Column 4: Exploring Mysteries of Living: Behavior and Contingencies

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.

Since the causes of behavior are cast in terms of "contingencies," the time has come to make some sense of the term “contingency.” This term stands in generically for the range of "causes" of behavior the way other terms cannot, such as "stars," in astrology, or "selves," in psychology.

In a contingency, as an if–then relationship, if one variable happens, then the other variable happens. Each contingent relationship involves a dependency between variables. One variable "causes" behavior while the other variable is the behavior, the effect of the cause. A dependency exists between the effect and the cause. The occurrence of the effect *depends* on the occurrence of the cause. While gradually getting used to the term "contingency," substituting “dependency” for it sometimes helps.

Of course, science generally avoids words like “cause” and “effect,” because they come with various bits of philosophical baggage. We can, however, still employ them to get things started. But science enhances accuracy by using the terms "independent variable" and "dependent variable," with the dependent variable occurring as a function of the independent variable.

For example, some electric stoves have ten buttons for each element, with each button tied to a different amount of electrical energy passing through and thereby heating the element. These buttons therefore constitute the values of the heat independent variable, and we manipulate the heat when we push different buttons. The word "manipulation" gets some bad press, sometimes deserved, but here in science it has a quite neutral meaning.

By manipulating the heat, we control the speed at which the water in our teapot boils. That speed can be a dependent variable, but the button pushing is the behavior dependent variable of our concern. Contingencies involving guests getting impatient for tea compel

pushing the button that provides the most energy to the stove element, making the water heat quickly. In contingency terms, the fastest water heating is contingent on (that is, “depends on”) pushing the highest energy button, which is contingent on (that is, “depends on”) guests getting noisy for tea.

Alternatively, conditions might be such that we cannot use the hot water for several minutes anyway. Perhaps we are preparing the crumpets or scones that accompany the tea. Then, pushing a button that provides less energy to the stove element makes the water heat more slowly.

As usual, that example is more complex in a couple of ways. The whole situation actually intertwines both physical variables (amount of energy and speed of water heating) and behavioral variables (conditions controlling pushing one button rather than a different button, with appropriate results). All this anticipates our initial coverage of behavior independent variables and dependent variables shortly.

Also, we actually only observe the repeatable sequence of these events in time, that is, one seems always to follow the other (“seems,” because observing every possible repetition—past, present, and future—is not possible). Enough such repetitions breeds a certain confidence that the sequences are not occurring by coincidence.

We may then begin using the overused (and possibly misused) term “cause” to describe the sequence, saying that the occurrence of a certain independent variable causes the occurrence of a certain dependent variable. We may even reach the point where the relationship is so well established, with such a high confidence level, that we begin calling it a “law” (like gravity).

We find different scientific disciplines connecting with different kinds of dependent variables as their particular subject matter. Generally, dependent variables involving energy constitute the basic subject matter of physics, while chemistry deals with matter as its dependent–variable subject matter. And dependent variables involving life forms constitute the basic subject matter of biology, while behaviorology deals with life functions, behavior, as its dependent–variable subject matter.

Behaviorology is interested in the functional relations that pertain to behavior, especially human behavior. With behavior in general, and changes in behavior in particular, as our dependent variables, consider just a general view of the independent variables that control behavior.

Note that the word "control," with respect to behavior, does not refer to "coercion," something that pre–scientific cultural notions make us suspect. Scientifically, "control" merely refers to behavior being a function of independent variables.

An easy, although only temporarily helpful, initial view of behavior and its “causes” takes a very simplified form that we call the “A—B—Cs of behaviorology.” This is actually a double contingency. Here the “A” stands for “antecedent controls,” while the “B” stands for behaviors, and the “C” stands for “consequent controls.” Expanding a little, this formula reads “antecedent events functionally control behaviors, while behaviors functionally control consequences.”

As contingencies, that formula says that the behavior is contingent on the antecedents and

the consequences are contingent on the behavior. Later, as the complexity increases, we will come to understand that the effectiveness of the antecedents is actually contingent on the consequences.

That formula indicates the most common kinds of variables surrounding behavior. A variety of stimulus variables comprise the antecedents of behavior. A variety of considerations surround behavior responses. And a variety of stimulus variables comprise the consequences, or “postcedents,” of behavior (of which "consequences" are only one type).

Stimuli occur in the environment, some of which exists inside the skin, because the laws of the universe affect what is inside the skin as much as they affect what is outside the skin. Thus, stimuli are the vast range of real events in the internal and external behavior–controlling environments.

More specifically stimuli are various kinds, qualities, and intensities of energy changes at nervous–system receptor cells. They produce structural changes in the nervous system that result in the occurrence of behavior (or affect behavior in some other way) and we describe this interaction as the neural *mediation* of behavior under those environmental controls. Note that nerves mediate behavior only *after* stimulation occurs. Nerves do not initiate behavior. This all occurs entirely naturally.

Internal and external environmental stimulus energies, some that evoke behavior and others that consequate behavior, work by affecting the brain and nervous system, which thus neither originate nor initiate the occurrence of behavior. Instead, brains and nervous systems only mediate behavior as part of the physiology that is ever present and operating when behavior occurs. Topics in later columns will fill in some details.

Essentially then, physiology is the locus at which internal and external environmental independent variables and behavioral dependent variables interact. Similarly, the processes and outcomes that the terms in our behavior formula imply need no participation from spontaneously acting or mystical inner agents.

For a more fun to read, general–audience primer on the topics of these columns, one that is less comprehensive but also less technical than my 2014 textbook, see my 2017 book, *What Causes Human Behavior—Stars, Selves, or Contingencies?* that BehaveTech Publishing, in Ottawa, Canada, published. You can find it fully described on the books page of www.behaviorology.org.

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 4 of 72.