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ABSTRACT

Methods proposed by L. A. Goodman (1987) for analyzing intrinsic properties of cross-classified nominal or ordered categorical variables were used to examine the performance of items measuring psychological adjustment (PA). These methods were applied to 35 3x4 tables cross-classifying 1,158 persons according to their mental health status (MHS) and responses to 35 Likert-type items measuring PA. The subjects included: 562 normal individuals; 336 persons who had recently attempted suicide; and 260 psychiatric inpatients. Items in this study were drawn from the Suicide Probability Scale. Two sets of orthogonal metric scores were derived for categories of MHS and PA variables. Scores in the first set--representing the direction of MHS and PA--were used to assign scale values to categories of the variables, making it possible to examine the consistency between intrinsic and a priori orderings. The second set of scores, representing the strength or intensity of the variables, formed J- or U-shaped curves when mapped onto the first set. These curves were used to distinguish positive and negative PA and MHS categories. For all tables, the intrinsic ordering of MHS categories was consistent with their a priori ordering; this finding was true for only 23 of 35 tables for PA. The location of the zero point indicated that categories representing positive PA varied depending on the content of the item, with some patterns evident across items of similar content. Two tables and 14 graphs are included. (SLD)

EXAMINATION OF ITEM PERFORMANCE VIA GOODMAN'S MULTIPLICATIVE ASSOCIATION MODELS: DETERMINING AN INTRINSIC ZERO-POINT ON A BEHAVIORAL CONTINUUM*

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ABSTRACT

Methods proposed recently by Goodman (1987) for analyzing intrinsic properties of cross-classified nominal or ordered categorical variables were used to examine the performance of items measuring psychological adjustment (PA). These methods were applied to thirty-five 3x4 tables cross-classifying 1,158 persons according to their mental health status (MHS) and response to each of 35 Likert-type items measuring PA. With these methods it was possible to derive two sets of orthogonal metric scores for categories of the MHS variable and for categories of the PA variable. Scores in the first set, representing direction of MHS and PA, were used to assign scale values to categories of the variables, making it possible to examine the consistency between their intrinsic and a priori orderings. The second set of scores, representing strength or intensity of MHS and PA, generally were found to form a J- or U-shaped curve when mapped onto the first set. The curves were used to determine an intrinsic zero-point along the PA continuum so that categories denoting positive PA could be distinguished from those indicative of negative PA and so that distinctions could be made between positive and negative MHS categories. For all tables, the first set of scores showed the intrinsic ordering of the MHS categories to be consistent with their a priori ordering, while this was true for PA categories in only 23 of 35 tables. The location of the zero point showed that item categories representing positive PA varied depending on the content of the item, with some patterns being evident across items of similar content.

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EXAMINATION OF ITEM PERFORMANCE VIA GOODMAN'S MULTIPLICATIVE ASSOCIATION MODELS: DETERMINING AN INTRINSIC ZERO-POINT ON A BEHAVIORAL CONTINUUM

The performance of individual items measuring psychological adjustment was examined using methods recently proposed by Goodman (1987) for analyzing intrinsic properties of ordered qualitative/categorical variables. These methods use information inherent in the observed joint distribution in an IxJ cross-classification table to derive *m* sets of metric "scale values" for categories of the row and column variables. Goodman's newer methods are an extension of his previously proposed (Goodman, 1979) log-multiplicative association models which yield only a single set of scores, one score for each row and each column category. The newer models also extend the more familiar log-linear models so that when categories of a variable represent ordered phenomena, these ordinal properties are taken into account in modeling the association in a table. Though log-linear models have been applied to measurement problems (e.g., Greene, Crone, & Folk, 1989), use of these newest association models in published applied works is considerably more rare.

THEORETICAL FRAMEWORK UNDERLYING GOODMAN'S MODELS

The theory underlying Goodman's newer association models is based on the premise that the degree and the nature of the association between two variables, as exhibited in an IxJ cross-classification table, can be described fully by examining a basic set of 2x2 subtables formed from pairs of adjacent rows and adjacent columns in a table. For an IXJ table, the number of subtables in the basic set is given by the expression (I-1)(J-1). The pattern of the association across these subtables determines the overall level of association in a table and establishes one or more intrinsic metrics corresponding to various properties underlying the original categorical variables. While the earlier log-multiplicative association models provided a single set of scores for categories of the row and column variables, the newest models yield several orthogonal sets of scores, each

representing a distinct intrinsic metric. The number of possible intrinsic metrics is a function of the number of rows and columns in a table.

An intrinsic metric, in Goodman's framework, is defined as one that is inferred from patterns in an observed joint distribution of variables. This implies that other variables comprising the cross-classification table are directly related to a variable's intrinsic metric. An a priori ordering, in contrast, generally does not depend on other variables and instead is determined from definitional properties of a variable's categories or from the substantive context in which a variable is viewed. Examples of an a priori ordering scheme are encountered perhaps most often in the social sciences with the use of Likert-type items where semantic properties of response categories are used to establish their ordering along an attitude continuum.

Goodman's original log-multiplicative association methods yield unsaturated models whose fit to empirical data is tested with a goodness-of-fit statistic. In contrast, the newer models are saturated models which exactly reproduce observed cell frequencies, rendering a goodness-of-fit test meaningless.

The newer models yield several sets of metric scores for each row and column variable, with the number of sets theoretically possible for an IXJ table being the minimum of I-1 and J-1. The first set provides a score for each row category and each column category, and these scores can be thought of as category scale values that mark the location of the categories along an underlying continuum. Without loss of generality, these values are generally scaled so as to have a mean of 0.0 and a standard deviation of 1.0; however, any transformation of these values which holds constant the ratio of distances between pairs of adjacent categories preserves their essential characteristics. By definition, these empirically derived scale values are optimal scores in that they maximize the magnitude of the association between the row and column variables. Goodman has shown that these scale values yield a correlation which is higher than or equal to that yielded by any other scheme for weighting the categories of the row and column variables. When viewed in a substantive content, scores in this first set are metric values that mark the location of a variable's categories on the continuum underlying a particular construct. Scaling categories on the basis of

these models provides a means of testing the suitability of any proposed weighting scheme, including the common equal interval scheme which, more often than not, is assumed true without an empirical test or theoretical justification.

