JOURNAL OF RESEARCH IN PERSONALITY 15, 383–388 (1981)

Control of Social Desirability in Personality Inventories: Principal-Factor Deletion

DELROY L. PAULHUS

Columbia University

Rational and statistical techniques for controlling social desirability (SD) in scales derived from self-report inventories are reviewed. The principal-factor deletion technique is explained in detail. It is applied during factor analysis when derived content scales are expected to be tainted with SD. If one principal factor is found to represent social desirability, the implicated factor is dropped and the communalities adjusted before the remaining factors are rotated to a desired simple structure criterion. Subscales derived from resulting factors are free of SD bias. Principal-factor deletion is compared with other approaches including rational techniques, covariate procedures, and target rotation.

As early as 1953, Edwards had provided evidence that some personality scales might be measuring individual differences in responsiveness to social desirability rather than their intended content domains. Although other writers (e.g., Block, 1965; Norman, 1967; Rorer, 1965) have argued that this fear has little empirical support, measures to control social desirability in constructing self-report inventories are now standard practice. Control of social desirability (SD) is conventional under a construct approach, since SD is typically viewed as an extraneous variable having the potential to contaminate content scales. However, the primary objective in developing some instruments is the maximization of predictive value: here SD effects should be removed only if prediction is enhanced. Indeed SD may very well deserve consideration as a conceptually important aspect of the trait being assessed (cf. Horst, 1968; Sackeim & Gur, Note 2). In sum, the appropriateness of controlling social desirability in a measurement device depends on its assumed role vis à vis the target content domain.

Strategies for controlling SD may be usefully divided into three classes: (1) rational techniques—controls built into the instrument to preclude

The author wishes to express his appreciation to Chris Olson, Sam Messick, Harold Sackeim, and an anonymous reviewer for their helpful comments. Send reprint requests to: Dr. D. L. Paulhus, Department of Psychology, University of British Columbia, Vancouver, B.C. V6T 1W5.

0092-6566/81/030383-06$02.00/0

socially desirable responding, (2) covariate techniques—the removal of SD contamination from scale scores using partial correlation or regression approaches, and (3) factor analytic control—the removal of SD contamination during the process of deriving factors from an item-correlation matrix. The principal-factor deletion technique discussed here falls into the latter category.

A variety of so-called rational procedures have been employed to preclude the intrusion of variation due to SD in data collected on self-report inventories. Among the rational procedures, use of forced-choice format, selection of subtle items, or items with neutral social desirability scale value (SDSV) are now common practice in scale development. More elegant techniques include Jackson's (1976) selection of content items on the basis of an index indicating degree of content saturation relative to social desirability. Unfortunately, the possible contribution of SD to the validity of an instrument is usually not testable if SD-control is actually built into the scale.

The use of the forced-choice format may be the most effective procedure designed to preclude social desirability effects (e.g., Christie & Geis, 1970; Rotter, 1966). If the two alternatives are matched for SDSV, then respondents are more likely to make their choice on the basis of the target personality variable. However, in certain cases, there are reasons for opting for a Likert scale format in lieu of forced-choice format. First, the matching of statements for content and SDSV is always a difficult process and frequently impossible. Moreover, this matching may not preclude the possibility that, when paired, the statements are unbalanced on SD (Edwards, 1970; Messick, 1960). Missing data are also common in forced-choice inventories since respondents can become too frustrated to make some of the required choices (e.g., Edwards & Diers, 1962). Also, when forced-choice data are used with factor analytic procedures, the interpretation of item clusters becomes even more precarious than usual: it is difficult to know which of the two statements precipitated the respondent's choice or, indeed, whether their gestalt had psychological impact different from *either* statement.

Covariate methods require the availability for each respondent of some measure of socially desirable responding (SDR) as well as content scale scores. If maximal prediction is paramount, the criterion may be regressed on SDR along with the content scale predictors. Even if SDR is not correlated with the criterion, its inclusion may contribute to incremental validity in the manner of a suppressor variable (Conger & Jackson, 1972). Within a construct approach, the removal of conceptually irrelevant SDR with partial or part correlation techniques is appropriate even if the validity decreases or is unchanged. With these techniques, *relationships* between content scales and other variables (e.g., a criterion) are corrected for SDR. The corrected content *scores* for each individual may be derived by regressing the content measure on the SDR scores; the residuals constitute a content measure controlled for socially desirable responding (e.g., Lubin, 1957).

Factor analytic control is useful when content factors are to be extracted from an item correlation matrix. If one or more SDR measures are available on all the respondents, these may be used as marker variables for rotation (e.g., Hurley, & Cattell, 1962). The other rotated factors should then be free of social desirability. Another method is to force social desirability to emerge as a rotated factor by including a number of pure measures of the response bias. This factor should drag with it the response bias variance in the items designed to tap content dimensions (e.g., Jackson & Lay, 1968). A related approach, the principal-factor deletion method, is described below.

