

## **Behavior Science to Practice: Connecting the Dots**

**Susan G. Friedman, Ph. D.**  
**Department of Psychology**  
**Utah State University, Logan, UT**

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### **Introduction**

The goal of this collection of four papers is to increase veterinarians' knowledge and practice of applied behavior analysis in their work with patients and clients. Applied behavior analysis (ABA) is the technology of behavior change based on the experimentally derived principles of learning and behavior. Three features distinguish ABA from other behavior technologies: 1) the primary focus is the functional relations between observable behavior and environmental events; 2) the primary explanatory principle is the law of effect, which states behavior is a function of its consequences; and 3) the primary interventional goal is to redesign the environment in order to provide the animal with an alternative way to achieve the same purpose served by the problem behavior, and to teach new skills to make the problem behavior less likely to occur.

ABA has its roots in Skinnerian behaviorism, which historically suffers a serious image crisis. This is partly due to the obstacles discussed below, and ultimately due to a shallow understanding of it. Addressing the elephant in the room, Staddon (2000) wrote, "Behaviorism is frequently declared dead. But, although services are held regularly, the corpse keeps creeping out of the coffin." Behaviorism, more currently known as behavior analysis, continues to stand the test of time because it continues to pass the test of good science: it is based on testable hypotheses (verifiable); it explains a wide range of behaviors (inclusive); it has good predictive utility; it is parsimonious; and it is useful (brings about positive behavior change across species). As with all other sciences, the behavior analysis of today is not the same as 100 years ago. The study of learning has

advanced due to the process of self-correction unique to science. This process is the result of systematic methods; public, peer review; and verification across independent researchers. Self-correction gives us confidence that, although any particular science finding may be corrected some time in the future, it is the best information we have today (see current findings on the relationship between environmental events and gene expression for a dramatic example of the self-correcting process of science; Massachusetts Institute of Technology, 2008).

Behavior analysis contributes an essential piece to the behavior puzzle, and ABA provides a behavior change technology no veterinarian working with behavior should be without. However, ABA is not well known or practiced, despite its longstanding science foundation and widespread, cross-species applicability. Instead, behavioral advice is often based on personal recipes derived from little more than untestable folk wisdom and everlasting cliches. Clearly, some personal recipes are effective. However, explanations about why they work are often phantasmagorical, and the result is continued poor practices (e.g., dropping a parrot reduces biting because the parrot concedes the dominant alpha role to its human owner). With all that ABA offers, what accounts for the difficulty connecting the dots from behavioral science to practice?

## **Obstacles to Connecting the Dots** ***Cultural Fog***

In 1944, Gunnar Myrdal (Myrdal, 1944), wrote:

A handful of social and biological scientists over the last 50 years have gradually forced informed people to give up some of the more blatant of our biological errors. But there must be still other countless errors of the same sort that no living man can yet detect, because of the fog within which our type of Western culture envelops us.

Culture refers to the collective attitudes and behaviors that are characteristic of a group and socially transmitted from one generation to another. Generally, when it comes to understanding (explaining) behavior, Western culture has us looking in the wrong place, namely, *inside* the animal, *independent of the conditions* in which the animal behaves. Theology points to internal forces (the devil made me do it); biological determinism points to an individual's genes (he inherited his stubbornness from his father); and some approaches to psychology point to the psyche (he has a weak superego). Yet the cultural influences that have us searching inside an animal to explain its behavior fly in the face of what each one of us knows, *empirically*, to be true: no-one keeps bumping into the same wall over and over again. If you bump into the wall when searching for the door, the consequence of that action (e.g., a headache or late arrival to the next location) produces a change in your behavior and you keep changing your behavior until you find the door. The next time you exit the room, you go directly to the door. As explained by Paul Chance (Chance, 2006), "Learning does not give the species the tendency to behave a certain way in a particular situation; rather it gives the individual the tendency to *modify* its behavior to suit a situation. It is an evolved modifiability." Even bacteria (from the kingdom monera, although this taxonomy is in flux) change what they do as a function of outcomes. In 1906, Jennings (Jennings, 1906) wrote:

The movements of the bacteria are not unordered, but are of such a character as to bring about certain general results, some of which at least are conducive to the welfare of the organism. If a bacterium swimming in a certain direction comes against a solid object, it does not remain obstinately pressing its anterior end against the object, but moves in some other direction.

This ability to change one's behavior based on experience may be "the crowning achievement of evolution" (Chance, 2006). Indeed, behavior is a tool used by each individual to affect, and be affected by, its environment. Behavior isn't found inside the animal with behavior problems; it is found in the interplay between behavior and the conditions in which the animal behaves.

### ***The Madness of Causes***

Another obstacle to scientific thinking about behavior is what Matt Ridley calls "the madness of causes" (Ridley, 2003). He wrote, "when you catch pneumonia the bacterium is only an opportunist, your immune system usually needs to be run down first by starvation, hypothermia or stress. Is that the 'true' cause?" There are many causes of behavior, from the molecular to the environmental, and many sciences investigating them. Each one represents a different level of analysis with its own focus and methods. Each one contributes a different piece to the behavior puzzle—that is, the correlates of behavior. It is the nature of the problem that ultimately determines which disciplines we turn to for behavior solutions. This makes interdisciplinary work vital to the health and welfare of patients and clients.