Goodman's newer models also yield a second set of scores, again one score for each row and each column category. Like the first set of scores, these scores maximize the correlation between the row and column categories with the added restriction that they are uncorrelated with the first set of scores. Likewise, sets of scores subsequently extracted yield maximally correlated row and column values that are uncorrelated with all previous scores. The first set of scores account for the largest proportion of the association inherent in the observed data; the second metric captures the next largest proportion of association, and so on.

In discussing his newer models, Goodman offers one interpretation of the substantive meaning underlying the first and second set of scores derived from a specific observed table. However, guidelines for interpreting metrics beyond these are not given. In a discussion of the similarities between his newer models and an approach to principal components analysis developed by Guttman (1950; 1954; Guttman & Suchman, 1947), Goodman shows that Guttman's approach yields scores that are mathematically comparable to scale values derived from the association models.

Similarities between the Goodman and Guttman models provide a rationale for looking to Guttman's work wherein support was found for hypotheses concerning interpretations of his various components. In turning to this body of work, the assumption is made that behavioral phenomena represented by Guttman's components are among the same phenomena that give rise to observed frequencies in tables of cross-classified data.

GUTTMAN'S PRINCIPAL COMPONENTS

Guttman's initial work on the principal components of scale analysis revolved around the desire to take a person's rank score, resulting from responses to a perfect (Guttman) scale, and to decompose that rank into a number of component scores. One goal of the principal components approach was to provide a means by which intensity of attitudinal behavior could be assessed

without asking two separate questions, one about the direction of a person's attitude (positive or negative) and one about intensity. This approach also sought to develop an empirical approach to the problem of finding an objective zero-point on an attitude continuum so that positive attitudes could be objectively distinguished from those that were negative.

Interest in an intensity function was not limited to perfect scales. Guttman noted that items with multiple response categories of the type proposed by Likert (1932) combine measures of both intensity and content by having a set of successive ordered categories representing different levels of intensity (e.g., Strongly Agree, Agree, Disagree, Strongly Disagree) follow a declarative statement. One of the objectives of Guttman's the principal components approach was to empirically separate the content and intensity scores.

Ultimately, the principal components of scale analysis, whether applied to rank scores obtained from a perfect scale or a Likert-type item, provided a method of partitioning a rank order score into a number of oscillating orthogonal components. The first component was viewed as a content score that located a respondent on a continuum underlying the construct being measured. For example, a first component score extracted from a person's response to an item measuring attitudes toward gun control would locate the person on a gun control continuum according to the direction of his or her views on this subject.

From the set of original rank scores, it was also possible to extract scores on a second component which, when mapped onto the content scores, produced a J- or U-shaped curve with one inflection point. The third component was a cubic function of the content score and had two inflection points, and so on for the various increasingly complex components.

In attempting to give a psychological meaning to the components, Guttman and colleagues (1954; Guttman & Suchman, 1947) devised a series of studies which offered support for the idea that the second principal component represented some expression of intensity, for example intensity of feeling or strength of attitude regarding the gun control issue. The third component corresponded to closure or the degree of certainty which characterized a person's behavior, and the fourth component was interpreted as degree of involvement or the willingness to mull over one's

position relative to some content area. Although it was mathematically possible for other components to exist, they were shown to account for increasingly smaller amounts of information which contributed little to a further understanding of the original rank scores. With this work Guttman was able to show that a person's response to an item is a linear function of the sum of the metric scores on each of the principal components, whatever their number. That is, a formerly one-dimensional representation of a person's rank on a behavioral continuum could now be extended to several dimensions, and a simple rank score could be partitioned into components corresponding to direction of behavior, intensity, closure, and involvement.

Further study of the J- or U-shaped curve relating content and intensity scores suggested that the projection of the bending point of this second degree function onto the content scale could be viewed as an empirically derived, or objective, zero-point on the continuum characterizing a variable's content. The importance of the zero-point rested primarily in the fact that it established a cut-point separating content scores that reflected negative positions along a behavioral continuum from those that reflected positive positions.

In reviewing the literature for examples of applications of Goodman's newer models, only one published study was found (cf., Smith & Garnier, 1987), and its authors clearly state that they are at a loss for a substantive interpretation of the second metric yielded by these methods. Investigating the feasibility of extending interpretations of Guttman's first and second principal components to the metric scale values extracted by Goodman's methods was one of the aims of the present research. Using Goodman's newer methods, this research sought to examine the performance of items measuring psychological adjustment (PA). To this end, the association in 35 tables that cross-classified respondents according to two ordered categorical variables--MHS and response to polychotomous items measuring PA--was examined. These tables were previously analyzed (Dancer, 1987) using Goodman's earlier association models. However, because the earlier models were found not to provide a good fit to more than half of the tables, it was thought that the newer models would provide a truer assessment of the functioning of the PA items.

The first set of metric values extracted with Goodman's method were used to examine the congruence between the a priori and the intrinsic ordering of categories of the MHS and PA variables. For the PA variable, congruence between the two orders would imply a monotonic relationship between the item response categories as they typically are ordered when used in clinical settings, and the ordering based on the items' intrinsic properties. Because the assumption of monotonicity is a fundamental to measurement, investigating monotonicity on the basis of information intrinsic to the cross-classification tables was thought to be especially important.

The second metric extracted these model was used to establish zero-points on the PA continuum assumed to underlie response categories of each item. Empirically defining a zero-point was thought to be a useful approach to distinguishing between response categories that reflect positive PA and those that reflect negative PA.

