

CHAPTER 1

The Structure of Personality Attributes

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In a classic early textbook, Allport (1937) reviewed definitions of the concept of personality. He called it “one of the most abstract words in our language” (p. 25) and discussed its broad connotations. Allport catalogued fifty distinct meanings—some from literary, theological, philosophical, juristic, and sociological traditions and others stressing external appearance or psychological constructs. The definition he proposed—“personality is the dynamic organization within the individual of those psychophysical systems that determine his unique adjustments to his environment” (p. 48)—was a synthesis of several psychological meanings of the concept.

Funder (2001) provided a more down-to-earth rendition: “an individual’s characteristic patterns of thought, emotion, and behavior, together with the psychological mechanisms—hidden or not—behind those patterns” (p. 2). Few could argue that what Funder refers to is not personality; it is reasonably close to a consensual

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view. It refers simultaneously to characteristics that are (1) ascribed to individuals, (2) stable over time, and (3) psychological in nature. Yet it also acknowledges that mechanisms explaining these traits may be difficult to isolate and measure.

Definitions make one's assumptions explicit, so how one defines personality is quite consequential: it affects how one selects variables when studying personality phenomena. What if one were to rely on some of the philosophical definitions of personality reviewed by Allport (1937), such as "the quality in every man which makes him worthwhile" (Adler, 1929, p. 8), "individuality which has become objective to itself" (Windelband, 1921, p. 281), or "selfhood" (Crutcher, 1931, p. 75)? With such definitions, one would hardly care to study the individual's actual behaviors at all.

But Allport's definition (1937) also highlights attributes that are seen as residing within the individual. Other ways of defining personality emphasize more external types of attributes, such as the role one assumes or the status one has achieved in society, one's external appearance (including personal attractiveness), and the reactions of others to the individual as a stimulus—that is, the person's social stimulus value (see MacKinnon, 1944). In work settings, of course, appearances are important. Moreover, Triandis (2001) suggests that in collectivist cultures, external factors are considered more important to personality than are the internal traits emphasized in individualist cultures.

Individual differences in externally defined attributes may be interwoven with individual differences in temperamental traits. Consider terms like *magnetic*, *charming*, *powerful*, and *likeable*, which seem to be partly internal and partly responses to the individual. Later in the chapter, we explore some structural models for personality that include such attributes.

Parsimony in Personality Models

Scale labels in personality inventories have a bewildering variety of constructs. And if one turns to single words potentially referring to personality attributes in modern languages, the situation becomes overwhelming. Allport and Odbert (1936), for example, catalogued nearly eighteen thousand words from *Webster's Second International Dictionary* referring to characteristics that might be

used to distinguish one human being from another. In follow-up work, Norman (1967) judged that over thirty-five hundred of these terms refer to stable personality traits. Clearly, no single comprehensive model can capture all possible personality attributes. We must economize and reduce, seeking a more parsimonious summary of this vast domain of concepts.

In the field of biology, taxonomies have helped in organizing a huge number of species into a single framework indicating how each is related to the others. Correspondingly, in the field of personality, there has been a rising wave of interest in the search for a scientifically compelling taxonomy of the huge number of personality attributes. A taxonomy is a systematic division of phenomena into ordered groups or categories; in other words, it is a way of "chunking" things. A scientific taxonomy helps organize and integrate knowledge and research findings by providing a standard scientific nomenclature. Such a nomenclature facilitates communication among investigators and aids in the accumulation of empirical findings. Identifying a widely useful taxonomy of personality attributes is one of the most important goals of basic research in personality.

A central question in taxonomy construction concerns the procedures to be used to divide or group the phenomena under study. A variety of approaches might be employed, but the most useful is a class of statistical methods generically referred to as factor analysis. As Goldberg and Digman (1994) noted, factor analysis can be considered a variable-reduction procedure in which many variables are organized by a few factors that summarize the interrelations among the variables. These factors can be thought of as summary constructs, or as higher-level dimensions in a hierarchical model of the variables in the domain.

Anyone seeking to employ factor analysis must first make a crucial determination: which variables to include in the analysis. If some theory were available—one that was formulated clearly enough to specify the particular variables that should be measured—an investigator might rely on that theory for variable selection, as several investigators have proposed (Cloninger, 1987; Eysenck, 1991). This could lead to an advantageous linking of the taxonomic model with a scientific theory. Even failures to verify the model in empirical studies could lead to important advances in the development of the

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theory. However, the theory might omit some significant summary constructs that a more empirical approach might reveal.

Alternatively, one could take a strictly practical approach. One could build up a taxonomic model incrementally by developing successively more and more measures, each constructed to predict some important human outcome. This is the approach that Gough (1996) espoused in developing the California Psychological Inventory (CPI). Although Gough did not initially aspire to create a comprehensive taxonomy, analyses of the interrelations among the CPI scales eventually led him to develop some summary dimensions to encompass them. The measures developed by this practical approach typically have empirical strengths, but they are not theoretically organized and may omit important constructs that no one happened to think of investigating.

