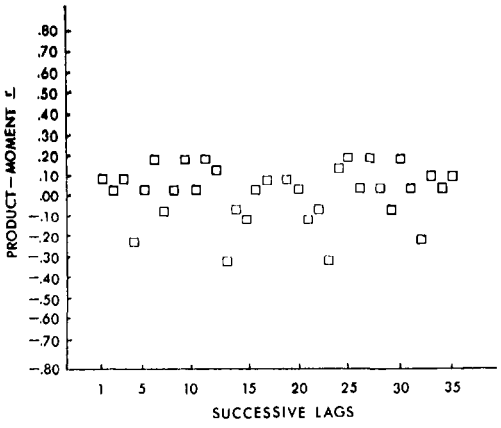


FIGURE 9. Autocorrelations for self-ratings of the childlike behavior of a middle-aged male in relation to his wife. (Autocorrelation curves such as this which fail to show the order illustrated in Figure 3 usually describe a domain of behaviors characterized as unpredictable, unstable, or chaotic.)

who, on seeing the disorder among autocorrelations between his ratings of his father's parentlike behavior, exclaimed: "I never knew what to expect from him. He might be nice and friendly one moment, and then WHAMO, the next minute he'd be beating us up for no reason at all." This finding that failures of internal consistency reflect unstable unpredictable interpersonal postures was confirmed in nearly 100% of the interviews.

If it is correct to reason that failure to obtain a high degree of internal consistency represents the significant psychological phenomenon of behavioral chaos and change rather than "failure" of a test, then it would follow that internal consistency should be higher in normal samples than in psychiatric samples. The hypothesis is confirmed since the average correlation between the autocorrelation curve and the inverted normal curve for the childlike behavior of 171 pediatric outpatients (Sample 1) was .92, whereas the comparable correlation for a sample (Sample 2) of 50 child psychiatry patients was .68. In a sample of 60 normal volunteers (Sample 4) the average r between autocorrelation curves and the inverted normal curve for childlike behavior in relation to a significant other person was .97, whereas the same coefficient of internal consistency for 50 (also Sample 4) psychiatric patients was .81. Without exception, for every set of ratings, the average internal consistency was greater in the normal sample than in the psychiatric sample.

The idea that reliability is a property of people as well as of scales has been expressed by others (Jackson, 1971, p. 243) and similarly, lack of order (Foa, 1968) or reliability (Hersch & Scheibe, 1967) has previously been seen as reflecting psychopathology.

Although internal consistency is more characteristic of normals, it can appear in psychiatric subjects and can also reflect psychopathology. For example, Figure 10 shows a map of the self-ratings made shortly before the subject made a serious suicide attempt. The correlation between the autocorrelation curve for the ratings shown in Figure 10 and the inverted normal curve was .98 showing that murderous attack had been directed toward the self with impressive consistency just before this suicide attempt. No one would be inclined to label this highly consistent and integrated disaffiliation toward self as "good" or "healthy," so autocorrelation curves should be interpreted in conjunction with the maps of the ratings.

The autocorrelations shown in Figure 11 were obtained from a medical student responding to the short-form questionnaire with ratings of his memory of his father. The map appearing at the top of Figure 11 shows that opposing tendencies were en-

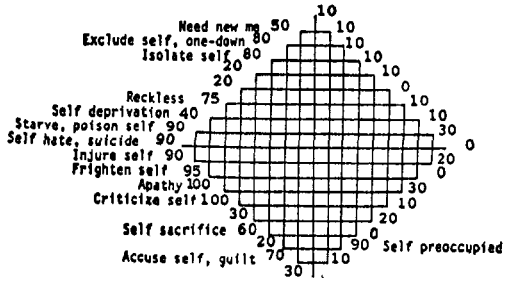


FIGURE 10. Map of self-ratings completed shortly before the subject made a serious suicide attempt. (Autocorrelations associated with these ratings showed a high degree of internal consistency oriented around self-destruction.)

