Laboratory Lore and Research Practices in the Experimental Analysis of Human Behavior: Issues in Instructing Subjects¹

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The use of instructions to control the behavior of human subjects has been routine in psychological research. In the experimental analysis of human behavior this practice has also been common, and it remains so today. Although there are long-standing cautions concerning the role played by instructions (e.g., Azrin, 1958), in more recent years laboratory lore with respect to instruction use has become replete with warnings of decreasing schedule sensitivity and increasing sources of extraneous control.

These cautions seem to have been inspired and supported by empirical documentation of the control that can be exerted by instructional stimuli. For example, it has been shown that not only can instructed responding differ from uninstructed responding (e.g., Shimoff, Catania, & Matthews, 1981), but that the same instructions can have different effects depending on the way in which they are presented and the conditions present at the time of delivery (e.g., Catania, Matthews, & Shimoff, 1982; Galizio, 1979). Furthermore, even subtle variations in the wording of instructions have produced rather dramatic discrepancies in performance on the same operant task (Buskist, Bennett, & Miller, 1981). Because of these sorts of findings, the nature of the functional relations between instructional stimuli and operant performance has become an important area of research in its own right.² Indeed, this

research is proving to be a major vehicle for expanding the types of issues addressed by behavior analysts, as in the effects of verbal responding on nonverbal behavior (e.g., Matthews, Catania, & Shimoff, 1985). The results from this body of work have been provocative, even if sometimes conflicting, but the generality of findings to the instructional practices used throughout human operant work has not been addressed.

INSTRUCTIONAL PRACTICES

Meanwhile, investigators face a considerable challenge when attempting to arrange the complex set of verbal stimuli that will be presented to subjects in the course of an experiment. Each element of the instructional set may influence responding in ways that would not exist if the instruction had been omitted or worded differently. Despite the empirical demonstrations of instructional control cited previously, it is not clear that instructional design has been greatly affected. For example, our survey of the studies using human subjects that have been published in the *Journal of the Experimental Analysis of Behavior* revealed that complete reporting of even formal experimental instructions has not always been standard practice. Reports of informal instructions, such as responses to questions or verbal interactions that occur between sessions, are even less frequent. Few studies have included any rationale or justification for the particular instructional procedures employed, and we found no evidence of any increasing tendency to do so.

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² A complete review of this literature is not consistent with the aim of the present papers. The in-

terested reader is referred to Baron and Galizio (1983) and Hayes (in press).

What is well represented in research with human subjects is an extremely wide variety of instructional practices. Part of the variability across instructional practices involves the particular aspects of the experimental conditions described. Whether singly or in various combinations, features that are frequently specified include: the functions of components of the experimental apparatus, reinforcer availability and value, the operant of interest (sometimes including specification of a particular pattern of responses), the relation between the response and the reinforcer, manipulations of the independent variable, and the purpose of the investigation (either correctly or so as to disguise it). Furthermore, instructions are sometimes stated in the form of mands, other times in the form of tacts, and in some instances as a combination of the two.

The method of presentation also varies. Instructions may be presented verbally in written or oral form (or both), and they may be demonstrated or modeled, sometimes in combination with a vocal or written presentation. Furthermore, they may be presented before the experiment begins, before successive sessions, during sessions, after a number of sessions, or in some combination of these options. The permutations of instructional elements and presentation formats are so numerous that it is difficult to describe any one practice as typical.

The impact of such variations, if any, remains largely unspecified at this time and few limiting precedents have been established regarding which instructional features are best suited to achieving particular effects on responding. These facts make practical instructional design particularly challenging. Whereas standard laboratory practices have been established over the years for optimizing experimental control with nonhuman subjects (e.g., food deprivation parameters, response force requirements, etc.), these are often lacking for human subjects, particularly with regard to instructional practices. The possibility exists that without an empirical delineation of the effects of particular instructional proce-

dures, the precise analysis and systematic reproduction of results that are necessary for advances in our understanding of human behavior may be hindered. A research program aimed at testing for any differential effects of various instruction procedures could therefore be of considerable benefit.

