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PERSONALITY STRUCTURE: EMERGENCE OF THE FIVE-FACTOR MODEL

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PROLOGUE

William McDougall (1932), writing in the first issue of *Character and Personality* (which later became the *Journal of Personality*), discussed at length the special meanings of "character" and "personality" for the two languages in which the new journal was to be published. Toward the end of his essay, he offered an interesting conjecture: "Personality may to advantage be broadly analyzed into five distinguishable but separable factors, namely, intellect, character, temperament, disposition, and temper. . . . each of these is highly complex [and] comprises many variables" (p. 15).

Although "factor," as McDougall used the term, is closer to "topic" than to contemporary usage of the term, the suggestion was an uncanny anticipation of the results of half a century of work to organize the language of personality into a coherent structure.

THE FIVE-FACTOR MODEL: A GRAND UNIFIED THEORY FOR PERSONALITY?

The past decade has witnessed a rapid convergence of views regarding the structure of the concepts of personality (i.e. the language of personality). It now appears quite likely that what Norman (1963) offered many years ago as an effort "toward an adequate taxonomy for personality attributes" has matured into a theoretical structure of surprising generality, with stimulating links to psycholinguistics and cross-cultural psychology, cognitive theory, and other areas of psychology. Further work will no doubt bring change, and clarification is needed at many points. Nonetheless, the hope that the method of factor analysis would bring a clarity to the domain of personality, a hope voiced years ago by Eriksen (1957) and Jensen (1958), seems close to realization.

HISTORICAL ROOTS OF THE FIVE ROBUST FACTORS OF PERSONALITY

As an excellent review by John et al (1988) points out, systematic efforts to organize the language of personality began shortly after McDougall's suggestion, although such efforts appear to be more surely linked to two German psychologists, Klages (1926) and Baumgarten (1933), than to McDougall. Klages suggested that a careful analysis of language would assist the understanding of personality, and this stimulated Baumgarten to examine personality terms commonly found in the German language.

As John et al note, the efforts of Baumgarten had little effect on the course of German psychology but did influence Allport & Odbert (1936) to un-

dertake their own examination of language, and this was to have a direct effect on research efforts that followed, beginning with the systematic work of Cattell (1943, 1946, 1947, 1948).

Cattell's system, based on factor-analytic studies of peer ratings of college students, and later extended to both the questionnaire and objective-test realms, was welcomed in many quarters as a more objective approach to the organization of the thousands of terms in the English (or any) language used to describe individual differences. The system, however, was of daunting complexity, employing a minimum of 16 primary factors and 8 second-order factors (Cattell et al 1970). Even at the time of publication of the second rating study by Cattell (1948), Banks (1948) was highly critical of the analysis and offered an alternative and much simpler analysis of Cattell's correlations.

Efforts to replicate the early rating studies of Cattell began with the carefully crafted studies of Fiske (1949). Using 21 of Cattell's bipolar scales, Fiske was unable to find evidence for anything more complex than a five-factor solution. Dubious about the meaning of these factors, Fiske nonetheless provided interpretations that are not far off the mark of contemporary views. Fiske's work, although published in a journal frequently read by personality researchers, appears to have had little effect on the development of the three systems so commonly found in personality textbooks (e.g. Feshback & Weiner 1982; Maddi 1989): that is, the systems of Eysenck (1970), Guilford (1975), and Cattell (1965).

Toward the end of the 1950s an American Air Force attempt to predict officer effectiveness was undertaken by Tupes (1957). Subsequently, Tupes & Christal (1961) reported their factor analyses of the 30 Cattell bipolar scales they had used in the earlier study. Like Fiske before them, they were unable to find anything like the degree of complexity Cattell had reported but agreed with Fiske that five factors appeared to account for the observations remarkably well. Tupes & Christal went on to reanalyze Cattell's earlier work (based on the published correlations) and Fiske's correlations, finding all of them in rather good agreement in terms of five factors: *Surgency, Agreeableness, Dependability, Emotional Stability,* and *Culture*.

Unfortunately the Tupes & Christal study was published in an obscure Air Force technical report and remained unknown to virtually all personality researchers, while the publications of Cattell and Eysenck dominated the literature on personality structure as leading models obtained by factor analysis methods.

Norman (1963), however, knew of the report and replicated the five-factor structure, offering the trait dimensions as steps "toward an adequate taxonomy of personality attributes." Other studies corroborating the work of Fiske and Tupes & Christal were those of Borgatta (1964) and Smith (1967). Borgatta, aware of the report by Tupes & Christal, devised a set of behavior

descriptors for peer ratings to reflect the five factors obtained by Tupes & Christal. Across five methods of data gathering in the course of a study of small group interaction, Borgatta found five stable factors. His interpretations have a current ring to them: *Assertiveness, Likeability, Emotionality, Intelligence,* and *Responsibility*. Smith (1967), using a set of bipolar scales from Cattell's studies for a study of peer ratings of college students, found evidence for only five factors.

Norman (1967) continued further, investigating various levels of abstraction, downward from the five-factor level, through an intermediate level, and eventually arriving at a three-tiered level of abstraction of personality descriptors. Since it is assumed by virtually all trait theorists (despite their critics) that personality traits, however assessed, have their links to behavior, a basic level is the specific response to a specific situation. Responses, if typically made to prototypic situations, are seen as habits, act frequencies, behavior aggregates, or specific items on inventories (e.g. "I seldom think about the future.") Figure 1 represents these four levels of abstraction. At the fourth level are the five broad constructs—the "Big Five"—generated by systematic trait research of the past 40 years.

