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The Virtues of Scientific Psychology: A Reply to Harzem

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Harzem recently expressed the opinions that, beginning in the 1960s, the progress of scientific psychology has been deferred and that psychological research has failed to address important social issues. He proposed that progress be resumed by taking up, anew, the experimental analysis of behavior. The present reply provides evidence inconsistent with Harzem's assertions regarding the state of contemporary, scientific psychology and questions the wisdom of disregarding the significant body of data and theory that currently are available to pursue the, as yet, unfulfilled promises of the experimental analysis of human behavior.

Key words: scientific psychology, behavior analysis, cognitive psychology, information processing

In a recent article, Harzem (1987) reflected on the current status of the field of psychology, concluding that there is an "urgent need for a new science of psychology that addresses the important social issues of our times" (p. 175). This new science should involve "substantial development of the experimental analysis of behavior . . . through its formulation of research problems related to every aspect of contemporary life" (p. 175). In the article, Harzem also lamented an absence of communication between different schools of thought within psychology, indicating that in the early 1960s such an absence did not exist. In his words, at that time, "there was an air of unity of scientific purpose. We argued the merits of different approaches, learned from each other, and sought to profit from differences of approach. Now we need . . . that atmosphere back" (p. 179). The following reply to Harzem's article is written in the spirit of open intellectual exchange of the type advocated by him.

A SCIENCE OF PSYCHOLOGY

Harzem (1987) observes "that the present state of the world is far worse than ever before" (p. 175). He qualifies this general observation to refer primarily to the fact "that we now face the prospect of disasters not only greater in dimension, but also different in kind" (p. 175). This enhanced prospect for disasters is attributed by Harzem to the fact that the consequences of our actions have increased as technology has advanced, without a corresponding increase in the ability to control human behavior. The resulting "behavior-technology gap," in which "demands of technology have outstripped the . . . existing limits of human performance" (p. 175), has led to two major problems. "The first problem is that of developing effective training techniques for personnel who are to operate safely the highly complex systems we have created" (p. 176). The second problem is that, because political and economic decisions can have both immediate and widespread consequences, "we must understand the fundamental behavioral phenomena that occur under these conditions" (p. 176). In short, "contemporary society *needs*, for survival, the kind of knowledge that a science of psychology can provide, so as to bring under control political-economic-military events" (p. 176).

That society needs the science of psychology to address problems created by technology is not arguable. Moreover, a lag between psychology and technology is an inevitable consequence of rapid technological growth (Wickens, 1984). However, the science of psychology has obtained systematic theoretical and applied knowledge relevant to current and future problems posed by technological

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advances. The contemporary research fields of experimental cognitive psychology and human performance arose from the ergonomic concerns of World War II and from the increasingly sophisticated technology of the twentieth century (Wickens, 1984). Thus, these areas of basic research are rooted in the applied problems created by technology.

Additionally, the applied field of human factors originated specifically from the need to "bridge the gap between applied problems and solutions" (Kantowitz & Sorkin, 1983, p. 15). System design problems in human factors are linked to the theoretical research in cognitive psychology by the field of engineering psychology (Wickens, 1984). "The aim of engineering psychology is . . . to specify the capacities and limitations of the human [generate an experimental data base], from which the choice of a better design should be directly deducible" (Poulton, 1966, p. 178; bracketed words added by Wickens, 1984).

The two specific problems noted by Harzem (1987), the development of effective training techniques and the understanding of decision phenomena, have a lengthy history of investigation within the areas of experimental cognitive psychology and engineering psychology. Issues involving training techniques that enable the acquisition, retention, and transfer of the skills necessary for effective human performance form a major part of basic and applied research (e.g., Anderson, 1987; Cormier & Hagman, 1987; Fitts, 1964; Fleishman & Hempel, 1954). Specific examples in which the research has impacted on training procedures include human-computer interactions (e.g., Berger, Pezdek, & Banks, 1987; Card, Moran, & Newell, 1983) and the design and use of industrial, flight, and weapon simulators (e.g., Cormier & Hagman, 1987).

The processes that people use to arrive at decisions in both artificial and real-world situations also have been examined extensively (e.g., Edwards & Tversky, 1967; Kahneman, Slovic, & Tversky, 1982; Tversky, 1987), and "happily there is now a proliferation of studies concerned with what people actually *do* to produce [decision] judgements" (Sanford, 1985, pp. 320–321). These studies have led to the development of decision aids and models that are applicable to a variety of specific decision-making situations, such as social-policy decisions, clinical decisions, and the resolution of interpersonal conflict (e.g., Arkes & Hammond, 1986; Hogarth, 1987). Thus, the science of psychology has provided contemporary society a substantial base of empirical and theoretical knowledge that addresses both training techniques and decision making.