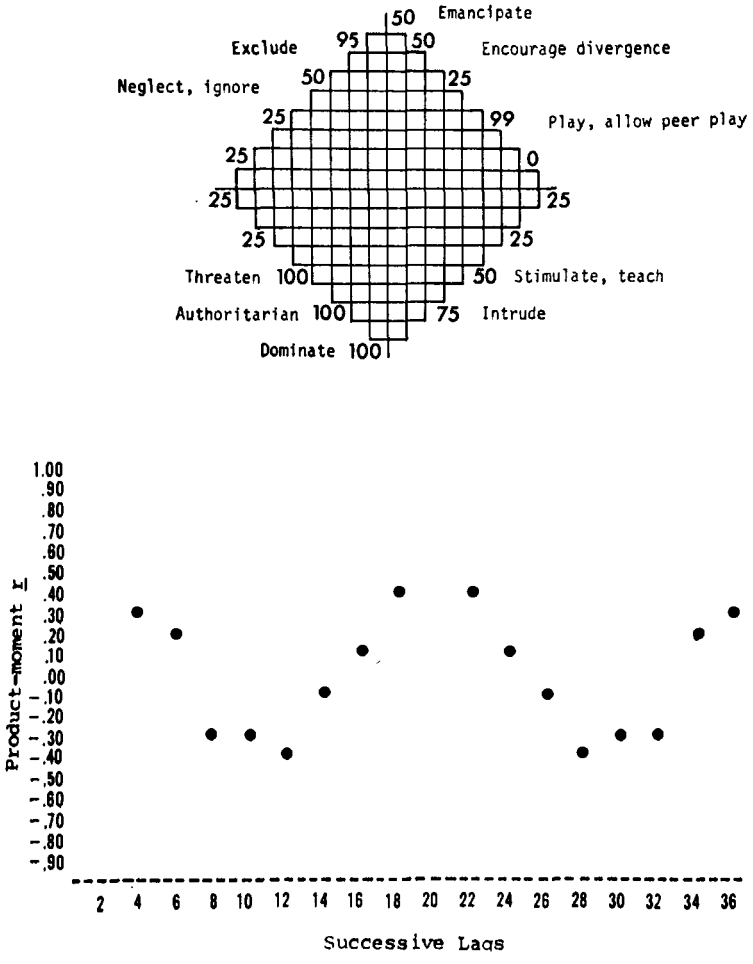


FIGURE 11. Map and autocorrelations of a male medical student rating his memory of his father. (The autocorrelations increase as more opposite points are paired, indicating ambivalent memory and/or double-binding behavior by the father.)

dorsed: neglect, ignore (125) and stimulate, teach (145) both received above-median ratings; exclude (127) and intrude (147); emancipate (120) and dominate (140); encourage divergence (117) and authoritarian (137) all received relatively high degrees of endorsement. These opposing tendencies or ambivalences are reflected in the autocorrelations shown at the bottom of Figure 11. Correlations become progressively larger as paired points become more oppositional. Autocorrelations falling into a pattern like Figure 11 may be one answer to the problem of how to define and study ambivalence. (Minkowich, Weingarten, & Blum, 1966)

> Clearly there is a need for methodological advance to encourage fruitful exploration of a topic so central to theories of personality formation [i.e., ambivalence]. The development of a simple, easily administered technique for the assessment of individual differences in ambivalent feelings, generally applicable in studies of interpersonal relationships, is a worthwhile objective in itself [p. 32].

There has also been a test of agreement between persons rating videotaped interviews in terms of Figure 1. Two female graduate students[6] initially unfamiliar with

[6] Acknowledgment and thanks are extended to Linda Kasuboski and Eileen Weil for making the ratings. Frederick Brown and Dennis Cook also contributed generously to this effort through their

Figure 1 spent two training sessions learning to rate 15-second segments of videotape in terms of quadrants of Figure 1. Collapsing points into quadrants meant that raters only had three judgments to make for each interaction scored: (*a*) Does it involve concern with the other and what is to be done to or for the other (parentlike), or does it involve the self and what is to be done to or for the self (childlike)? (*b*) Is it friendly or unfriendly? (*c*) Is it concerned with power–submission or with autonomy? These three binary choices yield $2^3 = 8$ categories, about as many as can be encompassed in instantaneous perceptual judgments (Miller, 1963). Sixteen successive 15-second segments of videotape were scored in terms of which of the 8 possible categories of behavior had occurred. Each of the 8 categories then had a score between 0 and 16 depending on how many 15-second segments exhibited the respective behaviors.

In this application of Figure 1, the two raters showed a very high degree of agreement. The average product moment *r*s between raters for each sample was .92, and the range over 20 segments (10 individuals each taped in two sessions) was .72 to .99.

Just as an exhaustive consideration of reliability was not appropriate for this paper, so a comprehensive review of validity is beyond the present purpose. All of the data presented relate to construct validity, and the needed tests of concurrent, predictive, and content validity have yet to be done. In that connection the relationship between the present questionnaires and the MMPI, California Psychological Inventory, 16 personality factors, Rorschach, and diagnostic categories may eventually be of interest.

