

Children and wild animals

Gail F. Melson

Purdue University

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Developmentalists are just beginning to consider the importance of wilderness and "wildness" in children's lives. This theoretical and empirical neglect of the "wild" is surprising, for a number of reasons. First, a contextual, systemic approach to the study of children's development (Fogel, et al., 2008; Melson, 2008) is now widely accepted. Since the publication of Bronfenbrenner's groundbreaking classic, *The ecology of human development* (1979), study of child development in context--often called "the ecological systems approach"--has emerged as the dominant paradigm. This approach mandates careful attention to all elements--physical, social, emotional--of a child's context. Second, it is evident that the contexts of development include many non-human life forms, including animals. Third, beyond animal presence, children's interest in and involvement with other animal species (Melson, 2001), with non-animal life forms, such as plants, and with natural environments are now well documented. This responsiveness to nature is consistent with the biophilia hypothesis (Wilson, 1984; Kellert & Wilson, 1993; Kellert, 1997), which argues that since humans co-evolved with other animals and life forms, humans are innately attuned to them and to aspects of natural settings associated with survival (e.g., savannah-like vistas affording shelter and visual inspection of the surroundings).

Nevertheless, children's interest in, ideas about, and engagement with wild animals has been largely ignored. One may speculate that this void is an adaptation to the widespread view that wild animals have been disappearing from the contexts of development for children in both industrialized and developing countries. If children's engagement with wild animals is perceived to be of historical interest only, its relevance to contemporary child development can be easily discounted. Further, in a process Kahn (1999) calls "environmental generational amnesia," people may take the natural environment they experience in childhood as the norm against which to measure later environmental changes. Thus, this process leads even scholars of child development to view the absence of the wild and wild animals in particular, from children's lives as the norm, and not as evidence of an already impoverished context. Finally, the supposed disappearance of the wild (along with the dwindling number of children who have direct contact with domestic farm animals) has thrown children's relationships with companion animals into sharper relief. As a result, pets have been singled out for study as the only animals that share children's daily lives. While the developmental, educational and therapeutic significance of the child-pet relationship is now well established (Melson, 2001; Fine, 2006), narrow focus on the importance of pets has led to a tendency to conflate child-animal interactions with child-pet interactions. In this way, dogs, cats, rabbits, guinea pigs, hamsters, fish and turtles--the most common species kept as pets--have become, in the words of Paul Shepard (1995), "the Others," ambassadors of the wild animal species no longer present.

This chapter challenges the widespread belief that wild animals play no role in children's lives. I argue that contemporary contexts of development, including those in

urbanized, industrialized countries, still include wild animals. While the human-wild animal connection has changed historically, it remains important. Nature, the "wild" of this book's title, continues to play a role in children's development, including in densely populated urban settings. Indeed, contemporary children's connection with wild animals and natural environments may be more complex and more significant than ever.

The central question this chapter asks is: What is the significance of contact with wild animals for children's development? Before one can entertain answers, however, the question itself needs 'unpacking': What is meant by a "wild" animal? What does "contact" mean? As Kellert (2009) argues with respect to children's interactions with nature, scholars need to ask the descriptive "What?" questions--how, when and where--as well as the "so what?" questions--What are the developmental consequences? What aspects of children's development are relevant? What components of wild animal contact are important?

In this essay, I draw on existing theory and research from a variety of disciplines, including psychology, sociology, animal science, environmental science, geography, and the emerging field of human-animal interaction (HAI) studies. Despite the range of relevant disciplines, both theory and empirical research on the significance of wild animals for children's development remain limited, for the reasons noted above. Moreover, no coherent conceptual framework sets the major issues, outlines the research agenda, and draws implications for education, parenting, social policy, and urban planning. The chapter seeks to begin such an endeavor.

What is a "wild animal"?

A conventional definition of wild animal is a non-human animal species that is not domesticated. Within these very broad definitional boundaries lie a wide variety of species. There are wild animals, such as lions, tigers, rhinos, and bears, associated with specific wilderness habitats. Such large mammals are the species most frequently thought of as "wild animals" in contemporary Western popular culture. However, many other wild animals--birds, squirrels, foxes, rats, and mice, for example--generally inhabit the edges or centers of human habitation, including dense urban areas, surviving opportunistically on human material resources (Palmer, 2003). Still other wild animals have wholly dependent relationships with humans because of intentional human behavior, such as wild bird feeding, falconry, carrier pigeon use, or the keeping of wild animals as pets (Drews, 2002). Wild animals in zoos, aquariums and nature parks, as well as in research facilities, exist in total dependence on humans within environments designed for specific purposes. In addition, feral animals, such as feral dogs and cats, are wild animals that once had been kept as pets but are no longer serving as companions or workers for humans.

Many species typically inhabit multiple contexts and have diverse relationships with humans. Tropical fish, for example, may be viewed as "pets" in a child's bedroom aquarium tank, but as "wild animals" in the Caribbean coral reefs that are their native habitat. Some rabbits are kept as pets, others are raised as production animals for food or fur, and still others are observed as wild animals scampering around the garden patch. Thus, rather than a sharp ontological divide between "wild" and "tame" or "wild" and "domesticated," I suggest, following Palmer (2003), that there are gradations of

dependence and connection of animals with humans, with no clear division between the "wild" and the "not-wild."