MINIMAL VERSUS EXTENSIVE INSTRUCTIONS

One major issue complicating the development of optimal instructional practices concerns a controversy over the use of minimal as opposed to more extensive instructional stimuli. While one position maintains that instructional stimuli even so subtle as demonstrated key press may prevent experimental contingencies from having their full influence (e.g., Matthews, Shimoff, Catania, & Sagvolden, 1977), the other advocates the practice of making instructions as explicit as possible precisely because minimal instructions have at times resulted in performance insensitive to experimental contingencies (e.g., Fantino & Case, 1983). Once again, we find that a number of research questions have been raised, but few answers provided. A more thorough-going empirical analysis of instructional effects on contingency sensitivity is begging, and the role played by other experimental parameters (e.g., reinforcer magnitude, schedule history) remains unaddressed. In particular, an assessment of instruction effect duration is needed to define the extent to which final experimental outcomes are a function of the instructions used, thus helping to place the importance of the instructions in perspective. Variables that influence the change in control from instructions to experimental contingencies could then be addressed as well, and any implications for an experiment's duration taken into account.

Arguments for the use of minimal instructions have pointed out such advantages as diminishing extraneous sources of control, increasing similarity to experimental procedures with nonhuman subjects in which noninstructional con-

trol measures are necessarily used, and facilitating comparability of procedures across different groups of human subjects who might not respond in similar ways to extensive instructions.

In contrast, the rationale for using extensive instructions is primarily stated in terms of getting the most experimental value from subjects in the face of the usual logistical and economic constraints that plague all operant research with humans. Instructions might be designed to enhance experimental efficiency by avoiding time-consuming shaping procedures, preventing unnecessary or troublesome responding, adding interest to boring tasks, and generating stable performances quickly by encouraging immediate contact with the experimental contingencies.

When goals of expedience can be met without altering functional relations or overly restricting their generality, relatively extensive instructions would seem to be the better choice. Indeed, achievement of this optimal state of affairs has been demonstrated in some studies that systematically assessed and reported the impact of instructional variables (e.g., Baron & Kaufman, 1966). Unfortunately, direct tests of instructional influence are not common, and the comparative data base that does exist on the relative control exerted by different instructional stimuli is small. Thus, the degree to which conditions of unaltered functional relations and generality have been achieved is usually unknown. In general, the greater the number of experimental components that are instructed, the greater the potential for ambiguity over instructional as opposed to contingency control.

ASSESSING INSTRUCTIONAL EFFECTS

In the face of these risks and in the absence of empirically derived rules for instruction design, a strategy adopted by some human operant researchers has been to incorporate control conditions into an investigation's design so that the effects of instructions can be directly evaluated.

This has proven especially valuable in situations in which instructional effects provide an alternative explanation for the results obtained or in which the instructions were more extensive or explicit than usual.

A number of different procedural arrangements have functioned in such an evaluative capacity. For example, one option involves the addition of a few experimental subjects who are presented with instructions that are different from those given to the other subjects (e.g., Holland, 1958). Performances obtained in the presence of the different instructions are then compared across subjects.

Within-subject comparisons of instruction sets are also made, although less often. One obvious but often neglected example of this tactic is the baseline technique in which extensive instructions are not delivered until after careful baseline measures have been collected (e.g., Ayllon & Azrin, 1964).

Still a different tactic assesses the relative influence of instructions versus experimental contingencies by presenting instructions designed to have effects that are contrary to those of the experimental contingencies (Galizio, 1979). This approach is valuable because instructional influences may be difficult to discern if they result in the same kind of effects on responding as contingencies would be expected to produce. Constructing instructions to produce contrasting effects can reveal the stronger of the two classes of variables. This assessment tactic has been suggested by Baron and Galizio (1983) for use in the direct investigation of instructional effects.

Although these are only some of the methods that have been used to evaluate instructional influences experimentally, such within-design assessment seems to be of considerable value. Not only are the interpretations of individual experiments facilitated, but at the same time the effects of specific instructional practices on particular behavior-environment relations are documented under controlled experimental conditions. The accumulation of a literature that carefully assesses instructional influences across a

range of research programs will gradually produce a data base that both directs effective instructional practices in operant research with humans, and advances our understanding of the relations between verbal stimuli and operant responding.