Social Desirability Ratings

Rating in terms of social desirability is more characteristic of normal subjects than of psychiatric subjects. The problem of response sets has been a major concern in studies of measurement of personality during the past decade (e.g., Rundquist, 1967). One well-known response set is acquiescence, and it was controlled in the analysis of the questionnaire by the procedure of printing on the map all items endorsed above the individual's own median. Thus, if a given individual tended to give blanket ratings, a relative picture of more salient attributes nevertheless emerged. Similarly, the pattern of autocorrelation was not importantly affected by the subjects' tendency to consistently acquiesce or resist items (except in the hypothetical extreme where all items would be given exactly the same rating—a possibility which did not materialize).

Perhaps the most worrisome and widely studied response set is that of social desirability. The presumption is that social desirability is an artifact, and its influence must be removed from the instrument measuring personality in order for it to be valid. For example,

> . . . the "good–bad" dimension accounts for most of the variance of the system, a finding which cannot be surprising when considered in light of Osgood's findings from the semantic differential. The problem, then, is to eliminate the unwanted dimension in the judgment system of the coder. If he is coding interactions of people selected as "normal," it may be difficult for the coder to score behaviors other than what he considers "normal" or "good" [p. 2].[7]

There is widespread evidence that social desirability is in fact present in most inventories. It appears to be one of the first factors to emerge in analyses of a wide variety of inventories (Horst, 1968; Messick & Jackson, 1972). Jackson's (1971) conclusion is unequivocal:

> The omnipresence of evaluative bias virtually requires that one of several statistical procedures (Neill & Jackson, 1970) for identifying items implicated in this form of bias be incorporated into any serious attempt at scale construction [p. 243].

Jackson (1971) also suggests that items be subtle in order to get around defensiveness

willingness to lend videotapes of interviews from their study of student dating behavior and through their help in developing a means to apply Figure 1 to the description of videotaped social interactions.

[7] A. T. Dittman, "Problems Of Reliability in Observance and Coding Social Interactions." Unpublished study. (Available from Allen T. Dittman, National Institute of Mental Health, Bethesda, Maryland 20014, or for a fee of $1.25 from the American Documentation Institute, Order Document No. 5740 for microfilm or photocopy.)

related to the need to respond in socially desirable terms: ". . . subtlety is a positive attribute in a personality questionnaire, particularly when one is measuring undesirable traits [p. 235]."

The questionnaires measuring perceived behaviors in terms of Figure 1 were not subtle, and there was little room for equivocation about the interpretation of the meaning of the items. There was no attempt to avoid or statistically correct for the effects of social desirability, and most of the items did, in fact, have a definite positive or negative value with respect to social desirability. When 30 student nurses were asked to respond to the questionnaire in terms of an ideal spouse and ideal self, the above-median endorsements consistently occurred for items in the region of Figure 1 which ranged on the three respective surfaces from Points 118–218–318 to Points 145–245–345. Psychologically speaking, this region of Figure 1 describes friendly autonomy (Quadrant 1) and moderate degrees of friendly interdependence (the least interdependent part of Quadrant 4). It reflects an orientation around the affiliation pole, with relatively more emphasis on the autonomous side of it.

Trying to "look good," to fake in the socially desirable direction, did occur in about 5 of the 50 child psychiatry cases. The analysis of responses to questionnaires in this 10% of the sample appeared to show distortion in the ideal direction when compared to information available through the hospital chart which in turn was based on reports from the school, social worker, and the intake team. There were also selected clinical cases which, according to their therapists, were trying to "look bad," to fake in the socially undesirable direction. The fact that a small percentage of people did "fake bad" or "fake good" does not mean that the results in Figures 3–12 and in Tables 1 and 2 were an artifact of social desirability. It does mean that self-descriptions did not parallel behaviors in some cases, and when interpreting individual protocols, this possibility, along with ordinary psychiatric considerations about defensiveness, should be remembered.

This modest restriction on the interpretation of individual's protocols contrasts greatly with the position of some response set theorists who might be expected to dismiss the group results in support of Figure 1 on the argument that artifactual responding in terms of social desirability accounts for nearly all of the subjects' reactions to the questionnaires. Such a general dismissal of self-ratings on personality questionnaires has been given serious consideration in the literature. For example, Jackson and Messick (1958) concluded:

> In the light of accumulating evidence it seems likely that the *major common factors in personality inventories of the true-false or agree-disagree type,* such as the MMPI and the California Psychological Inventory, *are interpretable primarily in terms of style rather than specific item content* [p. 247].

