

Act Prediction and the Conceptual Analysis of Personality Scales: Indices of Act Density, Bipolarity, and Extensity

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A framework for conceptual analysis is advanced that attempts to specify the different kinds of act predictive statements that can be made about personality scales. Three formal indices were defined and operationalized: act density, act bipolarity, and act extensity. An empirical exploration of the framework was applied to the analysis of 22 personality scales ostensibly subsumed by six dispositional constructs. Results reveal several patterns that may elude more traditional validation and conceptual-analytic strategies. The assumption of bipolarity is questioned. Discussion focuses on the implications of this scheme for scale development, taxonomy construction, and theory building in personality psychology.

Although a central goal of personality scales is to predict behaviors dispersed over time, validation and conceptual analysis of such measures have usually taken less direct forms. Cronbach and Meehl's (1955) classic article on construct validity helped to generate a quarter century of work on validation and desiderata. Terms were rapidly introduced to sharpen the diverse forms that validity can take: Loevinger (1957) discussed "substantive components" (item contents and universes included and excluded from a scale), "structural components" (interitem correlations and the degree to which these parallel or map onto the structure of nontest trait manifestations), and "external components" (item and total scale correlations with nontest criteria) of construct validity; Campbell and Fiske (1959) introduced converging and discriminating criteria for clarifying scale precision; and Gough (1965), from a different viewpoint, introduced primary, secondary, and tertiary evaluation procedures by which the range and meaning of scales can be successively appraised.

The purpose of this article is to offer a different approach to the conceptual analysis of psychological tests—one that directly addresses the implications of personality scale scores for everyday conduct. As such, the present approach is not immediately concerned with

substantive validity, with convergent and discriminant validity, nor even with the underlying psychological dimensionality inherent in a scale, although it has definite consequences for these notions. Rather, the present focus is on the different types of act predictions that can be made from personality scales.

The act frequency approach to personality (Buss & Craik, 1980, 1981, 1983), from which this framework emerges, conjoins the analysis of natural cognitive categories with a summary view of personal dispositions. First, dispositional constructs provide a fundamental system for the categorization of acts. The meaning of dominance, for example, can be unpacked by specifying acts (e.g., taking charge after the accident) that count as more or less central (or prototypical) members. Second, a dispositional assertion refers to the relative frequency with which the individual has displayed acts counting as members of that dispositional category over a period of observation. These multiple-act indices, or act trends, constitute a basic form of personality data, represent a theoretically sanctioned union of the concept of disposition with principles of aggregation and reliability (Buss & Craik, 1983), and hold implications for appraising personality scales.

In assessing the performance of personality scales, two strategies have been followed, one tightly focused and one wider ranging. Construct validity (Cronbach & Meehl, 1955), for example, entails scrutiny of quite specific evidence for the primary measurement goals formulated for a scale. The broader strategies

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offer potential users of scales and inventories a systematic way of sorting out the formidable array of useful additional information that builds up around any widely used instrument. Gough (1965) recommended a conceptual analysis using the three steps of primary evaluation (appraisal of scale validities), secondary evaluation (review of scale development, content, correlates with other measures, and personological portraits of high and low scorers), and tertiary evaluation (judgment of the theoretical significance of its constructs, consideration of its predictive efficacy beyond the original measurement goals).

The act frequency approach to personality contributes a novel perspective to both personality scale validity and the conceptual analysis of scale scores. The implications for evaluating scale validity are reviewed briefly before the new indices for the conceptual analysis of scale scores are introduced and explored empirically.

Multiple-Act Indices and Personality Scale Validity

From this perspective, the personality scale is expected to forecast the relative frequency of topographically dissimilar acts occurring over a period of time, which are all considered to be manifestations of a given dispositional category (e.g., dominance). The focus here is on the prediction of act trends, not the prediction of specific acts on specific occasions.

The call for multiple-act criteria in the appraisal of personality scale validity has been voiced before (e.g., Jaccard, 1974; McGowan & Gormly, 1976). By treating dispositions as natural cognitive categories of acts, the present formulation offers an important advance by providing a systematic procedure for generating multiple-act criteria appropriate to given dispositional constructs. Following Rosch (1978), dispositional categories are considered to be organized around prototypes, with some acts serving as core members and others as peripheral members. A process of act nomination and prototypicality ratings facilitates examination of internal category structure and the derivation of multiple-act criterion indices.

A personality scale assessing dominance, for example, is expected to display adequate relations to a multiple-act index of dominant

acts. Furthermore, an ascending gradient of validity coefficients is anticipated, as multiple-act criteria become progressively more prototypical. A series of studies using several dispositional constructs (dominance, submissiveness, gregariousness, aloofness, quarrelsomeness, and agreeableness) and examining various personality scales has illustrated this approach to the act prediction appraisal of personality scale validity (Buss, 1981a; Buss & Craik, 1980, 1981, 1983).

The relation of multiple-act criteria to the now traditional analysis of construct validity (Cronbach & Meehl, 1955) is worth delineating. The notion of construct validity was (in part) an effort to formalize the process of interpreting the Minnesota Multiphasic Personality Inventory (MMPI) scales that emerged in the 1940s and 1950s. As more and more nontest correlates were gathered for each MMPI scale, sometimes haphazardly, the construct presumably being assessed itself evolved to accommodate the observed patterns of correlates and perhaps point toward additional predictions. Thus, the scale tended to be prior, whereas the construct expanded as an inductive summary of external correlates, although it might also aspire to a higher level of articulation.

Cronbach and Meehl (1955) were explicitly critical of criterion-oriented approaches to validity, stressing particularly the inadequacy of any specific criterion in the appraisal of personality scale performance. The act frequency approach is in full agreement with their conclusion that no single act operationalizes a dispositional construct adequately and that several displays of the same disposition offer a better assessment. Indeed, the act frequency approach seeks to take that lead but to reverse the focus by seeking a systematic analysis of dispositional constructs on the criterion side. The criterion is not a single measure (as in the predictive or concurrent validity envisioned by Cronbach & Meehl, 1955) but instead is a construct-appropriate multiple-act index. The multiple-act index, grounded in everyday conduct, is prior, and the search is for empirically effective scales that can serve as efficient predictors of it. Of course a scale with excellent predictive validity in this sense also possesses construct validity; the measure does fit with the pattern of expected nontest

correlates because the latter is specified in advance.