Moreover, contact with wild animals always occurs within a specific context, varying in its "wildness." Like "wild animal," the notion of "wildness" or "the wild"--treated in more detail elsewhere in this volume--is not a simple binary property of an environment. Human visitors to some areas, such as parks and nature preserves, may go for immersion in nature, yet these environments may have been dramatically transformed by human design in order to give the visitor the felt experience of "wildness." In other areas, such as the Kalahari desert environment of the hunter-gatherer groups, known as the !Kung (Thomas,1990), the distinction between human habitat and "the wild" hardly makes sense. Here, human animals are simply one element of an intricate ecology of various animal species and plants, all living in mutual dependence. All the life forms of this ecology--human, other animals, plants--are continually changing and modifying it.

Wild animal as historical-cultural construction. Wild animals exist in a range of environments that vary in the extent and nature of their dependence upon humans, although all bear some mark of human imprint. Following Goffman's (1963) description of the social organization of public places, one may suggest that context sets the "frame" within which humans define an animal as "wild" or "in the wild." In this sense, wilderness and the "wildness" of an animal are social constructions that vary culturally, historically and idiosyncratically.

Historical changes in ideas about wild animals, children and the relation between them illustrate this point. Over a wide swath of human history--for example, the last 20,000 years--one might trace changes from hunter-gatherer views of animals as other

sentient and co-equal beings, immediately and deeply entwined with human experience and survival, to the ideas of early agriculturalists, who developed a vested interest in demarking human (and domestic animal) territory and resources apart from those of the wild animals surrounding them.

A more recent example of changing ideas comes from Europe and North America, from the nineteenth century to the present. The nineteenth century view was that wild animals were savage threats to humans, had no rights and therefore, could be mistreated, killed, indeed wiped out, with impunity. Hunting, the extermination of species such as wolves as threats, and "animaltainment," such as bear pits, and organ grinders with their monkeys dressed in outfits, were all celebrated in books and toys for children (Oswald, 1995; Varga, 2009). Wild animals were juxtaposed in contrast to "civilized humans" with the former completely subservient to the needs and wishes of the latter.

By the end of the 19th century, however, evolutionary ideas forced a rethinking of the supposed dichotomy of human and wild animal. Ideas about wilderness as the source of beauty, contemplation and transcendence--not merely threat--were gaining in the nature writings of Henry David Thoreau and John Muir, even as anti-cruelty and animal protection movements were growing. Ideas about childhood as a period of "natural" innocence led to the view that children, free from the strictures of "civilization," shared an innate kinship and connection with animals, including wild animals. Stuffed animals, from the original teddy bear to cuddly versions of almost every wild animal, became ubiquitous (Varga, 2009). Children's books about wild animals shifted from the 19th century themes of heroic killings of savage, threatening beasts, such as bears and wolves, to wild animals as hapless victims of now savage humans (Oswald, 1995).

As a result of these historical shifts, attitudes toward wild animals changed from viewing them as a threat to civilization to viewing civilization itself as a threat to wild animals. Thus, according to recent survey research, most young adults (and females more than males) from the U. S., Europe and Asia consider zoo confinement and wild animal traps unacceptable because they are viewed as harming wild animals. Among respondents in these countries, only those in the U. S. find sport fishing or hunting deer or fox for sport unobjectionable (Phillips & McCulloch, 2005).

However, despite the ascendance of the theme of wild animals as "noble beasts" rather than savage threat, scholars conclude that the earlier discourse persists albeit as a minor theme (Varga, 2009). This suggests that historical changes in social constructions of the wild never fully supplant earlier ideas, but layer over them. Even the earliest human ideas about wild animals, as evolved over millions of years as hunter-gatherers, may lie as a substrate within human minds as they think about wild animals.

Contexts of wild animal contact

The contexts of wild animal contact for children vary along dimensions of immediacy, structure, and affect. Hunter-gatherer societies, like the Inuit of Alaska or the !Kung of the Kalahari (Konner, 2005), resemble the environments of evolutionary adaptiveness throughout 99% of human history. In these societies, humans share ecological niches with the wild animals upon which they depend for survival. These animals are central to hunter-gatherer morality, spirituality and social cohesion (Nelson, 1993). Although contemporary hunter-gatherer societies are dwindling in number and none are fully isolated from agricultural and industrialized groups, hunter-gatherer children continue to have immediate regular contact with the animals that are food and

clothing sources for their culture. Their relationship to these wild animals is infused by the hunting traditions of their culture. Complex and highly charged emotion, often embedded in rituals of the hunt and its aftermath, surrounds the animals.

In urbanized, industrialized societies, less immediate, more narrowly focused contact with wild animals is more common. Many children observe and sometimes attempt to interact with wild animals in parks, nature preserves, zoos, aquariums, butterfly farms, bird sanctuaries and the like. Turley (2001) estimates that children account for 37% of all visitors to such wildlife settings. Children may feed wild ducks at a park or handle (under adult supervision) a wild animal, such as a hawk or bat, as part of a nature education program (Sorge, 2008). Many families observe wild birds at backyard bird feeders, see squirrels, rabbits, frogs and other creatures around the neighborhood, and discover that they share their homes unwillingly with ants, spiders, flies, cockroaches and mice.

