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Mapping Nonverbal Behavior on the Interpersonal Circle

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Whether and how personality is encoded in nonverbal behavior is reexamined. Behavior mapping, a recently developed approach designed to produce more focused answers, is used. Conversations among same-sex triads were scored for numerous seated kinesic behaviors. After winnowing some behaviors according to standard psychometric and behavior-mapping criteria, 6 behaviors of the head, hands, and legs could be clearly mapped on the interpersonal circle. Three of the 4 bipolar axes of the circle were primary axes for at least 1 behavior, although most are aligned with the Gregarious-Extraverted to Aloof-Introverted axis. Behavior mapping reaffirms that the interpersonal circle orders actual behavior (is not a merely cognitive ordering) and that it is a fruitful method for specifying behavior in terms of personality or vice versa.

Connections between nonverbal behavior and personality have been investigated for many years, with mixed results. Many significant relations between dispositions and nonverbal actions have been summarized in reviews by Harper, Wiens, and Matarazzo (1978), Mehrabian (1981), Bull (1983), and others. Nevertheless, pessimistic views are also found, even among these reviewers. In concluding his review of the area, Bull described the fruits of many studies as "not impressive" (1983, p. 87).

There are at least four reasons for pessimism. First, as in any area, disappointing results often occur when either the disposition or the behavior is measured with unreliable tools or when a behavior is measured only once. Second, nonverbal behavior is importantly influenced by factors other than personality, such as sex (e.g., Hall, 1984), the nature of the social situation (e.g., Duncan & Fiske, 1985), and even furniture arrangements (e.g., Gifford, 1983). Third, in some broad-based attempts to relate personality and nonverbal behavior, numerous correlations have failed to reach significance. Finally, correlations that do reach statistical significance have not always attained sufficient magnitude (i.e., accounted for enough variance) to satisfy the expectations of some observers.

Previous research in the area may be unimpressive, partly for these reasons, but the belief that nonverbal behavior encodes personality is still widespread. Bull (1983) even suggested that perhaps observers who believe such links exist are subject to a decoding error. Valid as the reasons for pessimism may be in certain circumstances, they are not sufficient in themselves to preclude all attempts to understand links between personality and nonverbal behavior. An alternative to Bull's hypothesis is that valid links between personality and nonverbal behavior do exist—that the links have what Egon Brunswik called ecological validity—but the nature of these connections has been blurred by results from inadequately designed studies. Our opinion is that the question remains open, on the basis of the following cautionary and optimistic responses to the pessimism.

First, particular attention must be paid to the reliability of the nonverbal behavior scoring and of the personality measures. In addition, multiple measurements of dependent variables have been shown to increase their predictability (e.g., Gifford, 1982; Jaccard, 1974).

Second, the reality of nonpersonality influences on nonverbal behavior does not negate the possibility of personality influences. Studies can be designed to make either dispositions or situations appear strong (Buss, 1989), but the point is not (or should no longer be) to demonstrate that dispositions or situations are more influential; it is to acknowledge the reality of multiple influences on behavior and to proceed with more substantive questions. When relatively normal interpersonal situations are examined, both dispositional and situational factors will play significant roles (e.g., Gifford & Gallagher, 1985).

Third, expectations about personality–nonverbal behavior links have sometimes been misplaced: Certain correlations should not, on closer analysis, have been expected to be significant. Personality appears to have five domains (McCrae & Costa, 1987, 1989; Peabody & Goldberg, 1989). Some researchers have examined nonverbal behaviors that seem to belong to one domain (e.g., smiles, presumably associated with an interpersonal domain, affiliation) in relation to a trait that belongs to another (e.g., self-control, which is presumably part of a different personality domain, impulse control). A significant correlation between smiling and self-control might be found, but it would not be expected because of the apparent mismatch in domains. When many behaviors are correlated with dispositions representing multiple domains, many nonrelations should be anticipated.

Finally, I believe that moderate expectations about the

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strength of personality and nonverbal behavior links are appropriate. Because most behavior—not only nonverbal behavior—is subject to multiple influences, neither personality nor other influences should be expected to explain very large proportions of variance in behavior on their own.

Recent research supports cautious optimism on the basis of these considerations. Gifford and O'Connor (1987, Study 2) correlated the eight dispositions of Wiggins' (1979) carefully developed Interpersonal Adjective Scales (IAS) with six verbal and four nonverbal behaviors from an interpersonal context (conversations) using a highly reliable nonverbal-behavior–scoring system that includes many repeated measurements over the course of a conversation.

The IAS (see Figure 1) is based on two primary, orthogonal dimensions (dominance and warmth, representing two of the Big Five personality domains) and two other, also orthogonal dimensions (extraversion and arrogance, which are intermediates between, or combinations of, dominance and warmth). The two pairs of dimensions are located 45° apart around the circle; thus, for example, extraversion is located 45° from dominance and 45° from warmth; it is the "northwest" to dominance's "north" and warmth's "west." In the Gifford and O'Connor (1987) study, the IAS was shown to order both means and correlations of several verbal and nonverbal activities in a highly significant manner; the authors found the patterning sufficiently striking to describe their results as *behavior mapping.*

Until that study appeared, critics of the personality paradigm in general and even the developers of an interpersonal circle (Conte & Plutchik, 1981) expressed doubts that interpersonal circles measured anything more substantial than cognitive (or lexical, or implicit, or response biased) representations of personality. No study had examined the links between actual behavior (some had looked at reported behaviors, which may be subject to the same cognitive or implicit influences) and the interpersonal circle.