DISAPPEARANCE OF PSYCHOLOGY FROM THE SOCIAL SCIENCES

Harzem (1987) states that although the importance of a science of psychology for society was recognized by Hobbes (1651/1958) and Comte (1836/1913) prior to the twentieth century, "in contemporary psychology, B. F. Skinner *has stood alone* in showing sustained concern for the broad problems of our cultures and in describing techniques that may be used to resolve some of these problems" (p. 176; emphasis ours). To say that B. F. Skinner has stood alone implies that contemporary psychology has been remiss in addressing issues of broad importance to society. However, the facts clearly indicate the contrary. Scientific psychology has concerned itself with a varied range of issues of general importance to society. For example, as indicated above, the research in experimental cognitive psychology and engineering psychology has addressed the two major problems of training and decision making that Harzem stresses. More generally, a cursory examination of the recent *Handbook of Perception and Human Performance* (Boff, Kaufman, & Thomas, 1986) and *Handbook of Human Factors* (Salvendy, 1987) testifies to the massive body of data and theory, both basic and applied, that has been generated regarding characteristics and limitations of human performance.

In the area of environmental psychology, "since the late 1960s thousands of studies have dealt with [person-environ-

ment relations]. . . . Much of this work has been stimulated by the recognition of environmental problems such as pollution, energy shortages, and unsuitable buildings" (Gifford, 1987, p. 2). The results of this research on environmental issues have been compiled in another recent comprehensive volume, the *Handbook of Environmental Psychology* (Stokols & Altman, 1987). This volume documents applications of environmental psychology to community problems, such as the design of environments for special populations, the role of the environment in delinquency and crime, and the management of scarce environmental resources. These problems are addressed by means of environmental assessment, which "is a general conceptual and methodological framework for describing and predicting how attributes of places relate to a wide range of cognitive, affective, and behavioral responses" (Craik & Feimer, 1987, p. 891).

Countless other examples of contributions from psychology to societal concerns can be cited, including the psychological consequences of affirmative action (Nacoste, 1987), psychological factors related to subtance abuse (Ratliff & Burkhart, 1984), compliance with prescribed medical treatments (Stanton, 1987), psychological issues in the criminal justice system (Weiner & Hess, 1987), diagnosis of learning disorders (Tylenda, Hooper, & Barrett, 1987) and other clinical problems (Elbert & Holden, 1987) in children, developmental stages in leadership skills (Kuhnert & Lewis, 1987), and factors influencing job satisfaction (Benson, Kemery, Sauser, & Tankesley, 1985) and organizational effectiveness (Pond, Armenakis, & Green, 1984). Obviously, psychology has not been remiss in addressing issues of broad concern to society.

Harzem goes on to argue that the failure of psychology to follow Skinner's lead in addressing issues of broad social concern has culminated in "the gradual disappearance of psychology from the social sciences" (p. 176). This supposed disappearance is attributed by Harzem to a number of factors, of which "perhaps the most influential amongst them are the efforts of the 'serious academic psychologists' to align psychology with the biological sciences, moving away, as far as possible, from the social sciences" (pp. 176–177). Harzem then cites economists and political scientists who indicate the importance of recognizing and applying to their disciplines the basic knowledge about human behavior provided by psychology (e.g., Wahlke, 1979). Thus, although the social sciences expect, and need, contributions from psychology, Harzem concludes, "the stark truth is that contemporary psychology is not . . . equal to meeting these intellectual expectations" (p. 177).

According to Harzem, one reason why contemporary psychology does not contribute as it should to the other social sciences is that "as the separation between psychology and the social sciences proceeded, *scientific* issues and theories of psychology almost ceased to be informed by the scientific problems of the other social sciences" (p. 177). But the multifaceted nature of contemporary psychological research ensures that psychology will be informed by the problems of many fields, including the social sciences. For example, psychologists interested in the biological bases of behavior align themselves closely with the biological sciences (e.g., Bridgeman, 1988). Similarly, engineering psychologists have close ties to industrial engineering (e.g., Kantowitz & Sorkin, 1983), and psycholinguists incorporate theories of linguistic structure into their psychological theories (e.g., Sanford, 1985). More generally, cognitive psychologists are informed by developments within the fields of computer science and neuroscience (e.g., Marr, 1982; McClelland & Rumelhart, 1986; Rumelhart & McClelland, 1986).