Jackson has proposed a threshold theory of responding to questionnaires in terms of social desirability which was tested by Rogers (1971). Briefly, Rogers used a computer and a Monte Carlo procedure to create MMPI protocols for fictitious subjects. Restrictions on the distributions from which the "subjects"' true or false responses were drawn were in terms of varied salience and varied thresholds of social desirability. Thus a fictitious subject for whom social desirability was highly relevant or salient and who had a low threshold for responding in terms of showing the socially desirable response would be assigned responses indicating he endorsed nearly all MMPI items in the socially desirable direction. Within these restrictions, his responses were randomly assigned. Subjects were varied in terms of salience and threshold, and factor analysis of the resulting "protocols" resulted in a structure similar to that obtained when protocols came from real subjects. Rogers (1971) concluded:

> The goodness of fit of predicted and observed factor structures is remarkable considering the relative simplicity of the theoretical formulation compared to the grossly complex cognitive and emotional processes that undoubtedly occur when a person responds to a personality inventory [p. 36].

The logic put forward by Jackson and associates (Bentler & Jackson, 1971) is de-

pendent on the argument (Rogers, p. 49) that the extent to which an individual's MMPI response shows high correlation with social desirability shows how much "his responses can be thought of as *determined* [italics added] by the desirability dimension [p. 49]." However, as Rogers recognizes, correlation does not establish determination:

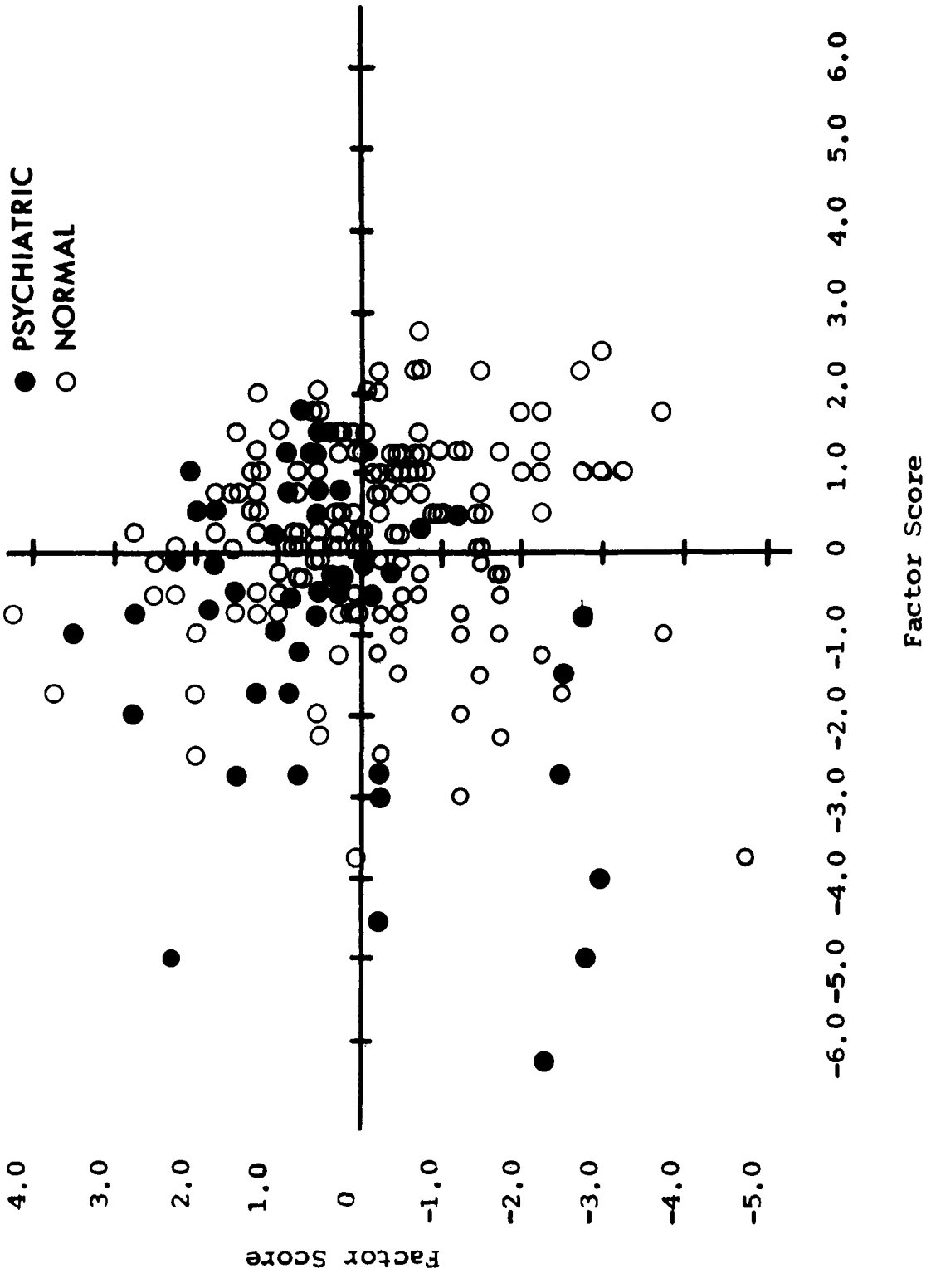
> The threshold stimulation results are not unique, to the extent that other formulations could generate the factor structure. Any item characteristic that correlates highly with item desirability would generate similar results in such a simulation [p. 36].

