It's Time to Drag Behavioral Safety Into the Cognitive Era

By JOHN KAMP

Why do workers at a site with a successful behavioral safety process choose safe behavior over at-risk behavior when they are not being observed? Since employees can only be formally observed a fraction of the time, they must consistently work safely when not being observed in order for injuries to be reduced. Safe behavior almost always requires more time and effort, which raises the question, "What is it about behavioral safety that motivates employees to make the extra effort to work safely when they are not being observed?"

This "why" question is at the heart of behavioral safety. The shocking part is that the psychological model commonly used to explain the conceptual foundation of behavioral safety—variously called "behaviorism," "behavior analysis" or "reinforcement theory"—cannot explain why employees choose to work safely when not being formally observed. Yet, few seem to recognize this "emperor has no clothes" situation.

PARADIGMS IN PSYCHOLOGY

First, let's review the paradigms in psychology. Like all scientific disciplines, psychology is a field of paradigms. The behaviorist paradigm, popularized by Skinner, dominated American psychology during the 1950s and 1960s. According to behaviorists, what goes on "inside" a person, such as thoughts and feelings, is inappropriate subject matter for a "science of behavior." Instead, the sole focus is on observable behavior and how it is controlled by external consequences—that is, how externally delivered rewards and punishers which follow behavior influence its future occurrence. The familiar "A-B-C" model often used to explain behavioral safety epitomizes this approach (Table 1).

In the 1960s, Bandura showed how behaviorism's simple, "empty-headed" model is unable to explain much human behavior. He pointed out that humans often adjust their behavior based on seeing what others do and what consequences they experience, a phenomenon he termed "observational learning." More broadly, Bandura showed that it is not actual consequences (those experienced in the past), but rather anticipated consequences (what people think will happen) that control human behavior. Because of human thinking capabilities (termed "cognitive processes" by psy-

chologists), people often change behavior without having to experience the actual external consequences that behaviorists see as having sole control over behavior.

Consider this simple example from safety. After seat belt laws were enacted, most people who changed from being non-wearers to wearers did so without having to directly experience any actual negative consequences of not wearing belts (such as a ticket or serious injury). The knowledge that a ticket or a serious injury were possible was enough to motivate the change. Such thought processes fall completely outside the behaviorist model.

Spurred on by Bandura and others who "saw the light," the 1970s saw the emergence of the "cognitive revolution" in psychology. This paradigm focuses on understanding how thoughts, perceptions, attitudes and judgments drive feelings and behavior. Today, this is the dominant paradigm in psychology, although a small minority continue to adhere to the behaviorist paradigm (Robins, et al). For safety professionals whose exposure to psychology has mainly been through behavioral safety, it may be a revelation that most psychologists do not use the A-B-C model and similar behaviorist concepts in their work.

TABLE 1

COMPONENT	DESCRIPTION	EXAMPLES FROM SAFETY
Antecedents (or Activators)	Things that precede behavior and can direct it, but do not ultimately motivate whether or not it occurs.	Signs and posters. Meetings and training. Presence of an observer.
Behavior	Observable actions of an organism; that which behaviorism seeks to predict and control.	Wearing PPE. Following lockout/tagout. Driving within the speed limit.
Consequences	What follows behavior and motivates its future occurrence.	Time saved by shortcut. Feedback from co-workers. Injury.

APPLYING BEHAVIORISM

The fact that strict behaviorism is no longer popular in psychology does not make it wrong; however, most psychologists today believe it has limited "real-world" application. In a controversial critique of behavioral safety, Thomas Smith, a safety professional, repudiated the behaviorist paradigm in psychology, stating, "when held up to the scrutiny of the scientific method, behaviorism failed" (Smith 37). Although this overall conclusion is broader than most psychologists would endorse, Smith's critique provides a healthy corrective to an unquestioning acceptance of Skinnerian psychology by the safety profession.

Because behaviorism relies on someone (e.g., manager) delivering consequences (e.g., praise) to shape someone else's behavior, it follows that a behaviorist approach can be effective when the target behavior is easy to observe or measure, and the person delivering the consequences can do so consistently.