Single-Act Correlates and the Conceptual Analysis of Personality Scales

Examination of the *patterns* of single-act correlates of scales offers another way by which personality scales can be conceptually analyzed (Buss, 1981b). Three formal act indices may be defined and operationalized in a broad framework for the conceptual analysis of personality scales. These indices are as follows: act density, act bipolarity, and act extensity.

Act Density

This index follows directly from an act prototypicality analysis of the dispositional construct being assessed or intended by a given personality scale. Act density is defined as the number of act correlates of a given magnitude within the nominally appropriate act category. Act density may be viewed as a fine-grained analysis of multiple-act criteria and specifically assesses the breadth or scope of a personality scale within the designated category. Other things being equal, the greater the act density of a given scale, the more desirable that scale is when compared with other scales designed to assess the same construct.

The act density index defined here bears an affinity to Jackson's (1971) concept of content saturation and Cronbach and Gleser's (1965) concept of bandwidth, although their purposes may be clearly distinguished. Content saturation (Jackson, 1971) is the degree to which test items correlate more highly with the cluster of items to which they belong (e.g., dominant items) than with items in domains other than the one to which they belong (e.g., impulsivity items) or with noncontent variance (e.g., social desirability). In contrast, the act density index is not concerned with minimizing internal covariation with other domains, but rather entails assessing the scope of a personality scale in predicting everyday acts within the designated category.

Bandwidth (Cronbach & Gleser, 1965; Goldberg, 1972) may be defined as the relative size of the spectrum of criteria that a scale predicts: A scale of extraversion, encompassing domains of sociability, impulsivity, liveliness, and activity, would have greater bandwidth

than a scale encompassing only one of these content domains. In contrast, act density is solely a within-category index, gauging the extent of act prediction within a designated dispositional domain rather than the extent to which it extends to and encompasses other, perhaps adjacent or conceptually related, domains.

Act Bipolarity and Extensity

The other two indices in the proposed scheme of conceptual analysis derive from an examination of the conceptually anticipated or postulated relations between various dispositional constructs (e.g., between interpersonal dispositions). To illustrate these two indices, the act frequency approach is conjoined with the Wiggins (1979) circumplex model of interpersonal dispositions. From this joint application, the indices of *act bipolarity* and *act extensity* (defined and operationalized later in this section) can be derived for a personality scale. The Wiggins circumplex model of interpersonal behavior serves to illustrate the proposed system of conceptual analysis. The act frequency approach and appropriate conceptual indicators based on act prediction could be similarly applied to alternative theoretically generated circumplex models of interpersonal behavior or to circumplex models for other psychological domains (e.g., temperamental dispositions).

However, the Wiggins circumplex model of the interpersonal domain does possess certain attractive features that lend themselves to conjunction with the act frequency approach. The Wiggins circumplex is a structural model that consists of 16 points or interpersonal constructs arrayed in a circular fashion. The relations between each construct and every other construct are specified by position within the model: Adjacent constructs are highly positively correlated (e.g., extraversion, gregariousness); opposing constructs are highly negatively correlated (e.g., dominance, submissiveness); and orthogonal constructs are uncorrelated (e.g., dominance, agreeableness).

The circumplex model has several clear advantages over an unstructured list. First, it provides a relatively comprehensive conceptual space onto which other variables can be mapped. Second, it alerts investigators to

"gaps" in coverage and suggests the sorts of variables that may fill these gaps. Third, it specifies a desirable attribute toward which taxonomists in personality might strive, namely, to specify relations among, rather than simple enumeration of, taxonomic categories.

But beyond these relatively obvious advantages, more subtle benefits emerge when the model is conjoined with the act frequency approach. First, it provides a set of predictions about gradients of relationships. In addition to validation of a given target dispositional variable, the model predicts a decreasing pattern of act correlations as one moves progressively away from the target variable in both directions around the circumference of the circumplex. Second, the model defines an opposing conceptual space within which acts from the target variable should be notably absent. That is, because of positional opposition on the conceptual model, negative validity coefficients should obtain between a scale and act criteria occupying the opposing space. And third, because the model specifies a finite set of variables, it lends itself to a useful form of analysis when contrasted with open-ended taxonomies.

The proposed form of conceptual analysis involves combining the act frequency approach with the Wiggins circumplex model in order to produce a novel set of indicators by which personality scales may be evaluated and understood conceptually. Each indicator provides a distinct act predictive statement about personality scales.

Act bipolarity, the second conceptual indicator, is defined as the number of act correlates of a scale, of a given magnitude, from the opposing act category on the circumplex model of the interpersonal domain. For evaluating the act bipolarity of a dominance scale, for example, the number of significant submissive act correlates is examined. Does dominance simply involve performance of many dominant acts, or does it also involve a notable absence of submissive act performance? Although most validation schemes have focused on criterion-relevant predictions within definitional domains, the concept of act bipolarity suggests that another critical feature of a personality scale pertains to act predictions in the opposing conceptual space. Comparative analysis of scales on act bipolarity yields an

evaluation of whether opposing conceptual space is well represented and hence needlessly duplicated by semantically opposing scales, or whether distinct pairs of scales must be developed to represent opposing regions.

Act extensity, the third conceptual indicator in the proposed framework, may be examined from two perspectives. The first refers to *total act extensity* and is defined as the number of act correlates of a given magnitude within categories other than the nominally appropriate and semantically opposing act categories. A dominance scale with high act extensity would predict act performance within many other categories (e.g., gregarious acts, extraverted acts, agreeable acts). Scales possessing low act extensity would predict few acts within categories other than the nominally appropriate or semantically opposing act categories.