Such everyday encounters with wild animals illustrate the fact that outside of contexts designed to mediate children's direct encounters with wild animals--zoos, parks, aquariums--many spontaneous observations of and interactions with wild animals persist in and around the child's home, school and neighborhood. Squirrels nest in a backyard tree, bumblebees circle a picnic bench, earthworms wriggle in the dirt, and rabbits invade the family garden. Even in the most urbanized environment, children have contact with wild animals every day. Because cultural constructions of "wild animal" center on prototypes of large mammals in wilderness settings, these encounters with squirrels, bees, worms, rabbits and the like are rarely thought of as *wild* animal experiences. Yet, these experiences may be important developmentally.

Structured, adult-mediated environments for encountering wild animals inevitably narrow the child's range of experiences with the wild animals in question in a number of ways. First, adults often design and supervise the child's experience, encouraging certain behaviors (e.g., feeding the ducks) and discouraging others (e.g., chasing them to see them fly away). To take another example, a backyard bird feeder focuses the child's attention on bird behavior only at and around the feeder. Adult mediation further constrains the child's attention to certain aspects of the animal and its behavior. In observing birds at a feeder, for example, adults might encourage the child to notice diacritical markings that aid in species identification. Second, settings structured by humans to provide a "nature experience" with wild animals also elicit a relatively narrow range of animal behaviors when compared with the animal's full repertoire of behavior in its ecological niche. Indeed, environmental demands may so modify animal behaviors (e.g., ducks 'begging' for bread crumbs brought in by human visitors to the park), that such behaviors bear little resemblance to naturally occurring patterns. Third, adult mediation of children's experiences with wild animals conveys cultural and moral messages concerning human-animal relations. To continue with the example of feeding ducks at a park, the experience may be framed as a way to bring animals normally wary of close human contact into touching distance, and to get them to do what we humans want. In the process, the insistent quacking, pushing and competition for thrown bread crumbs may be framed as amusing, "silly" animal antics. In this example, adult structure and mediation of children's engagement with wild animals invariably result in relatively impoverished experiences perceptually, cognitively, and even morally.

The emotional impact of exposure to wild animals is another important dimension of the child's experience. One cannot assume that only immediate, unstructured encounters with wild animals engage the deepest feelings. Activities like feeding ducks at a park, watching squirrels in the backyard, or wild bird feeding may evoke high or low affect from children (and the adults with them). For example, a child may be very excited to see a relatively rare species of bird appear at the bird feeder, and hence, watch the bird intently. On the other hand, the child might pay little attention and show little emotion when noticing the regular gathering of birds around the backyard bird feeder. Again, adult mediation encourages certain emotional "scripts"--disgust at ants on the kitchen counter, awe at a hawk circling overhead, laughter at the "tricks" on display at a dolphin show. In addition, the child's temperament and prior as well as concurrent experiences and relationships undoubtedly play a role. While there is wide variability in children's emotional engagement with wild animals and wild places, we know little about what child, animal or environmental factors are at play.

In addition to contextual characteristics such as immediacy, structure, adult mediation, and emotional tone, the frequency and duration of children's contact may be important. Just how much time does a child spend observing, interacting or being in proximity to a wild animal? In contrast to research on children's time spent with pets (Melson, 2001) there are no reliable estimates of the frequency or duration of children's attentiveness toward or contact with wild animals. While analyses of zoo and aquarium attendance suggest that children are disproportionately represented, attendance figures convey no information about frequency or duration of focused attention on the animals or on informational displays about them. Turley (2001) found, in a U. K. study, that family

groups with children were most interested in "family togetherness" and "a fun activity" as motives for zoo visits, with interest in observing or learning about wild animals a lower priority. Hence, children engaged in relatively little observation of the animals themselves. Kellert (2002) argues that zoos, nature programs and other structured experiences tend to be sporadic, focused on the rare and unusual, and lack intimacy, challenge and creativity. He concludes that as a result, such contexts are impoverished sources of information, experience and learning.

Contested contexts: the example of zoos

The experience of zoo-going serves as an illustration of the complexities of mediated encounters with wild animals. An estimated 98% of all Americans report having visited a zoo at least once (Dunlap, & Kellert, 1994). A U. K. study of zoo behavior (Turley, 2001) found that adults organized zoo visits primarily for children, with family groups containing children ages 5 to 12, most likely to visit. However, cross-cultural attitude surveys of young adults find considerable uneasiness with wild animals in zoo confinement (Phillips & McCulloch, 2005). Most respondents agreed that: "Many wild animals suffer considerably from stress and boredom, as a result of being kept in zoos" and disagreed that "The educational and entertainment value of zoos is far more important than any cruelty that may be involved in holding wild animals captive." (Children's views of wild animals in zoos have not been studied.)

Kellert (2002) argues that indirect contact with wild animals in zoos and nature programs is a poor substitute for unstructured encounters with wild animals in the context of exploration of natural environments. Stronger objections come from Berger (1991), who contends that the very act of observing animals in a zoo objectifies the animal and

separates the human viewer from the subjectivity of the animal: "Animals [in zoos] are always the observed. The fact that they can observe us has lost all significance." (p.16)

On the other hand, Myers and Saunders (2002) note that when children observe zoo animals, or even better, can touch them at petting zoos, the children can see good models of animal welfare, conservation and appropriate animal care. Seeing wild animals and learning about them in zoos can be an important source of learning about other species. However, Berger (1991) views even such learning with alarm: "They [wild animals] are objects of our ever-extending knowledge. What we know about them is an index of our power, and thus an index of what separates us from them. The more we know, the further away they are." (p.16) The contexts of the zoo, aquarium or nature park appear to be "contested frames," in which the meaning of encounters with wild animals is hotly debated.