It has been widely recognized that there are alternate interpretations of the social desirability variable in particular and of response sets in general. The arguments have been heated and prolonged. Rorer (1965) states: "In recent years the psychological literature dealing with response sets, response biases, or response styles has grown so large and been reviewed so many times that the reviews themselves have been reviewed [p. 129]." Rather than attempting to "resolve" the response set controversy here, let it be noted that except for the small percentage of subjects shown to fake good or fake bad, the results in support of Figure 1 are presented as valid and not as artifacts of social desirability. Subject responses did relate to social desirability, but it is proposed that the "alternate" characteristic correlating highly with social desirability was *normality,* not dissimulation. Most of the subjects in the present sample participated because of the opportunity to have personal feedback in an interview, and, in accord with the spirit of candor, openness, honesty, and self-inquiry so prevalent in the 1970s, they are presumed to have participated in good faith. This contrasts greatly with the attitudes present in the 1950s when the social desirability problem first was discussed, and when the social milieu was encouraging of being "cool," rather than of being honestly in touch with human vulnerabilities. If the present subjects gave the socially desirable response, it is presumed that most of them believed it to be true.

The argument is that in the 1970s, responses in terms of social desirability correlates highly with response in terms of affiliation, one of the primary dimensions of Figure 1. The hypothesis is that friendly feelings toward the self and toward others is normal and socially desirable; unfriendly feelings toward the self and toward others is deviant, socially undesirable, and a major reason for people to define themselves as psychiatric patients. The tendency of negative endorsements to characterize psychiatric subjects and of positive endorsements to characterize normals is illustrated in Figure 12. The figure shows the factor space as defined under Factor Analysis for 171 mothers rating themselves in relation to their normal child (Sample 1) and 50 mothers of child psychiatry patients (Sample 2) describing themselves in relation to their disturbed child. The child psychiatry group tends to appear on the disaffiliative side of the figure, and the willingness to endorse socially undesirable items is illustrated by a guardian aunt and uncle who brought a ten-year-old child to the psychiatry clinic asking for help. The aunt showed herself to be very "mean" to the child by, for example, assigning herself a score of 80 for the item for Chart Point 131—*injure:* "I hurt my daughter physically, psychologically, and socially. When talking with her, being with her, I try to 'nail her to the wall,' to 'get her,' to injure her in some way or other." The report based only on the questionnaire results went to the intake team, and they concluded the results were in complete agreement with their clinical conclusions. The report based on computer analysis of the questionnaire results read:

> In initiating or parentlike behavior, the aunt is chaotic and unpredictable. She is at times reasonable, protective, supportive, and confirming, but at other times critical, frightening, injuring, neglecting or dominating in a highly structured, order-worshipping way. In reactive, or childlike behaviors, the aunt is much more predictable and integrated: She never submits to the child: she feels injured by the girl and basically dislikes her, refusing help in any form from her, and withdrawing to her own affairs as much as possible.

The guardian aunt described in the example


● PSYCHIATRIC
○ NORMAL
4.0
3.0
2.0
1.0
0
-1.0
-2.0
-3.0
-4.0
-5.0
Factor Score
-6.0 -5.0 -4.0 -3.0 -2.0 -1.0 0 1.0 2.0 3.0 4.0 5.0 6.0
Factor Score

is plotted in Figure 12 at the point (−4.8, −2.8) indicating an overall tendency to exert hostile power over the girl. Some of the exceptions to the tendency of psychiatric patients to appear on the left-hand side of the figure and normal subjects to appear on the right-hand side are interesting. For example, the normal subject at the point (−3.7, −4.7) was an adolescent engaged in a bitter struggle with her mother over involvement in the local "counterculture." Some of the psychiatric patients appearing on the affiliative side of the figure were ultimately diagnosed as brain damage, learning disability, or in other nondynamic psychiatric categories.