Contrary to Harzem's (1987) opinion, the relations between psychology and these other disciplines have not resulted in psychology becoming separated from the social sciences. The term "cognitive science" recently has been used to refer to interdisciplinary instructional and research programs that involve not only psychology, computer science, and neuroscience, but also philosophy, anthro-

pology, and economics (Norman, 1981; Stillings et al., 1987). Moreover, other areas within psychology that study group processes (e.g., industrial/organizational, criminal justice, environmental, and social psychology) maintain close ties with the fields of sociology, anthropology, political science, and economics (Bass & Ryterband, 1979; Gergen & Gergen, 1986; Gifford, 1987; Penner, 1986).

For example, in his text on social psychology, Penner (1986) stresses that "contemporary researchers in social psychology often look to the other social sciences for a better understanding of the phenomena they study" (p. 12), and he notes that he has "collaborated with people from all three disciplines [anthropology, sociology, and political science]" (p. 12). Penner goes on to indicate that "further, social psychology has *always* drawn heavily from these three disciplines and they have had a *tremendous influence* on the development and shaping of present-day social psychology" (p. 12; emphasis ours). Although Harzem disparagingly describes "present-day social psychology [as] . . . oriented to immediate remedy rather than 'serious academic psychology'" (p. 177), the interaction between the other social sciences and social psychology argues against this evaluation.

As another example, Bass and Ryterband (1979) include figures characterizing the connections between industrial/organizational psychology and other disciplines, with these connected disciplines including sociology, anthropology, political science, and economics. The specific contributions of these disciplines to issues in industrial/organizational psychology then are discussed in detail. For instance, "political science offers a philosophy about formal organizations, particularly how human beings evolve and enforce social rules to which they feel they ought to be committed in running their organizations" (p. 6). In summary, the evidence indicates that contemporary psychology has not "almost ceased to be informed by . . . the other social sciences" (Harzem, 1987, p. 177).

The claim that psychology cannot meet the intellectual expectations of the other social sciences is contradicted by the previously mentioned major role that psychology plays in the interdisciplinary field of cognitive science. A specific individual who epitomizes this role is Herbert Simon. Simon considers himself to be primarily a psychologist, although he was trained and has worked in the areas of political science and economics (Baars, 1986). He was awarded the Nobel Prize in Economics for 1978 in recognition of "his contributions to our understanding of decision-making, particularly in organizations, and for numerous other contributions to social science" (March, 1978).

Harzem (1987) states that in economics a need exists for psychological science to address "an ever-increasing dissatisfaction with the assumption . . . that in economic matters humans act on the basis of rational expectations" (p. 177). Yet, one of the major contributions of psychologists, such as Simon, has been to document informational and computational limitations on rationality, stressing the use of heuristics in decision making and problem solving (Kahneman et al., 1982; Newell & Simon, 1972). Thus, the need noted by Harzem already has been addressed, with implications explored not only for economics, but also for social policy, law, conflict resolution, expert judgment, and related areas (e.g., Arkes & Hammond, 1986). In summary, scientific psychology not only has been informed by the problems of other social sciences and sciences, but has contributed extensively to an interdisciplinary body of theoretical and practical knowledge.

LACK OF COMMUNICATION WITHIN PSYCHOLOGY

According to Harzem, not only has communication between psychology and the other social sciences ceased, but "a similar cessation of intellectual communication has occurred within psychology, too, with damaging consequences for the discipline" (p. 177). He states that twentieth-century psychology was progressing through profitable interactions between individuals who argued the relative merits of alternative ap-

proaches. However, this progress came to a halt in the 1960s, "leaving a deafening silence for those who would be serious scholars of the human condition" (p. 178). Harzem's discussion of the cessation of communication and deferral of intellectual progress within psychology is based primarily on a symposium to the American Philosophical Society in which operant behaviorism was proclaimed as "the new psychology" (Boring, 1964). Harzem asks, what went wrong? That is, "what reason could there be for 'serious academic psychologists' not welcoming" (p. 178) the prospect of operant behaviorism? Harzem's answer to the question is that "the serious academic psychologists themselves were displaced, as strong social influences of the 1960s and 1970s operated upon psychology" (p. 178). He emphasizes two major influences that acted to displace serious academic psychologists, the rise of clinical psychology and the advent of information theory.