Total act extensity can be generated from any model that simply uses more than one bipolar category or dimension. However, the availability of a circumplex model affords a further and more precise index. This second facet of act extensity may be called *act adjacency extensity* and refers to act correlates that are conceptually anticipated by the model, excluding those in the nominally appropriate and semantically opposing act categories. That is, single-act correlates from categories closely adjacent to the target construct (positive) plus act correlates from categories adjacent to the conceptually opposing construct (negative) would both be counted positively in this index of act extensity. Excluded, or counted negatively, would be act correlates from categories orthogonal to the target construct. Thus, this index can be seen as representing a loosening of precision demanded by the Campbell and Fiske (1959) discriminant validity standards, but the loosening is a conceptually sanctioned, orderly, and meaningful one. In contrast, the index of total act extensity, from the perspective of the Campbell and Fiske criteria, would simply represent conceptually imprecise measurement.

Act Prediction: An Empirical Exploration

Each of the act prediction indices in this scheme is defined and operationalized as a conceptually independent, but possibly empirically correlated, feature of conceptual

analysis. The present study, evaluating 22 personality scales, was undertaken to provide an empirical illustration of this novel form of conceptual analysis generated by the conjunction of the act frequency approach with the Wiggins circumplex model.

The study illustrates the proposed form of conceptual analysis by selecting six dispositional constructs from the Wiggins circumplex model: the two major orthogonal vectors that define the circumplex (dominance–submissiveness and agreeableness–quarrelsomeness) plus one vector adjacent to the agreeableness–quarrelsomeness vector (gregariousness–aloofness). One hundred acts are generated for each of the six categories, and frequencies are assessed through self-reported performance. Clearly, field monitoring and other converging methods of assessing act performance are desirable (see Buss & Craik, 1983). Nonetheless, the data sets collected for this study illustrate the nature and usefulness of the proposed system of conceptual analysis and provide an array of empirical findings that illuminate conceptual linkages not obtained with previous systems of conceptual analysis.

The Act Nominations

Method

Subjects. Four samples of subjects participated in the act nomination studies. The first consisted of 88 undergraduates (37 males and 51 females) who completed the act nominations of gregariousness and aloofness as part of an extra-credit assignment for a class in personality psychology. The second sample consisted of 37 undergraduates (18 males and 19 females) who received experimental credit for act nominations for the category of submissiveness. The third and fourth samples consisted of 29 and 31 undergraduates who provided act nominations for the categories of quarrelsomeness and agreeableness, respectively.

Procedure. Each participant received a sheet with standard instructions, the basic form of which read as follows:

Think of the three most quarrelsome [gregarious, submissive, aloof, agreeable] females you know. With these individuals in mind, write down five acts or behaviors they have performed or might perform that reflect or exemplify their quarrelsomeness [gregariousness, submissiveness, etc.].

Five lines were provided upon which the act nominations could be written. The instructions were then repeated, altering the sex of the actor to male (e.g., "Think of the three most quarrelsome males you know . . .").

Results

The lists of aloof, gregarious, submissive, quarrelsome, and agreeable acts generated in this way were subsequently reduced by eliminating redundancies, "nonact" statements (e.g., adjectives), general-tendency statements (e.g., "she tends to avoid parties"), and statements considered too vague to constitute observable acts. Some act nominations (e.g., general-tendency statements) were converted into act descriptions by appropriate rephrasing. The final lists were examined for grammatical errors that were then corrected.

The target number of 100 acts within each category was obtained for all categories with the exception of aloofness, which remained at 89 after the reduction procedures. Therefore, an additional panel of 8 personality psychologists was asked to supplement this list of aloof acts; they were given the same instructions as those received by the undergraduate panels. In this way, 11 acts nominated by the expert panel were selected to supplement the 89 acts nominated by the undergraduate panel.

The acts were then prepared for subsequent studies, closely following the procedures reported by Buss and Craik (1980) for dominant acts. Each act was transformed from the third to the first person singular (e.g., "he greeted his friend with a hug" became "I greeted my friend with a hug"). Table 1 shows sample acts from each of the six dispositional categories. These lists of acts then formed six separate act reports.

Main Study: The Conceptual Indicators

Method

Subjects. One hundred undergraduates (55 females and 45 males) participated in the main study. None had participated in the preliminary studies. Subjects received experimental credit and individual feedback in return for their participation.

Materials. Relevant personality scales were selected to match the act categories generated from the previous studies. Selection was based on the surface correspondence between act category and scale construct. At least two scales were selected for each of the six act categories; the number of scales for each category ranged between two and five.

For the category of aloofness, the Wiggins (1979) Interpersonal Adjective Scales (IAS) of Aloof and Aloof-Introverted (FG) were chosen. For the gregarious act category, the California Psychological Inventory (CPI; Gough, 1957) Sociability (Sy) scale, the Jackson Personality Re-

Table 1
Sample Acts From Six Act Categories

Dispositional category	Sample act
Aloof	I continued to read a book amidst a group of people. I declined the invitation to the large party. I walked away from the group without saying "goodbye."
Gregarious	I volunteered to help a friend pack and move. I introduced myself to the new neighbor. I arrived late for the meeting because I had conversed with a friend met en route.
Dominant	I told her to get off the phone so that I could use it. I chose to sit at the head of the table. I asked someone else to wash the dishes.
Submissive	I entered the conversation only when someone asked me a question. I gave up my vacation wishes in deference to the preferences of my friends. I let my partner choose which movie we would see.
Quarrelsome	I ended the conversation by stalking out of the room. I made fun of the person who had not read the same books I had read. I insisted on having the last word in the discussion.
Agreeable	I volunteered to make dinner for my friends on the weekend. I readily did the dishes after dinner. I hugged my friend when we met on the street.

search Form-E (PRF-E; Jackson, 1967) Affiliation (Aff) scale, the Eysenck Personality Inventory (EPI; Eysenck & Eysenck, 1968) Extraversion (Ex) scale, the IAS Gregarious (Greg) scale, and the IAS Gregarious-Extraverted (NO) scale were selected. The CPI Dominance (Do), PRF-E Dominance (Dom), IAS Dominant (Dom), and IAS Dominant-Ambitious (PA) scales were matched with the dominant act category. For submissiveness, only the IAS Submissive (Sub) and IAS Submissive-Lazy (HI) scales could be found. For the category of Quarrelsomeness, the PRF-E Aggression (Agg) scale, the Buss-Durkee Aggression scale (B-D Agg; A. H. Buss & Durkee, 1957), the IAS Quarrelsome scale, and IAS Quarrelsome-Cold (DE) scale were selected.

