Personality Research: Components of Variance Attributable to the Person and the Situation

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Studies involving personality and situational variables were surveyed. Studies permitting determination of main effects and interactions involving these variables have increased since 1950. In one comparison, situational main effects were significant in 65.5% of the cases, whereas the figure was 31% for individual difference variables and 59.9% for interactions. In another comparison, 35% of situational main effects accounted for more than 10% of the variance, compared with 29% for personality indexes; 19% of the situational variable effects accounted for more than 20% of the variance, compared with 14% of the personality main effects. Low percentages of variance were accounted for by all variables investigated: situational, personality, demographic, and interactions among these variables.

The idea that what a person brings to different situations influences his or her behavior makes intuitive sense. Even the most radical behaviorist readily agrees that the response repertory of the individual is a significant datum for the experimentalist or behavior modifier, although there may be disagreement over the definition and means of measuring elements of the repertory. What has aroused controversy has not been the abstract idea that individual differences by themselves and in interaction with environmental variables influence behavior, but the success with which existing assessment methods provide meaningful measures of individual differences. For example, Mischel (1968, 1969), while recognizing the scientific importance of interrelating individual differences and experimental variables, has expressed disappointment at the low levels of correlation between personality variables and assorted criteria. He cites the high frequency of correlations that account for less than 10% of the variance in the criterion behavior and the infrequent occurrence of significant transsituational consistency in behavior that would support the notion of broad personality traits.

Bowers (1973) has recently presented a thoughtful analysis of metaphysical, psychological, and methodological aspects of these problems. Eleven studies reviewed by him, all of which involved the transsituational assessment of behaviors of the same subjects, demonstrated that the average amount of variance accounted for by the Personality × Situation interaction exceeds the average amount of variance accounted for by either persons or situations alone. As valuable as they are, studies of this type, in which no attempt is made to assess particular individual difference variables, do not provide information about Personality × Situation interactions. In other words, such designs tell us what is the case, but not why. The epistemic yield is best regarded as description rather than as understanding of the role of identifiable person variables in behavior. The typical Personality × Situations design employed in contemporary personality research is a factorial one in which groups differing on some individual difference variable are randomly assigned to differing experimental conditions. An analysis of the components of variance attributable to the factors and their interaction in such a design would serve to complement the data reviewed by Bowers, which provide information on the current "state of the phenomenon."

The analysis performed in the present study provides information on the current state of the science of personality in identifying and measuring dispositional variables that
account for behavior. The study concerns itself with two major considerations. The first involves the question of whether there has been an increase or a decrease in experimental investigations that incorporate personality variables. The second, and of greater relevance to the current controversy regarding situational and dispositional variables, pertains to the relative potencies of individual difference variables and experimentally manipulated variables, and the interaction between these two classes of variables. In the analyses performed, potency was considered from the perspectives of both statistical significance and proportion of behavioral variance accounted for.

**METHOD AND RESULTS**

The trend over the past two decades of studies that permit estimation of interaction effects was the first topic examined. The journals surveyed were the *Journal of Personality and Social Psychology*, *Journal of Abnormal and Social Psychology*, and *Journal of Personality*. Table 1 shows that there was an increase in the percentage of studies that permitted determination of interaction effects between individual difference and experimental variables. The increase was from 5% in 1950 to 14% in 1960 to 25% in 1970.

The part of the present survey related to interaction effects included a total of 385 studies published in the 1971 and 1972 volumes of the *Journal of Personality and Social Psychology*, the *Journal of Personality*, and the *Journal of Consulting and Clinical Psychology*. Many of the journal articles that were reviewed contained more than one dependent variable measure, so that a total of 692 statistical analyses were examined. Also surveyed were studies reported in *Dissertation Abstracts* of 1970.

Two separate analyses of independent samples of published literature were conducted. Analysis 1, based on the 1971 volumes of the *Journal of Personality and Social Psychology* and the *Journal of Personality*, was designed to assess the frequency with which individual difference variables were employed in personality and social psychological research and their likelihood of yielding statistically significant results both alone and in interaction with situational variables. Analysis 2 consisted of an assessment of components of variance accounted for by individual difference and situational variables and their interactions.