The Rise of Clinical Psychology

Harzem's (1987) interpretation is that "a shift occurred in the political and social climate demanding immediate payoff even from scholarly enterprise at the expense of research that might provide scientific significance without holding out any clear prospect of quick returns" (p. 178). One outgrowth of the emphasis on immediate pay-off was "to give ever-increasing strength to clinical psychology, the practitioners of which came to influence the direction of most academic departments of psychology, as well as the main national organization of psychologists, the American Psychological Association" (p. 178).

Two points can be made about the argument that clinical psychology disrupted the progress of scientific psychology. First, although clinical psychology has grown substantially from the 1960s to the present, scientific psychology also has flourished. For example, the number of manuscripts submitted to the *Journal of Experimental Psychology* from 1963 to 1974, during David Grant's tenure as editor, increased from about 450 per year to more than 800, thus necessitating that the journal be split into four independently published sections beginning in 1975 (Grant, 1974). Also, during the past 20 years, numerous additional journals, such as *Memory & Cognition, Learning and Motivation, Perception,* and *Basic and Applied Social Psychology,* have come into being to handle the large volume of research. The progress that has occurred during the past 20 to 30 years in psychology has been sufficiently great to be characterized as a scientific revolution of major importance (Baars, 1986; Hilgard, 1987; Miller, 1988).

Second, since the 1950s, the framework for most Ph.D. clinical training programs has been the Boulder model, which is based on the principle that the clinical psychologist be trained as both a scientist and a practitioner (Brickman, 1987; Raimy, 1950). Within the framework of the Boulder model, students are educated in basic areas of psychology, research methods, and statistical techniques, as well as in the practice of clinical psychology. Although the success of the model can be questioned (e.g., Spence, 1987), it "even today provides the framework for most of this country's training programs in clinical psychology" (Brickman, 1987, p. 1042). Thus, most clinical psychologists receive exposure to the basic areas of scientific psychology. Although many choose to become primarily practitioners, even they have received grounding in the fundamentals of scientific psychology.

Information Theory and Its Aftermath

Within scientific psychology, Harzem (1987) attributes the disruption of progress to information theory and its aftermath. "By the 1960s, the method of measuring information known as 'information theory' had attracted great attention in psychology" because "the studies of perception and sensation had become stagnant by that time and it appeared that information theory might provide new impetus for these areas" (p. 179). However, Harzem concludes that one consequence of the impetus provided by information theory was a divergence of approaches to psychological research.

This divergence reversed the trend toward increased communication between different schools of thought and toward the progress of scientific psychology.

The characterization of the field of sensation and perception as "stagnant" by the 1960s is far off the mark. The last half of the 1950s and first half of the 1960s were periods during which some of the most important advances in sensation and perception were made. For example, the "novel and striking experiments" (Hilgard, 1987, p. 144) of Gibson and Walk on space perception were being conducted using an instrument that is referred to as the "visual cliff" (Gibson & Walk, 1960; Walk, Gibson, & Tighe, 1957). Similarly, "the dramatic experiments of Hubel and Wiesel . . . which won for them the Nobel prize in 1981" (Hilgard, 1987, p. 145) provided a detailed mapping of the visual cortex (see, e.g., Hubel & Wiesel, 1963). Moreover, the classic book, *Perception and Communication,* published by Donald Broadbent in 1958, resulted in "a radical transformation of [the field of] perception" (Hilgard, 1987, p. 162). Research in pattern recognition that set the stage for intensive investigation over the next two decades was published in "an important paper" (Hilgard, 1987, p. 241) by Selfridge and Neisser (1960). In fact, research in sensation and perception progressed at such a rate during this period that it culminated with the founding in 1966 of *Perception & Psychophysics,* a journal devoted exclusively to that subject area, because "more outlets for scientific publication" (Morgan, 1966) were required.

Harzem (1987) makes three specific points about the impact of information theory on psychology:

1. "Information theory removes human characteristics from the data to which it is applied" (p. 179).