Underlying these differing views may be contrasting stances on optimal contexts for children's learning. From a Vygotskian perspective, children's learning is optimized when more skilled individuals, usually adults, guide the child from what he or she already knows to greater competence of predetermined outcomes, working within the child's "zone of proximal development" (Vygotsky, 1978). In this view, wild animal encounters that are mediated by a knowledgeable adult who is sensitive to the child's developmental level exemplify an optimal learning context. An alternate perspective views learning as optimal when child-directed and based on exploration and discovery of places free from adult structure or supervision (Pyle, 1993). From this perspective, unmediated, unstructured direct experiences with wild animals would result in more cognitive and emotional growth.

Wild animals through media imagery

The least immediate, most indirect forms of contact with wild animals are rapidly becoming the most common for children. Even those living in rural settings near wilderness areas such as national forests report that they see more animals on television and in movies than in the wild (Nabhan & Trimble, 1994). All children experience wild animals on the symbolic plane, in stories, toys, and other artifacts. This symbolic plane, what Nabhan and Trimble (1994) term "a vicarious view of nature," is now the most dominant form of engagement with wild animals and with wilderness more broadly. Nature documentaries, cartoon wild animals, Animal Planet and stuffed animals provide children highly scripted narratives of wild animals and wilderness. Background music and film editing help create emotional narratives, such as the "amusing antics" of wild animals, or the "frightening" vision of one animal killing and dismembering its prey. Although representations of wild animals are proliferating in print, visual media and toys, Kellert (2002) points out that animal symbols, reflected in cave paintings, totems, animal legends and myths, are as old as the human species itself.

This symbolic plane casts certain wild animals--usually large carnivorous mammals-- as more prototypically wild than others. Some animals--pandas, dolphins, and Emperor penguins, for example--are presented as "cute" and "friendly," while others, such as sharks and wolves, are portrayed as threats. In this way, some wild animals, encountered only through media and toy images, may become more salient for children as markers of emotion and personality than the living wild animals in their immediate environments. As an example, 4-5 year old Maltese children identified tigers and lions, not found locally, as their favorite animals and mentioned materials such as toys,

clothing, and school stationery, as sources for encountering them (Tunncliffe, Gatt, Agius, & Pizzuto, 2008).

Virtual reality is increasingly able to evoke feelings of immediacy, involvement and emotion similar to those that actual encounters with wild animals produce. Emerging evidence from cognitive neuroscience (Decety, & Jackson, 2004) shows that mirror neurons enable one to experience the emotions of direct engagement even when only observing or simulating it. These findings indicate that all forms of engagement with wild animals, even the seemingly most mediated and symbolic, may nonetheless be powerful experiences. At the same time, advances in virtual reality raise questions about what is lost when direct, unmediated engagement with wild animals and their environments disappears.

Children read about and look at stories, games, toys and other artifacts about wild animals with surprisingly high frequency. As of 1998, seven of the top ten all-time best-selling children's books in the United States were about animals, both pets (*The Pokey Little Puppy*) and wild animals (*The Tale of Peter Rabbit*) (Melson, 2001). Three-quarters of a random sample of U.S. children's books published between 1916 and 1950 had animal characters (Lystad, 1980). Nearly a third of the stories in fourth-grade school readers published in the U.S. from 1900 to 1970 have animal characters, half of which are the main protagonists (Melson, 2001). Moreover, children often prefer stories and other materials about animals to those about peers or other humans. In one study (Boyd, & Mandler, 1955), when third-graders heard stories with animal characters and identical stories with human characters, 75% of the children preferred the animal stories. Unfortunately, this study, along with the others cited above, failed to distinguish between

wild animal characters and other types of animals. Given the pervasiveness of exposure to wild animal imagery and content in various media--books, toys, video, television, Internet sites--it is surprising that so little is known about impact on children's interest, ideas, or values concerning wild animals.

Just as zoos and other mediated forms of contact with wild animals evoke both positive and negative reactions, so too with the symbolization of wild animals through fiction, video, and other media. On the one hand, wild animal symbols are pervasive. They play a role in children's developing sense of self, an issue addressed later in this chapter. On the other hand, some scholars decry animal symbols as a demeaning, reductive process that reduces the animal to an instrument or resource for human needs. Shapiro and Copeland (2005) advocate as an alternative to a symbolic role, the wild animal appearing "as an individual with some measure of autonomy, agency, voice, character, and as a member of a species with a nature that has certain typical capabilities and limitations." (p.344)

The varied forms of contact, from immediate to mediated to symbolic, and the varied contexts in which they occur are likely to be inter-dependent. Cultural views of wild animals and wilderness, transmitted to children via symbolic materials such as stories and toys, may influence how children think about and respond to living wild animals (Varga, 2009). For young children, particularly, compelling animal characters may obscure accurate understanding of wild animals. Every whale can become a Free Willy, every lion a king, and every vulture a plotting enemy. A humane educator reported (Melson, 2001) that children who had seen the animated movie, *Pocahontas*, in

which a hummingbird character attacked people, believed that the purpose of a hummingbird's long pointy beak was for pecking children's eyes out. On the other hand, a child's direct observation of a wild animal, such as a rabbit, may help the child distinguish between its behavior and characteristics and those of Peter Rabbit. Children's exposure to animal symbols can provide teachable moments for adults to help the child distinguish between accurate and symbolic, anthropomorphic animal characteristics.