The usefulness of one of these trait constructs was soon demonstrated by Smith (1967) and by N. Wiggins et al (1969). Using characteristics denoting the construct often referred to as Responsibility or Conscientiousness, these investigators noted the impressive predictions that could be made in the area of educational achievement for undergraduate and graduate students.

Thus, more than 20 years ago, the domain of personality attributes had been successfully analyzed, not just once, but by five competent, independent investigators, all of whom came to the same general conclusion: that the domain could be adequately described by five superordinate constructs. Then as now some difference of opinion existed about the interpretation of these constructs.

One might suppose, given the robustness of the studies conducted by independent investigators, that research would next have focused on these dimensions, clarifying them and seeking their antecedents and correlates as evidenced in personality development and important life events. However, the times were not right for these pursuits. First, many psychologists shifted their attention to issues that seemed to have greater social relevance for the late 1960s and 1970s. Second, a strong attack was launched upon the entire field of trait research by Mischel (1968), Peterson (1960), Ullmann & Krasner (1975), and other born-again fundamentalists, who excoriated trait theory as akin to scientific sin, while others (D'Andrade 1965; Shweder 1975; Wegner & Vallacher 1977) dismissed the study of personality traits as little more than illusions generated in the heads of personality researchers and their subjects alike. Third, the influence of radical behaviorism on a closely related field,

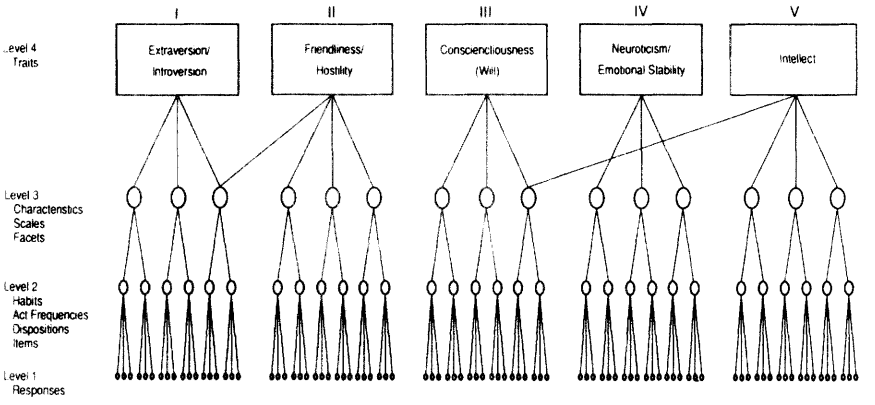

Figure 1 Four levels of abstraction, from specific behaviors to traits.

social psychology, led to a series of studies (e.g. Darley & Latane 1968; Milgram 1963) that seemed to demonstrate the overwhelming influence of the situation upon behavior. As an important paper by Funder & Ozer (1983) very neatly demonstrated, the enthusiasts for the situational view simply ignored much of the evidence, including the fact that situational variables usually failed to account for more than 15% of criterion variance, pushing instead an interpretation that happened to be in accord with the spirit of the times, both within psychology and in intellectual circles generally.

THE RECENT LITERATURE ON THE FIVE-FACTOR MODEL

Studies Based on Ratings

The past decade has seen a rapidly increasing interest in the five-factor model. As a result of his work on lexical analysis Goldberg (1981) noted the "robustness" of the model, stating that "it should be possible to argue the case that *any* model for structuring individual differences will have to encompass—at some level—something like these 'big five' dimensions" (p. 159).

Goldberg further suggested that the five major dimensions of the rating field could provide a framework for many theoretical organizations of personality concepts, including the views of Cattell (1957), Norman (1963), Eysenck (1970), Guilford (1975), Osgood et al (1975), and Wiggins (1980).

Digman & Takemoto-Chock (1981) reanalyzed six studies based on ratings, including the classic work of Cattell and Fiske, and reported the robustness of the five-factor solution of the rating domain, concluding that the five factors first identified by Fiske and by Tupes & Christal represented "an impressive theoretical structure. *Regardless of whether teachers rate children, officer candidates rate one another, college students rate one another,*

or clinical staff members rate graduate trainees, the results are pretty much the same" (pp. 164–65).

Hogan (1983), reviewing many studies of trait organization, suggested that six major dimensions would probably encompass all the particulars of observation, as did Brand (1984). The principal difference between the six-factor and the five-factor model seems to involve a splitting of the usual Extraversion dimension into sociability and activity. [In the Hogan Personality Inventory (Hogan 1986) Extraversion is divided into Ambition (surgency or ascendancy) and Sociability.]

Recently, Goldberg (unpublished) has provided what he considers to be "standard markers of the Big Five," a set of 50 self-rating scales, 10 for each of the five trait dimensions. Reliability estimates for factor scores formed by unweighted summation of scale scores vary between .84 and. 89. Goldberg also noted that the scores thus obtained correlated highly with the five trait scores of the Neuroticism, Extraversion, Openness Personality Inventory (NEO-PI) (Costa & McCrae 1985), an inventory specifically tailored along the lines of the Five-Factor Model.