METHOD

SUBJECTS

Subjects for this investigation were 1,158 persons representative of three populations: normative individuals, psychiatric inpatients, and persons who had made a recent, potentially lethal suicide attempt. The normative sample consisted of 562 individuals who reported having never made a suicide attempt and who had no psychiatric history. The sample of suicide attempters consisted of 336 individuals, each administered a series of psychological measures no more than 48 hours after a potentially lethal suicide attempt. The psychiatric inpatient group consisted of 260 persons with no known history of suicidal behavior. Collectively, these three groups were thought to reflect distinct, ordered categories of MHS.

MEASURE

Items in this investigation were drawn from the *Suicide Probability Scale* (SPS; Cull & Gill, 1982), a self-report measure assessing several aspects of psychological adjustment, especially coping behavior and subjective wellbeing, thought to be indicative of suicide risk in adolescents and adults. The measure consists of 36 Likert-type items, each having four response categories

denoting frequency of involvement in some behavior: NONE OR A LITTLE OF THE TIME, SOME OF THE TIME, GOOD PART OF THE TIME, MOST OR ALL OF THE TIME. The SPS is typically scored in such a way that higher scores indicate increasing amounts of psychological maladjustment. Without loss of generality, all scoring was reversed for this investigation so that higher scores represent higher levels of PA and MHS.

ANALYSIS

One of the SPS items (Item 11) is ambiguous and can be interpreted in either of two contradictory ways. Therefore, this item was excluded from all analyses. For the remaining 35 items, MHS of respondent was cross-classified with item response (viewed as a measure of PA), yielding 35 separate 3x4 contingency tables. As an example, two cross-classification tables are shown in Table 1. All tables were analyzed using Goodman's newer association models[1], and two standardized metric scores were obtained for each MHS category and each item response category.

Table 1 about here

Following extraction of the two sets of scores, 70 separate graphs were constructed using as coordinates the two scores for each MHS and each PA category. Thirty-five graphs depict properties of the MHS categories relative to the various items, and 35 graphs represent properties of the item response categories relative to respondents' MHS. Once the points in each graph (one point for each category) were plotted, a distance weighted least squares (DWLS)[2] smoothing procedure was used to fit a curve to the points. DWLS fits a line through a set of points using a least squares approach to produce a locally weighted curve. Unlike many other procedures, including linear and quadratic smoothing, which impose a predetermined functional form on a set of points, DWLS allows the shape of the curve to fit the data and, therefore, is useful when the shape of a functional relationship is unknown. Estimating the shape of the curve using DWLS was

[1] The models were estimated using GLIM (Baker & Nelder, 1978) macros programmed by Prof. Herbert L. Smith, Indiana University. These macros iteratively solve the maximum likelihood equations given in Goodman, 1979.

[2] This procedure is recommended by Wilkinson (1988).

further motivated by the fact that were this study replicated using a different sample of respondents, the newly extracted parameter estimates for the item response and MHS categories more than likely would deviate at least somewhat from scores obtained in the present analyses.

RESULTS

In each of the cross-classification tables, the first set of scale values extracted for MHS showed the a priori ordering of the categories to be consistent with the intrinsic order: the psychiatric inpatient group was intermediate to the normal and suicidal groups. The a priori ordering of item response categories, however, was not always found to be consistent with the intrinsic order. (The first and second set of scores for categories of each item are shown in Table 2.) For 12 items (Items #2, 3, 6, 10, 18, 21, 22, 25, 26, 31, 35, 36), the intrinsic metric suggests that in relationship to MHS, the empirically determined ordering of the item response categories does not correspond to increasing frequency (i.e., None of the time to Most or all of the time). For example, the association between MHS and Item 18 ("Things seem to go well for me.") shows that the intrinsic order is: None or little of the time, Some of the time, Most or all of the time, and Good Part of the time. While this ordering might at first seem counter-intuitive, a plausible interpretation of this finding is that respondents who report that things nearly always go well for them do not realistically appraise their situations and, therefore, exhibit less PA than respondents who feel that things go well a good part (but not all) of the time.

Table 2 about here

When scores from the second metric were plotted against scores from the first metric, the resulting configurations were fitted by J- or U-shaped curves in all plots for MHS categories and for the majority of item plots, with curves for a few items being L-shaped. A zero-point was identified in each plot by projecting the minimum point of the curve onto the x-axis. Categories to the right of a horizontal line containing this point were considered measures of positive behavior (MHS or PA); categories to the left were viewed as reflecting negative behavior. Plots illustrating a variety of findings are shown in Figure 1.

Figure 1 about here

Panel A of Figure 1 gives plots for the MHS categories whose coordinates were derived with respect to three different items. These plots were selected as examples because collectively they illustrate all distinct patterns observed in the MHS plots. In all 35 plots, the relative position of the psychiatric inpatient category varied only slightly, falling sometimes in the mildly positive PA region, sometimes in the negative region, and at other times on the zero-point. Of greatest significance, in terms of the clinical usefulness of these items, is the consistent finding that with respect to the content of each item, the three MHS categories occupy clearly distinct positions with the suicide category representing a lesser degree of mental health than the other two categories.

Panel B of Figure 1 gives the plots for Items 1 and 34 which have to do with external expressions of hostility. With these items the question is raised as to whether expressions of anger directed outward can be considered indicators of positive coping behavior or whether they should always be viewed as indicators of some degree of maladjustment. It seems reasonable to suggest that bottling up anger does more to promote negative PA than does an occasional expression of anger. These analyses suggest that with respect to the MHS categories considered here, throwing things when angry (Item 1) reflects positive PA unless that behavior occurs most or all of the time. On the other hand, breaking things when angry (Item 34)--an expression of hostility that is more extreme than throwing things--appears to indicate negative PA when the frequency of occurrence ranges from part to all of the time.