Wild animals and children's development

As Kellert (2002) notes, any experience with nature--direct, indirect, or vicarious (or symbolic)--may prompt cognitive, emotional and moral learning and have developmental consequences. With respect to engagement with wild animals specifically, little research documents links to developmental outcomes. Moreover, it is unclear how the varying modes of experience with wild animals described above differ in their developmental consequences. Some (Louv, 2006) fear that symbolic experiences of wild animals and nature lack the rich multi-sensory learning of more direct engagement and hence, lead to an impoverishment of experience. While provocative, this prediction currently lacks compelling evidence. To stimulate a research agenda in this area, I examine indirect evidence and theoretical support to raise questions about ways that wild animals may play a role in various developmental domains, specifically perceptual-cognitive, self, social, and moral development. In doing so, I suggest hypotheses about how differing modes of engagement may relate to children's development.

Perceptual-cognitive development. At least three areas of research and theory support the hypothesis that encounters with wild animals may promote perceptual-cognitive development. First, as noted earlier, the biophilia hypothesis (Wilson, 1984)

predicts that children (and humans of other ages) will perceptually orient toward life forms, including animals. This differential attention implies that living things will be preferential sources of perceptual and cognitive information. Because of this focused attention and also because biological entities are inherently complex and dynamic, living beings will be "information rich" sources for cognitive learning (Wilson, 1993). In addition, the biophilia hypothesis suggests that both positive and negative emotions--predisposing approach and avoidance, respectively--color perceptual/cognitive learning from living things and their environments. Consistent with this prediction is research showing that even infants are differentially attentive to and more positively engaged with living, as compared with toy, animals (Kidd, & Kidd, 1987).

An evolutionary perspective suggests that certain small wild animals, such as spiders and snakes, as well as large predators, would elicit children's fears, since such animals posed a threat in the environment of evolutionary adaptiveness. Studies of children's fears support this hypothesis (King, Hamilton, & Ollendick, 1998). In addition, research finds that environments that were associated with wild animal threat--darkness, deep woods, and being alone in unfamiliar places--also evoke children's fears (Heerwagen, & Orians, 2002).

The biophilia hypothesis implies that children's attentiveness to wild animals would be heightened when the characteristics of living organisms--multi-sensory, dynamic, autonomous, coherent and developing--are most evident. This would suggest that contexts that allow a full range of self-directed animal behavior would be more compelling than indirect, adult-mediated, and symbolic modes. Further, contexts that do

not constrain the child's perceptions, emotions and behaviors (except for child and animal safety) would be most enriching developmentally.

A second perspective derives from studies of the development of *folkbiology*, also called "naïve biology." This refers to "the cognitive processes by which people understand, classify, reason about and explain the world of plants and animals." (Cooley, Solomon, & Shafto, 2002, p. 65). Such processes include intuitive understandings of living things, such as the construct of "alive," similarities between humans, (other) animals, and plants, and reasoning from a biological kind to biological attributes. Interestingly, no studies of folkbiology have explored how children (and adults) reason about and classify animals as "wild" versus non-wild -- "tame," "domesticated," "pets," etc. Given that the notion of "wild" is a social construction embedded in a particular historical and cultural milieu, it would be interesting to determine how children come to acquire these classifications of animals and what they mean to the children themselves.

Carey's influential work (1985) argues that children's thinking undergoes a fundamental change from viewing humans as the prototypical animal, reasoning from humans to other animals, to viewing humans as one animal among others. (Carey's theory does not distinguish among species of animals.) Along with this shift is gradual acquisition of concepts of *biological kinds*, what things are (or can be) alive, as well as *biological essentialism*, what mechanisms and processes underlie a biological kind.

While cognitive maturation plays a role in the development of biological reasoning, there is evidence that engagement with living animals prompts cognitive gains in biological concepts. Japanese kindergarteners who raised goldfish for a year were able to reason more accurately about the biological properties of the fish than were

schoolmates without the goldfish care experience. Moreover, the children who had cared for goldfish also reasoned more accurately about unfamiliar animals, such as frogs, using analogies from their experiences with goldfish (Hatano, & Inagaki, 1993; Inagaki, 1990). While this study is limited to pet care experiences, Beck, Melson, daCosta, & Liu (2001) found that a 10-week home-based educational program for feeding wild birds at backyard bird feeders increased 7- to 9-year olds' knowledge about wild birds.

While the evidence is limited, these results raise the possibility that observation of wild animals, perhaps combined with appropriate care experiences, may contribute to conceptual change in biological reasoning. This possibility becomes more important against the backdrop of considerable ignorance and misinformation about animals found in surveys of children. For example, a survey of Connecticut youngsters (Kellert, 1997) found that 55% identified a whale as a fish, 79% believed that veal came from lamb, and a majority indicted animal predation as "wrong." Inner-city African-American children had the least accurate information, while rural youngsters had the most. This might suggest that direct experience with animals (both wild and domestic) contributes to more accurate knowledge. However, it is likely that children with the least knowledge also had access to fewer books, documentaries and structured nature outings than did other children. Hence, it is unclear what modes of engagement with wild animals are linked to perceptual/cognitive changes. For example, would more distal and brief observation of living animals (at zoo exhibits, for example) result in changes in biological reasoning similar to those of the Japanese schoolchildren who cared for goldfish for a year, in the Inagaki study cited above? Would mediated experiences of wild animals--watching a nature documentary, reading a book about monkeys--engage attention and be as

"information rich" a source of learning as more direct and immediate engagement with living wild animals? The extent and kind of engagement with animals that may impact biological reasoning are presently unclear.