Yet another incremental approach to variable selection relies on an investigator's initial judgments of the most important variables to measure, later adding measures of other variables that empirically turn out to be relatively independent of those initially selected. Comrey (1988) used this approach to variable selection in the development of the Comrey Personality Scales, as did Tellegen (in press) in the development of his Multidimensional Personality Questionnaire (MPQ). If many investigators adopted this approach and they all ended up measuring the same constructs, those variables would have some privileged status in models of personality structure.

Unfortunately, this has not occurred. Despite the long tradition of packaging structural models into multiscale personality inventories, until recently there was little agreement among them on the most important variables of personality, and consequently none of them had become widely accepted as a comprehensive taxonomy of personality attributes. There are several reasons for this. First, research on each inventory has operated independent of that on other inventories, with little comparison or integration (Goldberg, in press). Second, inventories tend to become fixed in form at an early stage, with rare revisions to reflect new developments in theory or measurement; revisions may be scientifically desirable but problematic from a commercial standpoint (Goldberg, 1999). And perhaps most important, the rationale for variable selection in these inventories, although reasonable in one way or another, has not been particularly powerful.

The Basis for the Lexical Approach

Is there a more compelling rationale for personality variable selection? As has long been recognized (Allport, 1937; Cattell, 1943; Goldberg, 1981; Norman, 1963), some of the most basic personality attributes might be discovered from studying conceptions implicit in the use of the natural language. If a distinction is highly represented in the lexicon, it can be presumed to have practical importance. Personality concepts salient in the lexicon should not be left out of a taxonomy of personality attributes (Tellegen, 1993). That is, folk concepts of personality provide basic but not exhaustive (necessary but not sufficient) components for a science of personality attributes (Goldberg & Saucier, 1995).

This leads us to a key premise of the lexical approach to taxonomy construction: *the degree of representation of an attribute in language has some correspondence with the general importance of the attribute in real-world transactions*. Imagine an attribute for which there is, within one language, a dense cluster of loosely synonymous terms; such an attribute would certainly have a claim to importance, at least with respect to the language community within which it is so richly represented (Zipf, 1949). An attribute that is represented by multiple terms in a language will likely appear as a factor in multivariate analyses. Moreover, if the factor includes terms that are used with high frequency, the importance of the factor is underscored. Factors derived from studies of natural language personality descriptors in different languages provide a superb starting point for a taxonomy of personality attributes, particularly if widely diverse languages are studied. These factors are but a starting point because the lexicon could omit or underemphasize some scientifically important variables, and the meaning of single natural language terms can be vague, ambiguous, or context dependent (John, Angleitner, & Ostendorf, 1988). We can assume, however, that attributes richly represented in the lexicon are there for a reason.

Cross-cultural generalizability is a valuable criterion for adjudicating among competitor taxonomic structures. Psychology is the study of mind and behavior of humans in general, not just of humans in a narrow range of sociocultural settings. Structural models derived within one limited population, or a limited sample from that population, are prone to reflect the unique patternings found within that population or sample. Culture-specific patternings may

be interesting in their own way, but models that transfer well across populations, and thus across languages and sociocultural settings, are more congruent with the scientific ideals of replicability and generalizability.

If we take cross-cultural generalizability as a criterion for a good taxonomic structure, we can apply this criterion in a lenient or a stringent way. The lenient way is to export a set of variables (most often, those represented in a single personality inventory) for use in other populations and then examine whether these pre-selected variables (after translation, if necessary) generate the same factor structure in each new language or culture. If the scales in a personality inventory generate similar factors across populations, one might argue that the structure is widely generalizable, as McCrae and Costa (1997) have done with respect to their revised NEO Personality Inventory (Costa & McCrae, 1992). However, this is not a very demanding test. It is not sufficient to show that when personality measures in a new language are made to conform to the procrustean specifications of one model, that model can be recovered. There may be a large number of possible models that are equally exportable and maintain their factor structures across many populations.

A more challenging test of generalizability is to identify the most salient and important personality concepts within each linguistic and cultural context, derive an indigenous factor structure from those variables, and then examine the extent to which this new structure corresponds to any previously proposed models. A model that could meet this test in any language would have great psychological import; it could be considered far more ubiquitous and universal than a structure that simply met the less demanding imposed test (that is, showed a high degree of translatability).

The lexical approach involves such an indigenous research strategy. Analyses are carried out separately within each language, using a representative set of native language descriptors, rather than importing selections of variables from other languages (for example, English). The hope is that the findings from these lexical studies will converge on a replicable pattern such that most languages will reflect its imprint. An analogous, and possibly universal, pattern has been identified in studies of color words across lexicons (Kay & McDaniel, 1978), corresponding to the genetics and neurobiology of color perception.