For example, facilities for those with behavioral or emotional disorders are settings in which patient behavior can be fairly easily observed by caregivers in a position to deliver consequences. Behaviorism has been applied successfully to replace dysfunctional behaviors with more-adaptive behaviors among certain "disturbed" populations.

In elementary schools, teachers can observe student behavior and deliver praise, "points," yellow and red cards, and other consequences contingent on behavior. In fact, many elementary school teachers practice behaviorism and it usually influences children's behavior (although critics question whether children's inherent interest in learning is stifled as a result). In some jobs, it is easy to count an individual worker's output. Widespread use of "pay for performance" schemes, such as piece-rate and sales commissions, reflects the belief that direct monetary consequences motivate high levels of employee output.

It should be obvious why these examples of the use of behaviorism to control behavior do not fit safety behavior in the workplace, however. Each day, workers have hundreds of opportunities to choose safe or at-risk behavior. It is simply impractical to have an "official consequence giver," such as a supervisor or behavioral observer, witness more than a fraction of those behaviors.

That is one reason safety recognition and incentive programs in industry traditionally focus on accident rates rather than actual safe behavior—accidents are much easier to measure. However, accident measures depend not only on how safely people work, but also on luck (Petersen 37); in addition, accident reporting is easily biased when reward or punishment is made contingent on them. Thus, accidents do not provide a suitable safety measure for a behaviorist approach, while safety behavior itself eludes measurement and delivery of consequences all but a fraction of the time.

WHAT REALLY CHANGES BEHAVIOR IN BEHAVIORAL SAFETY?

Let's now examine how behavioral safety is typically implemented. First, several meetings are held to educate managers, supervisors and workers and attempt to gain their "buy in." Next, a set of critical, observable, safety-related behaviors is identified (often by a group with a large worker contingent). Observers (most hourly workers) are trained to sample these behaviors, record observations and provide verbal feedback to those observed. Observation data is charted at the group level and discussed with a focus on how to increase the percentage of safe behavior. These data help identify opportunities for both behavior change and improvement in working conditions. Many training sessions and meetings are held throughout.

Basically, this is a method in which external consequences of safety-related behavior are just the same as they were

Origins of Behavioral Safety

It is interesting to contrast the typical method of implementing behavioral safety with that used in the research widely recognized as the forerunner of current behavioral safety processes. This research, designed and reported by behaviorist Judi Komaki, involved a behavioral safety process limited to observation of critical behaviors by outside researchers and charted feedback. There was no hourly involvement, no verbal feedback from observers and no effort to use the process to make working conditions safer; worker meetings consisted of one 30-minute training session. Clearly, the method of behavioral safety has been much embellished since its more purely behaviorist beginnings.

during the 99+ percent of time a worker is not being formally observed. Certainly, safety is discussed more frequently, particularly among workers who are more involved in the safety process. However, from a behaviorist viewpoint, these are mere antecedents and therefore cannot, by themselves, produce long-lasting behavior change. Yet, this method often (not always) seems to produce an increase in safe behavior and a corresponding decrease in injury rates.

The behaviorist concept of "intermittent reinforcement" cannot explain how occasional observation and reinforcement could lead to consistent safe behavior because it is trumped by the behaviorist concept of "stimulus control." Intermittent reinforcement explains why an organism will consistently engage in a behavior that is only sometimes associated with a reinforcing consequence. Playing a slot machine is often cited as an example.

However, intermittent reinforcement only holds when the situation is one in which a behavior is occasionally reinforced; organisms learn not to engage in a behavior in situations where that behavior is never reinforced. For example, people do not play a slot machine with an "out of order" sign on it. That is stimulus control.

The analog in behavioral safety is that workers clearly know when they are being observed (sometimes they are even asked for permission) and, thus, when reinforcement for safe behavior is available. The concept of stimulus control predicts no behavior change when workers are not being observed—in other words, most of the time.

The term "habit strength" is also used sometimes, as if somehow infrequent observation and reinforcement could get an employee "in the habit" of working safely despite all the rewards that at-risk behavior offers. Actually, habit strength is not a true behaviorist concept, as behaviorism has no provision for a behavior being maintained in the absence of external consequences to support that behavior.