Besides simple engagement with wild animals, attitudes of environmental stewardship, beliefs about similarities and differences between humans and animals, and cultural valuing of nature may make animal behavior and characteristics more salient and thus, focus attention for learning. Cultural values may predispose children to see inter-connections or disjunctions among living things. Some research has shown that children who live in rural cultures emphasizing wilderness preservation and harmony with nature show advanced biological reasoning (compared to same age rural children in other cultures). Thus, Menominee children in rural Wisconsin are more likely to accurately extend a biological property from animal to human than are their European American rural counterparts, who fail to do so on the grounds that "people are not animals" (Bang, Medin, & Atran, 2007). While the role of wild animals was not specifically studied, the investigators argued that Menominee children were reflecting their culture's emphasis on the close connection between people and wild animals. The Menominee creation story describes the people as coming from the bear, and Menominee society is organized into wild animal-based clans--bear, eagle, wolf, moose, and crane (Waxman, Medin, & Ross, 2007).

A third perspective derives from Eleanor Gibson's theory of perceptual development (Gibson, 1988). In this view, children learn about the *affordances* of objects--the "what does this do?" of things-- through observation and exploration. As Myers (1998) demonstrated in his year long study of preschoolers and animals, the

distinct affordances of various animal species, both wild and domestic, convey rich information about different ways of moving, sensing, responding and acting. Ricard and Allard (1992) showed that even babies under one year of age react distinctively to an unfamiliar animal--in this case, a rabbit--as compared with a novel toy or unfamiliar young adult. The infants crawled to approach and touch the rabbit, but looked and smiled at the woman only from a distance. They looked more frequently and longer at the rabbit than at the novel toy, a wooden turtle that moved, made noises and flashed lights.

Different species communicate different affordances to children. In another study (Nielsen, & Delude, 1989), researchers observed preschoolers and kindergarteners as they encountered the following live animals--a Mexican red-legged tarantula, an English angora rabbit, a mature cockatiel, and a five-year-old female golden retriever dog--as well as two realistic stuffed animals--a dog and a bird. While 80% of the children never looked at the stuffed animals, the live animals attracted the children in distinctive ways. For example, 10% of the children touched the tarantula, which was on the floor in a terrarium, but 74% touched the dog, which was in a sit-stay position. Over two-thirds of the children talked to the bird, while only 16% talked to the rabbit and none spoke to the tarantula. Thus, each species displayed its own distinctive way of being through its physical appearance and behaviors. In turn, the children responded to these distinctive characteristics with distinct and adaptive ways of reacting to each animal.

As children observe a wide range of wild animal species, the distinct affordances of each species add to the child's cognitive store of ways of being and in turn, prompt in the child adaptive ways of responding. In Piagetian terms, encounters with wild animals, whether immediate, mediated, or symbolic, all contribute to new schema, or new

cognitive constructs. All living animals present perceptually and cognitively rich, multi-sensory experiences, embodying novelty within recurring patterns of sight, sound, touch, smell, and movement. It is precisely this combination of new environmental information embedded within the familiar, what Piaget calls "moderate discrepancy from established cognitive schema," that most stimulates new conceptual thinking, or the emergence of new categories of thought, through the Piagetian process of *accommodation*.

Furthermore, both Gibson and Piaget argue that child-directed, active exploration of the environment is the primary engine of perceptual-cognitive growth. It is through self-directed exploration that the child discovers the affordances of novel objects, the associations among stimuli--for example, when I run toward the seagulls, they take flight-, and the similarities and differences among animals. This suggests that spontaneous direct encounters with living wild animals result in the greatest developmental gains.

Self development. The pervasiveness of animal symbols in every culture makes it evident that wild animals readily serve as symbols and expressions of aspects of the self. Psychodynamic theory, in particular, recognizes the power of animal imagery to reveal aspects of self. Freud (1965) noted how frequently animals, including wild animals, appeared in the dreams of his adult patients. The centrality of animal imagery and associations is such that psychoanalytically oriented clinicians have devised projective tests focused on animal symbolization for both children and adults. One example is the Animal Attribution Story-Telling Technique (Arad, 2004), in which family members assign an animal counterpart to each person and then tell a story about the animal protagonists. According to Arad, "the animal name attribution to family members ...helps promote the description of personality traits and interpersonal relationships

through the various animal counterparts." (p. 249). Animals also appear when children look at Rorschach inkblots. In one study of 650 children from two to ten years of age (Ames, et al., 1952), half of all the inkblot interpretations involved animals, although not all were wild ones.