The basic concept in behavior mapping is that activities that are relevant to a personality domain will show a clear pattern of means and correlations around the interpersonal circle. For example, the verbal behavior *acts initiated* (the number of occasions on which a person originates a whole verbal unit; Bales, 1970) was most strongly correlated in the Gifford and O'Connor study with the IAS disposition *gregarious–extraverted.* In both directions around the interpersonal circle away from gregarious–extraverted, correlations declined, reaching a minimum at the orthogonal pole (*arrogant–ingenuous*), then increased again (with the opposite sign) to reach a maximum at the other end of the pole, *aloof–introverted.*

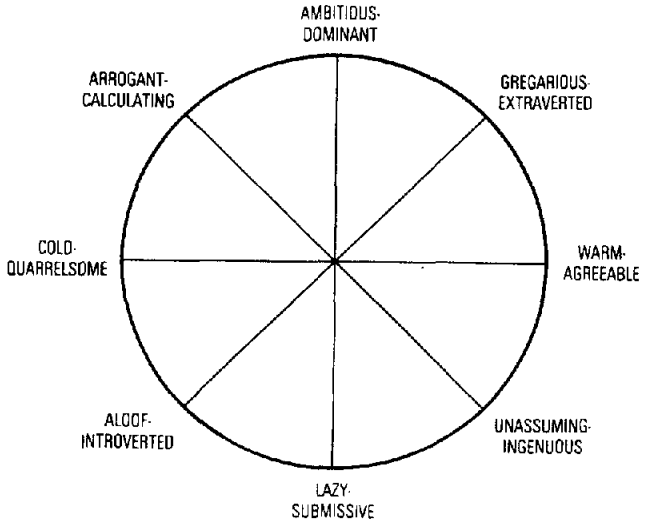

Figure 1. The interpersonal circle.

For acts initiated, this progressive pattern was perfect, that is, at each and every spot around the interpersonal circle, the correlations rose and fell in sequence. However, not all behaviors (e.g., gaze) could be mapped in this manner. Gifford and O'Connor (1987) suggested that gaze may be a behavior that is so influenced by other factors (e.g., one person's gazing depends heavily on another person's gazing) that behavior mapping based solely on one person's personality breaks down. Indeed, some authors (e.g., Kanki, 1985) have assumed that *any* behavior occurring in an interpersonal context "is automatically confounded by" (p. 234) the behavior of others. However, such interdependence is not automatic; it is an empirical question, and methods have been devised for assessing the degree of behavioral interdependence in a group context (Kenny & Judd, 1986; Kenny & La Voie, 1985; Kenny & Stigler, 1983).

As I noted earlier, another possibility is that a behavior under consideration simply is not relevant to the personality domain under investigation. In the behavior mapping approach, this would be indicated by nonsignificant correlations all the way around the interpersonal circle. (Such nonrelations should not necessarily be tallied as evidence that personality is unrelated to nonverbal behavior: It may simply be that the behavior in question is part of another personality domain.)

In this study, I use the behavior-mapping approach to screen and locate nonverbal behaviors on the interpersonal circle. Gifford and O'Connor (1987, Study 2) examined four seated kinesic activities; I examine a broad range of additional kinesic activities (34 face, head, trunk, arm, hand, leg, and foot behaviors) that occur in seated conversations. Because these activities occur in an interpersonal context, each of them potentially may be mapped on the interpersonal circle. However, on the basis of considerations discussed earlier, not all (or even most) behaviors are expected to clearly map on the circle. By winnowing the behaviors through a reasoned screening process and applying objective standards for mapping, I map only behaviors that quite clearly belong on the interpersonal circle.

Among behaviors that are clearly mapped, a primary axis will be apparent. In behavior mapping, the primary axis is the IAS disposition (and its opposite number 180° away) with which a behavior correlates most strongly. In addition, a clear pattern of correlations and means around the interpersonal circle will be apparent.

Method

The data for this study are from the conversations videotaped by Gifford and O'Connor (1987, Study 2), but 34 nonverbal behaviors not investigated by them are investigated in this study.

Subjects and Procedure

Sixty university students in the 18–25 year age range participated in same-sex groups of 3. Thirty men and 30 women were drawn from the

Table 1
Means, Correlations, and Number of Reversals for Nonverbal Behaviors

IAS disposition	Head orientation M_1	M_2	Direction	r	Direction
NO	4.7	4.1	+	.26	+
LM	4.5	4.3	+	.00	+
JK	4.42	4.40	+	−.204	−
HI	4.6	4.3	+	−.198	+
FG	4.2	4.6	−	−.37	−
DE	4.2	4.7	−	−.09	−
BC	4.38	4.44	−	.10	−
PA	4.1	4.8	−	.17	−
Reversals			0		1
Nods					
NO	3.2	3.8	−	.27	−
LM	3.4	3.6	−	.30	+
JK	3.8	3.2	+	.16	+
HI	3.9	3.2	+	.00	+
FG	3.4	3.6	−	−.18	+
DE	3.5	3.6	−	−.20	−
BC	3.1	3.9	−	−.06	−
PA	2.8	4.2	−	.03	−
Reversals			2		0
Object manipulation					
NO	3.7	2.9	+	−.06	−
LM	2.6	3.9	−	−.04	−
JK	1.4	5.2	−	.23	−
HI	6.6	0.6	+	.43	+
FG	2.9	3.6	−	−.02	−
DE	4.0	2.5	+	.01	+
BC	5.0	1.5	+	−.04	+
PA	1.3	5.4	−	−.46	−
Reversals			2		1

IAS disposition	Head orientation M_1	M_2	Direction	r	Direction
Left leg lean					
NO	4.6	3.7	+	.27	+
LM	4.4	3.9	+	.03	+
JK	4.3	4.0	+	−.30	+
HI	4.0	4.2	−	−.33	−
FG	3.9	4.3	−	−.26	−
DE	4.1	4.2	−	−.04	−
BC	3.7	4.5	−	.03	−
PA	4.3	4.0	+	.22	−
Reversals			0		1
Leg movement					
NO	2.6	5.5	−	−.20	−
LM	4.2	4.1	+	−.04	−
JK	3.8	4.5	−	.02	−
HI	1.9	5.9	−	.05	−
FG	6.0	2.2	+	.28	+
DE	3.6	4.6	−	−.01	−
BC	5.9	2.4	+	.07	+
PA	4.9	3.3	+	−.10	+
Reversals			2		1
Leg extension					
NO	2.0	1.8	+	−.02	+
LM	2.0	1.9	+	−.15	+
JK	1.94	1.90	+	−.27	+
HI	1.7	2.1	−	−.29	−
FG	1.9	2.0	−	.04	−
DE	1.9	2.0	−	.10	−
BC	1.8	2.0	−	.11	−
PA	2.1	1.7	+	.26	+
Reversals			0		0

