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Contextualism and the Development of Effective Prevention Practices

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Widespread and effective implementation of research-based prevention practices will be facilitated by the explicit adoption of a functional contextualist framework for prevention research. Such a framework has as its central goal predicting *and influencing* behavior and cultural practices. Research within this framework is evaluated in terms of its ability to contribute to that goal. As a result, it contributes directly to the ultimate goals of prevention science—affecting the incidence and prevalence of problems in populations. The approach contrasts with the mechanist framework, which is implicit in much behavioral science research. The mechanist framework has as its truth criterion the predictive verification of models of the interrelationships among variables. Such models can—but need not—identify manipulable variables that can be exploited to affect problems of interest. Such models require the inclusion of multiple cases for testing and this requirement may impede the tendency of scientists to work with a single school or community. Functional contextualism is suited to the study of the individual case. It provides a framework within which researchers can more readily collaborate with practitioners in the development and further evaluation of practices within the settings where practitioners will ultimately use those practices.

KEY WORDS: functional contextualism; philosophy of science; mechanism; science to practice.

INTRODUCTION

Analysis of the philosophical assumptions underlying scientific practices may facilitate translating prevention research into widespread, effective practice. Although philosophy of science was much discussed in the mid-twentieth century (e.g., Cronbach & Meehl, 1955; MacCorquodale & Meehl, 1948; Skinner, 1945), behavioral scientists seldom discuss it now. Yet, implicit assumptions underpin the way that we do science and some of our assumptions may have a profound impact on whether or not our science ultimately benefits society. This paper discusses two contrasting assumptive systems for scientific inquiry—mechanism and contextualism—and examines their implications for the integration of science and practice.

Pepper (1942) called generic systems for understanding and analysis *world hypotheses*. We might think of them as very general paradigms (Kuhn, 1970). Pepper argued that there are four relatively adequate world hypotheses, each characterized by a root metaphor and a truth criterion. A root metaphor is a common, everyday phenomenon that helps us to organize our thinking and analysis. What do phenomena in the world resemble? They are like machines or plants. The metaphor one uses affects how one analyzes human behavior or cultural practices (Biglan, 1995). In particular, one can characterize each world hypothesis in terms of its truth criterion—the basis upon which an analysis is said to be valid. Although Pepper identified four hypotheses, this paper discusses only the two that seem to have the most bearing on the relationship between science and practice.

Mechanism

The root metaphor of mechanism is the machine. How do we understand the world? It is like a machine. To understand a machine, you understand its parts, the

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interrelationships of those parts, and the forces acting on those parts. The approach had its impetus in the success of mechanics, beginning in the Enlightenment. The approach was enormously successful in generating our understanding of the physical world and had a profound influence on thinking about psychology in the mid-twentieth century (Smith, 1986).

The truth criterion of mechanism is *predictive verification*. One considers an analysis true if observation confirms its predictions. Although it may be simple to construct a theory that makes sense of what one has already observed, a valid mechanist model must predict relations among variables in, as yet, unobserved samples. The more generalizable and replicable the model, the better the analysis. Notice that implicit in this perspective is the notion of universal principles. Uniqueness is antithetical to this worldview.

Perhaps the clearest example of mechanism in the behavioral sciences is the effort to develop models to predict relationships among variables. The logic, methods, and statistical techniques for model building are very well-developed (e.g., Duncan *et al.*, 1999). Recent developments in social cognition provide another example of a focus on creating models of relations among cognitive concepts (Greenwald *et al.*, 2002).

It should be stressed that such model building does not necessarily preclude the identification of variables that can be manipulated to affect a phenomenon of interest. Such model building has been an important source of our understanding of how risk and protective factors influence development (e.g., Hawkins *et al.*, 1992). However, identifying such variables is not the central focus of mechanism and models often do not include variables that are directly manipulable (Biglan & Hayes, 1996).