In veterinary practice, three disciplines commonly converge around the subject of behavior. They are ethology, medicine and behavior analysis. Each discipline uses a different model for research and practice: the model matters. If you ask an ethologist, a veterinarian, and a behavior analyst why a parrot does a particular behavior, you will likely get three different answers. The ethologist typically focuses on the evolutionary model, with natural selection of adaptive genes as the primary

explanatory variable. She/he may reframe the question as, “In what way does the behavior improve this species’ survival in the wild?” The veterinarian typically focuses on the medical model, with biophysical or biochemical dysfunction as the primary explanatory variable. She/he may reframe the question as, “What underlying disease or disorder accounts for this behavioral symptom and what is the cure?” The behavior analyst typically focuses on the behavioral model, with behavior–environment interactions as the primary explanatory variable. She/he may reframe the question as, “What function does this behavior serve the animal, and how can we change the environment to change the behavior and teach new skills?”

Both ethology and medicine have essential roles in improving the lives of captive animals. Ethology informs us about the fit between a species’ natural history and the captive environment we provide. The medical model accounts for some devastating diseases with behavioral correlates. However, given a physically healthy animal, in a reasonably well-arranged environment, most behavior problems are the result of clients’ inadvertent reinforcement of the wrong behavior and insufficient knowledge of how to do otherwise. Even when ethological or medical issues are identified, behavior problems often exist independently of them. And neither the ethological nor medical models directly address the specific conditions under which an animal can learn. It is this piece of the behavior puzzle for which behavior analysis is best suited.

### ***Terminology Tumult***

Terminology tumult, fostered by the use of hypothetical, psychological constructs and vague labels, is also an obstacle to the widespread adoption of behavior science. The ABA definition of behavior is *what an animal does, given certain conditions, which can be measured*. External observers can’t verify private behaviors, such as thoughts and emotions, and so the main focus of ABA is necessarily overt, public behavior and environmental conditions. The focus on observable behavior does not discount animals’ cognitions and emotions. It represents adherence

to the most fundamental standard of scientific practice: measurability. As measurement technology improves, it may be that internal correlates of behavior, such as changes in heart rate, can improve our work with certain species and behavior problems.

Behavior is not hypothetical, psychological constructs or vague labels. Constructs are concepts and abstractions, used to describe commonalities among observed phenomena. When a concept is incorrectly regarded as a tangible thing, it has been reified. The history of psychology is littered with reified constructs used to explain behavior (see Stephen Jay Gould’s *The Mismeasure of Man* for an excellent treatise on reified constructs). For example, it is common for people to state that an animal’s failure to learn a behavior is caused by low intelligence, screaming is caused by neurosis, and inactivity is caused by lack of motivation. But how can a concept cause behavior? Hypothetical, psychological constructs are only placeholders for neuro-processes not yet understood. Even when these processes are known, no account of behavior will be complete without behavior–environment relations.

The dominance construct is a prime example of the reification fallacy. In popular magazines and Internet sites, the various pseudo-causes of parrots’ biting are height dominance, cage dominance, food dominance, flock dominance, gender dominance, floor dominance, phone dominance, and Super Male (for the bird with more than a few dominances). But what behavior and conditions are described by this concept? If we teach a bird to step up reliably from all locations by delivering reliably positive outcomes for the bird, have we cured its dominance?

Even ordinary labels like mean, stubborn or friendly can be problematic. Friendly is not a behavior an animal can do. Friendly is an adjective that describes a class of behaviors under certain conditions. However, we can train a bird to step onto a stranger’s hand when requested, perch in a calm manner on that hand, and accept some petting. When a bird

demonstrates these behaviors, we call it friendly. Constructs and labels have the following inherent weaknesses:

- They cannot be tested; therefore they are unverifiable.
- They foster self-fulfilling prophecies; you will get what you expect.
- They provide excuses to get rid of the animal; it's a defective bird.
- They increase the use of ineffective training strategies; "I'll show him who's boss."
- They give a false sense of understanding the problem, when we've only given it a name.
- They end the search for actual causes we can do something about; we can't change the bird's genes, so game over.

Another reified construct is instinct (i.e., the ascribed "cause" of behavior that is inborn, performed automatically without learning). Instinct is often used to explain any behavior observed in the wild. However, it is clear that, in addition to the awesome innate behavioral repertoires of wild animals (i.e., simple reflexes and modal action patterns), they also have huge dynamic, learned repertoires that are maintained in the wild environment by the same principles that maintain behavior in captivity. Further, a plethora of recent research demonstrates the significant learning component in many behaviors once thought wholly innate; for example, Berger's research with moose on the

learned fear of predators (Berger, 2007), and Gros-Louis' research on the learned vocalizations of male cowbirds (Gros-Louis, West, Goldstein, & King, 2006). Even as early as 1930, Kuo demonstrated the relationship between the early learning history of kittens and subsequent hunting of rats (Kuo, 1930).

### Conclusion

Behavior is a natural phenomenon, part of the physical world; thus, our knowledge of it can and should be based on scientific methods. Behavior analysis is the scientific study of the natural laws that govern behavior change due to experience, i.e., learning. ABA is the extension of these laws to prevent and solve practical behavior problems. It is a technology of behavior change or, conversely, a teaching technology. Although learning is often treated as a process outside of an animal's biology, it is the nature of animals to maintain, or change, what they do based on the outcomes of doing it. "Through learning, an organism can cope with changes in the environment for which its innate behavior is inadequate" (Chance, 2006). ABA is currently underrepresented in veterinary preparation and practice, compared with the medical and ethological behavior models. By removing the obstacles to connecting the dots from behavioral science to practice, veterinarians can add a sharp set of tools to their current toolbox, with which to humanely improve the lives of all species.

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