Analysis 1 included a total of 254 studies involving 305 separate analyses, which were divided into four classes: (a) those involving only situational independent variables \( (n = 147) \), (b) those involving only measured personality and attitudinal independent variables \( (n = 44) \), (c) those involving only demographic (e.g., sex, race, age) independent variables \( (n = 12) \), and (d) those involving both situational and individual difference variables \( (n = 53) \). The results of the analysis were tabulated in terms of the percentage of significant \( (p < .05) \) effects yielded by these classes of independent variables. Studies in which personality scales were correlated with other personality scales were excluded from the analysis so as not to spuriously inflate the percentage of significant results attributable to personality variables. In the case of the group of studies that incorporated both situational and personality-attitudinal variables within factorial designs, it was possible to categorize the magnitude of statistically significant effects (the categories were .05, .025, .01, and .001) and to tabulate the percentage of instances in which the situational main effect, the personality main
effect, and the interaction effect yielded the strongest effect in the analysis. As the last column of Table 3 shows, in 77.2% of the analyses, one of the three sources of variance was more highly significant than either of the other two.

The results of Analysis 1 indicated that individual difference variables were incorporated in 42.9% of the studies. As Table 2 indicates, a high percentage of significant results was obtained in studies in which a situational, demographic, or personality variable was the sole independent variable, a fact that is not surprising in light of editorial demands for significant results. Published studies that achieved nonsignificant results generally involved either failures to replicate previous findings or (especially in the case of individual difference variables) failures to demonstrate linkages to behavior that the construct in question would predict.

Of greater interest, however, is the pattern of Analysis 1 results pertaining to studies that incorporated both situational and individual difference variables. These results are presented in Table 3. In these studies, situational variables yielded significant results twice as frequently as did individual difference variables, and were nearly four times as likely to be the most potent variable in the analysis. Also noteworthy, however, is the high frequency with which significant interactions were obtained between situational and individual difference variables, as well as the relatively high percentage of cases in which the interaction was the most potent effect. These results suggest that individual difference variables may be most important in terms of how they interact with situational factors, and that such significant interactions occur nearly as often as do significant main effects for situational variables.

In addition to the evidence of Analysis 1 just presented and that of Analysis 2, to be presented, a set of comparisons was made for reports of empirical research other than those contained in journal articles. We examined PhD theses, summarized in the 1970 issues of Dissertation Abstracts, that incorporated individual difference variables and experimentally manipulated variables. It seemed desirable to gauge the trend of results among a group of research investigations that are typically not reported in journals. Although the emphasis on positive results characterizes dissertations as well as published articles, the emphasis is less in the former than in the latter.

The summaries of studies contained in Dissertation Abstracts for 1970 were read and categorized into those in which personality and demographic variables comprised elements in experimental designs in the field of psychology. Because these summaries do not contain many of the details found in journal articles, it was necessary to classify the dissertations not only into those that yielded positive and negative results with regard to main or interaction effects but also into a "cannot say" group. The "cannot say" results typically were too ambiguous to permit conclusions about whether positive or negative results had been obtained. Also in this category were summaries that simply omitted the results of relevance to the present survey. The percentages reported here are restricted to summaries of dissertations that explicitly indicated whether or not the relevant results had attained statistical significance.

At least one personality measure was used in 52 of the 123 dissertations surveyed. Of

<table>
<thead>
<tr>
<th>Variables and interaction</th>
<th>% Significant</th>
<th>% Largest effect</th>
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</thead>
<tbody>
<tr>
<td>Situational (S)</td>
<td>65.5</td>
<td>38.0</td>
</tr>
<tr>
<td>Individual differences (I)</td>
<td>31.0</td>
<td>10.4</td>
</tr>
<tr>
<td>S X I</td>
<td>59.9</td>
<td>28.8</td>
</tr>
</tbody>
</table>

Note. Results are based on 87 statistical analyses because of multiple dependent variables in several studies. Journals surveyed were the 1971 Journal of Personality and Social Psychology and Journal of Personality.
the 30 dissertations reporting main effects for personality variables, 53% \((n = 16)\) described statistically significant outcomes. Forty-six dissertations reported results relevant to interactions. Of these, 70% \((n = 32)\) were statistically significant. There were 48 dissertations dealing with demographic variables whose main effects could be classified unambiguously as being either statistically significant or not significant. Of these, 79% \((n = 38)\) were significant. Of the 63 dissertations reporting interactions involving demographic variables, statistical significance was obtained in 71% \((n = 45)\) of the cases. Of the 95 dissertations reporting results for situational variables, 63% \((n = 60)\) described positive outcomes.