Note. Mean 1 (M_1) is the mean amount of behavior (e.g., number of leg movements) of participants whose standard scores on a given disposition NO) were higher than their standard scores on the next listed disposition (e.g., LM). Mean 2 (M_2) is the mean amount of behavior for participants whose standard scores on the given disposition were lower than their standard scores on the next listed disposition. A plus sign in the first Direction column indicates that Mean 1 exceeds Mean 2; a minus sign indicates that Mean 2 exceeds Mean 1. A plus sign in the second Direction column indicates that the correlation between the disposition on the same line and the nonverbal behavior was more positive than the equivalent correlation for the disposition on the line above. In both cases, the prediction is for four successive plus signs followed by four successive minus signs. Reversals are the number of deviations from this prediction. IAS = Interpersonal Adjective Scale. IAS acronyms are as follows: NO = gregarious–extraverted; LM = warm-agreeable; JK = unassuming–ingenuous; HI = lazy-submissive; FG = aloof–introverted; DE = cold–quarrelsome; BC = arrogant–calculating; PA = ambitious–dominant.

psychology department subject pool and participated on a volunteer basis for "a study of conversational patterns." The participants were largely unacquainted with one another before the study (less than 10% described their coparticipants as friends; about 90% said they had never met or were merely acquainted).

The conversations took place in a laboratory room 5 m × 6.7 m that was carpeted, had paintings on the wall, and generally was made to resemble an informal waiting room. The participants sat in padded armless chairs that were arranged in a semicircle. Because of ethical concerns, I chose to inform participants that they were being videotaped, but to reduce any self-consciousness the participants may have felt, I placed the cameras in smoked-glass cabinets. Awareness of being videotaped did not affect expressive behavior in the only study to specifically examine this variable (Wiemann, 1981). To allow an unobstructed view of all participants for later scoring of nonverbal behavior, I placed the two cameras at right angles.

A week or so before the conversation, the participants were given the IAS. This instrument contains 128 adjectives; respondents indicate on 8-point scales the degree to which each adjective accurately describes themselves. When they arrived for the session, the participants were introduced to one another and asked to take a seat. They were given a list of suggested topics but encouraged to converse on any topic they chose. The conversations were allowed to proceed for about 15 min before the experimenter interrupted for a debriefing session.

Nonverbal Behavior Scoring

The videotapes of the conversations were then scored with the fourth version of the Seated Kinesic Activity Notation System (SKANS IV; Gifford, 1986). The main goals of the system are to include all major visible body movements that occur in seated persons and to define scoring criteria for these behaviors clearly so that scoring involves little

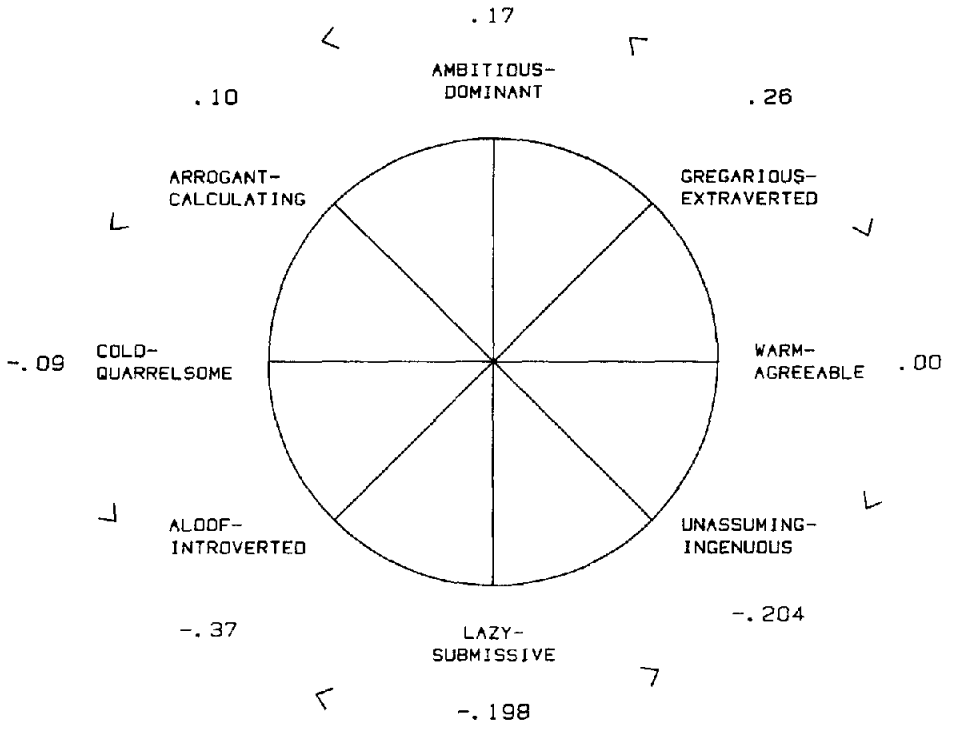

Figure 2. Head orientation mapped on the interpersonal circle.

interpretation and is essentially objective. SKANS IV measures 38 behaviors; all are described in this section, but the four studied by Gifford and O'Connor (1987) are marked with an asterisk. The behaviors are measured in one of three ways: time-sampling, frequency, or duration.

