COMPARING MULTIPLE REGRESSION

PROCEDURES AND CHI SQUARE

IN MMPI ITEM ANALYSIS

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Abstract

Multiple regression procedures and chi square were used to analyze
the MMPI items for a group of 110 black and white male college stu-
dents. Most of the items identified by the multiple regression
procedures were also identified by chi square. The added advantage
of having R^2 as an estimate of the percentage of variance accounted
for by race is discussed in relation to selecting items in empirical
scale construction.

The Minnesota Multiphasic Personality Inventory (MMPI) consists of four
validity scales and 10 clinical scales. In addition to these 14 scales more than
400 special scales have been developed from the MMPI pool of 550 items (Duckworth
& Duckworth, 1975). The method of empirical scale construction has been used in
the development of many of the original and special MMPI scales.

In the empirical approach, MMPI items responses of two distinct groups
(criterion and control) are contrasted to insure that scale items are selected
which are empirically related to the characteristic being assessed. Researchers
will usually select items for inclusion in the new scale on the basis of the level
of significance, usually .05, from the results of a chi square test. Once the
items have been selected, several other steps are carried out which include com-
paring the means of the criterion and control groups. If the purpose of the new
scale is to classify individuals into dichotomous groups, (i.e., black-white,
alcoholic - non-alcoholic) cutting scores are also established. The point of
this general description of scale construction is to show that little, if any,
direct attention is given to assessing the strength of the relationship between
the item results and the criterion.

Leitner (1979) has recommended multiple regression procedures in analyzing
R x C contingency tables. Chi square is usually applied to these type of data.
The multiple regression approach provides the researcher with an estimate of the
percentage of variance (R^2) accounted for as a way to better understand the strength
of the relationship implied. The purpose of this study was to examine the results
from item analyses conducted on a single sample using both chi square and multiple
regression procedures.

Subjects

The subjects were 110 black (n = 57) and white (n = 53) male first and seco

year college students from a state university in Missouri.

Procedures

The item responses of the sample were analyzed using chi square and

multiple regression procedures form the SAS package (Barr, et al., 1979).

For the multiple regression analysis the variables were coded as follows:

X = 1 if subject was black; 0 if white

Y = 1 if item response was true; 0 if false

Results

The chi square analysis identified 127 items that differentiated blacks and

whites at the .05 level or better and the multiple regression analyeie identified

124. There were 14 items identified by chi square and not identified by multiple

regression. There were five items identified by multiple regression and not iden

tified by chi square.

Discussion

Most of the items identified by the chi square analysis were also identified

by the multiple regression approach. When the R^2s from the multiple regression

approach were examined, the following pattern emerged. In general, for items with

p levels between .01 and .05, race accounted for about 5% (or less) of the varianc

for items with p levels between .001 and .009, race accounted for 6 to 8% of the

variance; for items with p levels between .0001 and .0008, race accounted for abou

12 to 15% of the variance (one item reached 20%). For about half of the items

identified as being significant, race accounted for 5% or less of the variance.

The p levels were examined for the 213 race-sensitive items identified by Harrison

and Dass (1967) in their study of black and white pregnant women. About half of

he items had p levels between .01 and .05. Making an assumption that the pattern ound by Harrison and Kass, was at least somewhat similar to the results of the urrent study, about half of their items would also have R^2s of 5% or less.

Although Harrison and Kass did not develop a scale from their race-sensitive tems, they have been used, in part, as the basis for selecting items for at least wo MMPI scales (White, 1974; Costello, 1977). The issue to be raised, not only or the two studies cited above, but for item analysis and empirical scales gener-.lly is whether researchers can develop better scales (e.g., more highly correlated ith the criterion) by considering the amount of variance accounted for by the item .ifferences. If not better scales, perhaps scales just as good with fewer items, ·y removing items which account for small amounts of variance. It should be ·ointed out that the Leitner (1979) article also demonstrated how the R^2 statistic ·ould be generated form the chi square procedure, but it will be observed that most .eneral statistical analysis packages do not provide the information directly.

References

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