McCrae & Costa (1985b) added 40 rating scales to a set of 40 developed previously by Goldberg (1983). Subjects from the Baltimore Longitudinal Study on Aging were rated by four or five peers who knew them well. Factor analysis of the 80 scales pointed to a familiar five-factor solution. Trait scores, obtained by unweighted summation of scale values, correlated generally in the high .40s with scores obtained by self-report, using a self-report version of the same instrument.

Interpretations of the Dimensions

While fairly good agreement appears to be developing concerning the *number* of necessary dimensions, there is less accord with respect to their meaning. Table 1 is based on the efforts of Goldberg (1981), Hogan (1983), Brand (1984), Digman (1988), and John (1989) to organize the various five-factor solutions that have been noted.

There is general agreement that Dimension I is Eysenck's (1947) Extraversion/Introversion and that IV represents the presence and effects of negative affect, or Tellegen's (1985) Negative Emotionality. To line up with the vast work of Eysenck over the years, Dimension IV is usually referred to as Neuroticism vs Emotional Stability. Here, then, are the original Eysenck "Big Two," first delineated over 40 years ago.

Dimension II has generally been interpreted as Agreeableness (Tupes & Christal 1961; Norman 1963; Goldberg 1981; Costa & McCrae 1985). Agreeableness, however, seems tepid for a dimension that appears to involve the more humane aspects of humanity—characteristics such as altruism, nur-

Table 1 The five robust dimensions of personality from Fiske (1949) to the present

Author	I	II	III	IV	V
Fiske (1949)	social adaptability	conformity	will to achieve[a]	emotional control	inquiring intellect
Eysenck (1970)	extraversion	——————Psychoticism——————		neuroticism	
Tupes & Christal (1961)	surgency	agreeableness	dependability	emotionality	culture
Norman (1963)	surgency	agreeableness	conscientiousness	emotional	culture
Borgatta (1964)	assertiveness	likeability	task interest	emotionality	intelligence
Cattell (1957)	exvia	cortertia	superego strength	anxiety	intelligence
Guilford (1975)	social activity	paranoid disposition	thinking introversion	emotional stability	
Digman (1988)	extraversion	friendly compliance	will to achieve	neuroticism	intellect
Hogan (1986)	sociability & ambition	likeability	prudence	adjustment	intellectance
Costa & McCrae (1985)	extraversion	agreeableness	conscientiousness	neuroticism	openness
Peabody & Goldberg (1989)	power	love	work	affect	intellect
Buss & Plomin (1984)	activity	sociability	impulsivity	emotionality	
Tellegen (1985)	positive emotionality		constraint	negative emotionality	
Lorr (1986)	interpersonal involvement	level of socialization	self-control	emotional stability	independent

[a] Not in the original analysis but noted in a re-analysis by Digman & Takemoto-Chock (1981).

turance, caring, and emotional support at the one end of the dimension, and hostility, indifference to others, self-centeredness, spitefulness, and jealousy at the other. Some years ago, Guilford & Zimmerman (1949) proposed Friendliness as a primary trait dimension. Fiske (1949) offered Conformity (to social norms). Reflecting both the agreeableness and docility inherent in the dimension Digman & Takemoto-Chock (1981) argued for Friendly Compliance versus Hostile Noncompliance as a more adequate interpretation.

The essence of Dimension III has proved no less difficult to capture. To many writers this has suggested Conscientiousness. However, as Digman & Inouye (1986) have pointed out, "conscientious," both as a scale in research and in its dictionary definition[1], is ambiguous, typically loading both factor dimensions II and III in studies. Noting several studies that have linked this dimension to educational achievement (Smith 1967; N. Wiggins et al 1969; Digman 1972b), Digman & Takemoto-Chock (1981) suggested either Will to Achieve or simply Will as the better term. The latter interpretation has a historical association with the early work of Webb (1915), who analyzed a set of 39 "character qualities," using Spearman's method of factoring, and noted, beyond the general intelligence factor, *g*, a second general factor of volition or will, *w*. "Conscientiousness," however, seems to have become the interpretation of general choice and will be employed here.

Dimension V has been variously interpreted as Intellect (Goldberg 1981; Hogan 1983; Digman & Inouye 1986), Intelligence (Borgatta 1964), and Openness (Costa & McCrae 1985). Quite likely it is all of these; that is, the factor dimension has pointed to a *domain* of trait characteristics that are more or less related. McCrae & Costa, their collection of scales emphasizing various characteristics of "openness" (e.g. openness to feelings and to new ideas, flexibility of thought, and readiness to indulgence in fantasy), find an Openness factor. Hogan (1986) has lumped cultural interests, educational aptitude, and creative interests under Intellectance. John (1989), reviewing the attempts of many researchers, noted that something like Intellect (e.g. Inquiring Intellect, Intelligence, Intellectance) had most frequently been employed.

As other literature on the five-factor model is reviewed below, the following trait names will be used: I: Extraversion/introversion (or Surgency); II: Friendliness/hostility (or Agreeableness); III: Conscientiousness (or Will); IV: Neuroticism/emotional stability (or Emotional Stability); and V: Intellect (or Openness).

[1]The *American Heritage Dictionary of the English Language* lists "1. Governed or accomplished according to conscience; scrupulous. 2. Thorough and painstaking; careful." The first definition applies to Dimension II, the second to III.