Examples of the 24 time-sampled behaviors include *head orientation* and *ankle separation.* Every 5 s, the person's angle of head orientation (e.g., straight ahead, 10° to the right, etc.) is scored, as is the amount of separation of the ankles (e.g., together, 8 cm apart, etc.). Time-sampled behaviors include the *orientation* (left vs. right turning) and *lean* (deviation from the vertical) of the *head, trunk,* and each *leg* and the *recline* (forward vs. backward position) of the *head* and *trunk.* Others are *hand* (each hand's *vertical* [up–down], *horizontal* [front–back], and *extension* [distance from body] positions), *arm wrap,* finger extension* for each hand (from flat and extended to fisted), *leg crossing, knee separation, ankle separation,* and *leg extension* for each leg.

Behaviors that involve left versus right movement (i.e., orientation and lean behaviors) were recoded as follows. Recall that the participants sat in a semicircle; envision the 2 individuals on the outside both orienting their heads to the right. One would be looking toward the others, and 1 would be looking away from the group. Because orienting toward or away seems a more appropriate measure than an absolute right versus left measure, the behavior of the 2 outside individuals was recorded to reflect inward (toward) versus outward (away) orienting and leaning. The center person's scores were similarly recoded, but looking straight ahead was scored as away orienting (in the semicircle seating arrangement, neither of the others was visible to the center participant if he or she looked straight ahead), and orienting either left or right was recoded as toward orienting.

Examples of the eight frequency-scored behaviors are *leg movements* and *nods,* both of which are scored on a once-per-cycle basis (i.e., each up–down or back-and-forth motion is counted). Frequency-sampled behaviors besides these are *head shakes, smiles,* foot movements, rocking, trunk movements,* and *yawns.*

Examples of the six duration-scored behaviors include *self manipulation* and *outside attention.* The number of seconds the person spends rubbing his or her chin or gazing away from companions is counted. Other duration-scored behaviors are *frowns, object manipulation, gaze,** and *gestures.**

In this study, each conversation was scored for the 34 behaviors not already examined. Five min of each conversation was scored, allowing for many repeated or cumulative measurements of each behavior. The scoring period began several minutes into each conversation to give participants time to establish a conversation and to become familiar with the setting.

Results

Reliability of Trait and Nonverbal Measures

Wiggins (1979) reported Cronbach alphas for the eight IAS scales ranging from .74 to .92. These alphas, based on the self-reports of four samples ranging in size from 100 to 152, have a median alpha of about .86. The IAS has adequate internal consistency.

Next, the reliability of the nonverbal behavior scoring was considered. The nonverbal behaviors were scored from the videotapes by two observers trained in SKANS scoring. Both observers scored all the behaviors for 9 participants (three groups). Because scoring is very time consuming (the two observers worked full-time for 4 months), the nonverbal behavior of the remaining participants was scored by one or the other of the observers. Interrater reliability for the scoring of each nonverbal behavior was estimated by first computing the intraclass correlations on the basis of the 9 targets whose behaviors were scored by both assistants (Guilford, 1956, p. 281, Formula 12.26). This

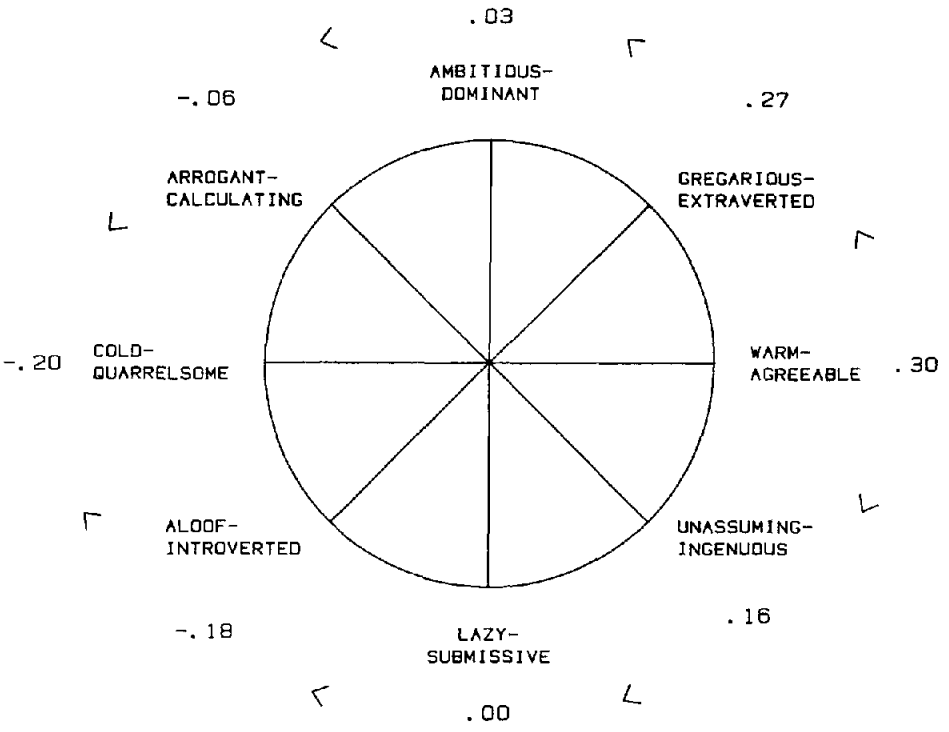

Figure 3. Nods mapped on the interpersonal circle.

produced an estimate of the reliability of a typical single scorer coding the behavior of 9 targets. These estimates were then adjusted to estimate the reliability of a typical single scorer coding the behavior of all 60 targets (Guilford, 1956, p. 452). The median reliability of the scoring of the behaviors was slightly over .98.[1] The goal of near-objective scoring for the SKANS IV system appears to have been met.

Winnowing Behaviors

Not all behaviors were suitable as mapping candidates, at least as they were scored. Some were eliminated and others were consolidated.

Eliminating inadequately assessed behaviors. Five behaviors (head lean, trunk lean, yawns, frowns, and rocking) were eliminated because they occurred very infrequently, showed very low intersubject variability, or were often difficult to view in the videotapes. This reduced the number of nonverbal behaviors to be considered from 34 to 29.

