

# Play as a Paradigm Case of Behavioral Development

Essay Review of *The Genesis of Animal Play: Testing the Limits*  
by G. Burghardt<sup>1</sup>

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Burghardt's book is the latest in a number of recent important contributions by biologists and psychologists to the study of animal play [e.g., Bekoff & Byers, 1998; Pellegrini & Smith, 2005; Power, 2000]. This spate of books is an indicator of the importance assigned to play in animal behavior and development, dating back to Darwin [1871] and Groos [1898]. More recently, E.O. Wilson [1975] identified 'play' as one of the most important areas of study for sociobiologists. Robert Fagen [1981] took up the challenge in his brilliant monograph *Animal Play Behavior*.

The study of play in humans has been less systematic. Aside from Rubin, Fein, and Vandenberg's [1983] chapter in the *Handbook of Child Psychology, Vol. 4* play has not been center stage in the human development literature for the past 20 years, though recent books by Power [2000], Pellegrini & Smith [2005], and Sutton-Smith [1997] have included discussions of both human and nonhuman play.

Why the recent neglect of play from the human development community? It is probably multidetermined. One factor might be the waning of Piagetian theory, in which play was central [e.g., Piaget, 1962, 1966]. Another might be the recent research conducted by biologists, such as Bekoff, Byers, Wilson, and Burghardt. This work may well have dampened the interest in the cognitive and psychosocial roots of play that was an important element in earlier strands of work. To psychologists, the play research in animals conducted by biologists may smack of biological determinism either proximally, like hormonal influences on behavior, or more distally, like natural selection influences.

But it is on this point that Burghardt's book should be interesting to students of human development. Burghardt straddles both worlds: he is a professor in the Departments of Psychology and Ecology and Evolutionary Biology (at the University of Tennessee), as well as being trained by E. Hess [1970], an ethologist also interested in human development. Burghardt rightly, I think, notes that in order to understand a behavior, such as play, and its role in development, one must ask at least

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four questions posed originally by Tinbergen [1963]: (1) What are its proximate causes? (2) What's its ontogeny? (3) What's its place in phylogeny? (4) What's its function? The study of ontogeny is especially important in understanding the relation between the organism and its environment.

### **An Epigenetic Perspective**

Consideration of these questions enables Burghardt to embed play in an epigenetic view of behavioral development. By this I mean experiences (e.g., behavior and the environment) in the process of development influence the ultimate expression of genes and their joint effects on behavior and cognition and eventually on evolution. The way in which genes are expressed is the product of interactions among genes, as well as transactions between organisms and the environment. From an epigenetic perspective, Burghardt argues that different play-related experiences during ontogeny can impact the subsequent course of evolution. But first, more detail is needed on the epigenetic view.

Perhaps most important for human developmentalists, the epigenetic view offers an approach to understanding how the same experiences and behaviors have different implications (e.g., the construct of the 'sensitive period') at different periods in development and for different individuals. Further, it shows how natural selection works at all levels of ontogeny, not just at maturity [Gottlieb, 2003]. For example, children's behavior is an outgrowth of, and useful to the emerging child during a particular developmental period, not as just preparation for adulthood. So, children's behaviors are not just imperfect variants of adult behavior, but they are ways in which individuals adapt to the specific niche of childhood. Pretend play, for instance, may not be just practicing adult roles. Instead, it may also be a useful way in which young children affiliate with their age mates.

Unlike a sociobiological or evolutionary psychological view, the epigenetic view, as advanced by Burghardt, does not treat the environment as a 'trigger.' The environment as trigger view suggests that genes are expressed within a 'reaction range' [Gottlieb, 2003]. For example, some evolutionary psychologists [e.g., Tooby & Cosmides, 1992] posit that cognitive modules and other forms of gene expression reflect the selection problems faced by ancestral humans in the Pleistocene era, the so-called Environment of Evolutionary Adaptedness. Specifically, the modules reflect the specific cognitive mechanisms used to solve specific problems faced in the Stone Age. The strategy that gets activated depends on the environmental trigger.

By contrast, the epigenetic view posits the environments (including individuals' behaviors) in which individuals develop affect genetic expression and evolution [Bateson, 1988]. In development, co-actions between organisms and their surroundings unfold or emerge, meaning that the eventual expression of a strategy or a behavior is the result of an active organism sampling the environment and various learning strategies effective in those environments. The strategies used later in development are the products of this transaction.

Play is especially useful in looking at the ways in which the environment and behavior affect evolution, rather than vice versa. Take, for example, cases of mother-child play, where mothers' physical play with their infants may relate to lower levels of stress and reactivity in infants [Field et al., 1996]. Infants' lower reactivity, in

turn, is related to their subsequent social behavior being more regulated [Stamps, 2003]. Being more socially regulated certainly has implications for individuals' immediate well-being as well as later adaptation. The ways in which mothers influence their children's development and eventual evolution has been recognized for many years, and is labeled the 'Baldwin effect' and more recently 'epigenetic inheritance' [Harper, 2005; Stamps, 2003].

### **Burghardt's Surplus Resource Theory**

Burghardt's extensive discussion of definitions of play builds on his important earlier work on the topic and his Surplus Resource Theory (SRT). SRT is an evolutionary developmental model which specifies the resources necessary for play to develop in different species, e.g., parental care and correspondingly long periods of immaturity, and ability to metabolize so as to thermo-regulate and engage in and recover from vigorous activity. SRT is the linchpin thesis of this book. Play can be observed in those orders with surplus resources; this includes not only mammals and birds but also, and most controversially (and originally), reptiles, fish, as well as some invertebrates. While Burghardt acknowledges that much of the evidence in these areas is anecdotal, he specifies testable hypotheses and evidence that supports aspects of SRT. In this regard, a real strength of this book is the review of play behaviors in animals not typically studied.

The extended juvenile period aspect of SRT is crucial to the role of play in developing the complex set of skills necessary for survival and reproduction. This is especially true for animals whose ecology is varied or unstable. From this position, individuals' behaviors are not triggered by an anticipated set of contingencies. Instead, juveniles use the resources afforded to them (safety and provisioning by a parent) during this 'sensitive period' to explore their environment and experiment with a variety of strategies that are effective in that niche. These environmental and behavioral factors, in turn, should indirectly affect subsequent gene expression and evolution.

### **Implications for the Study of Play in Human Development**

So what does Burghardt's book mean for those of us interested in human development? There is one very general but important message as well as a more specific implication for research in human development.

First, and most basically, Burghardt's epigenetic message is crucial to combating the view that suggests that any invocation of biology implies biological determinism. Instead the epigenetic view articulates the real transaction between behavior and genes. To deny that human development is rooted, at some level, in evolution begs the question: who or what is then responsible for the human condition?

The more specific implication of Burghardt's book for human development researchers relates to the role of play in human development. Burghardt's SRT provides guidance for testing hypotheses for the role of play, relative to other strategies, in developing strategies to cope with novel environments. For example, at what point in the distribution of resources does play become less efficient than adult teach-

ing in learning social skills? The theory predicts that when resources are abundant in a safe environment, play would be more efficient than direct adult tuition. Correspondingly, learning novel strategies during adulthood is more risky, relative to the juvenile period. These sorts of questions, in turn, also inform researchers how behaviors, such as play, affect subsequent evolution. In short, Burghardt's volume should be a useful resource because it demonstrates how play – a quintessentially juvenile behavior – is important in the developmental process.

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