Whereas Analysis 1 was largely concerned with statistical significance, Analysis 2 was concerned with proportions of behavioral variance accounted for by various kinds of independent variables. Hays (1965, p. 382) has described the procedure known as omega squared \((\omega^2)\), which may be used to estimate the amount of response variance that can be accounted for by each main and interaction effect in an analysis of variance. The analysis to be described here used the \(\omega^2\) procedure to assess components of variance accountable in terms of situational, individual difference, and interaction effects.

Analysis 2 was based on a sample of 102 studies involving 138 analyses of variance published in the 1972 volumes of the *Journal of Personality and Social Psychology* and the *Journal of Consulting and Clinical Psychology*. The sample was, of necessity, restricted to those studies that presented analysis of variance summary tables from which \(\omega^2\) could be computed. Excluded from the \(\omega^2\) analysis were trials effects in studies concerned with learning.

The results of Analysis 2 are presented in Table 4. The data summarize the total number of main and interaction effects of each type that were examined in the 138 analyses of variance. It is readily apparent that on the average, individual difference variables account for only a small proportion of variance, either alone or in interaction with other variables. However, it is equally clear that there is little difference between the mean and median proportions of variance accounted for by personality and by situational variables. Interactions involving situational and individual difference variables account for less variance than either of the main effects.

A supplementary analysis was performed on 249 additional analyses from the same journals involving situation, personality, and demographic variables that were analyzed by means of \(t\) tests and correlation coefficients. The \(\omega^2\) analysis was applied to \(t\) test results (Hays, 1965, p. 327), and correlation coefficients were squared in order to provide estimates of accountable variance. Combining these data with the analysis of variance results forms a composite but does not substantially alter the pattern of results. The following mean proportions of variance were accounted for in the composite: situational, \(M = 12.8\%\); personality, \(M = 22.6\%\) \((n = 331)\); situational, \(M = 9.4\%\); SD = 11.8% \((n = 201)\); demographic, \(M = 1.5\%\); SD = 2.6% \((n = 62)\).

Table 5 presents a breakdown of the data of Table 4 in terms of the distribution of the variance accounted for by main and interaction effects. The table shows the percentages of results accounting for different proportions of variance. Most striking in the data summarized in this table are the high percentages of results that account for relatively small proportions of the variance within each category of independent variables. Of additional interest is the fact that personality variables are nearly as likely to account for

<table>
<thead>
<tr>
<th>Independent variable and interaction</th>
<th>Total number of main and interaction effects analyzed</th>
<th>Mean percentage of variance accounted for</th>
<th>SD</th>
<th>Median percentage of variance accounted for</th>
</tr>
</thead>
<tbody>
<tr>
<td>Situational (S)</td>
<td>247</td>
<td>10.3</td>
<td>13.42</td>
<td>4.5</td>
</tr>
<tr>
<td>Personality (P)</td>
<td>53</td>
<td>8.7</td>
<td>11.23</td>
<td>3</td>
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<tr>
<td>Demographic (D)</td>
<td>43</td>
<td>1.8</td>
<td>2.28</td>
<td>1</td>
</tr>
<tr>
<td>S (\times) P</td>
<td>118</td>
<td>2.2</td>
<td>7.21</td>
<td>1</td>
</tr>
<tr>
<td>S (\times) P</td>
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<td>4.0</td>
<td>8.77</td>
<td>1</td>
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<tr>
<td>S (\times) D</td>
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<tr>
<td>P (\times) D</td>
<td>8</td>
<td>2.0</td>
<td>4.00</td>
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</tr>
<tr>
<td>P (\times) P</td>
<td>5</td>
<td>7.3</td>
<td>12.35</td>
<td>2</td>
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<tr>
<td>D (\times) D</td>
<td>4</td>
<td>0.2</td>
<td>.002</td>
<td>0.0</td>
</tr>
</tbody>
</table>
substantial proportions of the variance as are situational variables. For example, 35% of the situational main effects account for more than 10% of the variance, compared with 29% of the personality main effects; 19% of the situational variable effects account for more than 20% of the variance, compared with 14% of the personality variable main effects. The highly skewed nature of the distribution of variance percentages shown in Table 5 suggests that the median might serve as a more suitable measure of central tendency (and as a more accurate reflection of the current state of the science) than does the mean. It can be seen in Table 4 that the median proportion of variance accounted for in no case exceeds 5%.