Panel C of Figure 1 gives plots for two pairs of items where items in each pair are very similar in content. Items 5 and 19 have to do with responsibilities and the expectations of others. The plots for both items suggest that the zero-point on the PA continuum occurs between the response categories Most or All of the Time and Part of the Time. That is, people with positive PA feel the burden of responsibility and of others' expectations much of the time and that only when these stressors are experienced most or all of the time do they indicate negative PA. Items 30 and 32, also shown in Panel C, have to do with suicidal ideation and, like Items 5 and 19, yield zero-

points that reflect a consistent finding across items of similar content. For both items, the only response reflecting negative PA is the category Most or All of the time. The stability of the location of the zero-point for items with similar content can be seen as a check reliability of measurement despite differences in item semantics.

Items 6 and 15, shown in Panel D of Figure 1, are similar in content but the direction of the wording in the two items is opposite. Item 6, an affirmative statement, refers to the ability to accomplish worthwhile tasks, while Item 15 is a statement about not being able to do things well. As the item plots show, "reverse coding" is automatically accomplished with the association models. The plots suggest that being able to do things well (Item 6) part or most of the time as well as feeling unable to do things (Item 15) some or none of the time are indicative of positive PA. Finally, these plots show that the curves for these two items are mirror images of one another and that they are remarkably similar in shape. Again, the similarity in curves adds to the reliability of findings regarding the functioning of two items that differ in some technical respects (direction of wording) but are semantically alike.

The content of Items 10, 22, and 31 is not similar, but the plots of these items, shown in Panel E of Figure 1, exhibit patterns not illustrated by the preceding items. For these three items, the intrinsic order of the response categories with respect to MHS does not coincide with an ordering based on frequency. The plot for Item 10, for example, suggests that feeling appreciated by other people a good part of the time is a healthier response than feeling appreciated most or all of the time. Similarly, planning for the future (Item 22) and worrying about money (Item 31) are indicators of positive PA when engaged in moderately often, while planning for the future most or all of the time and never worrying about money are signs of less positive PA. Using an argument similar to that given above in the discussion of Item 18 ("Things seem to go well for me."), these plots suggest that idealistic, "rosy" assessments of one's situation (e.g., always feeling appreciated and never worrying about money) and a lack of spontaneity (i.e., always having a plan for the future) reflect some degree of maladjustment.

Table 2 shows estimates of the intrinsic association, ϕ_{ir} between MHS and item response for each item separately as reflected in the first and second metrics extracted with Goodman's models. The value of ϕ_1 , which measures the association between direction of MHS and direction of PA, shows that with the exception of two items which inquire about relationships with parents, all items are at least moderately related to MHS, and some items (e.g., Items 12, 25 and 33) have a strong relationship. The considerable smaller values of ϕ_2 indicate that while PA and MHS have somewhat of a relationship in terms of scores on the second metric, the association in each table is characterized predominately by the "content" metric.

DISCUSSION

Use of Goodman's models for investigating the association between MHS and item response had the primary advantage that categorical data could be analyzed in their own right, without "dummy coding" or the arbitrary assignment of numerical values to categories, as often is the practice with data of this sort. Using Goodman's methods, the observed frequencies in a table of cross-classifications could be modeled so as to yield two intrinsic metrics for the MHS variable and two metrics for the PA variable. Interpreting the first metric as direction of MHS and PA, and using the second metric to establish a zero-point that differentiated between positive and negative degrees of these two constructs led to insights concerning performance characteristics of polychotomous items with respect to a second related variable.

With these methods an intrinsic order for the categories--that is, an order based on information extracted from the observed joint distribution of MHS and item response--was established, and response categories measuring positive PA were distinguished from those measuring negative PA. Items having similar semantic properties--for example, content or direction of wording--were found to function similarly with respect to MHS.

The sizable positive values of ϕ_1 found between most items and MHS clearly indicate that normal persons tend to endorse item response categories which reflect positive PA, while psychiatric inpatients and, even moreso, suicidal persons endorse negative categories. Discussing ϕ_1 in this context suggests that examining the functioning of items with respect to some related

variable, especially when, as in the case of this study, the related variable could be considered a criterion variable, is a viable alternative to traditional item analysis. In support of this idea, it has been noted (Guttman, 1944) that item analysis, as currently practiced, evolved historically from the idea of external validity where the goal was prediction of an outside criterion variable from item scores. In the evolutionary process, total scores came to be substituted for an appropriate external variable primarily because appropriate data were often difficult to collect. With the ability to scale categorical variables using Goodman's techniques, some difficulties in identifying an appropriate external variable are eliminated, and these methods are recommended for exploring item discrimination and other aspects of item functioning important in measurement.

In the development of measurement instruments, the problem of how to weight item response categories, if it is addressed at all, usually has the goal of maximizing differences between a criterion group and one or more control groups. In applying Goodman's methods to cross-classification tables the goal is to assign category scale values that maximize the association between two variables. In some instances, more than one set of scores is needed to capture the various nuances of the association. The objectives of instrument development methods and of Goodman's methods are related but not identical. For example, the second set of metric values obtained from Goodman's models certainly would not accentuate group differences in terms of item scores since all respondents who occupy extremely negative or positive positions on a content continuum are assigned second scores of equal or near equal magnitude. However, the first set of scores--the "content score"--might produce group differences, depending on the strength and nature of relationship between items and a categorical grouping variable. Whether scores describing the intrinsic association between two variables do or do not reveal group differences, Goodman's newest models provide a valuable tool for examining intrinsic properties that contribute to an items functioning and affect the measurement process.