The Five-Factor Model as Represented in the Questionnaire Domain

Intimations that the Big Five might prove to be a model for the organization of traits as measured by questionnaires began to appear a decade ago. Digman (1979) analyzed the scale correlations of the High School Personality Questionnaire (HSPQ; Cattell & Cattell 1969) and found four second-order factors that gave some resemblance to rating factors I through IV. The various scales of the Personality Research Form (PRF; Jackson 1974) were then related to these four factors, producing substantial correlations that were in general as expected [e.g. .73 between n_{aff} (need for affiliation) and Factor II, Extraversion; −.62 between n_{imp} (need for Impulsiveness) and Factor III, Conscientiousness].

Goldberg (1981; 159), who may have been first to use the expression "Big Five," proposed that many well-known self-report inventories might reflect various aspects of the five-factor model.

An important study by Amelang & Borkenau (1982) not only supported the five-factor model; it also provided a fine response to Jensen's (1958) plea for the study that would answer questions concerning the relationships among the Cattell, Guilford, and Eysenck systems. The answer: They all fit into the five-factor model very nicely. Amelang & Borkenau apparently were unaware of the five-factor studies in the United States. Their study, therefore, provided a completely independent replication of the American studies.

More recent studies of the correlations of the scales of various inventories are in agreement with the Amelang-Borkenau conclusions. Birenbaum & Montag (1986), using an Israeli sample, factored the Sixteen Personality Factor Questionnaire (16PF) together with the Zuckerman Sensation Seeking Scales (Zuckerman et al 1964). They obtained a five-factor solution for the 16PF correlations that was subsequently replicated by Digman (1988). Like Amelang & Borkenau, Birenbaum & Montag appear to have been unaware of the five-factor model of the rating field.

In a series of studies Costa & McCrae have not only developed an inventory (Costa & McCrae 1985) to assess the five trait dimensions implied by the five robust factors of the rating domain, but have used the model and inventory in a series of studies that have demonstrated the ubiquity of the Big Five. The inventory began with an effort to move beyond the Eysenck "Big Two," Extraversion and Neuroticism. Analysis of the 16PF inventory (Costa & McCrae 1976) pointed to three meaningful clusters of scales, two of which mirrored the Eysenck Neuroticism and Extraversion dimensions, the third a set of scales suggesting "open vs closed to experience" (Costa & McCrae 1985; 26). Further development of the third dimension led to the creation of the NEO Personality Inventory (NEO-PI). The three original scales—N, E,

and O—were subsequently joined by Scales A (Agreeableness, Dimension II of the five-factor model) and C (Conscientiousness, Dimension III). Using the NEO-PI as markers for the Big Five, Costa & McCrae have demonstrated the presence of the five-factor model in the Eysenck Personality Inventory (EPI; Eysenck & Eysenck 1964; McCrae & Costa 1985a), the Jackson Personality Research Form (PRF; Jackson 1974; Costa & McCrae 1988), the Myers-Briggs Type Indicator (MBTI; Myers & McCauley 1985; McCrae & Costa 1989), and the California Q-Set (Block 1961; McCrae et al 1986). Analysis of the Minnesota Multiphasic Personality Inventory (MMPI; Hathaway & McKinley 1951) by Costa et al (1986) in the context of the NEO-PI found four of the Big Five factors—Neuroticism, Extraversion, Agreeableness (Friendliness), and Openness (Intellect)—well represented. Conscientiousness, however, was conspicuous by its absence.

Borkenau & Ostendorf (in preparation) carried out an all too rare confirmatory factor analysis of the five-factor model. (Virtually all studies have employed the traditional exploratory model). Using a German language version of the NEO-PI, self-ratings and ratings by knowledgeable others for adults recruited by advertisement, they first reduced self-ratings and ratings by others to five factor scores, added the NEO-PI five scores, and employed LISREL (Joreskog & Sorbom 1984) to assess the adequacy of the five-factor model to account for the correlations involved among the 15 variables from the three data sources. The model that best fit the data was based on five oblique trait factors that mirrored the Big Five quite closely and three oblique method factors. A more extensive analysis of the complete data available, 60 basic scales in all, 20 for each method, could not support the five-factor model that was tested. The authors point out, however, that the model assumed simple structure, something that the five-factor model simply does not possess.

A variant of the five-factor model has been provided by Peabody (1967, 1984) and by Peabody & Goldberg (1989). Peabody, noting that evaluation is confounded with most of the characteristics employed in the rating field, has based his approach on attempts to remove this basic dimension from consideration of other dimensions. Analyzing seven data sets of characteristics of wide scope, Peabody & Goldberg recovered the usual five factors in both "internal" judgments (based on similarity ratings of characteristics by judges) and "external" judgments (the usual ratings of persons by observers). A smaller sixth factor, "Values," was noted in the analysis of "internal" judgments. Noting that factor loadings on the first three dimensions (Surgency, Agreeableness, and Conscientiousness) suggested a circular pattern, rather than one exhibiting a clear simple structure pattern, Peabody & Goldberg transformed the factor values on the three factor dimensions to a general

Evaluation dimension and two descriptive dimensions, Tight vs Loose and Assertive vs Unassertive.

The Peabody & Goldberg studies indicate one of the bemusing aspects of the technique of factor analysis: its well-known arbitrariness of solution. For the five-factor model one has at least two choices of model: one based on the usual solution that has dimensions reflecting a high degree of evaluation, or one that seeks to describe the dimensions in terms of a broad, general factor (such as the *g* factor of intelligence) and others that describe the residualized content of what remains after "partialling out" the general evaluative aspects of the dimensions.