Contextualism

Contextualism is a philosophical tradition of American pragmatism (James, 1948; Menand, 2001; Peirce, 1905). Its root metaphor is the act-in-context. We understand the world the way we understand an act—not by itself, but in and with its context. Raising an arm to reach an object is very different than raising an arm to participate in a meeting. Of course, one could point to an endless number of contextual conditions for any given act. How then, does one evaluate the merits of an analysis of an act-in-context? For contextualism, the truth criterion is *successful working*. The analysis is valid to the extent that it helps the analyst achieve a goal.

Goals may vary, and the analyst—not contextualism—provides those goals. For this reason, there is a variety of contextualisms, each distinguished by its goals (Hayes *et al.*, 1993). Of particular relevance to the current discussion is *functional contextualism* (Biglan & Hayes, 1996; Hayes, 1994). Its goal is prediction and influence of behavior. We can best observe this orientation in behavior analysis (e.g., Biglan, 1995), with its focus on identifying variables that allow one not only to predict behavior but also to influence it through manipulation of environmental variables.

Note that for contextualism, unique events are not problematic. One can successfully analyze a single act-in-context without reference to other acts. One can manipulate variables to show their influence on a given behavior without showing how these variables apply to other cases.

MECHANIST AND CONTEXTUALIST FEATURES IN PREVENTION SCIENCE

Although prevention scientists seldom make their assumptive system explicit, some important emphases in prevention science are in keeping with mechanist traditions, whereas others reflect the contextualist tradition. Table 1 summarizes the contrasting emphases of mechanism and contextualism.

Emphasis on Models Versus Outcomes

The mechanist paradigm puts a strong emphasis on achieving comprehensive models of the phenomenon of interest. It encourages us to strive for an accurate, detailed, and *replicable* model of *all* of the genetic, physiological, psychological, behavioral, cognitive, demographic, social, economic, and cultural factors involved in the development and prevalence of human behavior. The emphasis follows directly from the root metaphor and truth criterion. If we are to understand behavioral phenomena in the same way we understand machines, then we will want to know all of the parts, their interrelations, and forces that act upon them. Moreover, because one can always create a perfect model with any given dataset, it is important to show that models derived in any given instance are replicable. Indeed, the more generalizable a model, the better.

Examples of this type of model building abound in prevention science. The Robert Wood Johnson Foundation funded a research network on the Etiology of Tobacco Dependence to develop models

Table 1. Contrasting Philosophies in Prevention Research

Mechanism	Contextualism
Accurate, detailed, and *replicable* model of all of the genetic, physiological, psychological, behavioral, social, demographic, economic, and cultural factors involved in the development and prevalence of targeted problems of human behavior	Increasingly successful system of surveillance and prevention activities that progressively reduce the prevalence of targeted problems in defined populations
The justification for including a variable in the model is that it *predicts* a problem behavior or a variable related to the problem behavior	The research is *valid* to the extent that it identifies variables that predict *and influence* the prevalence of tobacco use
The variables need not be manipulable	A variable that influences is necessarily manipulable
The model need not contribute to change the frequency or prevalence of a problem	Identified variables can be exploited to affect targeted problems
Research has no necessary relationship to practice	Practice can directly contribute to science, because it can identify variables that predict *and influence* problem behavior
Valid models are the prizes. Their impact on successful practice is less important	Science and practice are readily integrated
Generalizability is assumed	Novelty is categorical

of the factors involved in youth smoking. Modeling of attitudes and their relation to behavior was a staple of social psychology before prevention science began. This modeling continues within prevention science. Flay's Theory of Triadic Influence (Flay & Petraitis, 1994) attempts to organize and summarize the numerous variables shown to predict youth behavior.

A contextualist perspective, with its truth criterion of successful working, emphasizes outcomes. We will ultimately evaluate the worth of the analysis in terms of its contribution to our public health, education, or prevention science goals. What are those goals? Roughly, we are concerned with minimizing the incidence and prevalence of problems of human behavior and maximizing the prevalence of healthy and productive lives. In short, we seek an increasingly successful system of surveillance and intervention activities that progressively reduce the prevalence of targeted problems in defined populations.