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TABLE 1

CROSS-CLASSIFICATION OF 1,158 RESPONDENTS ACCORDING TO MENTAL HEALTH STATUS AND RESPONSE TO TWO ITEMS MEASURING PSYCHOLOGICAL ADJUSTMENT

MENTAL HEALTH STATUS	ITEM 24. ...people would be better off if I were dead.					ITEM 18. Things... go well for me.				
	NONE	SOME	GOOD PART	MOST	TOTAL	NONE	SOME	GOOD PART	MOST	TOTAL
1. NORMAL	527	24	0	6	557	23	87	220	225	555
2. PSYCHIATRIC	202	36	8	10	256	26	99	59	69	253
3. SUICIDAL	121	83	41	81	326	112	142	31	47	332
TOTAL	850	143	49	97	1139	161	328	310	341	1140
	(19 cases with missing data)					(18 cases with missing data)				

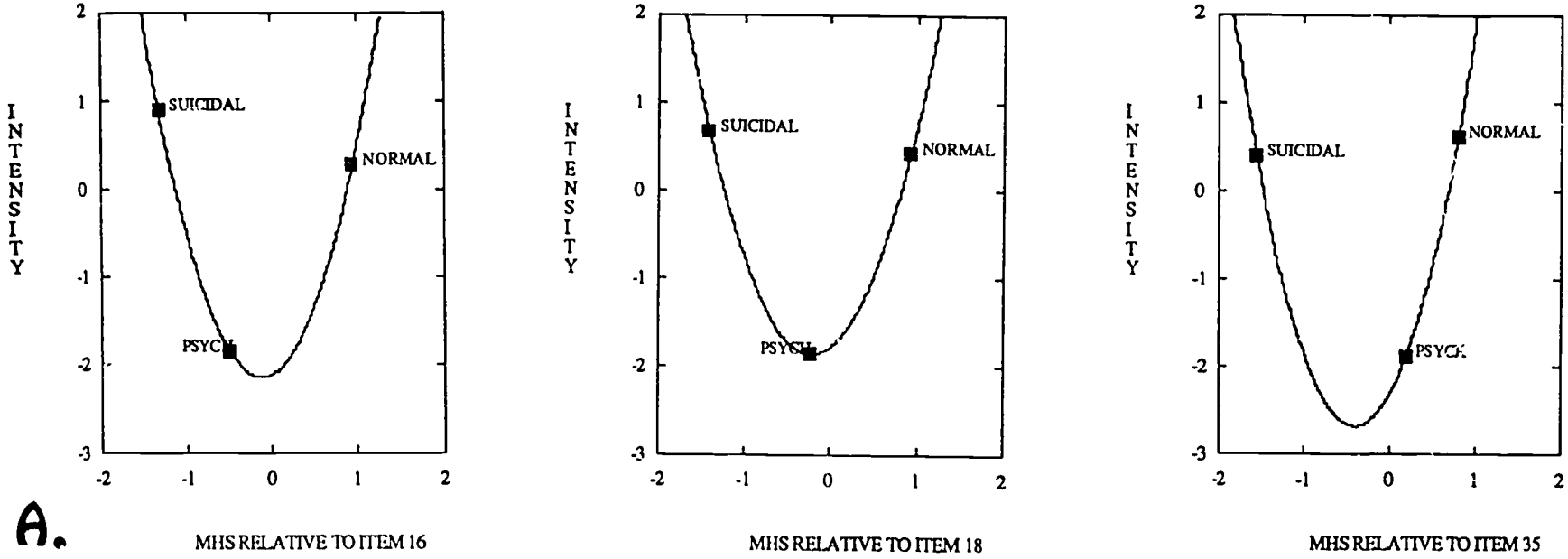
TABLE 2

INTRINSIC TWO-DIMENSIONAL METRIC FOR CATEGORIES OF ITEMS MEASURING PSYCHOLOGICAL ADJUSTMENT, AND INTRINSIC ASSOCIATION (ϕ_m) BETWEEN ADJUSTMENT AND MENTAL HEALTH STATUS FOR DIMENSIONS ONE AND TWO OBTAINED WITH GOODMAN'S MODELS FOR ANALYSIS OF ASSOCIATION

