

Childhood Experiences Associated with Care for the Natural World: A Theoretical Framework for Empirical Results

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Abstract

A growing literature shows that active care for the environment in adulthood is frequently associated with positive experiences of nature in childhood or adolescence, along with childhood role models who gave the natural world appreciative attention. This article offers a framework for understanding this finding, drawing on two bodies of theory: the ecological psychology of James Gibson, Eleanor Gibson and Edward Reed, and the attachment theories of John Bowlby and Donald Winnicott. It shows how these two bodies of theory complement each other, as interpersonal theories of attachment add an emotional dimension to the processes of encountering the world described by ecological psychologists. Based on a re-analysis of interviews with environmentalists in Norway and the United States, the article looks closely at remembered childhood interactions with influential role models.

Keywords: [children](#), [nature](#), [environmental learning](#), [environmental concern](#), [ecological psychology](#)

Motives for Environmental Action

When people who work to protect the environment or educate others about it are asked the reasons for their commitment, they give two answers more often than any others: special places in nature where they played as a child or hiked, camped or fished as an adolescent, and family role models who showed the value of the natural world through their own appreciative attention to it. They recall other experiences as well, such as membership in environmental or outdoor organizations, education, witnessing the destruction of a valued place, opportunities to learn relevant knowledge and skills in their jobs, and influential books. More frequently than anything else, however, they credit their commitment to environmental protection or environmental education to special childhood places and people. Why do these distant experiences continue to motivate their engagement with the environment many years later? This is the question that this article explores.

Tom Tanner (1980) introduced this study of significant life experiences after he noticed that biographies and autobiographies of great naturalists and conservationists repeatedly began with accounts of their spending many childhood hours alone or with a few companions in wild or semi-wild places. This observation inspired him to survey 45 leaders of conservation groups, asking them to identify the formative experiences that led them to their work. Most often, they wrote about time in natural areas, often in childhood, as well as parents and teachers, books, and the loss of a favorite natural habitat.

A growing line of studies of this kind have reported similar results (Chawla 1998a; Peterson and Hungerford 1981; Eigner and Schmuck 1998, cited in Bögeholz 2006; Palmer and Suggate 1998; Palmer et al. 1998; 1999; Sward 1999). In countries as far-flung as England, Germany, Greece, Slovenia, Australia, Canada, the United States, El Salvador and South Africa, when environmental activists or environmental educators are asked the sources of their concern for the environment, from half to more than 80 percent of the respondents identify childhood experiences of nature as a significant influence. Typically, they mention family members or other role models equally often or second in importance. Smaller percentages mention organizations, education, and witnessing the destruction or pollution of a valued place.

My own research has followed the same pattern. In Norway and in Kentucky in the United States, I carried out long interviews with 56 environmentalists (Chawla 1999). I began by asking men and women who had worked on a diverse range of environmental issues to describe their most important achievements. After they told their stories, I asked them, "How would you explain the sources of your commitment to protect the environment? What personal experiences turned you in this direction and inspired you to pursue it?" The two most frequent answers were the same in each country: positive experiences of natural areas in childhood and adolescence and family role models. Almost 90 percent of the Kentuckians recalled places where they played as children or hiked as adolescents. The proportion from Norway, 65 percent, would have been higher if some Norwegians had not debated whether playing outside in nature were not too typical for them to mention. About

three-quarters or more of each sample also talked about family members who directed their attention to elements of the natural world: usually a parent, but sometimes a grandparent, uncle, or older sibling. These two most frequent sources of commitment often went together, as 77 percent of those who identified a special childhood place also talked about a special relative in childhood who confirmed nature's value.

The extended interviews enabled people to talk at length and trace the chronology of formative events. After childhood places and family members, the third most frequent explanation that they gave for their activism, reported by more than half of each sample, was participation in an organization. I counted this answer only when they said that their environmental feeling originated or significantly deepened during participation. For example, several people spent time in the woods as Boy Scouts or Girl Scouts, or joined an environmental group at a friend's insistence, only to find themselves becoming authentically involved. Others learned strategies and skills that led them to see themselves in a new way, as an activist. Although other reasons that people gave for their environmentalism are also important—including education and witnessing pollution or habitat destruction—these reasons were cited by less than half of each sample.

