

INTRODUCTION: NEW EVOLUTIONARY PERSPECTIVES ON PLAY

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This special issue of *Human Nature* contributes to a long-standing body of literature on evolution and play in both animals and children. Play theorists of the late nineteenth and early twentieth centuries utilized evolutionary theory to understand the set of phenomena called *play*, and their writing generally coalesced into two perspectives: the surplus energy concept proposed by Spencer and the practice concept advocated by Groos. These perspectives remain powerful today as debate continues on the costs and benefits of play and whether play and the activities of juveniles in general are preparatory for adult competency in social and/or foraging skills (see Smith 2004 for a complete review). Evolutionary approaches to play research languished for most of the twentieth century until Fagen (1981), Bekoff and Byers (1981), and Smith (1982) renewed interest with the publication of their seminal works on animal and children's play. The resulting wave of research that has continued to this day has become increasingly sophisticated in attempting to analyze the putative adaptive functions of play in relation to social and/or foraging skills and the proximate mechanisms involved (Barber 1991; Bekoff and Byers 1998; Martin and Caro 1985).

The papers in this collection reflect several different evolutionary perspectives on play and the activities of juveniles. Lewis and Barton use a phylogenetic comparative method to examine the cerebellum in relation to social play behavior across primate taxa. They see social play as having potential effects in the development of adult social skills, such as fighting, social interactions, and dominance relationships. Lewis and Barton build on prior research demonstrating a relationship between neocortex size

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and the frequency of play behavior in primates, and argue that the cerebellum has a clear link to play behavior owing to its role in cognitive and motor functions. Moreover, they show that while the cerebellum does not function solely for play, the functions of the cerebellum are apparently intrinsic to play. Because the frequency of social play shows significant increases with cerebellum size (while controlling for body size), Lewis and Barton conclude that increases in cerebellum size in evolutionary history are related to the elaboration of play and the increase in the frequency of social play.

Pellegrini and Bjorklund examine the ontogeny and phylogeny of object and fantasy play from a functional perspective. Using the framework of evolutionary developmental psychology, they analyze each form of play through an examination of time and energy budgets of human and non-human juveniles. Pellegrini and Bjorklund use the concept of the environment of evolutionary adaptiveness to understand the functionality of play in relation to age and sex. They argue that the different forms of play have different functions in disparate spheres of endeavor. For instance, they see object play as potential preparation for adult competency in foraging, and as such, individuals derive future benefits from deferred effects of object play. Fantasy play may allow juveniles, both nonhuman and human, to examine situations from a variety of perspectives, and as a result may have immediate benefits.

Johnson and Bock examine the costs and benefits of different activities to juvenile baboons with regard to trade-offs between immediate and deferred effects. They hypothesize that juvenile baboons are less efficient foragers than adult baboons owing to their small size, lower level of knowledge and skill, and/or lesser ability to maintain access to resources. Their results show that juvenile baboons are less efficient foragers than adult baboons, possibly because of differences in memory and other cognitive functions related to locating food resources. They also found that an individual baboon's feeding efficiency for a given resource predicts the duration of its foraging bouts for that resource. Johnson and Bock show that in a socially foraging species such as chacma baboons, it is difficult to disentangle the ontogeny of social and foraging skills since the ability to efficiently harvest resources is partially dependent on social interactions and rank.

Bock and Johnson hypothesize that time allocated to play activities that develop specific productive skills should decline in relation to the proportion of adult competency achieved, that children will spend more time in forms of play that are related to skill development in tasks specific to the subsistence ecology in which that child participates or expects to participate, and that children will spend more time in forms of play that are related to skill development in tasks clearly related to the gender-specific productive role in the subsistence ecology in which that child participates or expects to participate. Results from a community of forager/agropas-

toralists show that children whose labor was in greater demand spent significantly less time playing. In addition, controlling for age and gender, children spent significantly more time in play activities related to tasks specific to their household subsistence economy. These results are consistent with the assertion that play is an important factor in the development of adult competency and highlight the important contributions of an evolutionary ecological perspective in understanding children's developmental trajectories.

This collection highlights both the diversity of perspectives utilized by play researchers and the difficulties of assessing the possible adaptive functions of play and the activities of juveniles. Because the effects of play may involve multiple currencies, temporal disjunctions, and complex interaction between sociality and foraging, play research benefits from a variety of approaches that can each address some aspects of these complex phenomena. In addition, these papers caution against rigid typologies of play, the dichotomization of activities into play and productive or social and foraging, and the assignment of benefits of play without a sophisticated analytical framework soundly based in theory.

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