What We Learn from Natural Language Personality Descriptions

The majority of lexical studies of personality descriptors have sought to test the most widely influential personality model of the past two decades: the Big Five factor structure (Goldberg, 1990, 1993b; John, 1990). The Big Five factors are customarily labeled Extraversion, Agreeableness, Conscientiousness, Emotional Stability (or its opposite, Neuroticism), and Intellect (or, in one inventory representation, Openness to Experience). There were signs of the Big Five structure in some studies from an earlier era (as detailed by Digman, 1990; Goldberg, 1993b; John, 1990), but its identification in studies of natural language descriptors in English (Goldberg, 1990) was decisive.

If we value cross-cultural generalizability, however, applicability to one language is not enough. As detailed in more lengthy reviews (Saucier & Goldberg, 2001; Saucier, Hampson, & Goldberg, 2000), lexical studies have yielded structures resembling the Big Five most consistently in languages originating in northern Europe, including German (Ostendorf, 1990) and Polish (Szarota, 1996), as well as English. Although a study in Turkish (Goldberg & Somer, 2000) also found a structure with much resemblance to the Big Five, studies of other non-Northern European languages (Church, Katigbak, & Reyes, 1998; Church, Reyes, Katigbak, & Grimm, 1997; Di Blas & Forzi, 1998; Szirmák & De Raad, 1994) have led to results that are less clearly supportive. And because a majority of studies have relied exclusively on self-report, the degree of generality of the Big Five in peer ratings is less certain than for self-ratings.

To this point, lexical studies have revealed a great deal about the relative robustness of the Big Five, as well as information about other less well-known candidate models, including some with fewer and some with more factors. We examine the most consistent findings from lexical studies to date by describing models with successively more factors.

What If We Allowed Ourselves Only One Factor?

Several lexical studies have reported evidence about factor solutions containing only one factor (Boies, Lee, Ashton, Pascal, & Nicol, 2001; Di Blas & Forzi, 1999; Goldberg & Somer, 2000;

Saucier, 1997). The findings from these studies have been quite consistent. The single factor contrasts a heterogeneous mix of desirable attributes at one pole with a mix of undesirable attributes at the other pole. This unrotated factor can be labeled Evaluation; it involves the contrast between socially desirable and socially undesirable personal qualities. We expect this one-factor structure to be the most replicable one across languages and cultures based on two principles: (1) the more terms that are associated with a factor, the more replicable should that factor be, and (2) because the first unrotated factor will have the most terms associated with it, it should be the most ubiquitous factor.

Findings of a single large evaluative factor are no doubt related to a classic finding in psychology. In judgments about the meanings of diverse objects in a wide array of cultural settings, a global evaluation factor (good versus bad) was typically found to be the single largest factor (Osgood, May, & Miron, 1975). Osgood hypothesized that the ubiquity of this evaluative factor was related to basic evolutionary principles: our forebears would not have survived if they had not become adapted at a very basic level to any signals of good versus bad objects or events—those leading to pleasure versus pain (for example, Can I eat it or will it eat me?).

Are Two Factors Better Than One?

Two-factor solutions from several lexical studies also suggest a consistent pattern: one factor includes attributes associated with positively valued dynamic qualities and individual ascendancy, whereas the other factor includes attributes associated with socialization, social propriety, solidarity, and community cohesion (Boies et al., 2001; Caprara, Barbanelli, & Zimbardo, 1997; Di Blas & Forzi, 1999; Digman, 1997; Goldberg & Somer, 2000; Hřebíčková, Ostendorf, Osecká, & Čermák, 1999; Paulhus & John, 1998; Saucier, 1997; Shweder, 1972; White, 1980). Such a factor structure resembles that embodied in the theoretical model of Bakan (1966), who labeled the two factors Agency and Communion. In addition, these two factors may be aligned with some of the other sets of dual personological constructs reviewed by Digman (1997) and by Paulhus and John (1998), including Hogan's (1983) distinction between "getting ahead" (Dynamism) and "getting along" (Social Propriety).

This constellation of two factors is also related to the three most ubiquitous dimensions of affective meaning, which include Potency (or Strength) and Activity in addition to Evaluation (Osgood et al., 1975). Whether this correspondence is due entirely to the imposition of universal tendencies in human cognition or to the natural structure of phenomena "out in the world" remains an open question. In judgments about human targets, Potency and Activity tend to merge into a single dimension that Osgood and his associates called Dynamism. Unpublished analyses with English-language adjectives indicate that the Big Two lexical factors are strongly related to the dimensions of affective meaning as indexed in pancultural bipolar scales applied in self-descriptions. The first unrotated lexical factor is strongly related to Evaluation (but independent of Potency and Activity), whereas the second unrotated lexical factor is related to Potency and Activity (but independent of Evaluation).