**DISCUSSION**

Our survey reveals surprisingly low percentages of variance accounted for by all classes of variables investigated: situational, personality, demographic, and interactions among these variables. If our somewhat negative evaluation of this result is reasonable, then many of the theoretical disputes that permeate the personality literature are explicable in terms of the narrow margin by which results are regarded as psychologically meaningful. Attainment of the .05 level of statistical significance may not provide a sufficiently firm base upon which to erect crisp psychological interpretations and powerful theories. From another perspective, however, by what standard is accounting for, say, only 10% of the variance a poor or disappointing performance? It appears that most current studies are directed toward the investigation of relatively subtle psychological phenomena, so that we might well expect the present results. If an independent variable is truly powerful (i.e., accounts for a massive proportion of the variance), it is generally also too obvious to be of “theoretical” interest. In any event, no matter how one views the results of the present survey with regard to the potency of individual variables, the state of affairs for situational variables alone is only slightly more favorable.

Although the present variance analysis is to our knowledge the first to be performed on a major segment of the personality-social literature, previous statistical and theoretical analyses of a similar nature have been conducted within specific segments of it (Argyle & Little, 1972; Averill, 1973; Bowers, 1973; Endler, 1973; Endler & Hunt, 1966, 1968, 1969). As mentioned earlier, Bowers (1973), summarizing the results of 11 studies using self-report and observational data, found that Person × Situation interactions accounted for more of the variance (20.77%) than did either main effects for persons (12.71%) or for situations (10.17%). Likewise, Endler (1973) has reported Person × Situation interactions that accounted for higher proportions of the variance than the mean of 4.7% that emerged from the present survey. This seems in no way surprising, since figures presented in this article are a composite representing studies in which the independent variables vary widely along a continuum of theoretical meaningfulness. It seems reasonable to assume that the more theoretically relevant a personality or demographic variable is to the situation to be manipulated and/or the behavior to be studied, the more variance will be accounted for by the Person.
× Situation interaction. In addition, as noted here, the figures reported by Endler (1973) and Bowers (1973) are Person × Situation interactions, whereas the present summary is composed of measured Personality × Situational interactions. That is, Bowers’ (1973) and Endler’s (1973) interactions use individual persons as one variable in their design, and their Person × Situation interaction is therefore a composite of all possible Personality × Situation interactions for the particular situations of interest.

Several considerations that are typically ignored in discussions of the relative merits of dispositional and situational variables are worth noting. One concerns the degree of difference between levels of individual difference variables and experimentally manipulated variables in the factorial Dispositional × Situational experimental design. In most instances, we would expect the dispositional variable to account for more variance if very different groups (such as schizophrenics and normals) were compared than if normal groups differing in locus of control were studied. It may be that in many instances manipulated situational variables, given high degrees of laboratory control, will be more “different” (and less confounded with other variables) than will groups of subjects differing on one imperfectly measured personality variable. On the other hand, unmeasured individual differences may cause subjects to perceive the same rigidly controlled situation in different ways and thereby increase within-cell variance, thus decreasing the proportion of variance accounted for by the situational variable.

The telling points made by Mischel (1968, 1969) and others regarding transsituational consistency of behavior and the low level of predictability of behavior from conventional personality assessment devices have resulted in an increasingly widespread conviction that situational variables are prepotent determinants of behavior and that individual difference variables are, by comparison, of only minor importance. Although limited to a small number of journals over a relatively brief period of time, the present survey suggests that though situational variables do indeed account for a slightly higher proportion of variance, their margin of superiority is by no means striking enough for them to be considered prepotent by comparison.

The results of the present survey are encouraging in one respect. The proportion of studies reported in the literature in which both dispositional and situational variables are incorporated into experimental designs appears to be on the increase. This approach may ultimately result in the greatest epistemic yield for the science of personality. Although a knowledge of situational variables may permit the best prediction of behavior in similar situations, Personality × Situation interactions may contribute greatly to specifying the processes that mediate the situational behavior relationships. Viewed in this light, the issue of the relative potency of situational and dispositional variables becomes secondary in importance to the question of how they might best be concurrently studied to advance our understanding of behavior.

REFERENCES