Children's readiness to use animal symbols to express and define aspects of the self is apparent in other areas. Detailed observation of young children's play finds many instances of taking on animal identities. For example, a boy begins 'growling' and stamping his feet while proclaiming: "I'm a gorilla!" to two other boys (Barker & Wright, 1952); preschoolers, after watching a robin, begin to "fly" and ask the teacher to catch them (Isaacs, 1948); several boys, after looking at a beetle, play at being a beetle by crawling over each other while repeating: "beetle, beetle, beetle" (Myers, 1998). Preschool children often dream about familiar wild animals--frogs, birds, deer--as well as farm animals, such as pigs, cows and sheep (Foulkes, 1999). Wild animals, especially spiders, snakes and sharks, appear on lists of "top ten" fears reported by both rural and urban U. S. children (White & Smith, 1989) as well as Australian children (Muris, Merckelbach & Collaris, 1997) and adolescents (Lane & Gullone, 1999).

Animal symbols and imagery are so ubiquitous that psychologists have used them to assess important domains of children's human relationships. Thus, children's moral reasoning concerning *human* social relationships is usually measured by presenting moral dilemmas involving anthropomorphized animal characters, derived loosely from Aesop fables. For example, in one scenario, a porcupine wants to spend the winter in the home of a family of moles. When the porcupine's quills begin to bother the tightly packed inhabitants of the moles' home, what, the child is asked, should they do (Johnston, 1988)?

The child's responses are interpreted as revealing their moral reasoning about a situation in which helping another *person* in need is pitted against self-interest.

As noted earlier, nowhere are wild animal symbols more pervasive than in children's media--books, videos, games, Internet. Animal characters allow children to imaginatively explore the boundary between human and animal, as Mowgli, the wolf boy in Kipling's *Jungle Books*, does when he learns the ways of the animals' world, or as Stuart Little does when he inhabits the body of a mouse. Issues of power and powerlessness play out for children as they read about small wily wild animal "scamps and rascals"—Peter Rabbit, Curious George, Cricket of *Cricket in Times Square*—whose antics get them into trouble but who are all right in the end. As Paul Shepard (1996) remarked, "animals have a critical role in the shaping of personal identity." (p.3) One might add that animals--wild and otherwise--reflect various facets of the child's sense of self.

Social development. From a very early age, children perceive animals--both pets and wild animals--as subjectivities, other autonomous living beings that, at least potentially, have intentions, feelings, and goals (Myers, 1998). Thus, it is not surprising that when children encounter a wild animal, they react as if they are having a social encounter. In this way, wild animals, like other animals, are social beings for children.

Social psychological research on the development of social interactions suggests that qualities of contingency, indeterminacy, and intentionality in another are important (Fogel, 1993). Thus, children engage with another as a living social being when the other responds contingently to the child, in intelligible but not completely predictable ways. Further, this "other" is seen as a social being when it appears to be autonomous, self-

directed, intentional and “coherent” (i.e., with an enduring self of its own despite variations in appearance and behavior). These qualities underlie children's (and adults') social responsiveness to robots, other technological emulations, and animals (Melson, et al., 2009; Melson, Kahn, Beck, & Friedman, 2009).

In pretend play, children often behave as if these qualities of social engagement exist, by supplying them for the other. Thus, a stuffed animal can be made to “roar” and respond to the child’s offer of a cup of tea with polite “drinking.” Children also amplify existing capacities in the other for social responsiveness, as when a child pats a dog, articulates a verbal response for the dog--“Oh, so you want some more?--and then pats the dog again.

The implications of this research are twofold: first, direct, unmediated encounters with wild animals, in which the animal responds contingently, are likely to be the most powerful in engaging with the animal as a social other. For example, a child digging in the garden accidentally unearths an earthworm that then wriggles away from her hand. Second, the power of pretense allows children to use this register to engage with wild animals *as if* they were playing a social role, even when the child is only observing the animal and the animal is unaware of the child. Pretense also makes mediated and symbolic wild animal encounters potentially social ones as well--at least from the child's perspective. However, the quality and intensity of a pretend, or “as if” social encounter is not equivalent to that of one in which both the self and the other respond in mutually contingent ways. Because the child controls both sides of a pretend social interaction, its power lies in the child's ability to rehearse and perfect interchanges. In an actual social interaction, the child must react to a dynamic interchange in which control is shared

between the social partners. Thus, both direct and pretend social exchanges with wild animals have developmental utility, in different ways.

In the case of wild animals, as contrasted to pets or domesticated farm animals, direct social exchange with humans may sometimes be undesirable from an animal welfare perspective. Rather, observation of wild animals in a way that does not disturb them or their environment often is optimal. Thus, a child's encounter with a wild animal presents an opportunity for the child to recognize and respect the subjectivity and social capacities of the animal while at the same time, refraining from engaging those capacities in social interaction, when such interaction might adversely affect the animal's welfare.

Animals play a role in social development in another way as well. When children encounter an animal in the presence of other humans--adults or children--the animal often serves as a joint focus of attention and a catalyst, what I have called "social glue" (Melson, 2001) for interchanges among the humans. For example, in the study of wild bird feeding cited above (Beck, et al., 2001), one child in each participating family was targeted for possible changes in bird knowledge and environmental attitudes. However, in the course of the 10 week program, involvement in wild bird feeding and "talking about the birds" increased for all family members and persisted one year after the program's termination. In another study, my student Laura Richards observed a first grade classroom with a variety of classroom "pets"--guinea pigs, gerbils, hamsters, a rabbit, newt, hedgehog and fish--over a four month period, noting interactions among the children focused on the animals. On average, during a single hour, 21 instances of "social glue" occurred (Melson, 2001). Although all the animals in this classroom were being kept as pets, it is likely that when children focus attention on wild animals jointly

with other children or with adults--for example, observing zoo animals or noticing deer on a forest path--these encounters prompt discussion and social interaction among the humans.