The Five-Factor Model and Behavior

The five-factor model emerged from analyses of rating scales that required measured judgments of others; for example, to what degree is person X fearful, sympathetic, etc. Inventories typically ask for reports of behaviors ("I tend to avoid parties"). Buss and his associates (Buss & Craik 1980, 1985; Botwin & Buss 1989) have employed measures closer to actual behavior with what they have called the *act-frequency* approach, which involves reports of the frequencies with which specific acts (e.g. "She said I was irresponsible") are performed during a specified period of time. Although the frequency is as recalled, rather than as actually observed, analysis of 20 acts and their frequencies as reported provided strong support for the five-factor model. Borkenau (1988) had judges rate the prototypicality of 120 acts verbally described (in German for his German subjects), and patterned after the Big Five. Correlations were calculated for the characteristics (e.g. talkative) across the 120 acts. Factor analysis of these correlations produced the usual five factors, leading to the conclusion that "they may be identified as the five major dimensions of personality" (p. 350). An important methodological point to this study is that the correlations between pairs of characteristics (e.g. talkative and frank) were based on values obtained from different judges.

Block (1989), however, has taken strong exception to the act-frequency approach, noting that acts, as they are recalled from memory with respect to frequency of occurrence, are very similar to inventory items. Block also noted that the extreme specificity of some of the act statements employed by the method ("He turned his back to me") would probably lead to low levels of usefulness. Despite Block's criticism, the act-frequency approach may prove to be a useful research tool. What is apparent in the act-frequency approach is an effort to get closer to actual behavior, as opposed to opinions about persons (e.g. "X is reliable," in the case of ratings, or "I am careful about my appearance," in the case of an inventory). While such opinions (judgments,

impressions) are presumably based on behavioral observation, they obviously may be distorted for many reasons.

Buss & Craik (1980), in presenting the act-frequency approach as an alternative procedure for data collection, also admitted that an "evident next step . . . calls for field studies . . . of acts observed in situ" (p. 390). As Block points out, this step has not been taken by the act-frequency approach enthusiasts, yet there is good evidence that judgments about persons, based upon recollections of their behavior, are rooted in actual behavior.

Such studies are not easily done on adults, unless the subjects are easily observed, as in institutions or laboratory situations. Years ago Borgatta (1964) demonstrated the linkage of peer ratings to laboratory behavior. More recently, Small et al (1983) reported a study of observed prosocial and dominance behaviors exhibited by a group of boys during a camping trip, using both peer ratings and frequency counts of actual behaviors. Correlations generally in the .70s and .80s were reported.

OTHER PERSONALITY SYSTEMS AND THE BIG FIVE

Cattell's System

As Goldberg (1981) has pointed out, Cattell's complex system has not been able to survive the test of independent replication. Beginning with Banks (1948) and Fiske (1949), no one (e.g. Howarth 1976; Digman & Takemoto-Chock 1981) has been able to find more than seven factors in the original correlations of the rating studies that were the basis of the system. However, the correlations of the 16PF scales, when factored, usually provide some indication of the Big Five (Birenbaum & Montag 1986; Noller et al 1987; Digman 1988). It is interesting that at one point Cattell (1956) himself was inclined to the view that the correlations of the 16PF scales would only support four factors. These four bear some resemblance to the Big Five.

Whatever the eventual fate of the Sixteen Personality Factor System, Cattell's contributions to the field, in the opinion of the writer (Digman 1972a) and of an earlier reviewer (Wiggins 1968), were important and essential for the development of a quantitative approach to personality assessment. The name of Lewis Thurstone will always be linked with a dimensional approach to ability. Raymond Cattell will be remembered as the pioneer geometer of the personality realm.

Eysenck's System

The "Big Two" initial dimensions of Eysenck, Neuroticism and Extraversion/Introversion, have appeared routinely in many factor studies of personality characteristics. To these two Eysenck subsequently added a Psychoticism dimension and set forth his view of the "three superfactors P, E, and N"

(Eysenck 1970). Like Guilford, Eysenck has considered intelligence (or intellect) to be something apart from temperament. Thus, the Big Five, if reduced to four superfactors, are almost in accord with the Eysenck three. It has been suggested (Zuckerman et al 1988; John 1989) that Eysenck's P factor is a blend of Dimensions II (Agreeableness) and III (Conscientiousness), and that *psychopathy* may be a better interpretation of the trait dimension.

Tellegen (1985), dissatisfied with the differences among traditional inventories, devised an 11-scale Multidimensional Personality Questionnaire (MPQ), which, when factored, provided three trait dimensions: Positive Emotionality, Negative Emotionality, and Constraint. He concluded that these three were very similar in content to Eysenck's Extraversion, Neuroticism, and Psychoticism dimensions. A three-factor solution of a variety of instruments by Zuckerman and his associates (1988) bears a striking similarity to the Tellegen model. Impulsive Unsocialized Sensation Seeking was offered as an alternative interpretation of Eysenck's Psychoticism factor.

Extraversion and Neuroticism, then, appear to be well established across many studies and across the rating and questionnaire domains. However, as Block (1977) has pointed out, Psychoticism as an interpretation of the third dimension is something else, and most critics of the Eysenck system believe that it was simply given an inappropriate label. The dimension appears to be an amalgam of Trait Dimensions II (Friendliness) and III (Conscientiousness or Will). Perhaps Eysenck, who enlarged his two-factor system with what seems great caution, may yet extend it to four and thus be in good agreement with the five-factor model.