The conclusion is that deviation from social desirability is itself "pathology," and it is an idea which has been expressed elsewhere (e.g., Heilbrun, 1964). In further support of this conclusion is the clinical truism that poor self-concepts are characteristic of disturbed individuals (e.g., Cole, Oetting, & Miskimins, 1969). In summary, social desirability was present in the data testing Figure 1 but not usually in an artifactual sense. Rather, the socially desirable response was in terms of affiliation without excessive power or autonomy and was the *normal* response; the socially desirable was not a bias—a response to be circumvented or screened out to get at "reality." It would be maladaptive indeed if, in the course of evolution, the "normal" was not also the desirable. Recent comparisons of the human with other primates have suggested strongly that most higher primates are sociable, affiliative creatures when reared under optimal conditions (Ainsworth, 1969; Stayton, Hogan, & Ainsworth, 1971). Within this benevolent view of the normal, it is highly appropriate and adaptive that the good–bad differentiation is the first one that the child learns (Borke, 1971). Affiliative, "good," socially desirable responses serve to keep the young primate with the troop so that he/she will be more likely to survive. Thus, the one who learns to give the socially desirable response is the one who is the most normal. It would be self-defeating to "eliminate" the primary dimension of affiliation when trying to describe the structure of behavior in ways which will yield clinically useful distinctions between normal and abnormal.

CONCLUSION

This paper has briefly reviewed some of the literature on the structural analysis of interpersonal behavior and proposes a structural model for social behavior which draws heavily from prior efforts, especially those of Schaefer and Leary. The suggested structure goes beyond previous models in that it is highly explicit (e.g., opposites, antidotes, and complements are defined logically as well as intuitively) and had been tested by the responses of normal as well as psychiatric subjects to relevant questionnaires.

The proposed structure has received support by techniques of autocorrelation, circumplex analysis, factor analysis, and correlations between surfaces. As indicated in the introduction, Figure 1 is consistent with approaches begun in sociology, psychology, and psychiatry. Still other theoretical schemes not yet mentioned and not consciously involved in the development of Figure 1 are also consistent with it; examples in this category are Murray's need system (Hall & Lindzey, 1957), FIRO—Fundamental Interpersonal Relations Orientation—(Schutz, 1966), and transactional analysis (English, 1973).

The proposed model and accompanying questionnaires are neither definitive nor final. However, the data presented here and the data currently being obtained add to the evidence that the effort to find structural order in interpersonal behavior is unequivocally worthwhile.

FIGURE 12. Two-space based on factor analysis of maternal ratings of themselves in relation to their children. (Factor 1 (abscissa) and Factor 2 (ordinate) scores shown here indicate that mothers of psychiatric patients ($n = 50$) tend to describe themselves in terms of the disaffiliative side of Figure 1 whereas mothers of normal children ($n = 171$) tend to describe themselves in more affiliative terms.)

REFERENCES

Ainsworth, M. D. S. Object relations, dependency, and attachment: A theoretical review of the infant–mother relationship. *Child Development,* 1969, **40**, 969–1025.

Armstrong, J. S. Derivation of theory by means of factor analysis or Tom Swift and his electric factor analysis machine. *American Statistician,* 1967, **21**, 17–21.

Armstrong, J. S., & Soelberg, P. On the interpretation of factor analysis. *Psychological Bulletin,* 1968, **70**, 361–364.

Baldwin, D. L. *Theories of child development.* New York: Wiley, 1967.

Baumrind, D. Child care practices anteceding three patterns of preschool behavior. *Genetic Psychology Monographs,* 1967, **75**, 43–88.

Bell, R. Q. A reinterpretation of the direction of effects in studies of socialization. *Psychological Review,* 1968, **75**, 81–95.

Bell, R. Q. Stimulus control of parent or caretaker behavior by offspring. *Developmental Psychology,* 1971, **4**, 63–72.

Bentler, P. M. & Jackson, D. N. Identification of content and style: A two-dimensional interpretation of acquiescence. *Psychological Bulletin,* 1971, **76**, 186–204.

Benjamin, L. S. A biological model for understanding the behavior of individuals. In Jack Westman (Ed.), *Individual differences in children.* New York: Wiley, 1973.

Bergin, A. E., & Strupp, H. H. New directions in psychotherapy research. *Journal of Abnormal Psychology,* 1970, **76**, 13–26.

Biermann, R. Dimensions of interpersonal facilitation on psychotherapy and child development. *Psychological Bulletin,* 1969, **72**, 338–352.