For the category of agreeableness, it was less clear what standard personality scales might be used, in addition to the IAS Agreeable (Agree) and IAS Agreeable-Warm (LM) scales. Based on judged conceptual similarity, the PRF-E Nurturance (Nur) scale, the CPI Femininity (Fe) scale, and the Personal Attributes Questionnaire (PAQ; Spence & Helmreich, 1978) Femininity (Fem) scale were chosen to correspond to the agreeable act category. Although this intuitively based correspondence may be reasonably questioned, it should be noted that a major advantage of the present conceptual analytic scheme is that it clarifies the behavioral domains within which the scales have the greatest predictive relevance. Thus, interim inappropriate classifications can soon be corrected.

The six act reports were labeled Act Report A, B, C, D, E, and F and were not explicitly identified by the category being assessed (aloof, gregarious, dominant, submissive, quarrelsome, agreeable). For each act report, participants were asked to check yes or no according to whether or not they had ever performed each act. If the answer was yes, subjects were asked to indicate on a 3-point scale

(rarely, sometimes, often) how frequently each act was performed.

Procedure. Data gathering for the main study occurred in three separate sessions, each separated by at least a 1-week interval. At least a week was placed between each of the sessions to prevent fatigue and to minimize the potential operation of response sets. In the first session, participants completed the IAS scales and the battery of personality scales listed in the Materials section. In the remaining two sessions, they completed the Act Reports: Act Reports A, C, and E in one of the sessions and Act Reports B, D, and F in the other.

Results

Predictor scales: intercorrelation matrix. Table 2 shows the intercorrelation matrix of the predictor scales. Within the triangular boxes are the correlations between the scales purporting to assess the same or highly similar concepts. Correlations within the rectangular boxes represent the correlations between one set of conceptually similar scales and another set of conceptually similar scales. The convergent correlations are generally lower than the scale reliabilities, suggesting differences between scales that are similarly named. The divergent correlations are generally lower than the convergent correlations, although the dominance and sociability scales are significantly positively correlated.

Table 2: Predictor Scales: Intercorrelations

Scale	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22
1. IAS Aloof	85	-37	-55	-53	-67	-73		-31	-23	-26	-16	25	23	-02	12	46	53	-43	-09	-44	-50	-45
2. IAS FG		-51	-50	-64	-51	-74		-47	-31	-41	-20	43	30	-20	01	28	33	-38	-07	-32	-26	-26
3. CPI Sy			50	58	26	46		55	39	45	34	-41	-30	04	-11	-14	-13	20	-10	09	16	13
4. PRF-E Aff				57	47	56		26	19	10	06	-03	01	09	-04	-18	-28	36	04	40	32	38
5. EPI Ex					36	61		39	36	38	16	-29	-08	22	07	-02	-01	11	-13	18	06	10
6. IAS Greg						85		33	15	19	27	00	-08	-07	-15	-52	-62	43	10	56	75	75
7. IAS NO								47	22	40	36	-21	-18	01	-15	-35	-42	36	05	45	57	56
8. CPI Do									61	58	44	-49	-36	17	05	-06	-08	29	-23	05	14	13
9. PRF-E Dom										51	40	-53	-45	27	15	-10	-01	18	-28	03	05	-03
10. IAS Dom											82	-66	-56	18	-05	06	09	06	-21	-03	07	04
11. IAS PA												-48	-63	03	-29	-13	-06	06	-24	06	29	19
12. IAS Sub													80	-07	06	10	02	-05	30	06	07	10
13. IAS HI														05	19	28	16	-14	22	-09	-14	-05
14. PRF-E Agg															70	09	12	-10	03	00	-19	-12
15. B-D Agg																	18	13	01	17	02	-24
16. IAS Quar																		88	-38	-12	-49	-69
17. IAS DE																			-48	-20	-66	-75
18. PRF-E Nur																				22	60	47
19. CPI Fe																					22	16
20. PAQ Fem																						61
21. IAS Agree																						
22. IAS LM																						

Note. IAS = Wiggins Interpersonal Adjective Scales; FG = IAS Aloof-Introverted scale; CPI = California Psychological Inventory; Sy = CPI Sociability scale; PRF-E = Jackson Personality Research Form-E; Aff = PRF-E Affiliation scale; EPI Ex = Eysenck Personality Inventory Extraversion scale; Greg = IAS Gregarious scale; NO = IAS Gregarious-Extraverted scale; Do = CPI Dominance scale; PRF-E Dom = PRF-E Dominance scale; IAS Dom = IAS Dominant scale; PA = IAS Dominant-Ambitious scale; Sub = IAS Submissive scale; HI = IAS Submissive-Lazy scale; PRF-E Agg = PRF-E Aggression scale; B-D Agg = Buss-Durkee Aggression scale; Quar = IAS Quarrelsome scale; DE = IAS Quarrelsome-Cold scale; Nur = PRF-E Nurturance scale; Fe = CPI Femininity scale; PAQ Fem = Personal Attributes Questionnaire Femininity scale; Agree = IAS Agreeable scale; LM = IAS Agreeable-Warm scale.

