SELECTING CONSISTENT VERTICAL AXIS SCALES

Elements used in the construction of a graphic display control a large proportion of the variance in the interpretative responses emitted by audiences (Parsonson & Baer, 1978, 1986). The vertical, or *y*, axis is used to report variation in the dependent variable(s); however, in published articles, the sizes of the scale along vertical axes (i.e., the distance between either additive or power-scaled intervals) within an article are often inconsistent. For instance, in the first two issues of Volume 21 of *JABA*, 5 of 19 articles (26.3%) using graphic displays employed inconsistent vertical axis scales for similar units of measurement. This alteration of the measures used to report behavior change can function to introduce unwanted control over conclusions regarding experimental effects.

By way of example, consider the effects of an experimental technique (e.g., differential reinforcement of other behaviors, DRO) designed to decelerate the dangerous problem behaviors exhibited by 2 adults with severe disabilities. After the experiment is conducted, the researchers begin constructing graphs to display their outcomes for analysis. However, the data for 1 participant show a pattern in which the experimental effect is not as discernible as that for the other subject, who received a similar independent variable manipulation. Because of the difficulty in discriminating a pattern for subjects whose behavior change was less obvious, their data are reported on a vertical axis scale that, although representing only half the integers of the other graph in the display, occupies the same amount of visual or graphic space (see Figure 1). Although the researchers may argue that the data have been made more interpretable by this attenuation, the size of the experimental effect based on the visual display has been altered in relation to the other graph within the display (see Figure 2 for an example of the same data using similar vertical axis scales). The practice of using inconsistent vertical axis scales is not only misleading for the viewer, it is a misrepresentation of the nature of the data.

Figure 1. An example of inconsistent vertical axis scales.

As a consequence of adopting unequal vertical axis scales, the intensity and generality of the effects of an experimental intervention may be overestimated, and/or restrictions in the intervention across subjects, stimuli, times, or settings may not be made available for further analysis. These consequences may serve to limit the refinement of a technology (e.g., the efficiency of a procedure) by focusing the experimenter and research consumers' attention on

Figure 2. The same data as Figure 1 replotted using consistent vertical axis scales.

experimental effects that, through misuse of graphic technique, have been inaccurately portrayed.

There are, potentially, means for standardizing the reporting of vertical axis scales within units of analysis. Although the contingencies for consistency necessarily must reside at the editorial level, authors preparing manuscripts for peer review should adopt specific practices to minimize the occurrence of reporting inconsistent vertical axis scales. The most effective practice to adopt is both pragmatic and simple: *Always use consistent interval unit sizes for all graphs reporting similar measurement units within a research article.* For example, if reporting the percentage of intervals in which targeted responses occurred, the same scale unit size should be used for all graphs (don't expand the scale on a subset of graphs because the behavior occurred at lower levels or was less variable). By adopting the practice of selecting consistent vertical axis scales

across graphs displaying similar measurement units, data presentations will more closely adhere to the original nature of the data—a practice that can only function to increase the effectiveness of an applied behavioral analysis.

REFERENCES

- Parsonson, B. S., & Baer, D. M. (1978). The analysis and presentation of graphic data. In T. R. Kratochwill (Ed.), *Single-subject research: Strategies for evaluating change* (pp. 101–165). New York: Academic Press.
- Parsonson, B. S., & Baer, D. M. (1986). The graphic analysis of data. In A. Poling & R. W. Fuqua (Eds.), *Research methods in applied behavior analysis: Issues and advances* (pp. 157–186). New York: Plenum Press.

CRAIG H. KENNEDY
UNIVERSITY OF OREGON

Received October 4, 1988

Final acceptance April 23, 1989