[Column 69 Set 2] Exploring More Mysteries of Living: Three Types of Evolution Explain More

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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 that these columns describe. See the 72 columns of the first set, in the *Explaining Mysteries of Living* book or on **BehaviorInfo.com**, for the *basics* of this science.

The last several columns considered many topics regarding robotics. Out of respect for our Law of Cumulative Complexity, this column begins looking at the larger context that affected the discoveries and developments that *all* earlier columns covered. It begins looking at some of the several levels of evolution.

That larger context involves three different and overlapping disciplinary levels of evolution. These result from three different but related kinds of selection. And all three kinds of selection involve consequences of one sort or another. So the context of all our column topics exists as three kinds of *evolution through selection by consequences.*

For the first kind of selection, we use the more than 150–year–old standardized name, *natural selection.* Lacking standardized names for the remaining two kinds of selection, here we use *behavioral selection* for one of the remaining two, and we use *group–practices selection* or *cultural selection* for the other.

While Darwin bequeathed us the term *natural selection,* actually all three kinds of *evolution through selection by consequences* are *natural.* Natural selection produces biological evolution, behavioral selection produces repertoire evolution, and group–practices selection (i.e., cultural selection) produces cultural evolution.

Most people already have some understanding of the extensive topic of biological evolution. Since libraries contain numerous volumes to satisfy additional curiosity about it, we only briefly cover the connection of biology with the other two kinds of evolution, repertoire evolution and cultural evolution.

This column emphasizes the interrelation of the three kinds of evolution. Then the next column considers the relatively new discipline, culturology, that studies the third kind,

cultural evolution, with which most people are least familiar.

As part of his Herrick Lecture at Denison University in 1960, B. F. Skinner provided an overview of our first two evolution types when he said, “All human behavior, including the behavior of the machines which man builds to behave in his place, is ultimately to be accounted for in terms of the phylogenic contingencies of survival which have produced man as a species and the ontogenic contingencies of reinforcement which have produced him as an individual.” (This quote also appears on page 297 of Skinner’s 1969 book, *Contingencies of Reinforcement.*)

Consider each evolution type in turn. Biological evolution and natural selection command a certain familiarity simply from having been studied already for over 160 years. Of our other two kinds of evolution and selection, the individual–level kind arose about 90 years ago, and the culture–level kind arose as a topic of study only about 40 years ago. Neither is as well known as humanity needs it to be.

Natural selection, at the species level, involves selection by consequences, through contingencies of survival, leading to *biological evolution.* This kind of evolution describes species changes as basically a function of gene selection through reproductive success. The result is the accumulation of changes that we see in species and speciation, a result that we call biological evolution. Any good biology textbook provides additional details.

Behavioral selection, at the level of individuals, involves selection by consequences, through the extensive variety of “contingencies of reinforcement.” This leads to *repertoire evolution.* This kind of evolution describes the general changes, in the behavior of individuals during their lifetime, that occur through control by contingencies in the broad sense that covers all contingent environment–behavior relations.

Those relations include reinforcement and the way it affects the effectiveness of evocative stimuli, along with schedules, punishment, function–altering stimuli, and so forth. The results lead to repertoire evolution, the gradual changes that accumulate in the individual’s personhood (i.e., the full, evocable repertoire of behavior). All our past columns provide some of the basic details, and many behaviorology texts provide extensive details (see the reference).

Natural selection selects genes that produce physiological structures that mediate an individual’s specific behaviors in a particular environment. But it also selects genes that produce structures that environmental feedback loops can affect. These loops, such as those involving the operant conditioning processes of behavioral selection, can alter these physiological structures such that they mediate new behaviors to new features in a changing environment. Thus behavioral selection can enhance natural selection, although only some behaviorally selected behaviors actually enhance survival, and even then only sometimes.

For example, the social repertoires that operant–conditioning processes produce usually enhance survival prospects when they involve imitative behaviors of moving with the crowd when some external threat induces crowd movement. Such repertoires, however, *reduce* survival prospects when they induce superstitious behaviors, like cutting down all the trees in a deity–appeasement activity such as may have happened on some Pacific islands.

The third type of evolution involves group–practices selection which, at the level of groups of individual organisms, involves selection by consequences operating as effects on the behaviors of most or even all of the individual group members through the extensive variety of social "contingencies of reinforcement." Another term for this kind of selection is cultural selection. Both the effects and the group–behavior products outlast the lifetime of the individual group members. Science activities provide an example.

Group–practices selection (i.e., cultural selection) lead to *cultural evolution.* This kind of evolution describes the general changes in the behavior of individuals that combine as cultural practices, producing group effects, through control by the social aspects of that same broad range of contingencies in the same broad sense of involving all contingent environment–behavior relations.

Those broad, contingent relations produce shared group–level successes such as lower energy and other costs, increased efficiency or effectiveness, and group survival. These induce generally gradual group–practice changes. The shared social contingencies emphasize modeling and imitation, but actually involve no new behavioral processes. The result is gradual change in cultures and the practices that characterize them, a result that we call cultural evolution.

The next column examines cultural evolution a little more closely. Another level of life sciences, one we call "culturology," pertains to cultural evolution.

The BOOKS page of www.behaviorology.org provides full descriptions of several behaviorology texts, including the book that contains the first set of columns, *Explaining Mysteries of Living,* and where and how to obtain it.

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