Table 3
Act Density

Scale	Total	Males	Females
Aloofness			
IAS Aloof	15	11	5
IAS FG	14	11	5
Gregariousness			
CPI Sy	50	19	35
PRF-E Aff	39	11	37
EPI Ex	43	5	42
IAS Greg	20	6	17
IAS NO	45	17	27
Dominance			
CPI Do	39	28	23
PRF-E Dom	37	19	25
IAS Dom	38	27	13
IAS PA	20	19	4
Submissiveness			
IAS Sub	10	6	5
IAS HI	15	10	4
Quarrelsomeness			
PRF-E Agg	45	15	45
B-D Agg	47	21	29
IAS Quar	6	9	0
IAS DE	6	7	1
Agreeableness			
PRF-E Nur	28	12	23
CPI Fe	3	1	5
PAQ Fem	13	7	11
IAS Agree	38	25	12
IAS LM	33	26	13

Note. See Table 2 note for an explanation of abbreviations.

Act density indicators. Table 3 shows the act density scores for each scale. The numbers in the table refer to the number of acts that each scale predicts significantly at the .05 level (two-tailed). Statistical significance is used here as a somewhat arbitrary, but reasonable, criterion for establishing whether a scale predicts the relative frequency of act performance. The significance is obviously determined by the statistical power in the particular analysis, and thus the act density of any scale would vary with the sample size used. Because the sample size used in the present analysis is the same for each of the scales, statistical significance does not bias the results in favor of one scale or another. With the present total sample size, correlations of .21 or greater are statistically significant beyond the .05 level (two-tailed).

Several patterns in Table 3 deserve special note. First, act categories differ from each other in act density scores across the relevant scales. The aloof and submissive act categories, rep-

resented by only two scales (both IAS), are poorly predicted. In contrast, the gregarious and dominant act categories are fairly well predicted, although there is variability from scale to scale within these categories. The quarrelsome and agreeable act categories exhibit uneven act density scores, with some scales being quite high and others surprisingly low. By examining the act density scores alone, it is not clear whether the low act density scores for the aloof and submissive act categories represent scale deficiencies or inherently lower predictability of act performance in these categories. Scrutiny of the act bipolarity and extensity data, however, will clarify these issues.

Second, similarly named scales differ substantially from each other in their act density scores. The CPI Sociability scale, for example, has an act density score that is two and one-half times higher than the IAS Gregarious scale. The B-D and PRF-E Aggression scales have considerably higher act density scores than do the matching IAS scales. Thus, the act density indicator provides a relatively clear basis for choosing among similarly named scales, at least for behavioral prediction in target conceptual space.

Third, these data suggest that the initial intuitive expectation that the Nurturance and Femininity scales would be relevant to the agreeable act category is only partly borne out. Although the PRF-E Nurturance scale has an act density score similar to those of the IAS Agreeable and LM scales, the CPI and PAQ Femininity scales have exceptionally low density scores. In fact, for the CPI Femininity scale, the act density score does not even exceed chance level. An examination of the act bipolarity and act extensity indices, however, will clarify somewhat the meaning of this scale, and in so doing, illustrate one of the important contributions of the present method of conceptual analysis.

Fourth, sex differences in act density scores should be noted. Although individual scales within category show substantial sex differences, the scales indexing gregariousness show marked differences in each of the five cases: Density scores are higher for females than for males in each case. Because the other five act categories do not show this sex difference, these data suggest that gregariousness scales, and perhaps the entire domain of gregariousness,

may be a more important individual difference parameter for females than for males.

Act bipolarity indicators. Table 4 shows the act bipolarity scores for each predictor scale. As with the act density scores, statistical significance is used to establish whether the target scale predicts the performance frequency of each act within the opposing conceptual category (a minimum magnitude of .21 for the total sample).

As with the act density scores, categories differ from each other in the magnitude of their density scores. The aloofness scales have high bipolarity scores, whereas the agreeableness scales generally have low bipolarity scores. Similarly named scales differ in the degree to which they predict acts in the opposing conceptual domain. For example, the IAS Quarrelsome scale has an act bipolarity score of more than twice that of the PRF-E Aggression scale.

But beyond these apparent cross-category and within-category differences in act bipolarity, several interesting patterns emerge when the bipolarity scores are compared with the density scores for a given category or set of scales within a category. Inspection of the results for the prediction of gregarious acts from the IAS Aloof and FG scales reveals that these scales both possess relatively high act bipolarity (in fact, the highest bipolarity scores in the battery). The FG scale, designed to index aloofness-introversion, predicts more gregarious acts than any of the scales designed to index gregariousness, sociability, or extraversion. When viewed along with the low act density found within the nominally appropriate aloof act category, these results indicate that the IAS Aloof and FG scales are not invalid, as might be inferred from the act density data when viewed alone. Rather, the overall pattern suggests that the IAS Aloof and FG scales have a potent domain of applicability, but one that is placed in opposing conceptual space.

These results also suggest that aloof acts may be inherently less predictable than are acts within the gregarious act category. This suggestion is corroborated by the bipolarity scores for the gregariousness scales, all of which are low. Thus, the disposition of aloofness may be better captured by more subtle forms of nonverbal communication and thus be less amenable to the present form of act frequency

Table 4
Act Bipolarity

Scale	Total	Males	Females
<i>Gregarious acts</i>			
<i>Aloofness</i>			
IAS Aloof	31	8	26
IAS FG	52	18	35
<i>Aloof acts</i>			
<i>Gregariousness</i>			
CPI Sy	10	10	2
PRF-E Aff	10	12	4
EPI Ex	10	16	3
IAS Greg	3	2	5
IAS NO	8	6	2
<i>Submissive acts</i>			
<i>Dominance</i>			
CPI Do	16	8	13
PRF-E Dom	19	6	19
IAS Dom	11	4	8
IAS PA	12	7	3
<i>Dominant acts</i>			
<i>Submissiveness</i>			
IAS Sub	24	18	21
IAS HI	9	15	2
<i>Agreeable acts</i>			
<i>Quarrelsomeness</i>			
PRF-E Agg	10	6	6
B-D Agg	12	12	3
IAS Quar	23	16	16
IAS DE	14	13	11
<i>Quarrelsome acts</i>			
<i>Agreeableness</i>			
PRF-E Nur	3	0	2
CPI Fe	5	0	1
PAQ Fem	3	0	3
IAS Agg	17	9	9
IAS Lm	9	7	11

Note. See Table 2 note for an explanation of abbreviations.

analysis; on the other hand, aloofness may be represented better by the acts that are not performed rather than those that are performed—a hypothesis that gains considerable support from the high IAS Aloof and FG bipolarity scores and is examined further with the act extensity data.