A mechanist tradition does not preclude achieving such outcomes. Indeed, one can use model-building approaches to identify variables that influence behavior (e.g., Dishion & Patterson, 1992). However, for the mechanist paradigm, identifying such variables is neither explicit nor fundamental. From a mechanist standpoint, we can perform perfectly valid science without contributing to our ability to affect the prevalence of problems in defined populations.

Which Variables to Include or Emphasize

For mechanism, the justification for including a variable in the model is that it *predicts* another variable in the model. Functional contextualism seeks to identify variables that predict *and influence* the phenomenon of interest, because only those that influence the phenomenon can be exploited to achieve change. Such variables must be manipulable—at least in principle—because if you cannot manipulate the variables, you cannot influence the phenomenon. In contrast, mechanism has no requirement for manipulable variables. Nor is there a requirement that the predictive model be about an outcome or dependent variable of public health significance. Models predicting attitudes or intentions to behave are perfectly appropriate, even if incomplete from the standpoint of affecting health-relevant behavior (Hayes & Brownstein, 1986). Thus, for mechanism, models need not contribute to changing the frequency or prevalence of a problem. In contrast, the contextualist approach necessarily yields variables with great potential for affecting frequency or prevalence of problems.

The Relationship of Research to Practice

These contrasting approaches have distinctly different implications for the relationship between science and practice. To the extent that we view research from the mechanist perspective, we need not integrate research and practice. Valid models are themselves the prize. The impact of those models on successful practice is secondary. Modeling can occur in applied or practice settings, but there is no inherent reason for doing so in practice settings. Finally, at least within the prestige system of science, modeling in applied settings has no particular advantage. Indeed, applied work typically has a lower status than does basic research. The frequent emphasis of NIH RFAs on

integrating basic and applied research suggests that such integration does not flow easily from the mechanist orientation.

For functional contextualism, science and practice integrate readily. Because the very validity of the analysis is a matter of identifying variables that predict and influence the phenomenon of interest, the research has direct implications for practice. Indeed, one may readily perform research in practice settings, because in those settings one may be better able to study the influence of manipulated variables. As a result, research conducted in practice settings can *be* basic research. That is, a basic understanding of the influence of variables on phenomena of interest can emerge from research in such settings. Practice is not derived from basic research. For this reason, the status or prestige associated with research done in practice settings is not lower than it is for basic research.

Novelty

From a contextualist perspective, novelty is categorical (Pepper, 1942). That is, analysis can proceed for each act or event even if it is unique. An effort to understand the influences on a given act or phenomenon in terms of its context does not require us to assume that relationships will be generalizable to other phenomena. For example, one might identify variables reliably affecting practices in a given school, whether or not the relationships can be generalized to other schools. For mechanism, this is not the case. Mechanists evaluate models in terms of their generalizability from the outset. Thus, contextualism can work effectively with a single case, whereas mechanism demands multiple cases. This may be why contextualist approaches are popular among community psychologists, who seldom have the luxury of working with large numbers of cases (e.g., Fawcett, 1990; Kelly, 1986).

At the same time, contextualism is not opposed to identifying generalizable relationships. If they exist, those relationships can emerge from contextualist research through a process of replication and induction. Novelty is antithetical to mechanism, however. If we judge the validity of an analysis in terms of the generalizability of identified relationships, we have to assume that multiple cases or samples are alike.

Nor does contextualism stand in the way of developing theories (Skinner, 1972). Theories are essential for summarizing what is known about the prediction and influence of behavior and for organizing questions for further research. However, for contextualism, theories are necessarily about the variables that predict and influence behavior. Theories that do not include such variables, such as theories about the relationship between attitudes and behavioral intentions, are considered incomplete because they do not specify variables one can manipulate to affect behavior.

IMPLICATIONS FOR INTEGRATING SCIENCE AND PRACTICE

If the ultimate goal of prevention science is to affect the incidence and prevalence of behaviors in defined populations, then explicit adoption of a functional contextualist framework may contribute to our progress. We can begin by recognizing that we seek to move toward a society with an increasingly successful system of surveillance and prevention activities that progressively reduces the prevalence of targeted problems in defined populations. We can then evaluate our research in terms of its likely contribution to achieving these outcomes.