Guilford's System

Noting that Guilford, like Eysenck, always viewed intellect as a domain separate from temperament, the four second-order factors suggested by Guilford (1975) appear to be supported by research (Amelang & Borkenau 1982) and to fit the four non-intellect factors of the five-factor model reasonably well. Based upon their study, however, Amelang & Borkenau suggested some reinterpretation of Guilford's primary scales and realignment of the primary scales to the higher level constructs.

Murray's Need System

Using Jackson's Personality Research Form (PRF; Jackson 1974) two independent studies (Borkenau & Ostendorf 1989; Costa & McCrae 1988) came to similar conclusions: The five broad dimensions of personality commonly noted in the rating field and increasingly noted in omnibus personality inventories subsume the many scales of the PRF. The Borkenau & Ostendorf study involved a factor analysis of German language versions of the NEO-PI,

the EPI, the PRF, and the Freiberg Personality Inventory (FPI), a widely used personality inventory in Germany; the Costa & McCrae study used the PRF and the NEO-PI.

Most of the PRF scales correlated as one might expect with the various trait dimensions of the NEO-PI: e.g. n_{ach} with Conscientiousness, n_{aff} with Extraversion, n_{agg} (negatively) with Agreeableness, n_{def} with Neuroticism, and n_{und} with Openness. However, unlike many inventories, the PRF provided clear indicants of Dimension III (Conscientiousness or Will).

The Borkenau & Ostendorf study, like the earlier Amelang & Borkenau report, both based on a large number of different inventories, confirm what has been suspected (Goldberg 1981): the five-factor model is robust, not only across different studies and languages in the rating field, but across languages and different inventories, as well.

The Interpersonal Circle

Based on the theoretical views of Horney (1937) and Sullivan (1953), Leary (1957) proposed that interpersonal behaviors could meaningfully be organized in terms of a circular pattern around two main axes, Love-Hate and Power. Over the past two decades, two research groups, Lorr and his associates (Lorr & Youniss 1974; Lorr & Manning 1978; Lorr & Nerviano 1985; Lorr & Knight 1987) and J. Wiggins and his group (J. Wiggins 1980; J. Wiggins & Broughton 1985; J. Wiggins et al 1988, 1989) have investigated this domain extensively. Their work suggests that the Interpersonal Circle Model corresponds to Trait Dimensions I (Extraversion) and II (Friendliness). For Wiggins these dimensions are Power (Dominance vs Submissiveness) and Love (Love vs Hate).

Lorr's Interpersonal Style Inventory (ISI; Lorr 1986) contains five broad scales, three of which (Interpersonal Involvement, Socialization, and Autonomy) appear to reflect Dimensions I and II of the five-factor model. Two others, Self-Control and Stability are clearly related to Dimensions III (Conscientiousness) and IV (Neuroticism).

Wiggins and his associates (J. Wiggins et al 1988, 1989) have gone beyond simply relating interpersonal characteristics to two broad dimensions, mapping the interpersonal domain in terms of a geometric (circular) model, wherein the location of each characteristic, relative to others and to the two main dimensions, is determined.

Linguistic Analyses and the Five-Factor Model

Beginning with the work of Baumgarten (1933) and Allport & Odbert (1936), research related to the Big Five has had obvious links with language and the manner in which it is employed in describing persons. Goldberg (1981)

provided an introduction to linguistic analysis for many personality researchers, and then showed the relevance of this for the realm of personality descriptors. As Goldberg noted, it was Osgood and his associates (1957) who conducted the best-known and most extensive investigation into the manner in which persons employ language as descriptors of objects, person objects included. It is widely known that Osgood's "Big Three" dimensions (Evaluation, Activity, and Potency) were obtained from factor analysis of scales across objects. What is not widely known, however, is that the initial analysis suggested more than three factors, or that a factor analysis conducted on a primitive computer in the middle 1950s, using the square root method of factoring, might produce a somewhat simplified analysis. Regardless, the cross-cultural stability of the system has been verified across many languages. Certain aspects of Peabody's (1967, 1984) system are related to the Osgood Evaluation, Activity, and Power dimensions. Since it has been noted that his system can be related to the five-factor model (Peabody & Goldberg 1989), one may surmise that the Big Five may possess as much cultural generality as does the Osgood system. Certainly, the work of Bond et al (1975), Amelang & Borkenau (1982), and Birenbaum & Montag (1986) suggests as much.

Hampson (1988) has reviewed the work of several investigators who adopted Rosch's model (Rosch et al 1976) of semantic categories for objects in the everyday world. Hampson noted that there is a "distinction between personality nouns and traits," and that "most personality theories have focused on trait-dimensions as opposed to personality types" (p. 202). Using the Rosch model, Hampson et al (1986) observed the manner in which subjects related personality characteristics at presumably different levels of *breadth* (abstractiveness). The results implied a three-tiered hierarchy of concepts for some (e.g. UNKIND/Selfish/stingy); a two-tiered hierachy for others. Figure 1 is an example of such a hierarchy: The superordinate concepts at the top have the greatest breadth (and related "fuzziness"), while those at lower levels, although more precise (with related "fidelity"), may have less usefulness—at least to personality researchers—because of their narrow meaning. To a social psychologist the specific behavior of *stopping to help* may be the observation of basic meaning for a study of helping behavior; to the personality researcher, the observation of interest would be the less specific measure of *need for nurturance*.