In another pattern that emerges, the act bipolarity results for the prediction of agreeable acts from the aggression scales reveals a striking reversal from the act density results. Both the PRF-E and B-D Aggression scales, although predicting quarrelsome acts remarkably well (each possessing high density scores), have low

act bipolarity. And the IAS Quarrelsome and DE scales, each having low density scores, possess moderately high bipolarity scores. Thus, the PRF-E and B-D Aggression scales possess high act density and low act bipolarity, whereas the reverse is true for the conceptually similar IAS Quarrelsome and DE scales. These results suggest that the density and bipolarity indices, when viewed together, reveal patterns in the conceptual analysis of scales that remain undetected in narrower domain-definitional validation.

Act extensity indicators. Act extensity, defined as the degree to which a scale predicts acts in domains other than those for which the scale was designed, may be viewed within Gough's system of conceptual analysis as an aspect of tertiary validation. That is, act extensity indexes the range of predictive information provided by a test beyond that which was envisioned or perhaps intended by the test author. It may seem that act extensity is largely unpredictable on a priori conceptual grounds. The Wiggins circumplex model, however, provides a conceptual scheme for predicting or prescribing the act extensity of each scale. Using the circumplex as a heuristic leads to the expectation that a scale will predict acts in domains that are closely adjacent on the circumplex. A dominance scale, for example, if it predicts acts in domains other than those of dominance and submissiveness, should predict arrogant and calculating act categories on the one hand and ambitious and extraverted categories on the other. The meaning of a scale may be clarified by the extent to which it is linked with various adjacent categories on the circumplex.

Table 5 shows the act extensity analyses of the predictor scales for the total sample. Within each act category, the act extensity analyses are partitioned into positive and negative correlations, as the *direction* of the prediction is an important facet of act extensity. Inspection of the act extensity analyses for the Aloof and FG IAS scales reveals an interesting pattern: The FG scale predicts the nonperformance of dominant acts, quarrelsome acts, and agreeable acts (the latter being particularly noteworthy). In fact, the nonperformance of dominant and agreeable acts by those scoring high on aloofness is more predictable than the *performance* of aloof acts by those who score high

on these scales. These act extensity findings for the aloofness scales are congruent with the circumplex model. The Wiggins circumplex predicts that aloofness will be *negatively* related to both dominance and agreeableness, the latter being more strongly negatively related.

When reviewing the results of the aloofness scales for act density, bipolarity, and extensity, a striking pattern emerges: The aloofness scales predict the nonperformance of acts in the domains of gregariousness, dominance, and agreeableness more than they predict the performance of aloof acts. These results, taken together, indicate that the meaning of aloofness may lie in the acts that are *not* performed more than in the acts that are performed. Aloofness may entail the refraining from normatively appropriate behavior or simply a lower frequency of acts across most categories.

An inspection of Table 5 for the act extensity of the gregariousness predictor scales reveals a pattern that is largely in keeping with the a priori expectations of the Wiggins circumplex model. Dominant acts are generally positively predicted by these scales, as are agreeable acts. Positive relationships between gregariousness and both dominance and agreeableness are expected because of their proximity on the circumplex. According to the circumplex model, however, both submissive and quarrelsome acts should be negatively predicted by these gregariousness scales. In fact, this finding only obtains for the EPI Extraversion scale, and slightly for the CPI Sociability scale.

Viewing the overall index of act extensity for these scales, it is apparent that the EPI Extraversion scale surpasses all the other scales, having an overall extensity index of 81. This finding is to be expected in that Eysenck conceptualized extraversion as a broad "super factor," a higher order factor consisting of many subfactors (e.g., sociability, impulsiveness, activity, liveliness, and excitability).

Findings for the IAS Greg and NO scales fit the circumplex model in direction for all categories except the submissive act category. These scales generally predict positive performance of submissive acts, whereas the circumplex model generates an expectation that nonperformance of submissive acts would be predicted by them.

The act extensity data of the dominance

Table 5
Act Extensity

Scale	Act category												Total
	Aloof		Gregarious		Dominant		Submissive		Quarrelsome		Agreeable		
	+	-	+	-	+	-	+	-	+	-	+	-	
Aloofness													
IAS Aloof					0	11	1	3	4	1	0	20	40
IAS FG					0	21	4	5	3	13	0	24	70
Gregariousness													
CPI Sy					22	0	3	10	4	3	18	0	60
PRF-E Aff					8	3	8	4	4	4	19	1	51
EPI Ex					30	0	4	18	9	3	16	1	81
IAS Greg					8	0	6	1	0	5	16	0	36
IAS NO					10	0	8	1	0	5	23	0	47
Dominance													
CPI Do	2	11	38	1					4	2	15	0	73
PRF-E Dom	1	6	22	0					10	0	4	7	50
IAS Dom	3	6	26	0					4	2	13	3	57
IAS PA	1	10	9	1					0	10	7	3	41
Submissiveness													
IAS Sub	8	4	0	13					2	4	2	10	43
IAS HI	12	0	3	2					5	1	4	5	32
Quarrelsomeness													
PRF-E Agg	9	1	15	0	32	0	12	8					77
B-D Agg	15	1	4	5	16	0	15	4					60
IAS Quar	1	4	2	9	0	3	2	4					25
IAS DE	2	1	11	1	0	3	2	1					21
Agreeableness													
PRF-E Nur	4	3	27	0	11	1	6	0					52
CPI-FE	12	1	6	5	2	17	10	4					57
PAQ Fem	3	3	10	0	0	5	8	2					31
IAS Agree	0	5	20	0	5	4	8	1					43
IAS LM	1	3	20	0	3	2	12	0					41