This is particularly true in areas of prevention research that are at the frontiers of our work. For example, this special issue seeks to identify "paradigms for the integration of school-based prevention research and practice" (Kaftarian, personal communication, 2003), because it is widely recognized that empirically supported practices are not being used as widely and effectively as they might be (Biglan *et al.*, 2003). First, we should identify factors that influence teachers, schools, and districts to adopt, implement, and maintain (Glasgow *et al.*, 1999) empirically supported practices. We know little about the important variables. A strategy that begins with individual teachers and schools and identifies influences on practice through single case and multiple baseline experiments (Biglan *et al.*, 2000) seems more likely to pinpoint influences than one that begins by attempting to test generalizable models through correlational model building. Generalizable relationships between influences and practices can emerge from such a strategy through a process of systematic replication (Sidman, 1960).

Beginning with the individual case will likely foster effective collaborations between scientists and practitioners. A project seeking to correlate hypothesized predictors of adoption and implementation in a sample of schools necessarily requires numerous schools, but school personnel are unlikely to play a major role in identifying the variables to be studied. Yet, following a single case strategy makes it possible for scientists and practitioners to develop the research plan collaboratively. At the end of the effort,

participating schools are likely to have new and beneficial practices in place.

The stance advocated here would increase the prestige associated with, and resources directed to, developing the real-world infrastructure for prevention practice. It is noteworthy that NIH criteria for evaluating research proposals do not address the question of whether the research will contribute to building the practice infrastructure. Although federal agencies other than the NIH send huge sums of money to states and communities to prevent psychological and behavioral problems, few studies are funded that would evaluate or improve ongoing practice through empirical work. For example, a study of a community intervention to prevent substance use could show significant effects, but no one is likely to measure its maintenance after the research ends, and if such measurement did occur, there would probably be little trace of the effective practices (Ringwalt *et al.*, 2002).

This is why the Society for Prevention Research is encouraging development of research conducted in and with the practice system. Specifically, the society advocates that each NIH institute develop RFAs to fund research in which practice agencies (e.g., OJJDP, CSAP, DOE) evaluate the programs they fund and evaluate strategies for effective dissemination and implementation. At the end of the research, practices shown to be of value could remain in place. Wilson Compton at NIDA has suggested the term "braided funding" to describe the use of NIH money to fund research within the practice system (Robertson, personal communication, 2003).

In sum, it has been difficult to integrate research and practice because, even at the level of our underlying philosophy of science, there is a fundamental disconnect. To the extent that our model of research emphasizes model building and treats affecting the incidence and prevalence of problems as something to be derived from these models, we will be less likely to pinpoint variables that predict and influence the prevalence of the problems we seek to prevent. Additionally, it will be harder to integrate research and practice in a way that accelerates the evolution of effective preventive practices.

The Cultural Practices Needed for Effective Prevention

Creating a vision of a society with science and practice effectively integrated could facilitate effective integration of research and practice (e.g., Biglan & Smolkowski, 2002). The backgrounds of many of us are in research and practice with individuals—as clinicians and educators. Over the past 40 years, practitioners have developed concepts and methods for working with individuals. We can point to many valuable, empirically supported programs and policies (Biglan *et al.*, 2004); however, it is more difficult to find well-developed concepts about the organizations and communities in which to implement these interventions (Biglan & Taylor, 2000).

It would be useful to think about this issue in terms of cultural practices (Biglan, 1995). If we could successfully integrate science and practice as they relate to school prevention efforts, what specific practices could we establish and maintain? Certainly, one practice would be the continued implementation of the program or policy proven effective. But, because fidelity of implementation would likely decline over time (Ringwalt *et al.*, 2002), the implementation of the practice would need to be continually monitored (Biglan *et al.*, 2004). Because the ultimate question is whether the problems we seek to prevent are actually prevented, a system for the ongoing monitoring of youth functioning will be required so that the school or community can see how it is doing (Mrazek, Biglan, & Hawkins, 2004).