As is true of the Big One factor structure, no lexical study has presented evidence to contradict the view that this two-factor structure is ubiquitous across languages and cultures. If both the one- and two-factor structures eventually turn out to be universal, the latter has some advantage because two factors provide more information than one.

What Would Be a Big Three?

Findings from most lexical studies to date suggest the general rule that if three factors are extracted and rotated, these factors tend to be broad versions of Extraversion, Agreeableness, and Conscientiousness, the first three factors from the Big Five (Saucier & Goldberg, 2001). All lexical studies that have identified the Big Five in five-factor solutions and also report the character of the three-factor solution report this Big Three. Moreover, some studies that did not straightforwardly replicate the Big Five did replicate this lexical Big Three (Di Blas & Forzi, 1998, 1999; De Raad & Szirmák, 1994; Hahn, Lee, & Ashton, 1999), so it appears more robust than the Big Five. And the Big Three (like the one- and two-factor solutions already described) seem relatively unaffected by how wide versus narrow a variable selection one employs (Saucier, 1997).

However, at least two lexical studies have not replicated this Big Three in three-factor solutions, these being the studies in French

(Boies et al., 2001) and Filipino/Tagalog (A. T. Church, personal communication, Aug. 9, 1999). Thus, although it has been widely replicated, this Big Three may not be universal. Nonetheless, this three-factor lexical model does seem to be more general than a widely touted alternative: the Extraversion-Neuroticism-Psychoticism model of Eysenck (1991). The Eysenck model predicts the emergence of Neuroticism among the three largest factors and the collapse of Agreeableness and Conscientiousness into one "Psychoticism" factor (Goldberg & Rosolack, 1994).

Regularities at the Five-Factor Level

As we have noted, lexical studies in languages originating in northern Europe (including English) have been supportive of the Big Five, and so has a study in Turkish. But studies in Italian (De Raad, Di Blas, & Perugini, 1997) and Hungarian (Szirmák & De Raad, 1994) found no counterpart to the Intellect factor in five-factor solutions. Instead, there were two Agreeableness-related factors, one contrasting peacefulness with aggression and irritability and the other contrasting humaneness with greed and egotism (compare Deary, 1996). Extraction of additional factors was necessary to find a factor related to Intellect.

Several lexical studies have included a relatively broad selection of variables, each with terms that could be classified as referring to emotions and moods or as being unusually highly evaluative, and two of these studies included terms referring to physical appearance. Because none of these studies found the Big Five in a five-factor solution, it is clear that the appearance of the Big Five as the first five factors is contingent on some strictures in variable selection.

Lexical Seven-Factor Models

Although not finding the Big Five in five-factor solutions, studies with inclusive variable-selection criteria in English and Turkish did find Big Five-like factors in a seven-factor solution (Goldberg & Somer, 2000; Saucier, 1997; Tellegen & Waller, 1987). The two additional factors were Negative Valence (a factor emphasizing attributes with extremely low desirability and endorsement rates), found in all three studies, and either Positive Valence (a factor emphasizing vague positive attributes like Impressive and Outstand-

ing and found in Tellegen & Waller, 1987) or Attractiveness (found in the other two studies).

Intriguingly, studies in two other languages with broad variable-selection criteria have led to an alternative seven-factor structure. The convergences between these studies occurred in spite of their many differences in methodology. Lexical studies in Filipino (Church et al., 1997, 1998) and Hebrew (Almagor, Tellegen, & Waller, 1995)—languages from widely separated language families and cultures—yielded a highly convergent seven-factor structure, although the similarity was obscured by discrepant labels. The English translations of marker adjectives for the Filipino and Hebrew factors have been shown to correspond in a one-to-one way (Saucier, 2002).

One of these new factors resembles the Negative Valence factor just described. Two of them resemble Big Five factors—Conscientiousness and Intellect. The other three Big Five factors—Extraversion, Agreeableness, and Emotional Stability—correlate substantially but in a complex way with the remaining four factors, which map an affective-interpersonal domain (compare Saucier, 1992). These four can be labeled Gregariousness (or Liveliness), Self-Assurance (or Mettle or Fortitude), Even Temper (Tolerant versus Temperamental), and Concern for Others (versus Egotism). Big Five Extraversion is related to Gregariousness and Self-Assurance, Emotional Stability to Self-Assurance and Even Temper, and Agreeableness to Even Temper and Concern for Others.

Similar factors have been obtained from lexical data in English (Saucier, 2002), and factors found in studies in Italian (Di Blas & Forzi, 1998) resemble the Multi-Language Seven. However, further replication tests are needed because few studies have used such inclusive variable-selection criteria. In any case, one would expect a model with more factors to have higher predictive validity, and there are some indications that this Multi-Language Seven model will outperform the Big Five in this regard (Saucier, 2002).