Note. "+" and "-" = positive and negative correlations. See Table 2 note for an explanation of abbreviations.

scales reveal some interesting patterns and are discussed separately for each scale, since clear differences between the scales emerge. According to the circumplex model, dominance scales should predict aloof acts slightly negatively, gregarious acts positively, and agreeable and hostile acts should not be predicted at all because these categories are orthogonal to dominance. The CPI Dominance scale generally conforms to this pattern: 11 aloof acts are negatively predicted; 38 gregarious acts are positively predicted; and the quarrelsome acts are only predicted at the chance level (6 out of the set of 100). However, 15 of the agreeable acts are positively predicted by the CPI Dominance scale. This latter finding is particularly interesting in that it is congruent with the specific aims of the CPI Dominance scale, which was designed to identify the "constructively dominant" person who "appeals to socially valid and worthwhile goals" (Gough, 1968, p. 59).

The PRF-E Dominance scale correlates negatively with 6 aloof acts and positively with 22 gregarious acts, as expected from the circumplex model. However, this scale positively predicts 10 quarrelsome acts and negatively predicts 7 agreeable acts. These act extensity findings indicate that high scorers on PRF-E Dominance would be more coercive and domineering than high scorers on CPI Dominance. These distinctions indicate that examining the act extensity of scales can reveal important although subtle differences between scales designed to assess approximately the same concept.

The circumplex model indicates that the aggressiveness scales should be uncorrelated with dominant acts, uncorrelated with submissive acts, positively correlated with aloof acts, and negatively correlated with gregarious acts. The PRF-E and B-D Aggression scales do not conform to this expected pattern. Both scales have high extensity scores for the positive prediction of dominant acts and moderately high extensity scores for positive prediction of submissive acts. These findings are particularly interesting in that they appear to conform to the classic pattern of the "authoritarian personality"—the person who behaves in a domineering way with subordinates and in a subservient manner with superiors.

An inspection of the overall extensity indices

for scales assessing agreeableness, femininity, and nurturance reveals that the CPI Femininity scale possesses the greatest extensity score. In light of the general failure of this scale to predict agreeable acts (act density), this finding indicates that the CPI scale has a range and utility of predictiveness but was misclassified in the present study as being located in the agreeable segment of the circumplex. Its greatest utility appears in these findings to be the successful prediction of dominant acts (negatively), the positive prediction of submissive acts, and the positive prediction of aloof acts.

In sum, the act extensity index provides a systematic means by which the predictive range of a test can be evaluated in domains other than the ones for which the scale was designed. This index has been shown to clarify the meaning of various scales, providing secondary evaluation (Gough, 1965) by revealing more precisely the underlying psychological dimension of each scale. An illustrative example is provided by examining the CPI Dominance and PRF-E Dominance scales. The act extensity scores for the various act categories were found to reveal interesting differences in the meaning of each, in spite of the fact that these two scales are highly correlated (.61). In the case of the CPI, the underlying psychological meaning of the test appears to entail the exercise of dominance for group goals and allosocial aims (as indexed by its positive relationships between the acts in the categories of gregariousness and agreeableness). In contrast, the PRF-E Dominance scale appears to be measuring a more coercive, manipulative, and ego-enhancing dominance, as indexed by its lower act extensity in the agreeable act category and its positive act extensity in the quarrelsome act category.

A second illustrative example of the use of act extensity to reveal the underlying psychological meaning of tests concerns the extensity indices of the PRF-E Aggression and B-D Aggression scales. These scales were found to correlate positively with act performance in the categories of both dominance and submissiveness, indicating that authoritarianism may underlie high scores on these scales. The high scorer may act in a domineering, coercive, and autocratic manner with subordinates and in a subservient manner with those of superior

status. These results provide heuristics to hypotheses that can be more thoroughly examined in subsequent studies.

Correlations between density, bipolarity, and extensity. The act frequency indicators of density, bipolarity, and extensity are viewed as conceptually and operationally independent, but possibly empirically correlated, facets of conceptual analysis. To what extent are these conceptual indicators empirically linked? Pearson correlations were computed between the indicators across the set of 22 personality scales used in this study. The correlation between act density and act bipolarity is $-.26$; that between act density and act extensity is $.60$; and the correlation between act bipolarity and act extensity is $.12$.

Tentative conclusions may be drawn from these relationships. First, the slight negative, but nonsignificant, correlation between density and bipolarity indicates that the two are relatively independent. This generalization is readily observed in comparisons between the density and bipolarity tables. Scales that possess high act density do not have particularly high bipolarity scores; scales with reasonably high bipolarity scores generally have slightly lower density scores. These findings seriously call into question the assumption, at least for the instruments used in this study, that personality scales are truly bipolar in the sense of predicting act frequencies in conceptually opposing domains. Instead, they indicate that *different* scales must typically be used for postulated opposite conceptual regions and that bipolarity in the act domain must be empirically demonstrated rather than assumed.

The substantial positive correlation between act density and act extensity suggests that scales that predict act frequencies well in the domains for which they were developed also predict act frequencies in other, sometimes quite disparate and possibly inappropriate categories. The PRF-E Aggression scale, for example, has one of the highest density scores (45) but also predicts positively many dominant (32), submissive (12), and gregarious (15) acts, the latter two categories being orthogonal and nearly opposed, respectively, on the circumplex model. On the other end, the IAS DE scale has one of the lowest density scores (6) and predicts few acts within other categories, achieving an extensity score of only 21.

The low positive, but nonsignificant correlation of $.12$ between bipolarity and extensity indicates that these two facets of conceptual analysis are relatively independent. When viewed along with the other correlations, one may conclude that there are no "all-purpose" scales: Those that perform well in predicting act frequencies in domain-appropriate and disparate categories are not differentially suited for predicting act frequencies in conceptually opposing domains.