Information theory defines a mathematical measure of information (the bit) that is based on uncertainty (i.e., the number of stimulus-response alternatives; see, e.g., Attneave, 1959) and thus, in some sense, can be described as removing human characteristics. For example, Baars (1986) poses the question, "But how was one to represent the alternatives . . . when those alternatives approached the kind of complexity needed to represent real human concerns?" (p. 193) He then goes on to answer, "This question simply was not dealt with. Thus, information theory seemed to beg the issue of knowledge representation. Nevertheless, in the theoretically impoverished environment of the 1950s, it was a step forward for psychologists to learn something about information theory" (p. 193). The failure of information theory to address the representation issue was acknowledged early on by researchers, with the consequence that "information *measurement* soon began to play a less important role, while information *processing* took on a major role" (Hilgard, 1987, p. 239). The reason for this shift in emphasis from information measurement to information processing was that several studies indicated that response latency and accuracy were influenced by informational variables, such as stimulus-response compatibility and practice, that cannot be quantified easily by information theory (Wickens, 1984, pp. 346–347). In other words, performance was shown to be a function of the required mental operations, rather than the number of bits of information (e.g., Ambler, Fisicaro, & Proctor, 1977; Leonard, 1958).

2. "By the use of information theory, empirically observed phenomena are converted into abstractions," rather than "abstract psychological concepts into empirically observable phenomena so as to scientifically investigate them" (Harzem, 1987, p. 179).

The strength of information theory was that precise predictions about empirically observable phenomena could be generated from the abstract concepts of the theory because the theory quantified information in terms of uncertainty. This point is illustrated vividly in Sanders and McCormick's (1987) description of classic experiments by Hick (1952) and Hyman (1953).

> Hick (1952) varied the number of stimuli in a choice reaction time task and found that reaction time to a stimulus increased as the number of equally likely alternatives increased. . . . When he plotted the mean reaction time as a function of information (bits) in the stimulus condition, the function was linear. . . . Hyman (1953), however, realized that according to information theory, he could alter stimulus information without changing the number of alternatives simply by changing the probability of occurrence of the alternatives. . . . Using this technique, he found that reaction time was still a linear function of stimulus information when it was measured in bits. Thus, information theory and the definition of the bit *made it possible* to discover a basic principle: choice reaction time is a linear function of stimulus information. This is called the Hick-Hyman law (p. 46, emphasis ours).

3. "Although the assertion that present-day cognitive psychology studies *mental processes* has been made persuasive through repetition, it will not stand up to careful scrutiny" (Harzem, 1987, p. 179). The scrutiny that Harzem provides involves the process of canning peas. "It makes no sense to study the *process* without, to that end, getting to know at least the machinery. . . . Yet, with very few distinguished exceptions, psychologists who aspire to study information *processing* and cognitive *processes* are not informed by human physiology and anatomy" (p. 179).

This point is incorrect on two counts. First, widespread agreement exists that a certain level of description, sometimes referred to as the functional level (Kosslyn, 1980) not only can, but must, be addressed separately from the neural "machinery." For example, Kosslyn states,

> We do not want our explanation of mental events to be couched in terms of brain events any more than a description of the architecture of a building should be couched in terms of locations of bricks and boards. A functional account can be offered quite independently of any specification of the physical device that has those functional capacities (p. 114).

Second, psychologists who study information processing and cognitive processes incorporate knowledge of physiology and anatomy into their models. For example, despite the distinction that Kosslyn makes between functional and physiological descriptions, he also cautions that "functional states and their physical realizations are not entirely independent. . . . Thus, the structure of the brain will obviously bear on the kinds of functional states that are possible" (p. 114). The incorporation of knowledge about physiology into information-processing models is illustrated clearly in the text, *Visual Information Processing,* by Spoehr and Lehmkuhle (1982). Chapter 2 of that text is devoted to a discussion of sensory physiology, with implications of physiology for information-processing models examined in other chapters. In fact, Posner (1986) has emphasized that one important feature of the information-processing language is that it provides "a way of translating between psychological and physiological processes" (p. V-7). One consequence of the translation provided by the information-processing language is that an area of major interest within experimental cognitive psychology currently is cognitive neuroscience. As one example, the Eleventh International Symposium on Attention and Performance involved a systematic attempt "to relate the information-processing approach to work in the neurosciences" (Posner & Marin, 1985, p. xxi).

Summary

Despite Harzem's assertion, the evidence indicates that there has not been a cessation of communication within psychology, much less a deferral of scientific progress. To the contrary, scientific psychology has thrived from the 1960s to the present. The explosion of knowledge that has occurred during this period, to a great extent, "was ignited by the information processing language . . . [whose] concepts brought a new unity to areas of psychology" (Posner, 1986, pp. V-6 and V-7).

