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# Comparative Psychology: An Epigenetic Approach

Gary Greenberg  
Wichita State University

*This article describes a comparative psychology course oriented around the themes of phylogeny and ontogeny. Accordingly, the course emphasizes the evolution and development of behavioral processes. Significant features of the course include discussion of the concept of integrative levels and Schneirla's approach/withdrawal theory. The course evaluates genetic determinism as used by ethologists and sociobiologists and stresses the principle of parsimony.*

My comparative psychology course stresses theoretical traditions of the field. These are traditions that focus on the ideas of continuity, evolution, and development throughout the animal world; on the principle of parsimony; and on the concept of integrative levels as an alternative to reductionistic thinking. These traditions were important for the theoretical position of Schneirla (Aronson, Tobach, Lehrman, & Rosenblatt, 1972), on which the course is based. Accordingly, the approach taken in my course differs considerably from a biologically based reductionistic orientation that emphasizes genetic determinism and instinct.

The orientation of the course is strictly an evolutionary one. The course begins with a thorough discussion of modern evolutionary thought. The behavior of an organism is shown to reflect the influence of its phylogenetic and ontogenetic histories (Seay & Gottfried, 1978). This is not only a parsimonious and timely position but also a practical one. Thus, just as evolutionary theory permits an orderly arrangement of facts in the biological sciences (Mayr, 1978), the case is made that it can also provide a similar organization for the data of comparative psychology.

The course then turns to a discussion of reductionism in science, its successes and its limitations. I believe this to be one of the significant facets of my course. The concept of *integrative levels* is introduced in this context. I develop the idea that the phenomena of the universe can be hierarchically arranged. The various sciences themselves fall into a tidy hierarchy with physics and mathematics somewhere at the bottom; biochemistry, physiology, and biology somewhere in the middle; and psychology, anthropology, and other social sciences somewhere at the top (Feibleman, 1954).

As this hierarchy is ascended, increased complexity is introduced at each new (higher) level; understanding phenomena at the new levels requires laws and principles unique to those levels (Aronson, 1984). The concept of integrative levels (or levels of organization) is central to my course because it allows me to conceptualize each different

phylogenetic position as a different level. At each new or higher level, new behavioral properties arise or emerge as a consequence of the unique developmental histories and increased complexity of the nervous system at these higher phylogenetic levels (Kuo, 1967; Schneirla, 1949). The great value of this approach is that it allows us to make some sense of the behavioral data comparative psychology has been collecting since the days of Darwin. As Mayr (1978) pointed out, this is precisely the great value of evolutionary theory in general. Tobach and Schneirla (1968) provided examples of the use of this approach in accounting for sexual behavior, imprinting, parent-young interactions, communication, and aggression.

It is at this point in the course that I turn to an extended review of the characteristics of the theoretical system of Schneirla, comparative psychology's preeminent theorist. Schneirla was one of the few successful theorists in comparative psychology (Gottlieb, 1984) and one of the few psychologists to make use of the concept of integrative levels (Tobach & Greenberg, 1984). Although it has not yet reached that stage of formality in which axiomatic propositions can be formulated, Schneirla's theoretical system allows for the parsimonious explanation and prediction of the behaviors of a vast array of animals. This is worth emphasizing because the criterion of parsimony has apparently been abandoned by some evolutionarily oriented students of animal behavior, most notably Wilson (Epstein, 1984; Wilson, 1975). Comparative psychology, as defined and practiced by Schneirla, his students, and his colleagues, remains committed to Occam's razor.

Schneirla's focus on ontogenetic and maturational factors allowed him to conceptualize behavior as a developmental phenomenon. The course of an organism's maturation exposes it to experiences, which subsequently shape and direct the growth of the behavioral repertoire. Schneirla postulated that early in an animal's life behavior is influenced more by stimulus intensity than by stimulus quality. He suggested that low intensities of stimulation tend to evoke approach responses and that high intensities tend to evoke withdrawal responses with respect to the stimulus source (Schneirla, 1959/1972). This fundamental prescription is known as the approach/withdrawal theory. The validity of this theoretical formulation has been established empirically (e.g., Turkewitz, Gardner, & Lewkowicz, 1984).

Schneirla's theoretical position is very much in tune with the epigenetic position prescribed by another of comparative psychology's important theorists, Kuo (1967):

We shall define behavioral epigenesis as a continuous developmental process from fertilization through birth to death, involving proliferation, diversification, and modification of behavior patterns both in space and in time, as a result of the continuous dynamic exchange of energy between the developing organism and its environment, endogenous and exogenous. The ontogenesis of behavior is a continuous stream of activities whose patterns vary or are modified in response to changes in the effective stimulation by the environment. (p. 11)

It has always surprised me that the invitation by Schneirla and Kuo "to search for nonobvious experiential precursors in the development of seemingly innate behavior . . . has been largely ignored" (Gottlieb, 1981, p. 24).

It is only fair to point out that ethology was also moving in this same theoretical direction, and it is at this point in my course that I begin an extended discussion of the relationship between ethology and comparative psychology and a critical appraisal of the concept of instinct. This relationship, never a particularly easy one, led to the great ethology-psychology debates, which were primarily about the biological nature of behavior and methodological issues. Ethology advanced the position that behavior was a biological phenomenon that was determined by an organism's genotype. Crucial to this position was the concept of instinct.

