

INSTRUMENTATION IN BEHAVIOR ANALYSIS

INSTRUMENTACIÓN EN ANÁLISIS DE LA CONDUCTA

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Of several definitions of “instrument,” the one most appropriate to this special issue of the *Mexican Journal of Behavior Analysis* is “a measuring device for determining the present value of a quantity under observation” (Merriam Webster Dictionary <https://www.merriam-webster.com/dictionary/instrument>). The definition is sufficiently broad to cover devices that (1) arrange contingencies of reinforcement and punishment and (2) measure the effects of those contingencies on behavior. Instruments are the stuff of which science is made, and without which science would not exist. Even theoretical science depends, in the final analysis, on instruments, for it is these devices that bring theoretical ideas down to brass tacks by allowing those ideas to be put to empirical test. Behavior analysis is no different from its older and more established fellow-sciences in its dependence on instruments and instrumentation. Even before Skinner, the quintessential tinkerer with tools and gadgets of all types (e.g., Skinner, 1956), comparative and experimental psychology had a long history of adopting, adapting, and constructing all sorts of instruments from places as diverse as experimental and sensory physiology (e.g., Popplestone & McPherson, 1999) to the local hardware store, or ironmongery (Thorndike, 1898).

Instrumentation in behavior analysis began with Skinner, who sought the kind of precision and objectivity for the study of learning that, by his time, had become well-established in experimental psychology generally. The articles in this issue

could be described as “variations on a theme of Skinner” in that they describe instrumentation that has its origin in the creative apparatus that Skinner pioneered in the early 1930s and elaborated on by generations of other researchers following in the Skinnerian tradition. It is the case, however, that behavior-analytic instrumentation of this sort has had an impact on the practice of not only behavior-analytic science, but many others areas of contemporary psychology and beyond. Many of the instruments of animal cognition, behavioral pharmacology, and behavioral neuroscience, for example, are grounded in instrumentation that originated in early operant conditioning laboratories.

Observation is the core of science, and instrumentation is the core of observation. The articles in this issue describe the creation, adaptation, and application of instruments and methods that resonate to earlier themes within behavior analysis, what has been labeled *endogenous technology* (Lattal, 2008) and those that rely on technology imported from other disciplines and technologies, sometimes labeled *exogenous technology*. The instruments described in many of the articles represent a combination of the two sources of technology. Todd’s (2017, this issue) research into the history of cumulative recording reveals a treasure trove of heretofore-unknown-to-most behavior-analysts instruments and techniques for cumulative recording in experimental physiology long before Skinner first used such recording in the experimental analysis of behavior. In discussing the evolution of the Skinner box, Manabe (2017, this issue) describes how the basic idea of recording behavior in an enclosed isolated chamber can be expanded by using different exogenous technologies to investigate what an animal might be doing in an operant chamber other than responding on a contact operandum, a theme also reflected by Escobar and Santillán (2017, this issue), and Robles (2017, this issue), who similarly describe the adaptation of infrared photocell technology to expand the range of other behavior that can be recorded either as concurrent operants or behavior adjunctive to operant behavior. Iversen’s (2017, this issue) development of a computer-game joystick as a tool for the precise measurement of response variability is in the best tradition of adapting exogenous and endogenous devices to address heretofore uninvestigated issues related to the understanding of operant behavior, in this instance response variability during acquisition and extinction. Lattal and Yoshioka (2017, this issue) discuss how that most basic of scientific instruments, the human observer, might be improved both as a direct participant in the research process and as the mediator between technology-derived instruments and what they call the human instrument.

The aforementioned interdependence of scientific advancement and instrumentation development is a common theme from the history of science that finds its way into the articles in this special issue. Escobar and Santillán, Iversen, Manabe, and Robles all illustrate how adapting advances in technology can allow expansion of the basic science. Of particular note is the paucity of laboratory research on vocal and verbal behavior, discussed by both Robles and Manabe, both of whom suggest instrumentation modifications that might facilitate research in this largely neglected area. Stedman-Falls and Dallery (2017, this issue) extend and illustrate the theme of science-technology interdependence to applied behavior analysis by reviewing and assessing how both widely available “low” and “higher” technology devices have been adapted to better the human condition.

At the same time that the articles in this issue underline the importance of instrumentation in behavior-analytic research, they also illustrate how investigators can, with appropriate technical know-how (cf. Lattal & Yoshioka, 2017, this issue), create precise and sophisticated instruments for both controlling contingencies and recording their behavioral effects. Devices like the ones described in several of the articles free investigator and practitioner alike from the bonds of highly (many would say “overly”) priced instruments that as often as not are not easily adapted to the fluid needs of active researchers following research problems wherever the data takes them (cf. Escobar and Santillán, 2017).

The devices and methods described in these articles are but the tip of the iceberg with respect to the history, uses, and adaptations of instrumentation in behavior analysis. Behind each there is both a rich history and ahead of each is a bright future for behavior analysis as it continues to co-evolve with the types of instrumentation discussed herein.

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