Implications and Limitations

In lexical studies, variable selection is taken out of the hands of the expert and entrusted to a more disinterested source (that is, a dictionary). Using this method, some consistencies in the structure of personality attributes become clear. We can discern a hierarchical

structure, with very broad factors related to the affective meaning dimensions of Osgood et al. (1975) at the top of the hierarchy. At a slightly lower level of breadth are the Big Five or partially related alternatives that have been recovered in some languages. Although some investigators have claimed that factors like the Big Five are human universals (McCrae & Costa, 1997), this conclusion is certainly premature. Even at this early juncture, we can find studies of languages in which the Big Five do not seem to be the best model for representing the indigenous lexical structure. Clearly, tests of the Big Five against competitor structures are needed.

Moreover, there are some important limitations to the body of lexical studies carried out to date. More studies are needed in non-Western settings where the majority of the world's human population resides and with non-European languages. Lexical studies have focused almost entirely on those attributes represented in adjectives, although some attributes may be represented mainly as type nouns (Hick, Nerd, Slavedriver, Tease) or as attribute nouns (Integrity, Mettle); certainly more studies that include attributes represented in nonadjectival forms are needed. In addition, most lexical studies to date have relied exclusively on self-descriptions, a methodology whose use should be supplemented with descriptions by knowledgeable informants.

Another possible limitation of current lexical studies is that they have focused on the attributes of individuals, and few have examined the attributes of groups or organizations (Slaughter, Zickar, Highhouse, & Mohr, 2001). Given the long history of studies of organizational climate (Astin & Holland, 1961; Ellsworth & Maroney, 1972; Moos, 1972; Wolf, 1966), it would be extremely instructive to examine the structure of interorganizational differences using a comprehensive set of lexical stimuli. Is there something akin to the Big Five or other lexical structures when we study descriptions of groups rather than persons? Future research may provide an answer.

One might wonder why the factor structures found in lexical studies are so important, given that the currently dominant formats for personality assessment are inventories containing phrase- or sentence-length items. One huge advantage of lexical studies is that the personality-descriptive lexicon constitutes a far more bounded and finite population than the set of all possible questionnaire items, and therefore one can reasonably argue that a lex-

ical variable selection (for example, the five hundred English adjectives of highest frequency of use; Saucier, 1997) is representative of that population. This makes it easier to arrive at defensible scientific generalizations about personality attributes.

As it happens, the structure of personality attributes as encoded in the scales included in current personality inventories may not differ markedly from that encoded in single person-descriptive terms. The higher-level factors from the Sixteen Personality Factor Inventory (16PF; Conn & Rieke, 1994) and the Revised NEO Personality Inventory (NEO-PI-R; Costa & McCrae, 1992) are variants of the Big Five. Six of the seven factors represented by the scales included in the Hogan Personality Inventory (HPI; Hogan & Hogan, 1995)—Sociability, Ambition, Adjustment, Likeability, Prudence, Intellectance, and School Success—have been shown to correspond fairly well to six of the Multi-Language Seven factors, with Negative Valence (and School Success) excluded (Saucier, 2002). Of course, future inventory scales need not be limited to the content found in lexical factors; lexical factors indicate necessary but not sufficient components for an adequate representation of personality attributes (Goldberg & Saucier, 1995). Lexical studies provide a superb initial grid for personality assessment, but they are not the entire enterprise.

Structural Models That Provide More Specific Constructs

Thus far, we have discussed only structures containing broad, orthogonal factors. We turn now to the more specific constructs that are agglomerated into these factors.

Some Advantages of Lower-Level Constructs

Hierarchical structural models, such as the consensual one that could emerge from lexical studies, are advantageously flexible. One can attain either great parsimony at the few-factor level or greater informativeness at levels with more factors. One can generate even more informativeness by subdividing the broader factors into more specific subcomponents (sometimes called facets).

However, it is possible that going to the facet level may require giving up some degree of cross-cultural replicability.

Broad factors have a number of limitations. They are composed of many variables, and this creates a degree of ambiguity. As Block (1995) and John (1990) have noted, investigators differ in the psychological meaning that they give to each of the Big Five factors (see Johnson & Ostendorf, 1993, for one plausible account of the reasons for this problem). For example, Extraversion can be thought of as a composite of Sociability, Assertiveness, and Positive Emotionality (as well as other related constructs), but some see Sociability as more central (Costa & McCrae, 1992), others see Assertiveness as more central (Goldberg, 1993b; Peabody, 1987), and still others see Positive Emotionality as more central (Watson & Clark, 1997). Although the factors are usually labeled with a single term, plumbing the psychological meaning of a broad factor like one of the Big Five is a cognitive task of considerable complexity. This is because a broad factor is not so much one thing as a collection of many things that have something in common. It is easy to ignore the diverse character of the variables contained within a broad factor. A better way to understand each factor might be to characterize its crucial subcomponents, which, although empirically interrelated, are conceptually distinct.