To summarize, although behaviorists might say the A-B-C model explains the success of behavioral safety, critical examination reveals it does not. Behavioral safety introduces many new antecedents, yet few new external consequences for safe or at-risk behavior. Therefore, something other than strict control of safe behavior through manipulation of external consequences is occurring when behavioral safety succeeds.

What is that something else? When people at a site with a successful behavioral safety process are asked why the process works, they do not say, "We've shifted the consequences to favor safe behavior over at-risk behavior" (even though many have been taught the A-B-C model). Instead, they cite "increased awareness," "more positive attitudes toward safety" and "people caring more about safety." These are all cognitive, not behaviorist, explanations—they focus on changes in internal processes that clearly lie outside the behaviorist domain. Yes, behavioral safety changes behavior (when it works), but clearly it does much more by changing perceptions, attitudes and values than by changing the external consequences of safe and at-risk behavior.

Thus, a disconnect exists between the theory typically used to explain behavioral safety (behaviorist) and the actual methods of behavioral safety (cognitive). Safety professionals need to acknowledge that current behavioral safety methods work primarily by producing cognitive changes and must look to cognitive psychology for knowledge that will enhance behavioral safety theory and methods. Put another way, if explanations of behavioral safety remain stuck in the outmoded behaviorist paradigm, practitioners will never look outside that paradigm for ways to improve the overall methodology.

LOOKING TO COGNITIVE PSYCHOLOGY: ATTITUDES & BEHAVIOR

How can knowledge from cognitive psychology be applied to enhance behavioral safety? Consider this example. A huge body of psychological research exists on attitude formation and change, yet many psychologists who practice behavioral safety not only ignore this research, they publicly advocate against deliberately focusing safety improvement efforts on worker attitudes.

Ironically, these same practitioners implement a process that encompasses many initial meetings to "educate" managers, supervisors, labor leaders and workers; a high level of worker participation in process design and implementation to promote "buy in"; and training observers how to provide feedback. These are all attempts to create favorable attitudes toward behavioral safety in general, toward specific aspects of the behavioral safety process and toward safe behavior. Why not acknowledge this and see whether findings on persuasion in communication (e.g., Petty and Cacioppo) can be applied to increase the effectiveness of efforts to influence attitudes and behavior?

A common argument against explicitly targeting worker safety attitudes is that a) though it may seem counterintuitive, changes in behavior often lead to changes in attitude and b) changing behavior can be achieved more efficiently and effectively than changing attitudes. Put simply, if a safety professional can get people to work safely, their attitudes will change to favor working safely.

However, if the relationship between behavior change and attitude change were that simple, wouldn't traditional safety discipline programs make workers want to work safely? After all, workers will follow safety rules when the boss is watching to avoid being disciplined, so shouldn't that behavior change produce a favorable attitude toward following rules when the boss is not watching? The answer, of course, is no.

Although the ability of behavior change to produce attitude change has been documented, one rarely hears discussion about the fact that cognitive psy-

chology has defined clear limitations on this phenomenon. The "insufficient justification effect" from cognitive dissonance research explains how people reconcile their attitudes with their behavior.

In the original experiment demonstrating this effect, Festinger and Carlsmith had research subjects spend an hour performing boring tasks. They then persuaded each subject to tell the next subject (who was actually their assistant posing as a subject) that the tasks were quite interesting. Some subjects were paid only $1 for participating in the study, while others were paid $20 (a substantial sum in the late 1950s).

When asked later to complete a questionnaire about how much they enjoyed the boring tasks, those paid $1 reported significantly more enjoyment than those paid $20. The well-paid subjects apparently told themselves that the $20 provided sufficient justification for deceiving the next subject; they did not truly believe the tasks were interesting. The poorly-paid subjects, on the other hand, seemed to have convinced themselves that, since $1 did not sufficiently justify lying, the tasks must actually have been somewhat enjoyable (Festinger and Carlsmith 203+).