Consolidation of highly correlated behaviors. Three pairs of bilateral behaviors (e.g., left leg extension and right leg extension) were combined because they showed very high correlations with each other ($r > .90$). This combination of left and right behaviors resulted in the creation of leg extension, finger extension, and hand extension as replacements for six bilateral measures. Incidentally, not all bilateral movements were highly correlated (e.g., right and left leg lean). Knee separation, ankle separation, and leg crossing were highly related and hence combined into a single measure called *leg openness.* These consolidations resulted in a net decrease of 5 behaviors, leaving 24 kinesic activities for further consideration. Attempts to factor analyze these behaviors in the service of potential further consolidation were unsuccessful; the resultant factors accounted for relatively little variance and had little face validity.[2]

Simple and Complex Domain Relevance

Some nonverbal behaviors are related to the domains of personality included in the interpersonal circle (dominance and warmth) and some are not. This relevance, measured as a correlation with IAS dispositions, varies from very weak to very strong. Domain relevance may be simple (free of other influences) or complex (present but moderated by other influences).

Domain relevance. Domain relevance is defined as the degree to which a behavior exhibits a significant and patterned relation to the interpersonal circle. Because domain relevance varies in strength across behaviors (some behaviors will exhibit

[1] The reliability for a few behaviors was much lower because of infrequent occurrence of the behavior, low variability across participants, difficulty in viewing tapes, and so on. Naturally, these behaviors were not further considered (see the next section). The intraclass correlations for the six eventually mappable behaviors, on the basis of the 9 participants scored by both raters, ranged from .72 to .99, except *object manipulation,* which was only .36. Adjusted to the scoring of 60 participants by a single scorer, these reliabilities ranged from .94 to .99; that for object manipulation was .79, which was deemed adequate for further analysis.

[2] Among the eight eventually mappable behaviors (six in this study plus two from the Gifford and O'Connor, 1987, study), no two were correlated higher than .29 (the median absolute correlation was .10), where the .01 level of significance (using a two-tailed test) is .33.

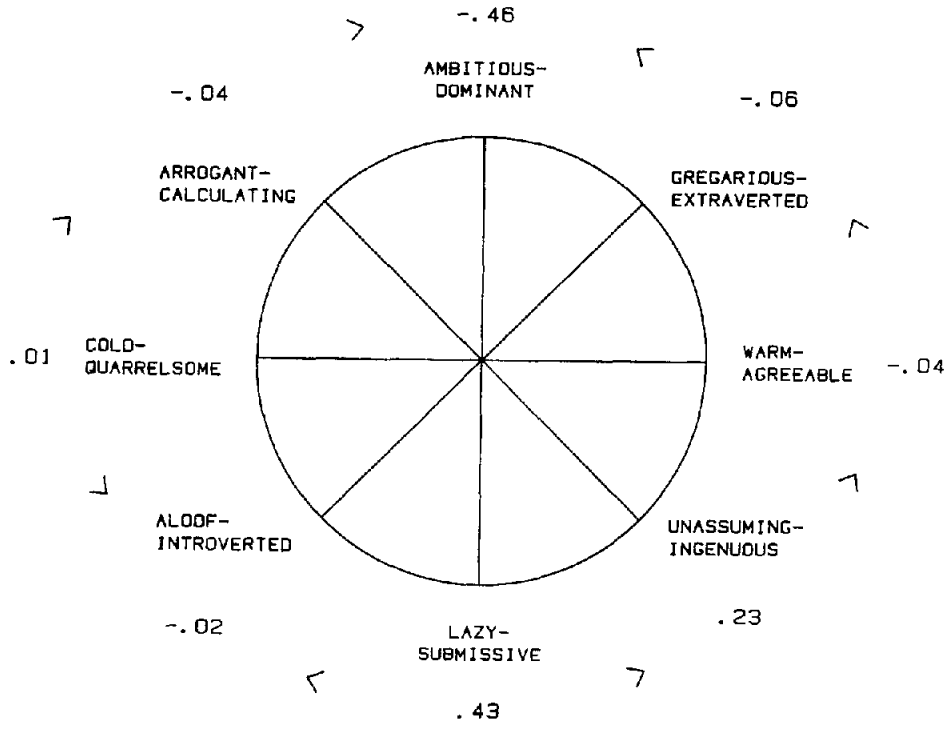

Figure 4. Object manipulation mapped on the interpersonal circle.

strong, clear links, whereas other behaviors will exhibit less clear links or no apparent links), criteria must be selected to distinguish significant from nonsignificant domain relevance. The criteria chosen for acceptance as a domain-relevant behavior were these: The behavior must manifest (a) a significant correlation with one IAS scale, (b) a significant, oppositely signed correlation with the IAS scale 180° away, and (c) a clear pattern in which correlations and means increase and decrease between these polar extremes.

These criteria embody key elements in the mapping approach, the notions that behavior should be related to the whole domain in a clear (i.e., a primary axis is evident) and ordered (i.e., patterning across the domain is evident) manner. This may be contrasted with the traditional approach of correlating nonverbal behaviors with single dispositions. That is, the behavior-mapping approach will describe a nonverbal behavior as "mappable" only when its pattern of correlations and means shows a primary axis (indicating the strength of the link) and a clear ordering of correlation and means around the interpersonal circle (indicating the consistency of the link). This should result in more certain answers to the long-standing question of personality and nonverbal behavior connections.

Simple domain relevance. I examined the remaining 24 behaviors, using Kenny's intraclass correlation techniques (Kenny & Judd, 1986; Kenny & La Voie, 1985; Kenny & Stigler, 1983), to determine whether their domain relevance was simple or complex.

The relation to personality of 15 behaviors was unaffected by group members' actions; they were deemed to have simple domain relevance. However, this does not mean that all 15 possess strong domain relevance. Using the three criteria just described, 5 of the 15 behaviors were determined to have strong simple domain relevance. One was a head behavior (nods), one was a hand behavior (object manipulation), and three were leg behaviors (leg movement, leg extension, and left leg lean).