Indeed, identification of specific subcomponents can help to clarify the conceptualization of the broader factors (Briggs, 1989). Because broad factors blend together subcomponents that might be distinguished from one another, some of the finer features of personality description are lost when making only a few broad distinctions. Such finer features appear to reflect genetic sources of variation beyond those bearing on the broad-level factors (Jang, McCrae, Angleitner, Riemann, & Livesley, 1998). And a representation of personality structure that makes the finer features explicit potentially offers higher precision and accuracy (or "fidelity") in personality description. When categories are narrower, the exemplars for each are more similar, enhancing diagnostic value for specific instances (John, Hampson, & Goldberg, 1991). Broad-bandwidth constructs, on the other hand, sacrifice fidelity to gain efficiency.

A structural representation combining both broader and narrower constructs may be an optimal compromise. The broader-bandwidth level offers higher efficiency (parsimony), whereas the

narrower level offers higher fidelity (predictive accuracy). Moreover, to the extent that subcomponents are measured reliably, those measures afford valuable information about middle scorers on the broad dimensions, because middle scorers may score high on some subcomponents of a broad factor but low on others.

Perhaps the major benefit of measuring subcomponents pertains to predictive validity. As diverse commentators (Goldberg, 1993a; Mershon & Gorsuch, 1988; Paunonen & Ashton, 2001) have pointed out, the amalgamation of measures into broad factors leads to a loss of specific variance, thus lowering the overall validity of the composite (for important potential exceptions, see Ones & Viswesvaran, 1996). Consequently, an investigator who seeks optimal predictions should use as many specific sources of variance as statistical power, and thus sample size, will permit (Goldberg, 1993a).

The quest for high predictive accuracy leads to the development of measures at levels far more specific than the broad factors compared in lexical studies; such subcomponents are likely to predict more powerfully than the single broad factor into which they are agglomerated. Even when more specific variables provide little predictive gain over the common factors, it can be useful to know which aspect of the common factor is responsible for the bulk of the correlation, thus providing more conceptual clarity.

How many hierarchical levels are needed? Eysenck (1991) described four for personality constructs. The lowest level includes isolated behaviors (talking with a stranger), and the second level includes recurring behaviors or habits (tending to talk to strangers). The third level involves clusters of interrelated habitual behaviors (sociability, liking to be with people), which one might think of as middle-level traits. The fourth level is composed of amalgamations of middle-level traits that form broad factors (such as Extraversion). Lexical studies suggest that this fourth level might itself be divided into two levels, including an even more highly abstract level such as is represented in composite factors like Evaluation, Social Propriety, and Dynamism. That is, one can blend the apparent primary personality factors to create a few higher-level combinations, as do some languages that combine the colors white, yellow, and red into a single word (translatable perhaps as "light/warm") and the colors black, blue, and green into another word ("dark/cool"); Kay and McDaniel (1978) call these composite colors.

Lexical studies comparing the lower-level subcomponents of broad factors are still in their infancy. Given the high similarity in the Big Five representations in the highly related English and German languages, Saucier and Ostendorf (1999) tested whether such similarity extends to the lower-level subcomponents as well. They found that although not all of the subcomponents from each language replicate perfectly, most of them did. Specifically, the replicated hierarchical subcomponents of the Big Five included four facets each for Extraversion, Agreeableness, and Conscientiousness and three each for Emotional Stability and Intellect.

Organizing the Subcomponents

There are two distinct ways of organizing the more specific subcomponents of the broad factors, called the horizontal and vertical approaches (Goldberg, 1993b), and any complete taxonomy of personality attributes must include both kinds of organizational features. The vertical aspect refers to the hierarchical relations among the variables (for example, Reliability is a more abstract and general concept than Punctuality), whereas the horizontal aspect refers to the degree of similarity among variables at the same hierarchical level (Wit involves aspects of both Intelligence and Humor).

The defining feature of horizontal models is that the relations among the variables are specified by the variables' locations in multidimensional space. When that space is limited to only two dimensions and the locations of the variables are projected to some uniform distance from the origin, the resulting structures are referred to as "circumplex" representations. The most famous example of such models is the Interpersonal Circle (Kiesler, 1983; Wiggins, 1979, 1980), which is based on variants of the Extraversion and Agreeableness factors in the Big Five model. Other examples of circumplex models include those that incorporate the first three of the Big Five factors (Di Blas & Forzi, 1999; Peabody & Goldberg, 1989; Stern, 1970); the affective-interpersonal factors based on Extraversion, Agreeableness, and Emotional Stability (Saucier, 1992); and two replicated nonevaluative factors (Saucier, Ostendorf, & Peabody, 2001).

