

Column 6: Exploring Mysteries of Living: Contingencies and Awareness



Copyright © 2019 by **Stephen F. Ledoux**

A Los Alamos member of The International Behaviorology Institute

Why these Columns? Because human behavior causes global problems, and solving these problems requires changes in human behavior... So *everyone* benefits from knowing something about the natural science of human behavior (called behaviorology) that these columns relate. Having first appeared as newspaper columns, these columns began appearing on **BehaviorInfo.com** starting in 2020.

In the last column, we considered the three terms in our basic formula for beginning to examine any particular behavior and its independent variables. Here we consider consequences and awareness.

Consequences divide into various types that we detail later. Our concern just now is their status as either “reinforcing” or “punishing” consequences, because this characteristic pertains to the central role of consequences. This central role involves consequences either making responses occur more often, in which case the consequence earns the title “reinforcer,” or making responses occur less often, in which case the consequence earns the title “punisher.”

For example, at certain specially designed intersections in Europe, drivers are photographed. Yes, that is common, but what happens next is less so. Those drivers who stop for the red light receive a free lottery ticket while those who run the light receive a payable traffic ticket. The data, for all those who drive that route, show that the number of drivers obeying the light increased when the authorities put these contingencies into place. Similarly, the number running the light decreased. Thus we can call the lottery tickets reinforcers and the traffic tickets punishers. No surprise there. After all, we must all obey the laws of nature—no other option exists—both before and after science discovers them.

We would, however, prefer to see these stimuli occur immediately after the responses that produce them, and earn these titles at the level of the individual drivers rather than the crowd of drivers. We will see more individual examples in later columns. We will also see that delays, such as from the mail delivery of these consequences, will compel an expansion in the details of our analysis. As previously described, these real examples are always more involved than whatever particular principle we are using them to elucidate.

How does earning the reinforcer or punisher titles work? Recall that the energy trace of an evocative stimulus at nervous–system receptor cells evokes behavior by triggering changes in nervous–system structures that mediate the behavior occurrence. With behavior that occurs through muscle contractions stimulated by motor neurons, the energy from evocative stimuli makes sensory neuron bundles fire, which then make motor neuron bundles fire, which makes muscles contract, which is the behavior that we see occurring.

Reinforcers work also by triggering changes in the nervous system, but these changes are altered structures that are more enduring and thereby make the body a different body, even if only in very small ways. The result is that, after reinforcers occur, the changed nervous system makes the occurrence of the related evocative stimuli more easily evoke the behavior again. We observe this as the behavior occurring more frequently. And punishers work like reinforcers except that the enduring nervous–system structural changes leave the evocative stimuli less effective, so that the behavior occurs less frequently.

While physiology does not cause behavior, much more actually happens as contingencies cause behavior by operating through our physiology. The details of the physiological events supporting the operation of both evocative stimuli and consequences come from cooperation with our colleagues in physiology.

We can elaborate these terms into a more clear statement of the fundamental formula for *initially* analyzing any behavior. The “A—B—Cs” readily become the more specific formula of "Evocative Stimulus—Response—Consequential Stimulus," with "Reinforcing Stimulus" being a good example of a "Consequential Stimulus."

We call that more specific formula the "three–term contingency" for obvious reasons. We can write many similar formulas, with three or more terms, to describe a range of alternative contingency forms. However, this particular one summarizes our starting point for analyzing any bit of behavior that becomes of interest or concern for us.

We start by investigating the stimulus variables in the setting. Behavior never occurs in a vacuum (at least not for very long) because numerous evocative and other types of stimuli fill every setting. Recall our “at our desk” example. Next (actually the order is not this strict) we examine the responses for any characteristics that can affect outcomes. And we continue by considering the many factors that affect the effective operation of the consequences, which make great topics for future columns.

In due time we will find that our analysis of the contingencies in which behavior participates is deeper and far more extensive than our starting–point formula indicates.

Is “contingency” still an uncomfortable notion? Remember, responses actually produce their consequences. Responses make the environment change in some way that serves as a consequence. Stopping at the red light made a lottery ticket appear in the mailbox. Now recall that a “contingency” may best be understood at this time as a dependency: The occurrence of the consequence depends on the occurrence of the response, which itself depends on the occurrence of the evocative stimulus. Or, better, the consequence occurrence is contingent on the response occurrence, and the response occurrence is contingent on the evocative stimulus occurrence.

For example, when out driving, as the car approaches some curves, those curves, as evocative stimuli, evoke steering responses which staying safely on the roadway consequates. That consequence of staying on the road depends on, that is, is contingent on, proper steering responses, which depend on, that is, are contingent on, the evocative stimulus directions that the curves take.

Here is something else, related to contingencies, that I find very important for thoroughly understanding human behavior. You should note, and possibly find fascinating and important as well, that *people need not be aware of the stimuli in contingencies for those stimuli to affect their behavior*. For instance, you need not be aware of the curves, in that driving example, for them to evoke correct driving responses.

Awareness is one of the neural behaviors of consciousness, which are later column topics. Awareness seems to operate as a "single channel" capability. That is, only one behavior at a time, a "single channel," can occur with each behavior-capable organ. This includes not only visible organs like arms and legs, but also internal organs, with various brain parts constituting separate behavior-capable organs.

For example, if you must give a speech for having won an award, that requirement can evoke the relevant brain part's single-channel neural-awareness responses, perhaps engaging them with "daydreams" of your speech writing while driving. Then, the curves (as evocative stimuli), and continuing to stay on the road (as reinforcers), will still effectively control your steering responses. (Up to a point, that is. "Don't try this at home" as they say—or alone, etc.)

Ultimately you will observe, which is another neural behavior of consciousness, this not-needing-to-be-aware when, arriving at a red stop light further along the road, you find yourself wondering, which is yet another neural behavior of consciousness, how you got there, and where the last mile or two went. Virtually everyone who has driven for more than year has had such an experience. And it is entirely natural.

You neither crashed nor heard sirens wailing nor got pulled over, so the steering responses must have been adequate. Those steering responses were occurring, however, under what we call "direct stimulus control." They were occurring right along with, that is, at the same time as, your daydreaming responses, but along the arms channels.

The daydreaming responses were in the way, so to speak, of your being aware of the steering responses, because the needed neural channel was already occupied with those daydreaming responses.

How often have you experienced something like that? It is not magic, although it seems wonderfully magical. It is just the behaviorological laws of nature at work, laws which operate without our needing to be aware either of them or of the variables involved.

Writing these columns occurs separately from membership in The International Behaviorology Institute (TIBI, at www.behaviorology.org where you can always find more information and resources). The author is not speaking for TIBI, and the author and TIBI need not be in agreement. TIBI welcomes feedback, members, and donations (501.c.3). This is column 6 of 72.