Complex domain relevance. The other 9 of the 24 behaviors were shown to have complex domain relevance; their correlations with personality were significantly moderated by sex (1 behavior) or the actions of other group members (8 behaviors).

The sex difference was in head recline. Nonverbal sex differences may occur either in amount (e.g., women smile more than men) or in degree of correlation with a disposition (e.g., smiling is more highly correlated with extraversion in women than in men). This study is not specifically concerned about sex differences in the amount of nonverbal behavior; the focus is on the encoding of dispositions. Therefore, differences in the magnitude of correlations between personality and sex are of primary interest. Head recline showed a significant difference (Ferguson, 1976, p. 184): For women, head recline (holding the head forward, i.e., chin down) was positively correlated ($r = .28$) with *Unassuming–Ingenuous,* but for men the same correlation was −.22. Head recline was eliminated from further consideration not only because it operates differently for men and women, but because it did not significantly encode any IAS disposition.

The intraclass correlation (r_i) measures the degree to which a given person's behavior in the conversation is related to others' behavior (Kenny & La Voie, 1985; Kenny & Stigler, 1983). Eight behaviors indicated significant group influence. Five of these were positive correlations, meaning that if 1 person engaged in much of the activity, the others also tended to engage in it.

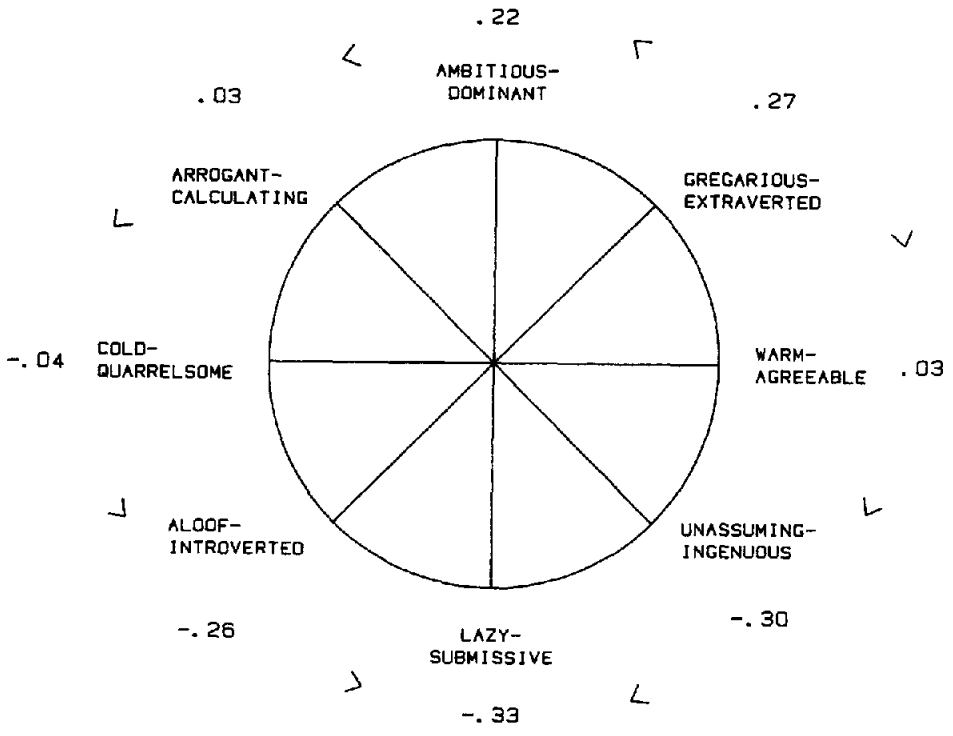

Figure 5. Left leg lean mapped on the interpersonal circle.

These were head shakes (r_i = .42, p = .001), leg openness (r_i = .50, p = .001), finger extension (r_i = .32, p = .01), trunk movements (r_i = .27, p = .02), and trunk recline (r_i = .26, p = .03). Three r_is were negative, indicating that if 1 person engaged in the activity, the others tended not to engage in it. These were head orientation (r_i = −.47, p = .001), right leg orientation (r_i = −.26, p = .02), and right leg lean (r_i = −.27, p = .02).

The finding of a significant r_i indicates that the behavior of group members is significantly intercorrelated, but this does not necessarily mean the behavior is unrelated to the actor's personality. Group influence can be partialed to obtain an estimate of the correlation between a disposition and nonverbal behavior, controlling for group influence (Kenny & La Voie, 1985).

The eight behaviors with significant r_is were examined in the manner just described. One of these, head orientation, showed significant links to the interpersonal circle when group influence was controlled; the other seven did not. Head orientation also met the criteria for strong domain relevance and therefore could be mapped on the interpersonal circle.

Mapping Nonverbal Behavior on the Interpersonal Circle

In total, then, six behaviors examined in this study—five with simple but strong domain relevance and one with complex but strong domain relevance—met the criteria for mapping. Table 1 indicates how each of these behaviors meets the criteria, and Figures 2–7 illustrate the mapping of them on the interpersonal circle.

Two behaviors studied by Gifford and O'Connor (1987), gestures and arm wrap, also met the mapping criteria. A third behavior they studied, gaze, did not nearly meet the mapping criteria. A fourth, smiles, met their criteria but did not meet our somewhat stricter criteria (its ordering is fine and it has a significant negative pole but no significant positive pole).

What is encoded by the eight behaviors that can be mapped? The grexalin axis is primary for four activities: More gregarious persons turn their head toward others more, gesture more, move their legs less, and wrap their arms less than more aloof persons. The warm–cold axis is encoded in nods; warmer individuals nod more than colder ones. The dominance–submissive axis encodes three behaviors: leg extension, object manipulation, and left leg lean. Dominant people manipulate objects less, extend their legs more, and lean their left legs toward the group more than submissives do. (Note that left leg lean but not right leg lean is among the encoding behaviors. Although other bilateral behaviors were combined because of very high correlations, left and right leg lean were correlated only .02.)