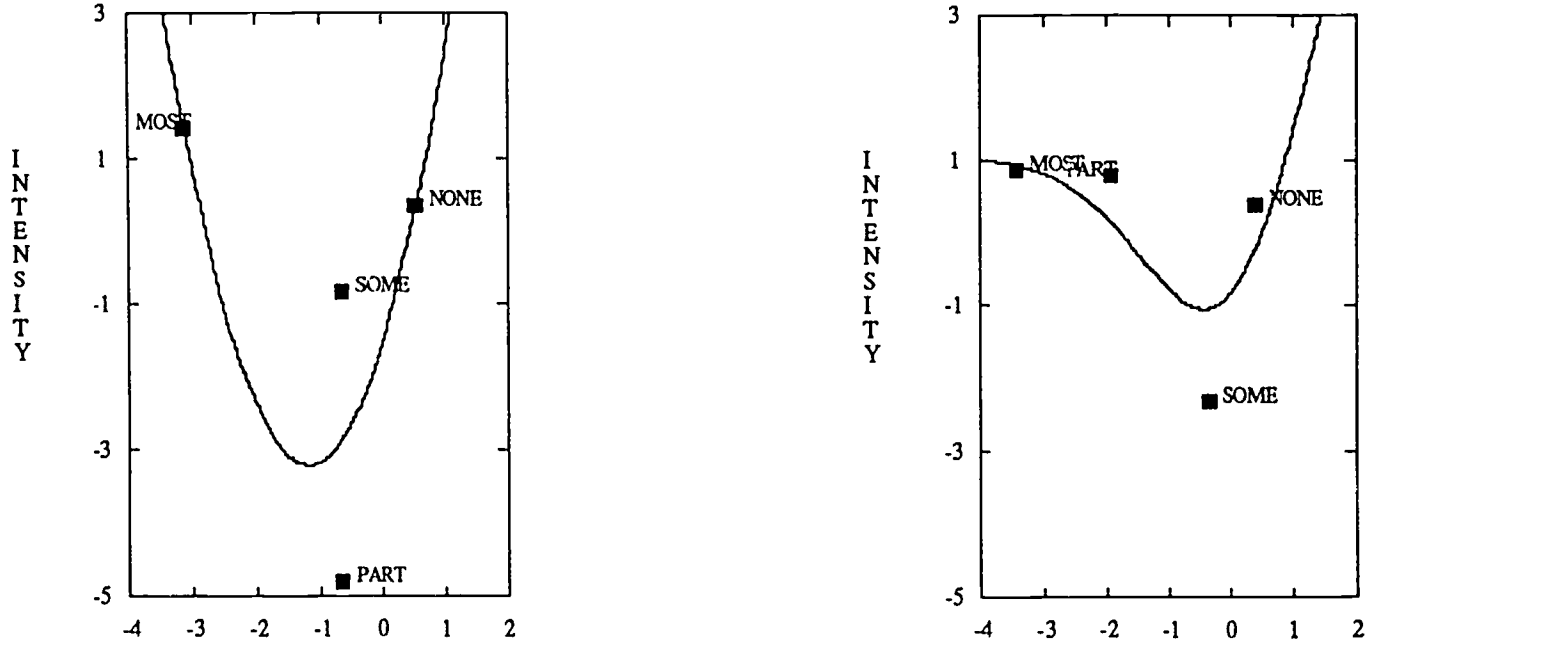
ITEM	RESPONSE CATEGORIES								ASSOCIATION	
	DIMENSION ONE				DIMENSION TWO				ϕ_1	ϕ_2
	N[1]	S	P	M	N	S	P	M		
1. When...mad I throw things.	.55	-.61	-.62	-3.10	.32	-.86	-4.82	1.41	.46	.10
2. ...people care for me deeply.	-2.11	-.84	1.10	.32	.89	.12	1.18	-1.20	.32	.13
3. ...tend to [illegible]npulsive.	.34	.60	-.34	-2.44	1.16	-.08	-2.06	.54	.20	.10
4. ...think b[illegible]ngs.	.57	-.47	-.85	-2.52	.40	-.76	-2.57	1.83	.44	.08
5. ...too much responsibility.	.60	.41	.01	-2.18	1.00	-.71	-1.97	.36	.38	.07
6. ...much I can do worthwhile.	-2.21	-1.21	.84	.48	-.02	.38	.37	-1.03	.30	.02
7. ...think suicide to punish others.	.48	-1.64	-2.52	-2.62	96	-1.56	4.60	-.59	.47	.06
8. ...feel hostile toward others.	.70	-.49	-1.61	-3.18	.50	-1.27	.01	2.56	.36	.05
9. ...feel isolated from others.	.76	-.20	-1.29	-2.29	-.29	1.12	-2.70	.41	.49	.04
10. ...people appreciate me.	-1.91	-.63	1.21	.05	.54	.73	.71	-1.45	.32	.12
12 ...feel so lonely..cannot stand it.	.79	-.41	-1.19	-1.93	.36	-1.31	-1.50	1.64	.79	.05
13. Others...hostile to me.	.67	-.38	-1.36	-3.09	-.21	.92	-3.68	.36	.42	.03
14. ...make many changes in...life.	1.14	.49	-.32	-1.48	.91	-.42	-1.82	.78	.58	.03
15. ...not able to do things well.	.90	-.27	-1.25	-2.07	-.29	1.04	-2.47	.40	.55	.03
16 ...trouble finding and keep job.	.62	-.80	-1.10	-2.19	-.05	1.91	-2.96	.09	.64	.06
17. ...no one will miss me.	.84	-.38	-1.09	-1.75	.38	-1.64	-.71	1.34	.50	.05
18. Things...go well for me.	-1.63	-.86	.99	.70	1.8	-1.32	.04	.38	.58	.07
19. ...people expect too much.	.65	.37	-.39	-2.37	1.03	-.83	-1.49	.68	.41	.10
20. ...I need to punish myself.	.70	-.52	-1.55	-2.14	-.19	1.39	-2.79	.42	.48	.03
21. ...not worth continuing to live.	.64	-1.10	-2.14	-1.80	.00	-.46	-3.51	2.11	.61	.08
22. I plan for the future....	-1.82	-.20	1.31	-.24	1.29	.23	.63	-1.47	.30	.12
23. ...no friends to count on.	.80	-.01	-1.04	-2.04	.43	-.64	-2.47	1.34	.48	.06
24. ...people...better if I were dead.	.58	-1.25	-2.00	-2.11	.11	-2.02	-.69	2.32	.64	.04
25. ... less painful to die....	.63	-.90	-2.05	-1.90	.02	-.45	-3.20	2.01	.71	.04
26. I feel ...close to my mother.	-2.15	-.66	.97	.48	-.15	1.01	1.65	-.83	.19	.13
27. I feel ...close to my mate.	-1.57	-1.10	.49	.82	-.05	.43	-2.01	.67	.29	.08
28. I feel hopeless	.93	-.40	-1.11	-1.71	-.06	.67	-2.79	.87	.59	.07
29. ...people do not approve of me.	.84	-.28	-1.20	-2.13	.15	-.01	-2.98	1.52	.53	.06
30. ...thought of how to do self in.	.65	-1.18	-1.29	-2.28	.09	-1.60	2.84	1.28	.60	.08
31. ...worry about money.	.30	.78	.00	-1.90	-1.73	.81	.07	.35	.33	.10
32. ...think of suicide.	.54	-1.02	-1.63	-2.90	.12	-.34	-3.97	2.20	.58	.07
33. ...feel tired and listless.	.86	.16	-.88	-2.20	1.02	-1.11	-.27	.88	.74	.10
34. When mad...break things.	.43	-.31	-1.90	-3.39	.37	-2.34	.78	.84	.50	.06
35. I feel ...close to my father.	-1.62	.03	1.06	.59	.24	-1.61	-.59	1.04	.17	.07
36. I can't be happy....	.75	-1.07	-1.56	-1.50	.09	-1.63	2.88	.18	.55	.05

[1] N = None or little of the time; S = Some of the time; P = Good part of the time; M = Most or all of the time

Figure 1. The intrinsic two-dimensional location for (a) mental health status categories and (b-e) response categories of polychotomous items measuring psychological adjustment, obtained with Goodman's (1987) association models.