Cantor & Mischel (1979) examined the manner in which subjects sorted person concepts into superordinate categories. It is interesting that the categories selected by these investigators were "the extraverted person," "the cultured person," "the person committed to a belief," and "the emotionally unstable person." The only personality type missing from this list to make it congruent with the Big Five is "the friendly person."

THEORETICAL CONJECTURES: WHY FIVE DIMENSIONS?

Revelle (1987: 487) felt that "the agreement among these descriptive dimensions is impressive . . . [but] there is a lack of theoretical explanation for the *how* and the *why* of these dimensions."

John (1989) has wondered, as have others (Goldberg 1983; Digman & Inouye 1986), why five? One possibility has been that the model, with its historic link to Cattell's original work, reflects the basic dimensionality of the scales originally chosen by Cattell (1943). That possibility seems to have been laid to rest by John's study. Using college students to rate their own personalities with terms chosen from the Adjective Check List (ACL; Gough & Heilbrun 1980), John found that the relationships among the 60 most commonly used terms gave the familiar five-factor solution. Factor V, a frequently debatable dimension, contained terms related to "culture" (artistic, sophisticated), "intelligence" (intelligent, complicated, sharp-witted), and "creativity" (imaginative, original, inventive).

Is the common finding of five—sometimes six, rarely more—factors underlying the manifest variation and covariation in a wide assortment of personality descriptors related to limitations on human information processing? There have been a few intimations of this (Goldberg 1983; Digman & Inouye 1986).

CORRELATES OF PERSONALITY DIMENSIONS

Heritability of Personality

Since the time of Cain and Abel parents and philosophers have wondered, as have Plomin & Daniels (1987), "Why are children in the same family so different from one another?" The genetic influence on personality was reviewed rather recently (Henderson 1982). Since that review the evidence for a strong hereditary effect on Positive Emotionality (Extraversion), Constraint (Conscientiousness), and Negative Emotionality (Neuroticism) has been strengthened by the first reports from the Minnesota Twin Study (Tellegen et al 1988). Agreeing with previous studies, the genetic contribution to the personality seems to be about 50%, with trivial amounts attributable to shared (e.g. family) environment. Rushton et al (1986) have reported similar results in a study of the heritabilities of altruism and aggression.

Direct Measures of Family Influence

The literature has long stressed the seeming importance of the family, particularly the behavior of parents toward children. Certainly, therapists would attest to a strong relationship here, based upon what their clients unfold to

them about life in their families of origin. However, it is possible that parental practices are completely confounded with hereditary effects, as the studies reported above might suggest.

McCrae & Costa (1988) used the Parent-Child Relations Questionnaire (Siegelman & Roe, unpublished) in a retrospective study of parental practices, based on mature adults who were also given the NEO-PI inventory. Intraclass correlations based on siblings in the study were modest, between .27 and .37, except for the scale Casual-Demanding ($r=.67$). Correlations among the three parental practices scales and the five personality scales were also modest. Two correlations were as one would expect: the Loving-Rejecting scale correlated $-.30$ with Neuroticism and .23 with Agreeableness. These two relationships are similar to those found earlier by Digman & Digman (1980) in a study of the personality effects of environmental stressors, where the correlations between a measure of parent-child interaction and teacher ratings of Neuroticism and Hostility were typically in the .30's. In the former study, the ratings were retrospective and based on mature adults; in the latter, they were based on school children aged 12–14. It appears that the effect of parental rearing practices, although significant, is smaller than many of us have believed.

Cross-Cultural Comparisons

Bond et al (1975) translated Norman's 20 scales into Japanese and administered the scales to undergraduate students at a Japanese university. Factoring of the 20 scales led to a clear five-factor solution. These factors were quite comparable to those of the Norman (1963) factors, with coefficients of congruence generally in the high .80 to low .90 range. Factor V related less well (.72).

Bond et al also related their factors to those obtained by Guthrie & Bennett (1970) in a study of Philippine students. The first four factors were highly related to those obtained in the Guthrie-Bennett study. Factor V, however, related less clearly to the factor obtained in the Philippine study. (Factor V, it may be noted, has been the most debatable of the five dimensions; suggesting Culture to some researchers, Openness to others, and Intellect to yet another group.)

The German studies on the five-factor model have been noted above: a study by Amelang & Borkenau (1982) of various traditional inventories, and the analysis of a German version of the Jackson PRF by Borkenau & Ostendorf (1989). In Israel, Birenbaum & Montag's (1986) analysis of the 16PF was in terms of five factors that closely resembled an analysis of the inventory by Digman (1988).

The Big Five have appeared now in at least five languages, leading one to suspect that something quite fundamental is involved here. Is this the

way people everywhere construe personality, regardless of language or culture?

Masculinity-Femininity and the Big Five

The feminist movement has stimulated studies that have examined traditional stereotypes and prototypes of masculinity and femininity, as well as providing contemporary scales for assessing these characteristics (Bem 1981; Farnill & Ball 1985). Some personality inventories (e.g. the CPI, the Comrey CPS, the GZTS) have always considered M/F an important aspect of personality.