A more comprehensive circumplex representation was proposed by Hofstee, De Raad, and Goldberg (1992). Dubbed the AB5C model, for Abridged Big Five-Dimensional Circumplex, this representation contains the ten bivariate planes formed from all pairs of the Big Five factors. In the AB5C model, each trait is assigned to the plane formed by the two factors with which it is most highly associated (for example, its two highest factor loadings). Variables that are located in close proximity in each plane are clustered together so as to form ninety clusters of interrelated traits. Because of the circular ordering of these clusters, they form forty-five bipolar dimensions. An inventory developed to measure these forty-five AB5C facets has been provided by Goldberg (1999).

At a less formal level, the scales in some personality inventories are ordered horizontally by the similarity among their scales; for example, the scales from the CPI are grouped on the profile sheet in such a way that adjacent scales are more highly associated with each other than are those located further away. Indeed, the locations of the scales on the profile sheets for most personality inventories are based on some degree of such horizontal ordering.

More recently, some inventory developers have used an explicitly hierarchical scheme for ordering their middle-level constructs. A few of these have been borrowed from lexical research on the Big Five factor structure. The most salient example of incorporating findings from lexical studies into inventory construction has been provided by Costa and McCrae (1992), who added the lexical Agreeableness and Conscientiousness factors to their original three-factor NEO inventory. The latest revision of their inventory has six subcomponents (called facets) associated with each of the five highest-level constructs (called domains), for a total of thirty scales.

Other multiscale personality inventories provide a wide range of organizational schemes for their middle-level personality constructs. For example, the sixteen scales of the 16PF are associated with five broad factors, and the eleven scales from the Multidimensional Personality Questionnaire (Tellegen, *in press*) are classified as facets of four factors. At the other extreme, the thirty-one scales from the Temperament and Character Inventory (TCI; Cloninger, Przybeck, Svrakic, & Wetzell, 1994) are organized as

components of seven broad factors, as are the forty-four homogeneous item composites from the HPI. The CPI (Gough, 1996) has an open-ended number of middle-level constructs, since new ones can always be generated from the inventory's large item pool.

These middle-level facet systems appear to converge only partially; rarely are the same labels used for similar constructs. Because personality inventories are so widely employed, the high degree of divergence at the scale level, at least in terms of labels for the constructs, creates a scientific problem. Indeed, there is a virtual Tower of Babel with respect to the labels for middle-level constructs; every inventory developer seems to speak a different tongue. Although in numerous studies McCrae and Costa have studied the relations between the scales from various inventories and their own NEO-PI-R, they have concentrated on delineating joint broad factors, not on reconciling the competing sets of constructs found at the more specific level.

The degree of convergence between the lower-level models embodied in various personality inventories is not yet well understood, nor are the relations of these inventory-based models to those derived from lexical studies. More research is needed to develop an overarching structure linking the facet systems in various inventories and then linking these systems to lexical findings concerning the general structure of personality attributes. In addition, we should learn more about the degree to which these inventories might reference some useful personality characteristics that are not well captured in personality-descriptive lexicons.

For the industrial/organizational psychologist, the most important question concerns the comparative validity of each of the inventory and lexical models in predicting important human outcomes, especially those involved in the world of work. The manuals for many personality inventories include tables of correlations between its scale scores and various criterion indexes, but virtually all of the findings from different inventories are incommensurate. Test authors are not encouraged to conduct comparative validity studies, pitting their instrument against one or more others as predictors of the same set of criterion indexes. As a result, neither the science of personality assessment nor its applied practitioners have information about the comparative performance of the different

instruments available in the marketplace. There is no Consumers Union for testing our tests.

One basic problem is that scientific goals may have become subjugated to commercial interests. To solve this problem, Goldberg (1999, in press) has recently developed a public domain venue for conducting comparative research, the International Personality Item Pool (IPIP). The IPIP is an international effort to develop and continually refine a set of broad-bandwidth personality inventories, all of whose items are freely available and whose scales can be used for scientific and commercial purposes. Although no one investigator alone has access to many diverse criterion settings, the international scientific community has such access, and the IPIP provides a venue for pooling their findings.

Because the IPIP is an open system for the accumulation of new personality measures, all we can provide here is a snapshot of its current status. Included at the IPIP Web site (<http://ipip.ori.org/>) are 280 personality scales, each developed from subsets of the 1,956 items now available in the pool. All of the IPIP items are in a common format, one that should elicit relatively faithful translations across diverse languages. The scales are intended to measure the constructs included in various lexical models, plus constructs similar to those included in each of six commercial personality inventories (NEO-PI-R, 16PF, CPI, HPI, MPQ, TCI) already mentioned in this chapter, in two other inventories—the revised Jackson Personality Inventory (Jackson, 1994) and the new Six Factor Personality Questionnaire (Jackson, Paunonen, & Tremblay, 2000)—and in eighteen other popular personality scales. (For further information about this ever expanding resource, see Goldberg, 1999, in press, and the IPIP Web site.)