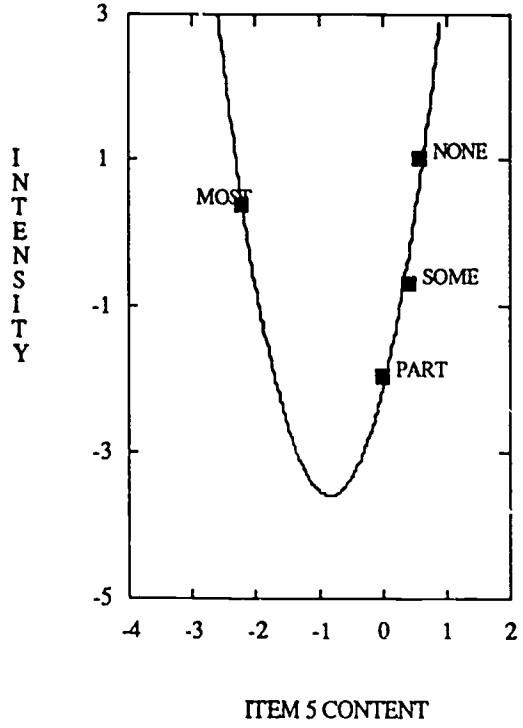


A.



B.

C.


INTENSITY
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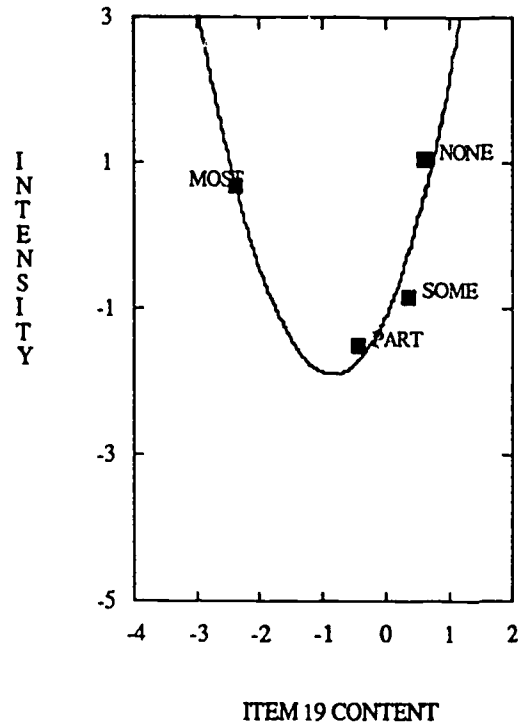
1
-1
-3
-5
-4 -3 -2 -1 0 1 2
NONE
MOST
SOME
PART
ITEM 5 CONTENT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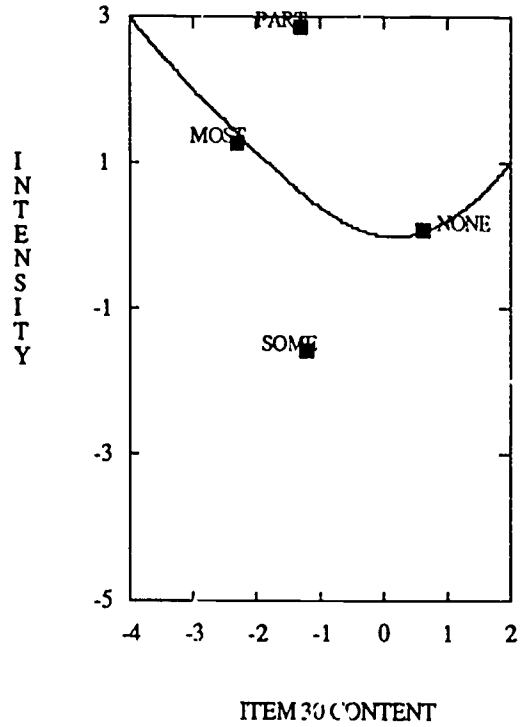
1
-1
-3
-5
-4 -3 -2 -1 0 1 2
NONE
MOST
SOME
PART
ITEM 19 CONTENT


INTENSITY
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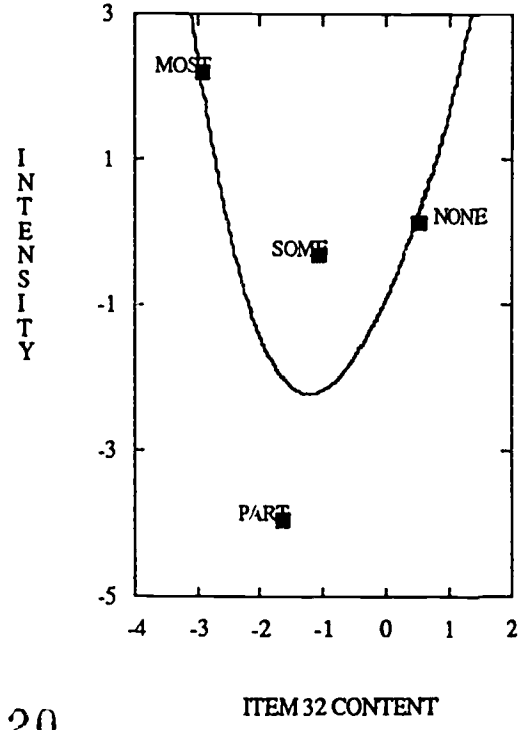
1
-1
-3
-5
-4 -3 -2 -1 0 1 2
PART
MOST
NONE
SOME
ITEM 30 CONTENT