Discussion

The study clearly indicates that when certain experimental design and methodology problems are overcome, nonverbal behavior may be mapped on the interpersonal circle. After a winnowing process, six kinesic activities can be mapped in addition to the two identified by Gifford and O'Connor (1987). More generally, the study confirms the still debated notion that

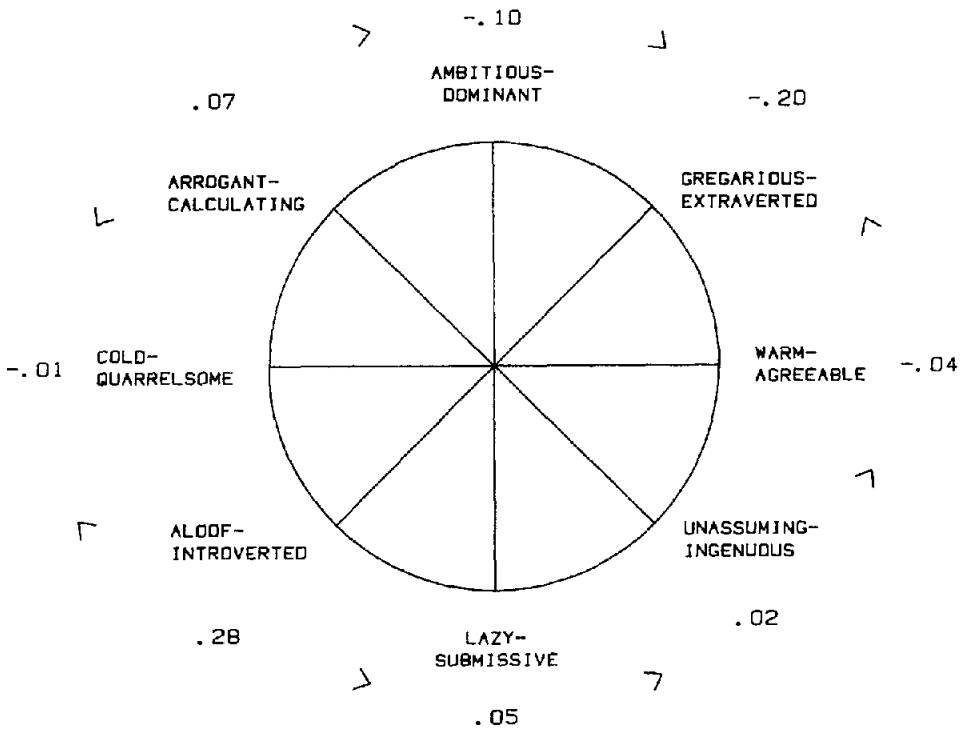

Figure 6. Leg movement mapped on the interpersonal circle.

personality–behavior links are real (i.e., have ecological validity) rather than illusory (i.e., are decoding errors).[3]

The behavior mapping procedure indicates the location of each behavior's primary axis and suggests the strength with which dispositions predict nonverbal behavior in a seated conversational context. Three of the four IAS axes are primary for at least one nonverbal behavior examined in this study, but grexalin is the central and most common primary pole. As predicted, the strength of these links is moderate, but the mapping of the behaviors around the interpersonal circle is quite clear. Each of these points is elaborated in the following paragraphs, but in brief, the study (a) confirms and extends Gifford and O'Connor's (1987) demonstration that the interpersonal circle maps actual behaviors and (b) provides additional evidence that behavior mapping is a useful way to almost cartographically specify behavior in terms of personality (or vice versa).

Experimental Design and Methodology

The checkered history of research into the relations between personality and nonverbal behavior is partly due to unwarranted enthusiasm and optimism. Even eminent researchers have plunged into the thicket armed with a broad arsenal of personality measures that they correlated with a wide range of nonverbal activities. When the overall correlation matrix looked sparse in terms of significant correlations, optimism turned to despair.

I believe that when a broad set of dispositions is related to a broad set of nonverbal behaviors, sparse significant correlations should be expected. The behavior mapping paradigm approaches the problem warily, searches for clear patterns among the sparse results, and harbors moderate expectations. If the notion of a Big Five set of personality domains is valid, one corollary should be that each domain is primarily related to a largely distinct behavioral domain. This study may be seen as an attempt to determine which nonverbal behaviors are associated with two of the Big Five domains, dominance and warmth. Given the strong interpersonal context of the behavior investigated in this study, these two domains were the most appropriate for study.

A cautious note of optimism may be derived from the results. When nonverbal behaviors are screened, not only on the basis of standard psychometric criteria (e.g., discarding inadequately assessed or rare behaviors and combining highly correlated behaviors) but also on the basis of less frequently used criteria (e.g., examining behaviors for signs of influences other than personal-

[3] In this study, as in many others, self-reports are used as measures of personality. Thus, my conclusions are limited to self-reports of dispositions. Whether self-ratings or others' ratings of personality are more valid (assuming there are "true" personality scores, as opposed to equally valid multiple realities) is not established. However, research just reported (i.e., after the data for this study were collected) on this thorny issue indicates both convergence and the lack of convergence for self-ratings and others' ratings of dominance and friendliness, the two key dimensions of the interpersonal circle, depending on disposition, sex, and method of assessment (Moskowitz, 1990). The issue of self-ratings versus others' ratings in relation to the mapping paradigm is an important question that is next on my research agenda.