There are many competing structural models of personality attributes at the middle hierarchical level. Indeed, it appears that the more specific is the level of constructs examined in these models, the more structural chaos is found, and the higher is the potential for confusion among researchers who are not committed to a single inventory. In some respects, this situation reflects a longstanding pattern in personality psychology: each expert has his or her own distinct personality theory, and each theory is accorded its own chapter in personality textbooks, with little empirical competition

among the approaches. To employ a sports metaphor, we have bred a large number of racehorses, each having claims to superiority, but we have rarely bothered to pit them against one another in an actual race. It is time to conclude these preliminaries and get on with some meaningful competition. Comparative studies of structural models must now begin.

How Good Are Existing Structural Models?

Which is the best structural model of personality? In attempting to answer this question, we face severe limitations because relatively few studies have generated comparative evidence on the utility of multiple structural models. However, because most readers are familiar with the Big Five model, we can illustrate the potential application of relevant criteria with a brief discussion of how well the Big Five appears to satisfy them.

Many psychologists are interested in a structural model with a strong biological basis. It is relevant that all of the Big Five factors are moderately heritable. However, none is completely heritable, and none is strongly environmental with respect to shared family antecedents; we might find a competitor model (or variant of the Big Five) with more causal clarity at some point in the future. There is no clear evidence that the Big Five correspond to main lines of genetic or biological influence, but the same must be said for all other structural models at this time.

Reliability and validity are frequently referenced criteria for comparing models. The Big Five factors generally show impressive stability across time and agreement across observers, but we do not know if some competitor model might be better on these counts. Because they are factors based on lexical representation, the Big Five have substantial bandwidth and certainly represent socially important dimensions, although it is not clear that the Big Five captures all socially important dimensions. The Big Five does show impressive predictive validity, but models containing a wider range of individual differences would doubtless outperform the Big Five in this respect.

Generalizability across differing types of data and across cultural settings is a potentially important criterion. The Big Five has some generality across self- and peer-rating data (Goldberg, 1990,

1992), but it is not yet clear whether it is superior to potential competitor models in this regard. With respect to generalizability across cultures and languages, the Big Five appears adequate using the lenient criteria that we discussed earlier, but there may well be other models that meet stringent criteria even better. With respect to applicant samples in personnel selection, some have found the Big Five difficult to recover (Schmit & Ryan, 1993), and others have proposed models with more than five factors (Hough, 1994).

A more comprehensive model—one that covers the domain of important variables more thoroughly—will generally be preferred to a less comprehensive model. The Big Five may be adequately comprehensive if we use fairly narrow and conventional ways of defining what is a relevant personality variable and set a stringent threshold (a very low multiple correlation with the Big Five) for a variable to be judged “beyond the Big Five.” But there are clearly dimensions of individual differences beyond the Big Five, particularly if we widen the taxonomy to include abilities, social attitudes, or appearance-related characteristics (Saucier & Goldberg, 1998). And given the indeterminate boundaries around the concept of personality, especially the ambiguity about whether externally defined attributes should be included, it makes sense to widen the taxonomy in this manner.

Many psychologists stress that a good structural model has a strong theoretical basis. The Big Five is often described as “merely” a descriptive taxonomy because it was empirically derived; there are other structural models that come packaged with more a priori theory, although the Big Five seems to be slowly accumulating theoretical perspectives post hoc (Wiggins, 1996).

In summary, the strongest performance of the Big Five seems to be on criteria like social importance, breadth, stability, cross-observer agreement, and generality across self- and peer-rating data. But the Big Five seems vulnerable to being bettered by another model on other criteria: causal clarity, correspondence to main lines of biological influence, predictive validity, generalizability across cultures and languages (by stringent criteria), association with theory, and comprehensiveness. However, we sorely lack comparative analyses involving multiple models with respect to all of these criteria. On the path to an optimal structural model for personality attributes, there is still much to learn.

Conclusion

We have seen important progress in discerning the structure of personality attributes. At the very broadest level (although too broad for some purposes), this structure appears to have much in common with Osgood's classic dimensions of affective meaning (1962), which were found in studies of the ways that diverse objects (not just persons) are judged and perceived. At a slightly less broad but more informative level are the well-known Big Five factors. The extent to which the Big Five is optimal at its level in the hierarchy is not fully determined. And at more specific levels, we find even less consensus about an optimal model for the classification and organization of personality attributes. Much remains unresolved, and therefore it is important to reflect on the range of criteria by which structural models can be compared—in other words, what makes a structural model good. Although the Big Five model seems to perform strongly on some criteria, on others it seems more vulnerable to being superseded eventually by alternative models. Future models may well be more comprehensive, more widely generalizable across languages and cultures, and associated with measures that are more highly predictive of a wide array of useful criteria.

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