PRINCIPAL-FACTOR DELETION

Very often, a set of subscales is derived from a self-report inventory by performing a factor analysis on a sample item correlation matrix and then constructing a subscale corresponding to each interpretable factor using a number of the highest loading items. Unfortunately, the social desirability component is unlikely to appear as a separate factor after a simple structure rotation. The reason is that SD permeates all the items to some extent, yet no item purely measures SD (compare Jackson & Lay, 1968). As a result, it is likely that SD will be found to correlate moderately with each of the derived subscales.

However, if the factor analysis is interrupted before rotation (at the stage of a principal-factor analysis) the first factor to emerge often represents social desirability (Horst, 1968; Edwards, 1970). This result has been found in a variety of assessment domains: e.g., the MMPI (Edwards & Diers, 1962); the CPI (Edwards, Klockars, & Abbott, 1970); and locus of control (Paulhus & Christie, 1981). One way of verifying the emergence of an SD component is to correlate the loadings of items on the factor with their SDSVs. This correlation should be high (>.70) whereas similar correlations for the other factors should be minimal. A second way of demonstrating that a principal factor represents SD is to show a high correlation between the factor scores and some measure of individual differences in SDR.[1]

The first step in principal-factor deletion is to perform a principal-factor analysis on the data matrix. If the ultimate objective is to derive k subscales from m items, then $(k+1)$ factors should be extracted.

It is at this stage in the analysis that SD is most completely extricated from the variation attributable to the content variables. Accordingly, if

[1] The different implications of the two approaches are discussed by Edwards (1970). See also Boe, Gocka, and Kogan (1966).

SD is to be controlled, this is the stage at which it is most effectively purged. The procedure is simply to drop the factor which represents SD from the set of factor loadings. The communalities for each item must be adjusted since they were calculated to represent the variation explained by the original $(k+1)$ factors. The adjusted communality for an item is simply the original communality minus the square of its factor loading on the deleted factor. The resulting set of k loadings and m communalities represent the maximum variation which is explainable with k factors and which is independent of social desirability.

This set of loadings now qualifies for rotation using any desired technique. Only after rotation is the resulting factor pattern ready for interpretation in terms of content variables. Depending on the original interrelationship with SD, the pattern of k loadings may or may not resemble the factor pattern which would arise from a direct extraction of k factors without regard to SD. In any case, if the factors are interpretable, one may proceed to construct the desired subscales using the highest loadings items or any other selection method.

In summary, then, the principal-factor deletion method involves the following four steps: (1) a principal-factor analysis of the original item matrix, (2) determination of which factor, if any, represents SD, (3) adjustment of communalities if (as in SPSS) these are required for the rotation algorithm, and (4) rotation of the remaining factors to the desired criterion.

The technique has been applied recently[2] to an inventory of locus of control items (Paulhus & Christie, 1981). Originally, in a five-factor solution, three of the rotated factors correlated over .30 with SDSV ratings. When the same correlations were calculated on the unrotated factors, the first factor correlated .86 and the others negligibly. After dropping this factor and rotating the rest, the correlations with SDSV ratings dropped under .20 for all factors. The internal consistencies of the resulting scales were crossvalidated on an independent sample and were found to be lower but satisfactory (all alphas > .65). The success of the technique is also reflected in the well-documented construct validity of the final content scales (Paulhus & Christie, Note 1; Paulhus, Molin, & Schuchts, 1979; Paulhus & Christie, 1981).

The principal-factor deletion technique need not be restricted to controlling one SD factor. It is well known that SD comprises multiple factors (Messick, 1960; Wiggins, 1966). If two or more appear during factor extraction, they may all be dropped. Of course, careful consideration must be given to the meaning of such factors before discarding them. Neither the proposed technique nor any other statistical control for SD should be applied pro forma.

[2] Messick and Jackson (1972) used a similar procedure to eliminate a factor which correlated .996 with SDSV ratings.

COMPARISON WITH OTHER TECHNIQUES

Unlike rational techniques, post hoc techniques do not preclude the influence of SD when the individual responds to the test items. This intrusion of SD into the item variance can be an advantage in that it permits assessment of the contribution of SD to prediction. For example, in the principal-factor deletion method, subscales derived under SD control may be compared with the subscales derived from a regular factor analysis. The two subscales targetted at a given trait may differ substantially and, where prediction is the overriding goal, the choice is made on the basis of criterion validities. Under a construct approach, this assessment might suggest what role SD should play in the nomological network of the content variables. While SD is often considered to be conceptually irrelevant to content dimensions, Horst (1968), for one, views SD as a higher order personality variable which moderates other traits. In another approach, Sackeim and Gur (Note 2) have argued that SD may truly reflect overlooked aspects of content variables.

