FURTHER COMMENTS ON USING HAND-HELD COMPUTERS FOR DATA COLLECTION

Recently, Paggeot, Kvale, Mace, and Sharkey (1988) discussed "some merits and limitations of hand-held computers for data collection." In their commentary, they noted problems presented by auditory cues associated with interval recording, problems they solved very nicely by installing an earphone jack in the computer.

Although we agree with the authors' solution, we wonder whether they might have misled some readers who have not used computers to collect and analyze data, because neither the merits nor the limitations of these machines are related to interval recording. For the last 5 years, we have used the Epson HX-20® for a number of projects, most of which are now being submitted for publication, but some of which have already been published (e.g., Felce, deKock, & Repp, 1986; Felce & Repp, in press; Felce et al., 1987). In addition, we now use 15 Epson HX-20s and three Zenith Super-sports® in more than a dozen studies ranging from self-injury to academic performance. As such, we have had many thousands of hours of experience with these machines.

In none of these hours, however, have we used interval recording. Some of the merits of the computer as a recording device are that it has an internal clock, allows simultaneous entry of 45 behaviors, preserves the sequence in which events occurred, notes the second at which each event began and ended, and allows us to analyze sequences of behavior (as in contingencies) that we cannot analyze when using interval recording. From studies published in *JABA* and elsewhere, we know that interval recording itself produces error beyond that which observers contribute (e.g., Ary, 1984; Powell, Martindale, Kulp, Martindale, & Bauman, 1975; Suen & Ary, 1989), error that researchers do not need.

Two arguments have been made by colleagues for imposing intervals on the real-time capability of a computer. These are that doing so allows us (a) to have many behaviors in our code and (b) to

sweep across subjects every few observations. Neither of these, however, is a good argument for sacrificing the benefits of continuous recording. In our work, we have employed 40 observers (this is a conservative estimate) whose education has ranged from high school to a doctorate. All have participated in studies in which 20 to 30 behaviors or events were in the observation code and the behaviors could be recorded simultaneously. Although not all people are able to handle such complexity, most are. Sweeps are handled even more easily. A program has been written that signals the observers to move from 1 subject to another at fixed intervals (e.g., 5 min); within the interval, however, all data are collected continuously. The computer then prints sequences and summaries of behavior for each time block or automatically aggregates data across time blocks in which the same subject has been observed.

We have discussed in some detail the advantages of real-time data collected on computers elsewhere (e.g., Repp & Deitz, in press; Repp & Felce, in press; Repp, Harman, Felce, Van Acker, & Karsh, 1989; Repp, Karsh, Van Acker, Felce, & Harman, in press). In summary, however, we believe two of the major advantages of the computer are that (a) it can collect continuous data in real time, and (b) it analyzes data rapidly and without error. Paggeot et al. (1988) certainly acknowledged the latter and would not disagree with the former. Remarks made to us, however, suggest that their commentary has been interpreted by some as a recommendation to use time-sampling procedures with computers. This certainly was not the stated intent of the authors, and they should not be criticized for the interpretation of others. However, we would like to add to their commentary a different perspective on the merits of using computers to collect observational data.

REFERENCES

- Ary, D. (1984). Mathematical explanation of error in duration recording, using partial interval, whole interval and momentary time sampling. *Behavioral Assessment*, 6, 221-228.
- Felce, D., deKock, U., & Repp, A. C. (1986). An eco-

- behavioral analysis of small community-based houses and traditional large hospitals for severely and profoundly mentally handicapped adults. *Applied Research in Mental Retardation*, **7**, 393-408.
- Felce, D., & Repp, A. C. (in press). The behavioral and social ecology of community houses. *Research in Developmental Disabilities*.
- Felce, D., Saxby, H., deKock, U., Repp, A. C., Ager, A., & Blunden, R. (1987). To what behaviors do attending adults respond?: A replication. *American Journal of Mental Deficiency*, **91**, 496-504.
- Paggeot, B., Kvale, S., Mace, F. C., & Sharkey, R. W. (1988). Some merits and limitations of hand-held computers for data collection. *Journal of Applied Behavior Analysis*, **21**, 429.
- Powell, J., Martindale, B., Kulp, S., Martindale, A., & Bauman, R. (1975). Taking a closer look: Time sampling and measurement error. *Journal of Applied Behavior Analysis*, **10**, 325-332.
- Repp, A. C., & Deitz, D. E. D. (in press). Using an ecobehavioral analysis to determine a taxonomy for stereotyped responding. In S. Schroeder (Ed.), *Ecobehavioral analysis and developmental disabilities: The twenty-first century*. New York: Springer-Verlag.
- Repp, A. C., & Felce, D. (in press). A micro-computer system used for evaluative and experimental behavioural research in mental handicap. *Mental Handicap Research*.
- Repp, A. C., Harman, M., Felce, D., Van Acker, R., & Karsh, K. G. (1989). Conducting behavioral assessments on computer-collected data. *Behavioral Assessment*, **11**, 249-268.
- Repp, A. C., Karsh, K. G., Van Acker, R., Felce, D., & Harman, M. (in press). A computer-based system for collecting and analyzing observational data. *Journal of Special Education Technology*.
- Suen, H. K., & Ary, D. (1989). *Analyzing quantitative behavioral observation data*. Hillsdale, NJ: Erlbaum.

ALAN C. REPP

NORTHERN ILLINOIS UNIVERSITY

KATHRYN G. KARSH

EDUCATIONAL RESEARCH & SERVICES CENTER, DEKALB, ILLINOIS

DAVID FELCE

BRITISH INSTITUTE OF MENTAL HANDICAP

DALE LUDEWIG

EDUCATIONAL RESEARCH & SERVICES CENTER, DEKALB, ILLINOIS

Received February 20, 1989

Final acceptance May 2, 1989