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SELECTION IS A MECHANISM: COMMENTARY ON LEÃO & NETO (2018)

LA SELECCIÓN ES UN MECANISMO: COMENTARIO SOBRE LEÃO Y NETO (2018)

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Leão and Neto have presented an interesting and complex history relating to Skinner's conceptual and empirical evolution of the notion of consequences selecting patterns of behavior. As these authors are careful to note, terms like "selectionism" and "determinism" (and I would add "mechanism") have multiple uses in the language and thus attempting to provide anything like a clear picture of just how Skinner changed in his thinking about the nature of the operant over a decade or so of quite active work is more than a challenge. Just as challenging is how such terms have evolved in their uses over now at least eight decades since the years of concern to Leão and Neto. Perhaps these authors might disagree, but I detected in their treatment concepts like selectionism, determinism, and, especially, mechanism positions that have flavored behavior analysis for some time now and which, in my view reflect, at best, quite limited, if not outright misleading conceptual frameworks. I hasten to add that such does not affect some of their conclusions, however guarded, of, for example, when Skinner may have first considered operant classes as potentially selected through their consequences and how he may have come to

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refine this approach. Certainly, this was obvious at the point he first shaped a performance in the lab; I'll say a bit more about shaping subsequently.

In setting up various contrasts the authors have, at the least, oversimplified concepts like "mechanism," "selectionism," "determinism," and "probability" in ways that never reflected their significant aspects, even in Skinner's time. Moreover, over the years these concepts and others were "set" within the behaviorist community by various writers in ways too often then taken as "gospel" (e.g., Baum, 2005; Chiesa, 1994; Hayes, Hayes, & Reese, 1988; Moxley, 1999).[1] This is not the place to review all the problems with these examples (see, e.g., Earman, 1986, Marr, 1993; 1996; 2003a; 2003b; 2009; 2018; Marr & Zilio, 2013; Slife, Yanchar & Williams, 1999), and I'll simply focus on but one issue.

"Selectionism *versus* mechanism" is typically presented with an emphasis on the "isms." That is, as contrasting philosophical positions on how some aspects of nature are said to work. But, proposing a *mechanism* is expressively addressing how something works. If that weren't enough, given the putative analogy between Darwinian natural selection and consequence-behavior selection (as in shaping), I quote from Ernst Mayr, the late preeminent evolutionary biologist:

Darwin's natural selection was his most daring, and most novel, theory. It dealt with the *mechanism* of evolutionary change and, more particularly how this *mechanism* could account for the seeming harmony and adaptation of the organic world. It attempted to provide a natural explanation in place of the supernatural one of natural theology. Darwin's theory for this natural selection was unique. There was nothing like it in the whole philosophical literature from the pre-Socratics to Descartes, Leibnitz, Hume, or Kant. *It replaced teleology in nature with an essentially mechanical explanation* (2004, p. 109, italics mine).

Analogously, if we wish to shape the behavior of a feeder-trained pigeon to turn in a circle clockwise, we deliver food *immediately upon* any behavior directed toward the desired final performance—we have a recipe for generating new behavior that virtually anyone can learn with a bit of practice—how mechanical is that? Of course, there are many subtleties of technique, but they simply reflect more mechanisms.

Selection as mechanism can be compellingly demonstrated by a device called a *quincunx*—built somewhat like the Japanese pachinko machine (e.g., Weaver, 1982, p. 261). It stands vertically and at the top are a very large number (e.g., a thousand) of small ball bearings that are released one a time to the top center of an enclosed section below with a line of pegs facing outward and placed in many staggered rows so that a ball will collide with pegs in each row until it finally falls into one

of several equally-spaced partitions at the bottom. In the typical arrangement, the distribution of balls among these partitions comes to resemble a normal density function—most of the balls fall in the center partitions with fewer left and right toward the outer ones. What one sees is an aggregation of many, many *essentially random events* ultimately approaching a smooth well-known mathematical function. To quote Marr (2009):

> Of course, one could change the distribution in innumerable ways by, for example, bending or removing pegs, changing the number of balls, or even the shape of the balls; in other words, changing both the environment and the "organism." Of course, we could imagine the balls entering this device say, at the rate of one per day. Over the course of history, these individual and surely mechanical events would emerge as a particular distribution through selection. *History is just mechanism over time* (p. 114).

So much for "historical causation" as distinct from "mechanism." Consider our now circulating pigeon above. If we played a recording of the shaping process backwards we would see how each reinforcer presentation affected the ongoing behavior back to whatever behaviors were occurring before shaping began—the "free operants." In many cases, however, the history of some ongoing behavior is unknown; at best, we have to guess how it might have come about. Though Skinner, perhaps reluctantly, used the word "spontaneous" to describe the unanalyzed operant, he certainly attributed it to controlling (i.e., causal) variables, some of which reflecting an evolutionary history, others, perhaps, mere coincidence (Skinner, 1978).

Setting up a "straw" mechan*ism* with images of caroming billiard balls, old wind-up clocks, levers, and such with putative absolute deterministic (i.e., nonstochastic), immediate, and reversible causation in no way reflects even significant aspects of, for example, classical physics, as illustrated in thermodynamics, electromagnetic and gravitational fields, radioactive decay, non-linear dynamical systems, and a host of other phenomena. Moreover, dynamical systems theory, for example, is reflected in many quantitative models in modern biology, including evolutionary biology, as well as behavioral processes (e.g., McDowell, 2013). All this is not to say that, for example, biology (including the behavior of organisms) is *just* physics. No thoughtful scientist would make such a claim. Mayr (2004), for example, passionately argued how the complexities of biology rendered it unique and, especially, quite distinct from physics, but this has little to do with the current issues. Moreover, most, if not

all of Mayr's distinctions can be largely attenuated through considerations of the properties of complex dynamical systems (e.g. Marr, 1997).

Finally, as for "selectionism" *versus* "mechanism"—to my knowledge, Skinner himself never saw these as distinct concepts—this contrast is a contrivance created by others.[1]

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[1] I know from personal interactions with Skinner how disgusted he was to have his behaviorism placed under the guise of Pepper's "contextualism." If Skinner were to return from the dead, I am certain that many would be enlightened at his reactions to much of what has subsequently been attributed to his radical behaviorism.

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