Borke, M. Interpersonal perception of young children: Egocentrism or empathy? *Developmental Psychology,* 1971, **5**, 263–269.

Carlson, R. Where is the person in personality research? *Psychological Bulletin,* 1971, **75**, 203–219.

Carson, R. C. *Interaction concepts of personality.* Chicago: Adline, 1969.

Chance, E. Content analysis of verbalizations about interpersonal experience. In L. Gottschalk & A. Auerbach (Eds.), *Methods of research in psychotherapy.* New York: Appleton-Century-Crofts, 1966.

Cole, C. W., Oetting, E. R., & Miskimins, R. W. Self concept therapy for adolescent females. *Journal of Abnormal Psychology,* 1969, **74**, 642–645.

Cooley, W. W., & Lohnes, P. R. *Multivariate procedures for the behavioral sciences.* New York: Wiley, 1962.

Coopersmith, S. *The antecedents of self-esteem.* San Francisco: W. H. Freeman, 1967.

Cottrell, L. Interpersonal interaction in the development of self. In D. A. Goslin (Ed.), *Handbook of socialization theory and research.* Chicago: Rand-McNally, 1971.

Cronbach, L. J. *Essentials of psychological testing.* (2nd ed.) New York: Harper, 1960.

English, R. TA's Disney World. *Psychology Today,* April 1973, 45–51.

Feffer, M. Developmental analysis of interpersonal behavior. *Psychological Review,* 1970, **77**, 197–214.

Felker, D. W., & Thomas, S. B. Self-initiated verbal reinforcement and positive self-concept. *Child Development,* 1971, **42**, 2185–2187.

Fiske, D. W., & Rice, L. Intra-individual response variability. *Psychological Bulletin,* 1955, **52**, 217–250.

Foa, U. G. Convergences in the analyses of the structure of interpersonal behavior. *Psychological Review,* 1961, **68**, 341–353.

Foa, U. G. Perception in behavior in reciprocal roles: The ringex model. *Psychological Monographs,* 1966, **80** (15, Whole No. 623).

Foa, U. G. Three kinds of behavioral changes. *Psychological Bulletin,* 1968, **70**, 460–473.

Foa, U. G., & Turner, J. L. Psychology in the year 2000: Going structural? *American Psychologist,* 1970, **25**, 244–247.

Freedman, M. B., Leary, T. F., Ossorio, A. G., & Coffey, H. S. The interpersonal dimension of personality. *Journal of Personality,* 1951, **20**, 143–161.

Goldberg, L. R., & Hase, H. D. Strategies and tactics of personality inventory construction: An empirical investigation. (ORI Research Monograph, Vol. 7, No. 1) Eugene: Oregon Research Institute, 1967.

Goldfried, M. R., & Kent, R. N. Traditional versus behavioral personality assessment: A comparison of methodological and theoretical assumption. *Psychological Bulletin,* 1972, **77**, 409–420.

Goldin, P. C. A review of children's reports of parent behaviors. *Psychological Bulletin,* 1969, **71**, 222–236.

Grant, D. A. Testing the hull hypothesis and the strategy and tactics of investigating theoretical models. *Psychological Review,* 1962, **69**, 54–61.

Guttman, L. Order analysis of correlation matrices. In R. B. Cattell (Ed.), *Handbook of multivariate experimental psychology.* Chicago: Rand-McNally, 1966.

Hall, C. S., & Lindzey, G. *Theories of personality.* New York: Wiley, 1957.

Harman, H. H. *Modern factor analysis.* Chicago: University of Chicago Press, 1960.

Harper, L. V. The young as a source stimuli controlling caretaker behavior. *Developmental Psychology,* 1971, **4**, 73–88.

Heilbrun, A. B., Jr. Social learning theory, social desirability, and the MMPI. *Psychological Bulletin,* 1964, **61**, 377–387.

Herbert, E. W., Gelfand, D. M., & Hartman, D. P. Imitation and self-esteem as determinants of self-critical behavior. *Child Development,* 1969, **40**, 421–430.

Hersch, P. D., & Scheibe, K. Reliability and validity of internal-external control as a personality dimension. *Journal of Consulting Psychology,* 1967, **31**, 609–613.

Horst, P. *Personality: Measurement of dimensions.* San Francisco: Jossey-Bass, 1968.

Jackson, D. N. The dynamics of structured personality tests: 1971. *Psychological Review,* 1971, **78**, 229–248.

Jackson, D. N., & Messick, S. Content and style in personality assessment. *Psychological Bulletin,* 1958, **55**, 243–252.