INTENSITY
3
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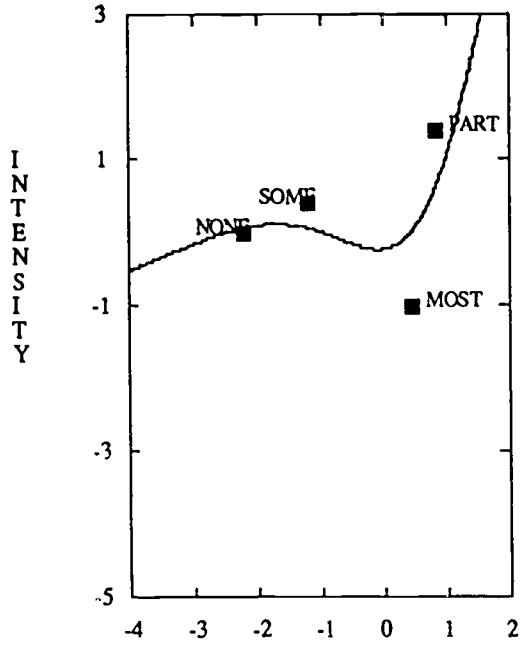
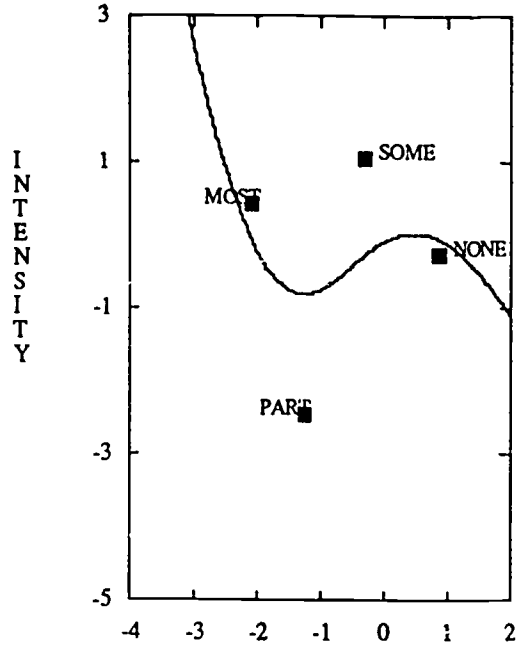
-1
-3
-5
-4 -3 -2 -1 0 1 2
MOST
NONE
SOME
PART
ITEM 32 CONTENT

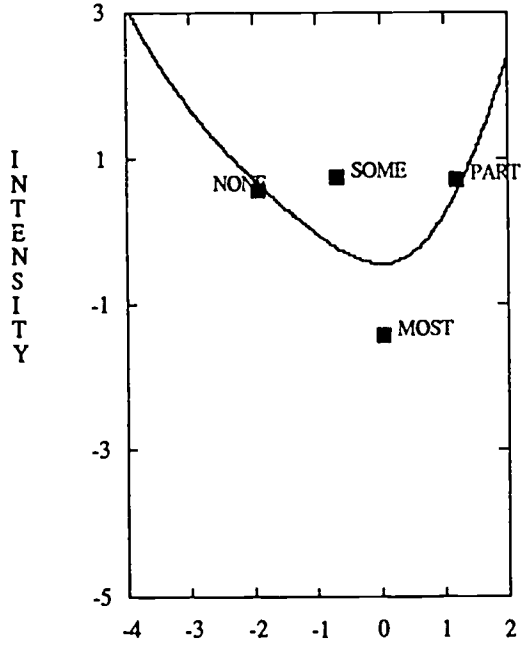
D.



ITEM 6 CONTENT



ITEM 15 CONTENT



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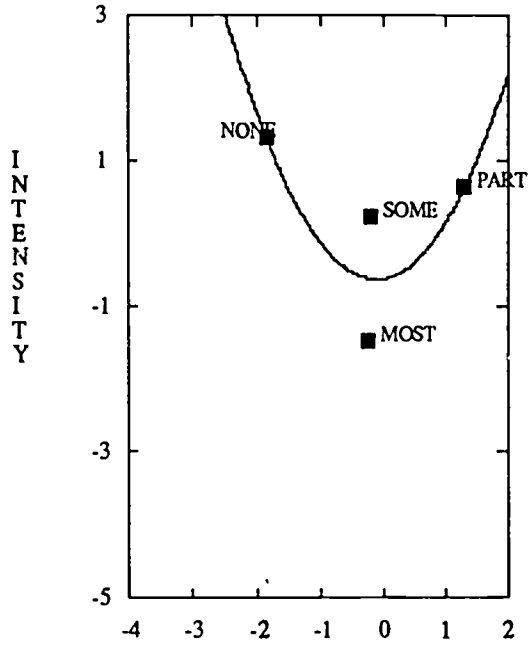

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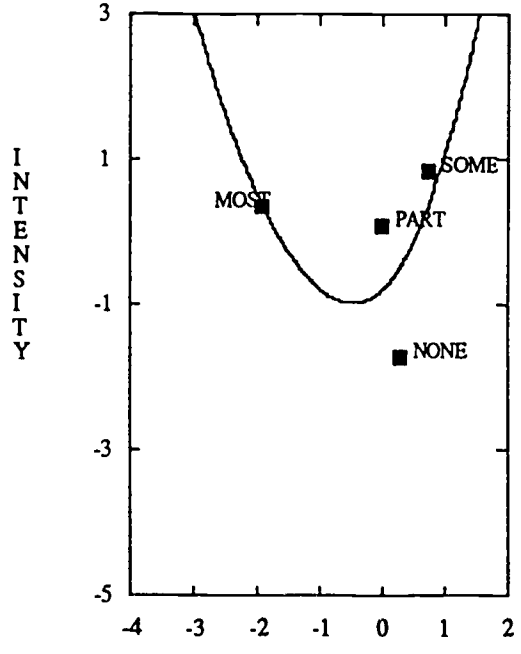

ITEM 31 CONTENT

END

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March 21,1991