We will surely need other practices. A system of accountability for reinforcing school personnel's adherence to effective prevention practice is essential. We know little about what reinforces such adherence, but evidence suggests that creating a shared vision among teachers about the importance of the practice and providing ongoing feedback about desired outcomes are helpful in implementing and maintaining effective behavior management in schools (Sugai *et al.*, 2000). Presumably, the system would need to embed prevention practices in the "normal" practices of the school. Indeed, the practices would come to be "just what we do here." These might include routine review by school and district officials of the implementation of prevention practices and youth well being. But, ensuring such a practice may require state or federal policy to create contingencies like those of the Synar amendment, which requires every state to monitor and reduce illegal sales of tobacco to young people or risk losing block grant funds for drug and alcohol abuse treatment (U.S. Department of Health and Human Services, 1996).

The evolution of these practices will facilitate and be facilitated by the development of new roles for people trained in science and science-based practice (Biglan & Smolkowski, 2002). Schools and communities will need people to administer and analyze assessment systems and make the data an effective guide to

practice. They will need people trained in empirically based practices who can evaluate not only research reports of preventive practices but also the practices implemented by their schools. They will need to be *pragmatically oriented*. If their training has led them to feel they cannot be scientific if they work with a single school or district—that science is about replicability across cases—they will be dissatisfied with their role and unprepared to use scientific principles and methods to help young people in their community.

Part of the problem is that the mechanist paradigm is not progressive. It does not pull our research toward the new issues we need to address. Attention to these issues flows naturally from a contextualist focus on affecting the incidence and prevalence of problems. It is less clear that having as our primary emphasis the elaboration, refinement, and replication of models of the neurocognitive processes and behavior of individuals will pull us toward consideration of these larger social system issues. An endless number of studies might be done to further refine such models without moving to population-based analyses of these processes. Continued efforts are certainly justified; however, such a focus does not pull us toward the research necessary to evolve the cultural practices that will implement and maintain effective preventive practices.

The Need for Single Case Experimental Designs

A mechanist focus on model building does not foster the kind of experimentation needed to bring about changes in the practices of schools and communities. Randomized trials are certainly necessary to determine if our interventions have consistent benefits across diverse populations. However, these trials are premature when our concern is with encouraging schools and communities to adopt, implement, and maintain effective practices. At this stage in our understanding, we are seeking variables that influence schools and communities. Pinpointing variables in individual cases (schools or districts) and systematically replicating relationships in subsequent cases will allow us to inductively develop a set of theoretical principles about how to influence adoption, implementation, and maintenance. Biglan *et al.* (2000) provide a rationale for, and description of, interrupted time-series experiments for conducting such research. Once studies have identified variables that affect these processes in individual cases, we can conduct randomized trials to test whether the principles are indeed generalizable. (Note that, although randomized trials validated most of the interventions in clinical psychology, the core components of those interventions were developed in single case research; Biglan, 2003).

Substantial obstacles hinder the pursuit of such a contextualist strategy. Until the rationale for pinpointing functional relationships in individual cases is better understood and the validity of single case experimentation for doing so is appreciated, it will be difficult to get review committees to approve the necessary research. Moreover, statistical techniques for analyzing such experiments are underdeveloped. Recently, Duncan *et al.* (in press) have demonstrated the utility of LGM methods for analyzing time-series data. Evidence of the utility of such methods for developing effective interventions is also important (e.g., Biglan *et al.*, 1995, 1996).

In summary, the greatest challenge to progress in prevention science involves translating scientific findings and methods into widespread reductions in the incidence and prevalence of human behavior problems. We will facilitate progress if we explicitly evaluate our scientific analyses in terms of their contribution to the goal of the prediction and influence of the incidence and prevalence of problems. Adopting such a goal will foster the integration of research and practice because achieving this goal requires that we learn how to influence the practices of schools and other organizations that directly affect populations. In turn, scientists and practitioners will have to work together more collaboratively to achieve this goal. A framework that acknowledges, and indeed celebrates, the analysis of the influences on the individual case is best suited to making progress on such problems, because it directly focuses on pinpointing manipulable influences that can be exploited to affect practice. Greater understanding of the validity and potential contribution of single case experimental designs must accompany such a shift toward a contextualist paradigm for prevention science and practice.

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