One advantage of covariate methods is that only they may be applied to already developed scales. One drawback is that SDR measures are required on the same respondents who furnish the content scale and criterion scores. Now, in principal-factor deletion, SDR scores may be used to determine the SD component but SDSV ratings will also suffice for this purpose. Fortunately, the latter may be collected on some other sample of respondents since all that is required is a reliable estimate of the social desirability of each inventory item. The primary advantage of the factor analytic methods is that content scales are derived from an already corrected pattern of relationships. That is, the bias in the item matrix is removed before the factors are extracted. In contrast, covariate methods involve the correction of scores from already biased scales. If the items for these scales were selected from a factor analysis of contaminated data, then correction with covariate methods can never fully rectify this.

The principal-factor deletion and target rotation approaches are closely related, but each is preferable for certain types of data and statistical packages. Target rotation approaches are available in OSIRIS and DATATEXT, but not in SPSS, SAS, or BMDP. However, principal-factor deletion may be performed with any of these packages since in every case, the factor rotation may be conducted independently of the factor extraction. In general, SD is most efficiently controlled with target rotation given the availability of marker variables for SDR and a target rotation algorithm. Principal-factor deletion provides a practical alternative when SD appears as one principal factor and only standard factor analytic algorithms are available.

REFERENCES

Block, J. *The challenge of response sets.* New York: Appleton-Century-Crofts, 1965.

Boe, E. E., Gocka, E. F., & Kogan, W. S. A factor analysis of individual social desirability scale values. *Multivariate Behavioral Research,* 1966, **1,** 287–292.

Conger, A. J., & Jackson, D. N. Suppressor variables, prediction and the interpretation of psychological relationships. *Educational and Psychological Measurement,* 1972, **32,** 579–599.

Christie, R., & Geis, F. *Studies in Machiavellianism.* New York: Academic Press, 1970.

Edwards, A. L. The relationship between the judged desirability of a trait and the probability that the trait will be endorsed. *Journal of Applied Psychology,* 1953, **37,** 90–93.

Edwards, A. L. *The measurement of personality traits by scales and inventories.* New York: Holt, Rinehart & Winston, 1970.

Edwards, A. L., & Diers, C. J. Social desirability and the factorial interpretation of the MMPI. *Educational and Psychological Measurement,* 1962, **22,** 501–509.

Edwards, A. L., Klockars, A. J., & Abbott, R. D. Social desirability and the TSC MMPI scales. *Multivariate Behavioral Research,* 1970, **5,** 153–158.

Horst, P. *Personality: Measurement of dimensions.* San Francisco: Jossey-Bass, 1968.

Hurley, J. R., & Cattell, R. B. The Procrustes program: Producing direct rotation to test a hypothesized factor structure. *Behavioral Science,* 1962, **7,** 258–262.

Jackson, D. N. *Jackson personality inventory manual.* Port Huron, Michigan: Research Psychologist's Press, 1976.

Jackson, D. N., & Lay, C. H. Homogeneous dimensions of personality scale content. *Multivariate Behavioral Research,* 1968, **3,** 321–337.

Lubin, A. Some formulae for use with suppressor variables. *Educational and Psychological Measurement,* 1957, **17,** 286–296.

Messick, S. Dimensions of social desirability. *Journal of Consulting Psychology,* 1960, **24,** 279–287.

Messick, S., & Jackson, D. N. Judgmental dimensions of psychopathology. *Journal of Consulting and Clinical Psychology,* 1972, **38,** 418–427.

Norman, W. T. On estimating psychological relationships: Social desirability and self-report. *Psychological Bulletin,* 1967, **67,** 273–293.

Paulhus, D. L., & Christie, R. Spheres of control: An interactionist approach to locus of control assessment. In H. Lefcourt (Ed.), *Research with the locus of control construct.* (Vol. 1). New York: Academic Press, 1981.

Paulhus, D. L., Molin, J., & Schuchts, R. Control profiles of football players, tennis players and non-athletes. *Journal of Social Psychology,* 1979, **108,** 199–205.

Rorer, L. G. The great response style myth. *Psychological Bulletin,* 1965, **63,** 129–156.

Rotter, J. B. Generalized expectancies for internal versus external control of reinforcement. *Psychological Monographs,* 1966, **80,** (1, Whole No. 609).

Wiggins, N. Individual viewpoints of social desirability. *Psychological Bulletin,* 1966, **66,** 68–77.

REFERENCE NOTES

1. Paulhus, D. L., & Christie, R. *Conceptual advantages of the spheres-of-control battery.* Paper presented at Eastern Psychological Association convention, Washington, D.C., April 1978.
2. Sackeim, H. A., & Gur, R. *Response sets and styles: A review and a reinterpretation of unresolved issues.* Unpublished manuscript, University of Pennsylvania, 1976.