An analysis of the Australian Sex Role Inventory was conducted by Farnill & Ball (1985). Factored together with the Personality Description Questionnaire (PDQ), the Australian scale proved to be clearly multifactorial and related to three personality dimensions. One, which resembles a fusion of Big Five Dimensions I^+ and II^- (Extraverted and Hostile), was interpreted as prototypically undesirable masculinity. A second, an emotional factor and similar to Dimension IV (Neuroticism), was seen as undesirable femininity. Desirable femininity was suggested by the positive pole of a factor much like the positive pole of Dimension II (Friendliness). The analysis also noted a personality factor much like Dimension III (Conscientiousness). M/F appears to be a rather complex phenomenon, but at least partly related to the Big Five.

Personality Stability

As Costa & McCrae (1988) point out, most of the theories of the effects of aging on personality, while interesting, are not based on studies that have tracked persons over extended periods. An exception is Block's (1971) study, which presented evidence based on correlations of persons over time, the bulk of which were quite substantial. Conley (1984) did a follow-up on couples first assessed in the 1930s, using the Bernreuter Personality Inventory and the Bell Adjustment Inventory. Correlations with psychiatric symptoms in late adulthood in the .25 to .40 range were obtained.

A six-year longitudinal study of trait-stability was conducted by Costa & McCrae (1988), based on their Baltimore Longitudinal Study of Aging panel. Using their NEO-PI instrument, they noted retest correlations for Neuroticism, Extraversion, and Openness of .83, .82, and .83, respectively. These values approach the reliabilities of the scales themselves, leading to the conclusion most of us make with surprise upon seeing a good friend after many years of separation: He's just the same as he always was.

Costa & McCrae also noted very slight changes in mean levels over the six-year period. The effects were generally very slight (accounting for less than 1% of variance) across the 20 scales of the inventory. These persons maintained their own rank order, generally, over time with respect to these measures, and the group as a whole changed imperceptibly.

METHODOLOGICAL ISSUES

The Person-vs-Situation Debate

Carson (1989) feels that the debate may be over. Kendrick & Funder (1988) seem ready to move beyond the person-vs-situation controversy, finding some lessons to be derived from it. They examined many of the hypotheses that had been advanced by the situationists to account for whatever consistency had been reported and found that none of them (e.g. attribution, semantic illusions, stereotypes) held up under scrutiny. Agreeing with Mischel & Peake (1982) about the importance of behavioral relevance, Kendrick & Funder list other time-honored procedures for improving correlations based on ratings: the use of raters well acquainted with the ratees, the use of multiple behavioral observations and multiple observers, and the use of characteristics that are publicly observable.

Aggregation

The way out of the "personality correlation" bind of .30 or so, often mentioned as the most to be expected from personality measures, is a procedure that has been implicitly practiced almost since the dawn of scientific psychology. The procedure involves what in the past were known as "composite variables," what we now call "aggregation."

One recognizes the futility of trying to predict Johnny's answer to a single arithmetic question on a Friday afternoon test from an item on a quantitative aptitude test. Such correlations are likely to be very low for a variety of reasons treated in elementary statistics texts: dichotomous variables, unreliability of items, restriction of range, etc. What has been done in the field of educational assessment is to *aggregate* a set of, say, 80 items and to correlate the composite measure with an index of *general* achievement—the familiar grade average, a composite based not only on many measures of achievement, but on measures over time as well. Epstein (1986) has reminded those whose statistics lessons are not well remembered that aggregation is basically an application of the Spearman-Brown prophecy formula that predicts increases in reliability and related validity as a function of lengthened (i.e. increased) observation.

At this point I should like to take off my reviewer's hat and write as a researcher with experience directly related to the points raised by Kendrick & Funder. Some time ago I noted the benefits of the procedures recommended by Kendrick & Funder (Digman 1972b; Digman & Digman 1980). Aggregating teachers' ratings across several scales believed to be related to Trait Dimension III (which I now prefer to call Will, but at that time called the Monitor Factor) and across four teachers in four different elementary and intermediate school years, I obtained a robust (unit weighted) multiple

correlation of .70 with subsequent high school grade average. Both independent and dependent variables, it should be noted, were composite variables, based upon a great deal of quantified observation over the years.

EPILOGUE

Hogan (R. Hogan, personal communication, September, 1985) may have expressed the greatest enthusiasm for the Big Five model:

> This is an area in which personality psychologists have a major scientific finding to report. We now can specify with some confidence the structure of the vocabulary that observers use to describe [persons]—put another way, we have a replicable model of the structure of personality from the viewpoint of an observer. . . . There is now considerable agreement that observers' impressions can be expressed in terms of about five dimensions.

John (1989) seems equally bullish, as do McCrae & Costa (1989). Others (Livneh & Livneh 1989; Waller & Ben-Porath 1987) have their reservations. There is probably no doubt in the reader's mind that I agree wholeheartedly with Hogan. At a minimum, research on the five-factor model has given us a useful set of very broad dimensions that characterize individual differences. These dimensions can be measured with high reliability and impressive validity. Taken together, they provide a good answer to the question of personality *structure*.

The *why* of personality is something else. If much of personality is genetically determined, if adult personality is quite stable, and if shared environment accounts for little variability in personality, what is responsible for the remaining variance? Perhaps it is here that the idiographic (i.e. idiosyncratic) study of the individual has its place. Or perhaps we shall have to study personality with far greater care and with much closer attention to the specifics of development and change than we have employed thus far.

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