ADDRESSING URGENT QUESTIONS

Harzem (1987) summarizes his opinion about the role of psychology in society by stating that "it is not encouraging to those who hope to look to contemporary psychology for at least some help in facing the dangers and threats of our age" (p. 179). In fact, he characterizes much of current psychological research

activity as "reminiscent of Nero's fiddling while Rome burns" (p. 179). Harzem concludes that because the search for knowledge has been held up, "psychologists must now face some of the most urgent questions of our time" (p. 180). To answer these questions, Harzem prescribes that psychologists "take up, anew, the development of the 'new psychology' described by Boring in 1964" (p. 179), that is, "the development of the experimental analysis of behavior" (p. 175).

The massive body of basic and applied data and theory to which we have referred in earlier sections clearly speaks against Harzem's (1987) opinion that the search for knowledge has been held up. To the contrary, contemporary psychology has developed the knowledge pertinent to addressing a broader range of issues than ever before. This knowledge development has been attributed by many authors (e.g., Baars, 1986; Fleishman, 1987; Hilgard, 1987) largely to the "cognitive revolution," which removed longstanding restrictions regarding the topics that could be investigated and the forms that theories could take. The knowledge that has been generated as a consequence of this removal of restrictions meets Harzem's stated requirement of being based on questions "formulated so as to make it possible to answer them empirically, through scientific research" (p. 180).

Harzem's recommendation that psychology take up, anew, the development of the experimental analysis of behavior seems to be based on his previously stated opinion that "reinforcement theory [is] the outstanding scientific theory of human behavior in the present century" (Harzem & Williams, 1983, p. 567). However, by his own admission, the "empirical evidence bearing on it . . . has not, so far, been readily forthcoming" (Harzem & Williams, 1983, p. 567), with what evidence there is having "arisen mainly from animal research" (Harzem & Williams, p. 565). The "relatively sparse experimental analysis of human behavior literature" (Buskist, 1983, p. 453) stands in contrast to the imposing body of human experimental literature generated from other perspectives. Harzem (1987), thus, apparently expects psychologists to disregard views of human behavior that have evolved from extensive, systematic, empirical research in favor of views that have not. For psychologists to do so would be inconsistent with the fundamental principles of scientific inquiry.

Our discussion of the virtues of scientific psychology is in no way intended to diminish the important contributions about basic and applied principles of conditioning that have been generated from the perspective of operant behaviorism. However, for the experimental analysis of behavior to have the potential for further significant impact on the larger enterprise of scientific psychology, behavior analysts should take the following steps. First, behavior analysts should cease denying the reality of the cognitive revolution and familiarize themselves with the major advances that have occurred in psychological research (see, e.g., Miller, 1988). Even if behavior analysts disagree with the interpretations provided for findings generated from other approaches, they must be aware of those findings and of the rationales that underlie the interpretations. Only then will behavior analysts be in a position to develop effective arguments about specific, alternative accounts of the findings.

Second, behavior analysts should quit talking to themselves in "in-house journal[s] . . . about things [of which they] are already quite convinced" (Buskist, 1987, pp. 1–2). The isolation of behavior analysts from the rest of psychology was documented several years ago (Krantz, 1971), and this isolation still seems to exist today. Behavior analysts must communicate their findings to "unconvinced" psychologists through outlets other than behavior analytic publications (see Geller's, 1987, chapter in volume 1 of the *Handbook of Environmental Psychology,* for an example of such a communication). Only through presenting the findings to a wider audience, integrating these findings with existing literatures, and inviting critical evaluations from persons outside of the behavior analytic tradition, will the work of behavior an-

alysts have impact beyond their own circle.

Third, behavior analysts should join the rest of the psychological community in the ongoing pursuit of scientific knowledge, without having the predetermined agenda of "supplanting cognitive explanations" (Johnston & Shook, 1987, pp. 231–232). Cognitive explanations should be supplanted not on ideological grounds, but only when alternative explanations can be shown to be adequate to the task of providing parsimonious, detailed accounts for the pertinent empirical data. Any meaningful interaction between behavior analysts and other psychologists is precluded when behavior analysts deny a priori, on ideological grounds, the possible validity of cognitive accounts and seek to make "behavior analysis the dominant intellectual force of the 21st century" (Pennypacker, 1986, p. 148), rather than seeking the truth, wherever it may lie.

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