Leary, T. *Interpersonal diagnosis of personality.* New York: Ronald Press, 1957.

Maccoby, E., & Masters, J. C. Attachment and dependency. In P. Mussen (Ed.), *Carmichael's manual of child psychology.* New York: Wiley, 1970.

Mahler, M. *On human symbiosis and the vicissitudes of individuation, Volume 1: Infantile psychosis.* New York: International Universities Press, 1968.

McClelland, D. C. Opinions predict opinions: So what else is new? *Journal of Consulting and Clinical Psychology,* 1972, **38**, 325–326.

Messick, S., & Jackson, D. N. Judgmental dimensions of psychopathology. *Journal of Consulting and Clinical Psychology,* 1972, **38**, 418–427.

Miller, G. A. The magical number seven, plus or minus two: Some limits on our capacity for processnig information. In R. D. Luce, R. R. Bush, & E. Galanter, (Eds.), *Readings in mathematical psychology.* (Vol. 1) New York: Wiley, 1963.

Minkowich, A., Weingarten, L., & Blum, G. Empirical contributions to a theory of ambivalence. *Journal of Abnormal Psychology,* 1966, **71**, 30–41.

Mueller, W. J. Patterns of behavior and their reciprocal impact in the family and in psychotherapy. *Journal of Counseling Psychology Monograph,* 1969, 16(2, Pt. 2).

Mueller, W. J., & Dilling, C. A. Therapist-client interview behavior and personality characteristics of therapists. *Journal of Projective Techniques and Personality Assessment,* 1968, **32**, 281–288.

Neill, J. A., & Jackson, D. N. An evaluation of item selection strategies in personality scale construction. *Educational and Psychological Measurement,* 1970, **30**, 647–661.

Osgood, C. E., Suci, G. J., & Tannenbaum, P. H. *The measurement of meaning.* Urbana: University of Illinois Press, 1957.

Ranson, G. J., Schaefer, E. S., & Levy, B. Cross-national validity of a spherical conceptual model for parent behavior. *Child Development,* 1968, **39**, 1227–1235.

Rinn, J. Structure of phenomenal domains. *Psychological Review,* 1965, **72**, 445–466.

Rogers, T. B. The process of responding to personality items: Some issues, a theory, and some research. *Multivariate Behavioral Research Monographs,* 1971 (No. 71-6).

Rorer, L. G. The great response-style myth, *Psychological Bulletin,* 1965, **63**, 129–156.

Rundquist, E. A. Item response characteristics in attitude and personality measurement: A reaction to L. G. Rorer's 'The great response—style myth'. (Tech. Bull. STB G7-16). San Diego: U. S. Naval Personnel Research Activity, 1967.

Schaefer, E. S. A configurational analysis of children's reports of parent behavior. *Journal of Consulting Psychology,* 1965, **29**, 552–557.

Schaefer, E. S. From circular to spherical conceptual models for parent behavior and child behavior. In J. P. Hill (Ed.), *Minnesota Symposia on Child Psychology.* (Vol. 4). Minneapolis: University of Minnesota Press, 1971.

Schaefer, E. S., & Bayley, N. Maternal behavior, child behavior, and their intercorrelations from infancy through adolescence. *Monographs of the Society for Research in Child Development,* 1963, **28** (3, Whole No. 87).

Schlesinger, I. M., & Guttman, L. Smallest space analysis of intelligence and achievement tests. *Psychological Bulletin,* 1969, **71**, 95–100.

Schutz, W. C. *The interpersonal underworld.* Palo Alto, Calif.: Science and Behavior Books, 1966.

Scott, W. A. Comparative validities of forced-choice and single-stimuli tests. *Psychological Bulletin,* 1968, **70**, 231–244.

Scott, W. A., & Johnson, R. C. Comparative validities of direct and indirect personality tests. *Journal of Consulting and Clinical Psychology,* 1972, **38**, 301–318.

Stayton, D. J., Hogan, E., & Ainsworth, M. D. S. Infant obedience and maternal behavior: The origins of socialization reconsidered. *Child Development,* 1971, **42**, 1057–1069.

Sullivan, H. S. *The interpersonal theory of psychiatry.* New York: W. Norton, 1953.

Tanner, J. M. Physical Growth. In P. H. Mussen (Ed.), *Manual of Child Psychology.* New York: Wiley, 1970.

Toman, W. The duplication theorem of social relationships as tested in the general population. *Psychological Review,* 1971, **78**, 380–390.

(Received May 22, 1973; revision received April 10, 1974)