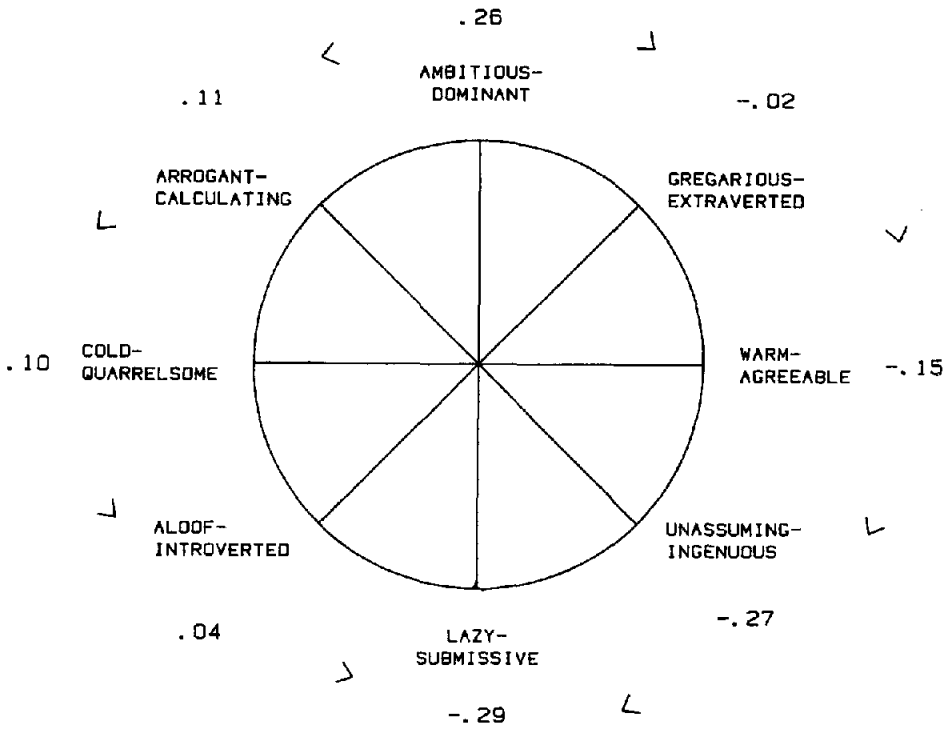

Figure 7. Leg extension mapped on the interpersonal circle.

ity), numerous behaviors can be mapped on the interpersonal circle.

In this study, I examined only seated kinesic activities; other nonverbal and verbal behaviors will be mapped on the interpersonal circle in future efforts. Gifford and O'Connor (1987) have already demonstrated that personal space and several of Bales's verbal behaviors do so.

An interesting side issue involves the proportion of nonverbal behaviors that are significantly influenced by the actions of others in the group. The intraclass correlation analyses show that only one third (8 of 24) are so influenced. Clearly, some nonverbal behavior in a group setting is affected by the actions of others in the group, but this influence is far from automatic.

The Full Axis and the Empty Axis

One purpose of the study was to extend the original mapping done by Gifford and O'Connor (1987). As McCrae and Costa (1989) pointed out, most of the behaviors mapped in that study were arranged along the grexalin axis. The following question might be raised: Do nonverbal behaviors as a whole require several primary axes or only the one? The results of this study indicate that of the interpersonal circle's four bipolar axes, three are primary axes for one or more of the mappable behaviors. Of the eight IAS dispositions comprising the four axes, five different dispositions serve as the positive pole for the nonverbal behaviors so far mapped. Apparently, most or all of the interpersonal circle is needed to map interpersonal behavior. On the other hand, grexalin is obviously the dominant axis; most behaviors map onto it; a few map onto its immediate neighbors.

The lack of behaviors with a primary axis along the remaining dimension (arrogant–unassuming) has a curious parallel in the relative lack of descriptors in that sector of the interpersonal circle that has been noted by developers of interpersonal circle lexicons. This raises the interesting possibility that the two shortages are connected. If few behaviors encode that axis, perhaps there have been few behavioral bases over the centuries of language development for coining adjectives suitable for the arrogant–unassuming dimension. So far, the behavior mapping paradigm indicates that the most and least common primary axes are orthogonal.

Encoding and Decoding

Bull (1983) suggested that observers who believe personality is encoded in nonverbal behavior may be subject to a decoding error. Given the large number of other biases in perception and attribution that have been documented by social psychologists over the past several decades, this is a reasonable hypothesis. The present study, however, does not support the notion that all personality–nonverbal links are illusory.

However, this does not mean that decoding errors do not occur. In a study of job applicant qualities inferred by professional personnel interviewers through nonverbal behavior that investigated both halves of the Brunswik lens model (i.e., ecological validity and cue utilization), examples of both accurate and inaccurate decoding were found (Gifford, Ng, & Wilkinson, 1985). Interviewers used nonverbal cues correctly to make reasonably accurate inferences about the applicants' social skills, but they also made serious decoding errors in inferring appli-

cants' motivation to work. Subsequent studies should determine the extent of decoding accuracy in trait inference; this study focuses only on the encoding half of Brunswik's lens model.

Moderate Expectations

The sizes of the links between behaviors and their primary axes, although significant, are not particularly large (peak correlations range from .28 to .46). This raises the omnipresent specter of weak trait-behavior relations. However, it is important to ask this question: Weak compared to what? Some reviewers have assumed that situational predictors of behavior are much stronger than dispositional predictors, which typically correlate .30 to .40 with behavior. This assumption may arise from the common practice of reporting analyses of variance (ANOVAs) for social situational effects but correlation coefficients for personality effects.

Focusing on the significance level of ANOVAs tends to mask the amount of variance accounted for by a situational effect, which is much more obvious in (the square of) a correlation coefficient. Funder and Ozer (1983) converted the significant ANOVA results from several well-known social situational studies into correlation coefficients and reported that these range from about .36 to .42. For reasons described in their article, Funder and Ozer conclude that even these modest figures may well be overestimates of the true magnitude of these situational effects. Rosenthal (1990) has similarly demonstrated that very widely cited medical studies often account for very small amounts of variance yet lead to important policy changes. In summary, the present results—like the results from other personality studies—are not weak when an appropriate comparison is made. Finally, on behalf of both social and dispositional effects, Rosenthal and Rubin (1979) showed how findings that account for relatively small percentages of variance can still have important consequences.

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