The hostilities came to an end with Hinde's (1966) efforts to effect a synthesis between the two fields. The appearance of his book, *Animal Behaviour*, marked the end of the instinct doctrine. The new era in ethology, instead, emphasized ontogenetic factors (i.e., development) in the shaping of behavior. That this was an enduring change is indicated by the theoretical thrust of a major text that I use in my course, Barnett's (1981) *Modern Ethology*.

Despite its title, this book is particularly appropriate for the course I teach. It is evolutionary and phylogenetic; it is developmental and ontogenetic; it eschews the recent attempts to reduce psychology to biology; it contains a section entitled, "The Death of Instinct." As I have said elsewhere, "If this is ethology, why not call it comparative psychology?" (Greenberg, 1982, p. 19). This important text completes the synthesis between comparative psychology and ethology that began with the appearance of Hinde's influential book. As Barnett's book shows, it is fair to characterize ethology today as epigenetic, antireductionistic, and anti-instinctive (although the classical ethologists are still influential in their own right).

There is, of course, much more to my course than extended discussions of theory, which take us through half of a 16-week semester. We also deal with the behavioral content of our text, reviewing traditional topics of comparative psychology courses. There is little that is unique to this aspect of the course, except for exercises we conduct at the local zoo. By observing different species in many behavioral interactions, much of the content of my course becomes real to the student. Being able to compare behaviors makes the teaching of comparative psychology much easier.

I have chosen to focus on the theoretical aspects of my course in this article because that is what makes it unusual. I am not so naive to believe that Schneirla offers the only via-

ble theoretical possibility in comparative psychology. He is just one rung on the theory-building ladder, and that ladder is still being built (Gottlieb, 1984).

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## Notes

1. This article is based on a paper presented as part of the symposium, "Teaching Comparative Psychology: Its Nature and Role

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2. Requests for reprints should be sent to Gary Greenberg, Department of Psychology, Wichita State University, Wichita, KS 67208.

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## On Changing the Framework of Psychology: Comparative Psychology is What General Psychology Should Be

Jack Demarest  
Monmouth College  
West Long Branch, New Jersey

*When behaviorism became the dominant force in American psychology, many of the concerns of functionalism, including evolution, adaptation, and ontogenesis, were left behind. Contemporary psychology textbooks and curricula continue to perpetuate this behaviorist framework despite its atheoretical, nonbiological orientation. Even as these concepts begin to work their way back into textbooks and classrooms, they are treated unsystematically as appendages to the traditional behaviorist framework. Comparative psychology, the last bastion of the functionalist viewpoint, can solve this problem, but misconceptions about the field abound. Some of these misconceptions are discussed in this article, and I demonstrate how a comparative psychology course can provide the framework for reorganizing the focus of general psychology and integrating it into a neofunctionalist perspective.*

Among the army of individuals who make up the diverse discipline of psychology, there is a tiny band who go by the name of comparative psychologists. Most of those who choose not to study what comparative psychologists study nevertheless know what the field is all about and its significance for general psychology, or at least they claim to know. In fact, a significant proportion of these people are wrong. This would not be a particularly important revelation except for the fact that many of the misleading attitudes and mistaken beliefs that psychologists hold make their way into classrooms, textbooks, and psychology curricula. Consequently, we have virtually ignored the role that comparative psychology should play within the framework of general psychology. In doing so, we have overlooked the one common thread that ties together almost all of the diversity that is found in mainstream psychology: an evolutionary perspective.

### Misconceptions of the Mainstream Psychologist

There is a long history of criticism concerning comparative psychology stemming, in part, from ideological differences with behaviorists and with ethologists, practical limi-

tations on how much can be generalized from nonhuman to human psychology, and a host of psychosociological factors that have served to segregate comparative psychology from mainstream psychology (Demarest, 1980, 1983, in press; Dewsbury, 1984). This is not the place to review the history of criticism in comparative psychology; however, mentioning some of the misconceptions that have arisen from the debate may be instructive. For example, it is a common belief among psychologists that the primary role of comparative psychology is to reveal some general principles of behavior useful in the study of humans. The phrase most often heard from these people is that studies of animals allow us to explore psychological phenomena that would be impossible or unethical to study in humans. This attitude has been the rationale given in numerous introductory psychology textbooks for much research in learning theory and most physiological psychology (e.g., Coon, 1985; Crider, Goethals, Kavanaugh, & Solomon, 1986; Kagan & Havemann, 1980; Lefton, 1985). The "animal model" approach is, in fact, one technique that could be used in comparative psychology, but it is certainly not fundamental to the field. Indeed, if this approach is applied without paying attention to the ecological and systematic relevance of the animal model to humans, the model may be quite misleading (DeSantis, 1983; Plaut, 1975), and it is the failure to recognize this basic principle of comparative research that accounts for why much research in animal psychology has been irrelevant to human psychology.

Another common claim is that comparative psychology is chiefly concerned with species differences and similarities in learned behavior and is almost exclusively limited to mammals, especially nonhuman primates (e.g., Kagan & Havemann, 1980; Kalat, 1986). This point of view was fostered by criticism from biologists that comparative psychology has been scientifically myopic in concentrating on acquired traits and that it has never been particularly comparative anyway (R. B. Lockard, 1971; Lorenz, 1950). Arguments of this sort are wrong because they fail to distin-