Discussion

The prediction of multiple-act criteria for specific dispositional constructs, structured according to prototypicality within each act category, provides a basic contribution to the analysis of personality scale validity (Buss & Craik, 1980, 1981, 1983). Conjoining the act frequency approach with the Wiggins circumplex model of the interpersonal domain also produces a new system by which personality scales can be conceptually analyzed. The system yields three conceptual indicators (density, bipolarity, and extensity), which are the focus of the present report. Each defines a different type of act predictive statement that can be made about a scale. Consideration of these three indicators together reciprocally clarifies scales and act categories, calls into question the general assumption of scale bipolarity, and carries implications for the construction of scales and the overarching taxonomies that encompass them. Each of these implications are taken up in turn.

The first implication pertains to the reciprocal clarification of scales and act categories. In this study, the conceptual analysis of scales and acts referencing aloofness produced an intriguing outcome. Not only did the scales designed specifically to assess aloofness perform poorly in predicting reported performance of aloof acts but aloof acts remained largely unpredictable from any of the 22 scales in the battery. Examination of the act bipolarity and extensity indices for the IAS Aloof and FG scales suggests an explanation. The bipolarity indices were quite robust, indicating that those who score high on aloofness report performance of fewer gregarious acts than those scoring low. And the extensity scores suggest that those scoring high on aloofness

report performance of relatively fewer acts in almost every act category. For example, the IAS FG scale correlated negatively with reported single-act frequencies in the categories of agreeableness (24), quarrelsomeness (13), and even dominance (21). In fact, the IAS FG scale received one of the highest total act extensity scores; and of the 70 significant correlations in the FG extensity act categories, 63 were negative. Examples of acts that are reportedly performed less frequently by those who score high on IAS FG are "I took the lead in organizing the project" (dominance), "I ended the conversation by stalking out of the room" (quarrelsomeness), and "I complimented my co-worker on her clothes" (agreeableness).

It is perhaps noteworthy that Wiggins (1979) encountered a conceptually related problem in discovering adjectives for the "weak" and "hostile" areas of the circumplex. For the category of "aloof" adjectives were used (e.g., antisocial, unneighborly, impersonal, unsociable, unsmiling, uncheery) that appear to refer not to behaviors but rather to the absence of certain classes of behaviors.

In sum, by viewing the results from the density, bipolarity, and extensity indicators together, it can be tentatively concluded that aloofness is somewhat unique among dispositions, being represented not so much by the acts that are performed, but rather by the acts that are not performed in a variety of dispositional categories. What persons do not do, in this case, may be more important than what they do. This illustrates the capacity of the present conceptual system to clarify scales and act domains reciprocally in a way that would elude more traditional forms of validation that look more narrowly at only construct-relevant regions.

A second implication of the act prediction form of conceptual analysis involves questioning the too readily made assumption of bipolarity. This point is dramatically illustrated in the present data by finding that the PRF-E and B-D Aggression scales predict positively reported performance in both the dominant and submissive categories. For example, the acts "I told others to perform menial tasks instead of doing them myself" (dominance) and "I changed my clothes when the others made fun of my attire (submissive) were pos-

itively predicted by the PRF-E Aggression scale. Thus, instead of bipolarity, the results suggest the "authoritarian" pattern whereby domineering acts are displayed, particularly with respect to subordinates, as well as acts of conformity, indicating submission to group norms.

This pattern, combined with the overall slight negative correlation between act density and bipolarity, suggests that true bipolarity may be the exception rather than the rule. When predicting criteria in apparently opposing conceptual space, bipolarity must be demonstrated rather than assumed.

A third implication is that categories may differ from each other in their overall density. Because density is a function of the interaction between predictor scales and act categories, the present data set cannot determine whether the obtained category differences are due to actual differences among act categories in inherent predictability or are due to the particular predictor scales used in the present battery. Nonetheless, these category differences raise the intriguing possibility that some act categories may be intrinsically more sparsely predicted than others. Such differences in density may be linked to the relative tightness or looseness of the relations among the acts themselves. In the present analyses, the categories possessing the lowest density scores (aloofness and submissiveness) also had the lowest mean between-act correlations (.07 and .09, respectively). The categories possessing the highest overall density across scales (gregariousness and dominance) also had the highest mean between-act correlations (.12 and .14). Thus, in developing an act category taxonomy of the interpersonal domain, specification of the act density of each category may be a desirable feature to add to the more common taxonomic specifications of category boundaries, cross-category linkages, and hierarchic organization among categories.

Finally, the present form of conceptual analysis has clear implications for the manner in which scales can be constructed. Personality scale constructors should attend *explicitly* to the appropriate or sought after standing of a scale on the indices of density, bipolarity, and extensity. Attention to bipolarity and extensity at the level of item inclusion will require test authors to specify more clearly the construct

for which the test is intended. Is it desirable for a scale to possess bipolarity or extensity? The answer depends on the purposes for which the scale is constructed, and explicit attention to the conceptual indicators defined and operationalized here highlights the importance of such conceptual specification.

In sum, the proposed method of conceptual analysis attempts to specify the different kinds of act predictive statements that can be made about personality scales. The density indicator makes a statement about the scope of act prediction in the domain for which the scale was constructed. The bipolarity index addresses postulated opposing conceptual space and speaks to act predictions in that realm. Extensity involves a statement about the categories within which act frequencies are predicted beyond those for which the scale was constructed.

The research used to explore this new approach to conceptual analysis must be viewed as illustrative rather than as definitive. Assessment of act frequencies were self-reported rather than observed, and independent methodologies must be used to converge on the patterns discovered in the present data set (see Buss & Craik, in press). The selection of dispositions as the basic form of categorization must similarly be viewed as illustrative: The conceptual analysis presented here may be applicable, with modification, to act analysis using roles, projects, scripts, or even situations as categorization schemes, provided there is at least some form of taxonomic structure from which to generate a finite set of categories.

The present scheme is therefore only a preliminary attempt to specify the types of act predictive statements that can be made about psychological tests of whatever sort. By exploring these implications, the act frequency method of conceptual analysis highlights patterns that must ultimately be described and accounted for by any theory or taxonomy of personality psychology.

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