Moral development. Until recently, theory and research on children's moral reasoning and behavior have focused exclusively on the morality of human-human relationships. This narrow focus has persisted until recently, despite the fact, as noted earlier, that children's moral development with respect to human relationships is routinely assessed with animal characters. However, there is growing recognition that a morality of human-animal relationships and human-environment relations is developing as well. Across cultures, children are wrestling with issues of animal welfare and environmental degradation. Kahn (1999) interviewed African-American youngsters in inner-city Houston and found them concerned with these issues.

A developmental progression in values concerning nature has been identified (Kellert, 1996), in which children gradually shift from predominantly egocentric attitudes--nature serving one's needs and desires--to recognizing the aesthetic, emotional and symbolic values of nature (Kellert, 2002). In addition, experiences with nature have been shown to enhance moral reasoning in this domain. Direct experience with living animals is associated with less egocentric and dominionistic reasoning (Kellert, 2002) and more biocentric reasoning (Kahn, 1999). Moreover, individual differences in empathy and perspective-taking predict attitudes toward environmental protection, including reasoning about wild animal welfare. For example, when empathy and perspective-taking increase (through role-taking instructions), adults exhibit more positive attitudes toward protecting whales (Shelton, & Rogers, 1981). Increased

empathy, induced through such instructions, prompts more ecocentric moral reasoning (i.e., reasoning based on benefits to the environment) even when the object of reasoning is a vulture (Berenguer, 2010). As noted earlier, children from cultures emphasizing harmony with nature (and specifically, with wild animals) show more advanced biological reasoning. This suggests that children in such cultures also may reason about the moral claims of nature, wilderness and wild animals in more biocentric or ecocentric ways, since both cognition and emotion undergird moral reasoning and behavior.

It is unclear, however, whether children's moral reasoning differs about specific *components* of nature--different types of animals, plants, streams and mountains. For example, studies of folkbiology find that children recognize animals as "alive" and having a biology at earlier ages (around age four) than they recognize the same attributes in plants (around age eight), perhaps because plants do not engage in autonomous and apparently intentional movement, a hallmark of a living being for children (Coley, et al, 2002). This suggests that if moral regard is linked to being viewed as alive, young children may be less concerned about the welfare or protection of plants than of animal life. With respect to different types and species of animals, mammals and those higher on the phylogenetic scale evoke more concern for animal welfare and preservation of wilderness habitats. Wild animals with what might be termed "privileged status"--panda bears, dolphins, porpoises and whales--galvanize societal concern and protection in ways that equally endangered species, such as wolves and sharks, do not. Therefore, moral reasoning about wild animals appears to vary not only by the developmental level of the child, and the child's experiences with wild animals, but also by species and by cultural views of wild animals and their habitats.

Conclusion

Any exploration of children's ideas and behaviors with respect to wild animals must be speculative and tentative. As noted above, in many areas, empirical studies are lacking, in others, the few existing studies are of adults only. Cross-cultural investigations are few, despite clear evidence that engagement with wild animals is culturally mediated. Most assessments of attitudes toward animals fail to distinguish between types or species of animals, particularly companion animals versus wild animals. In general, sources of variation in children's contexts have not been investigated. For example, do children living in or near wilderness areas differ from other children in their cognitions, attitudes or behavior related to wild animals, particularly those living in these wilderness areas? What is the relation, if any, between a child's bond with his or her pet and ideas about or behaviors toward wild animals? Finally, variations in children's contacts with wild animals -- immediacy, structure, frequency, duration, context--need to be systematically linked to variations in child outcomes, such as biological knowledge, attitudes toward wild animal welfare and conservation, etc. While questions currently outpace answers when one focuses on children and wild animals, the developmental significance of asking those questions should be apparent.

However, even considering the nascent state of our understanding of child-wild animal relationships, one may advance some conclusions to guide the development of theory-driven developmental research. (1) Despite the widespread view that the wild has vanished from the world of childhood, contemporary children, even in industrialized, urban settings, have extensive and varied contacts with wild animals. Among the many worlds children live in, they continue to live "in the wild." (2) Children's engagement

with wild animals and "the wild" is rooted in human evolutionary history, as well as in cultural and historical forces. For these reasons, wild animals and wilderness should be presumed to be developmentally significant. (3) Engagement with wild animals is multifaceted and diverse; it varies along dimensions of immediacy, structure, affect and adult mediation. (4) While increasingly, children are experiencing wild animals indirectly, in mediated contexts designed by adults, these experiences nonetheless, can be cognitively and emotionally intense. (5) Despite the power of all forms of encounters with wild animals, both theory and research suggest that direct, unstructured engagement is most developmentally significant. (6) There is accumulating evidence that engagement with animals, wild and non-wild, is linked to perceptual, cognitive, self, social, emotional, and moral development. Animals, wild and non-wild, focus attention, aid perceptual discrimination, foster *accommodation* (in Piagetian terms, the acquisition of new conceptual categories), reflect and refract the self, act as social others, and prompt moral reasoning about other species and one's place in the universe. Children's place is in the wild, and the wild is in children.

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