NONINSTRUCTIONAL ALTERNATIVES

One other topic merits discussion. A number of noninstructional procedures have emerged from human operant laboratories for purposes of controlling more exacting operant responding. For example, response manipulanda with stringent effort requirements are sometimes used to engender stable responding in short periods of time (e.g., Azrin, 1958). Similarly, certain schedule histories can result in stable performances on schedules that typically produce less tightly controlled responding (e.g., Weiner, 1964). It is interesting that the performances controlled by such procedures are often quite similar to the effects that instructions are designed to produce. In keeping with the former examples, rapid production of stable responding is perhaps the most common justification for use of extensive instructions. Investigators who employ noninstructional techniques in lieu of verbal alternatives avoid charges of rule interference and gain the added benefit of clearly specified sources of control. The empirical development of other noninstructional procedures designed to accomplish particular control stands as a research direction deserving of further attention.

Because *total* elimination of instructions has often met with its own problems (e.g., response inhibition; Ader & Tatum, 1961), a strategy practiced in some laboratories has been to restrict instructions to introductory, orienting statements designed to engender initial responding. Response dimensions that are particularly critical to the investigation are left uninstructed and thus dependent on interaction with experimental contingencies. For example, in a study of reinforcement schedule sensitivity, the

operant key-press response was shaped after subjects were instructed that they could earn points exchangeable for money (Matthews et al., 1977). In another case, an investigation of the reinforcing value of S+ and S- stimuli used complete instructions to describe monitoring and reporting meter deflections, but production of the schedule-correlated stimuli was not instructed (Perone & Baron, 1980). These studies exemplify a balance of instructional and noninstructional practices that may prove to satisfy the criteria of both limiting extraneous influences and providing expedient control.

SOME INTERIM RECOMMENDATIONS

Clearly, important research questions regarding instructional effects remain unanswered. Some of those questions have been outlined in the preceding discussion. Until such issues are addressed, however, experimenters still face the difficult task of designing experimental procedures without a complete understanding of the optimal manner in which to achieve adequate control over their subjects' behavior. Although the specific recommendations that can be offered must remain limited, it may be helpful to suggest a number of factors worthy of careful consideration when designing experimental instructions.

A first set of considerations involves specification of the subject characteristics that are necessary to answer the experimental question being addressed. One important dimension is the extent of subjects' verbal history and repertoire. When appropriate, selection of subjects who are nonverbal (e.g., infants or profoundly retarded individuals) can avoid the complication of experimenter instructions.

Activities outside of experimental sessions such as scheduling, payment, and discussing experimental experiences with others are also important, as are the within-session response characteristics necessary to ensure proper contact with the independent variable. The latter category may include variables such as the topog-

raphy of the response class, the nature of its acquisition, its frequency or other dimensional quantities, features of response classes that are not of experimental interest and steady-state requirements. Once delineated, the full array of techniques that are available to produce and maintain the chosen response characteristics can be considered. The pros and cons of noninstructional as well as instructional options can be carefully weighed in relation to each of the already-specified needs for control over responding. In this way, instructional stimuli will be created with as much care as any other feature of the experimental environment, as a function of well-defined experimental goals.

In certain cases, particular alternatives may be clearly preferable. For instance, it may be reasonable to turn immediately to instructional procedures whose effects are already well-known. Another option is to begin the experiment with minimal instructions and add elements in successive phases as the data indicate their necessity. These tactics do not necessarily mean that minimal instructions will result, but that whatever their quantity, they will be created to serve very specific functions. Ideally, this strategy would help to minimize the risk of extraneous instructional effects while achieving the degree of control necessary to detect the full effects of the independent variable conditions.

Another consideration involves the potential benefit of assessing particular instructional stimuli within the experimental design. One way to judge the value of this tactic is to ask if instructions could be reasonably considered as a viable explanation for the performances that will be obtained. If instructional events (or, for that matter, any other extraneous variable) could qualify for this role, it may be necessary either to eliminate them entirely or to gather evidence that they are not responsible for the effects produced by contact with the independent variable conditions (see Johnston & Pennypacker, 1980).

Finally, given our current level of understanding, a full description of all in-

structions presented seems necessary. In addition, a discussion of their rationale and possible impact may be warranted.

CONCLUSION

Although this paper is an exceedingly brief consideration of issues surrounding the use of instructions in human behavioral research, it is nevertheless clear that instructional design is an extremely important topic. In fact, it is too important to be left to discussions of "laboratory lore." Instructions are an integral part of an array of control procedures that can become entangled with independent variable effects and thereby influence the veracity and generality of our experimental conclusions. In addition, control by instructional stimuli is a part of the basic research agenda in the area of verbal behavior. The emerging experimental literature suggests that the role of instructions is indeed being further defined.

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