This classic experiment (and dozens that followed) shows that if a person can justify something s/he has done as reasonable in light of some external influence (e.g., "I wore my PPE because the boss was watching or because I knew the behavioral observer would give me a cafeteria credit"), his/her attitude toward the behavior will not change ("I still think PPE is unnecessary").

If, however, behavior cannot be easily justified by external influence ("I put on my PPE when I saw the observer coming, even though I knew if I didn't have it on all she would do is mark it down and talk to me about it"), then a person is likely to change his/her attitude to make it consistent with his/her behavior ("I guess I am starting to believe in wearing PPE").

The practical implication of this effect is that the smallest possible inducement one can use to get people to change their behavior is more likely to change their attitude to become consistent with that behavior. This argues against including material rewards for safe behavior as part of a behavioral observation process. Such incentives merely create a cognitive justification for working safely during observation, which in turn would limit development of favorable attitudes toward working safely when not being observed. In this way, opening the door to cognitive findings can help keep safety professionals from tripping up in the implementation of behavioral safety. (Although the focus here is on how behavioral safety changes workplace safety behavior, general influences on worker safety attitudes are an important topic in their own right. For example, an organization's "safety culture" seems to influence worker safety attitudes, but that influence is not uniform across individuals. These attitudes may vary over time, for example, as management attention to safety fluctuates. To the extent that worker safety attitudes become manifested in their behavior, these processes are important to understand.)

TABLE 2

AREA	POSSIBLE APPLICATION
Persuasion in communication	Increasing initial "buy in" at the site.
Using behavior change to promote attitude change (cognitive dissonance)	Predicting effect of incentives on attitudes toward safe behavior.
Risk perception	Increasing effectiveness of feedback on at-risk behavior.
Social influence	Getting people to willingly serve as observers.

RISK PERCEPTION & SOCIAL INFLUENCE

Risk perception is another area of cognitive psychology that may hold promise for enhancing behavioral safety. Although behavioral safety "thought leaders" typically do not use the term "risk perception" (Geller's 1996 book is an exception), they indirectly acknowledge its influence when they say the threat of injury is a weak consequence because of its low (perceived) probability of occurrence. In practice, behavioral observers are often trained to point out in feedback that simply because a behavior does not usually result in an injury, that does not mean it could not.

Perhaps findings from risk perception research could help augment change efforts in behavioral safety. As one example, a group of researchers recently applied risk perception concepts from "protection motivation theory" to explain hearing protection use among industrial workers (Melamed, et al). Attention is another area of cognitive research that is clearly relevant to workplace safety, yet it has been largely ignored by behavioral safety.

Thus far, this article has argued that behaviorist principles cannot explain why workers at a site with a successful behavioral safety process choose safe behavior when not being observed, because external consequences still favor at-risk behavior. One exception to this argument would be if behavioral safety causes workgroup members to informally provide consequences that shape each other's ongoing safety-related behavior. However, since behavioral safety incorporates no external consequences that would reinforce peers for coaching each other outside of a formal observation, the behaviorist explanation fails again.

The study of social influence is another body of research outside the behaviorist paradigm that could enhance behavioral safety. This research helps illuminate when people will comply with a request; when they will conform with a group; how the presence of others affects behavior; and how group norms are formed and maintained. These topics have clear relevance for specific behavioral safety issues such as how to get workers to be willing to observe/be observed; how to use social feedback to change behavior; and how to get workers to informally coach each other for safety.

This discussion provides only a brief overview of areas where psychological concepts and research from outside behaviorism may enhance behavioral safety (Table 2). In the author's opinion, before any breakthrough gains will be achieved, behavioral safety must be

Cognitive concepts such as attention seem to be regaining favor in safety discussions. Hopefully, this means that forces are building which will lead to a "cognitive breakthrough" in behavioral safety.

"dragged into the cognitive era." Such gains are needed to:

- identify the most-potent elements in current behavioral safety methods;
- modify current methods to improve their effectiveness;
- develop new methods;
- increase the overall success rate of behavioral safety;
- improve the efficiency of behavioral safety (i.e., reduce the amount of resources required for success);
- better diagnose and overcome implementation pitfalls;
- transfer knowledge from behavioral safety to improve other areas of organizational performance.

