Behavior Measures and Variability

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The expression termed Kinetic output (K_o) is offered as a single dimensionless variable which essentially blends response frequency and response duration within a specified time interval into a single value. There are several aspects of this approach that need additional discussion to clarify its significance in the advancement of behavior analysis.

One point involves what appears to be the most salient feature of K_o , variability. That intra- and intersubject variability occurs in behavior analysis is certainly well established. At the same time, in a very real sense, variability is considered a dependent variable in behavior analysis rather than merely a descriptive statistic as is the case in other areas of psychological research. It behooves the behavior analytic researcher to design research to pinpoint the variables that may be producing the variability. The use of K_o could conceivably obscure the variability that needs to be investigated. If we adopt a measure that may obscure variability, then we may be doing a disservice to the development of behavior analysis. We are not saying that K_o necessarily masks variability, but there exists a real possibility that it could. The results of the one empirical study presented in the paper suggest that K_o reduced the variability in a very large percentage of the instances. Is such a decrease in variability actually an advantage? Conceivably a researcher using K_o could conclude that the variability was so small that the research does not warrant the additional time, effort, and expense to investigate it further. Granted the behavior analyst is interested in determining the variables affecting variability, but reducing variability through mathematical manipulations is a markedly different approach. If we can identify the variables that produce variability,

then we may be able to reduce variability, depending on the variables involved.

There may be variables that affect variability that cannot be eliminated or sufficiently well controlled to eliminate their effects on variability. That could be very important information for either the basic researcher or the applier of behavior analysis.

It is possible that the variables that may affect response frequency are different from the variables that affect response duration, at least in some subjects or clients. There may be situations in which the reduction of response duration is much more important than the reduction of response frequency. We may, in some situations, want to increase response duration and actually reduce response frequency. A knowledge of the variables that differentially affect response frequency and duration would be invaluable in this situation.

The growing interest in disorderliness or chaos in physical theory suggests that disorderliness may be as important to investigate as orderliness. Are variability and orderliness inversely related as the authors imply? Is variability in and of itself then a reflection of disorderliness or is it a function of other variables, variables which may not have been observed or investigated by the researcher? We do assume that behavior is determined. If the behavior goes up and down from moment to moment, we still have to assume that there are variables which are affecting the behavior. The measure K_o does not change the nature of the responding nor does it appear to allow us to observe functional relationships we couldn't see before. Even if one assumes that orderliness and variability are inversely related, the behavior per se isn't necessarily more orderly using K_o . Only the trans-

formed data are more orderly. There are several different mathematical manipulations that have been used for years in statistical analyses that have successfully reduced the variability in a set of data. Though these transformations may be effective in reducing the variability sufficiently to produce a statistically significant difference, it is highly questionable if these practices have been very successful in identifying important variables.

Behavior analysis from its inception has stressed the use of measures that were directly related to the behavior of the subject. The frequency of response measure gained rapid acceptance among operant researchers because it was a direct measure of the behavior in question. The duration of response measure, though involving a markedly different kind of count, time, is still a measure that relates directly to the behavior in question. The Kinetic output measure (K_o) is a derived value that is somewhat further removed from the behavior of the subject. Derived measures certainly have value and an important place in science. Their value, however, is not based on their effectiveness in reducing variability. Their value has been established because they have enabled the development of new and different relationships that may not have been possible using the measures that went into their derivations.

One final point needs mentioning. One empirical study is hardly adequate to jus-

tify an acceptance or rejection of K_o as a useful measure in behavior analysis, a point acknowledged by Powell and Dickie. Additional different kinds of studies are necessary before we can determine if it has any pragmatic or theoretical value. Some of this research would be directed toward determining the relative effects of a variety of variables on rate, duration, and K_o measures. When it can be shown that the effects of a variety of variables on K_o lead to different and more valuable relationships than rate and/or duration measures, then we believe a stronger case can be made for its extensive usage in behavior analysis.

In summary, to reduce variability through mathematical manipulations may not be contributing to the advancement of our knowledge of behavior analysis. It may even inhibit the discovery of potentially valuable functional relationships. If, in order to achieve reduced variability, we have to collapse differences elsewhere, we may be missing differences that are there and potentially worth further exploration. Perhaps the best we can do at present is to be extremely careful in interpreting collapsed data and to report both rate and duration measures in addition to K_o measures. We certainly agree with the authors that it may be worthwhile for more researchers to obtain both rate and duration measures so that additional comparisons of the relative effectiveness, efficacy, and heuristic value of K_o can be determined.