Behavioral safety has a good track record, so many things are being done well in its implementation. But does it always succeed? Is it cost-effective? Is it possible to do it better? It is hard to claim there is no room for improvement.

IS MOMENTUM BUILDING?

The assertion that behavioral safety has much to gain by embracing cognitive psychology is not a new argument. [See Geller, Topf and Sarkus; in addition, Krause's recent writings emphasize "employee engagement" rather than externally-delivered consequences as the key motivating influence in behavioral safety (2000 24-25; 2001 29-30). He defines "engagement" using cognitive concepts: intellectual connection, emotional connection, creative connection, and psychological connection (2000 24).] Cognitive concepts such as attention seem to be regaining favor in safety discussions. Hopefully, this means that forces are building which will lead to a "cognitive breakthrough" in behavioral safety.

Cognitive psychology is a broad field. Not everything it offers will be of value in behavioral safety. One clear strength of the methodology as practiced today is its precision and focus. While it would be a mistake to "muddy the waters" by bringing in too many new concepts and methods, prudent application of some new thinking would be beneficial. Otherwise, behavioral safety may grow stale and die from a simple lack of vitality. That would be a great loss to those who could still benefit from a method that has so far demonstrated a positive track record in injury prevention. ■

REFERENCES

Bandura, A. *Principles in Behavior Modification.* New York: Holt, Rinehart, Winston, 1969.

Festinger, L. and J.M. Carlsmith. "Cognitive Consequences of Forced Compliance." *Journal of Abnormal and Social Psychology.* 58(1959): 203-210.

Geller, E.S. *The Psychology of Safety: How to Improve Behaviors and Attitudes on the Job.* Radnor, PA: Chilton Book Co., 1996.

Geller, E.S. "Behavior-Based Is Not Enough: Non-Behavioral Principles to Strengthen Your Safety Process." Presentation at the Behavioral Safety Now Conference, Reno, NV, Oct. 2000.

Komaki, J., et al. "A Behavioral Approach to Occupational Safety: Pinpointing and Reinforcing Safe Performance in a Food Manufacturing Plant." *Journal of Applied Psychology.* 63(1978): 434-445.

Krause, T.R. "Motivating Employees for Safety Success." *Professional Safety.* March 2000: 22-25.

Krause, T.R. "Moving to the 2nd Generation in Behavior-Based Safety." *Professional Safety.* May 2001: 27-32.

Melamed, S., et al. "Usefulness of the Protection Motivation Theory in Explaining Hearing Protection Device Use Among Male Industrial Workers." *Health Psychology.* 15(1996): 209-215.

Petersen, D. "Measuring Safety System Effectiveness: What Measures Should We Use and Why?" *Professional Safety.* Oct. 1998: 37-40.

Petty, R.E. and J.T. Cacioppo. *Communication and Persuasion: Central and Peripheral Routes to Attitude Change.* New York: Springer-Verlag, 1986.

Robins, R.W., et al. "An Empirical Analysis of Trends in Psychology." *American Psychologist.* 54(1999): 117-128.

Sarkus, D.J. "Augmenting Behavior-Based Interventions in Managing Occupational Safety Performance." Unpublished master's degree thesis. Moraga, CA: St. Mary's College of California, 1996.

Smith, T.A. "What's Wrong with Behavior-Based Safety?" *Professional Safety.* Sept. 1999: 37-40.

Topf, M.D. "Behavioral Safety: A Multifaceted Approach." *Professional Safety.* Aug. 1998: 34-36.

John Kamp, *Ph.D., is director, research and development, for NCS Pearson. An organizational psychologist, he has developed and implemented processes in the areas of selection of safe employees, safety climate assessment, safety management consulting and behavioral safety. Kamp holds a Ph.D. in Psychology from the University of Minnesota. He is an associate member of ASSE's Valley Coastal Chapter.*

This article is based on a presentation by the author at ASSE's February 2001 Behavioral Safety Symposium, which was held in Orlando, FL.