These explanations need to be put in context. Nineteen of the people that I interviewed were 50 or older and the youngest were in their late 20s. For all of them, childhood was distant. In their environmental campaigns, they advocated protecting the environment on the basis of well-calculated rationalizations: because the pollution that endangers wild habitats also diminishes human health; because the environment is an intricate web of interdependency and human well-being depends on maintaining it intact; because the exploitation of the earth is related to the exploitation of other people; or in the case of several Norwegians, because they adhered to the deep ecology of Arne Naess (1995/1973). But when these people explained why they themselves invested countless hours of their time on the environment's behalf, their reasons were usually much more personal and simple: because of the childhood place where they played, or where they hiked or skied as adolescents; and because a beloved family member directed them to look closely at the plants and animals around them.

This is simple descriptive research, but a number of comparative studies reinforce these results. Two are surveys in the United States which contained a measure of "environmental sensitivity," based in part on reports of childhood experiences of hunting, fishing, camping, and family vacations in natural areas—all activities that a child would typically do with family mentors. This measure turned out to be a leading predictor of self-reported action for the environment in several samples, including elder hostel participants, Sierra Club members, and members of fishing, hunting and trapping associations (Sia, Hungerford and Tomera 1985/86; Sivek and Hungerford 1989/90). In a random survey of 822 Iowa farmers, those who enhanced wildlife habitat on their land, compared to those who did not, were much more likely to say that in childhood they had a wild place where they went to be alone, often hunted with family or friends, fished, and read nature books (Pease 1992). Another United States survey of 2004 randomly selected adults found that

nature activities in childhood predicted pro-environmental attitudes and behaviors like recycling, "green" voting, and participation in programs like Earth Day (Wells and Lekies 2006). According to this survey, exploring nature with other people was not predictive, but this result is not surprising, considering that other studies indicate that what matters is not simply having outdoor companions, but what these companions do. An interview study of 51 young adults who showed strong interests in natural history and ecology found that they remembered positive experiences of exploratory play in nature, while in contrast, ten young adults who lacked these interests either did not recall free play in nature or described having uncomfortable outdoor experiences forced upon them (Vadala and Bixler, forthcoming).

In Switzerland, a survey of a representative sample of 1004 citizens showed that those who took action for the environment through recycling, voting, signing petitions, and civic engagement at the local level were likely to have a history of nature experiences, and to say that they had these experiences before they were 20 (Finger 1993; 1994). Among 281 German citizens, interest in nature, indignation at its inadequate protection, and "emotional affinity" for it, in the sense of love for the natural world and a sense of safety and oneness in it, were significantly related to time spent in nature, including time in childhood, and the meaningful company of family members or teachers (Kals, Schumacher and Montada 1999). Emotional affinity toward nature, interest, and indignation, in turn, predicted a willingness to protect the environment.

Young people themselves talk about similar experiences. When high school students in Wisconsin were asked why they joined environmental action clubs, the majority spoke about their experiences of natural areas around their home or school (Sivek 2002). Role models came second in importance, and in this case, students usually mentioned teachers or advisors who sparked their interest in the club. A German survey of 1243 10-18 year-olds, which included students active in nature and environmental clubs and those who were not, found that the strongest predictors of a stated intention to protect nature were nature experiences, the environmental behavior of parents, and the behavior of peers (Bögeholz 1999, cited in Bögeholz 2006).

All of these studies are descriptive or correlational and depend upon self-reports. Perhaps people who staff conservation agencies, enhance wildlife habitat on their farms, join nature clubs as students, or choose careers in environmental education selectively remember time in nature in childhood and adults who demonstrated nature's value, while others who show less environmental concern forget or choose not to mention experiences of the same kind. All interview and survey research depends on the selective and reconstructive functions of memory. Research on autobiographical memory indicates, however, that studies of significant environmental experiences draw upon memories of the most reliable kind: unconstrained recall about past experiences of personal importance, with a focus on general facts about major periods of life (see review by Chawla 1998b).

Even granting that these self-reports involve memories that are likely to be reliable, these descriptive and correlational studies cannot establish the direction of influences. It is possible that individual differences lead some children with a special affinity for nature to seek it out and evoke sympathetic behavior toward nature from parents and teachers. Relations between children and adults are interactive, and therefore inherent differences among children are a factor to consider.

Only experimental designs, carefully controlled longitudinal research, and close observation can authoritatively determine causes of environmental behavior and directions of influence. The dynamics of children's use of local places, however, suggests that a critical line of influence runs from adults *to* children (Hart 1978). Many studies show that when nature is accessible for play, children gravitate to it (Chawla 1992), and children around the world choose natural areas as favorite places if they have no serious reasons to fear them (Chawla 2002). Yet, it is their caretakers who decide whether they are allowed to use these places freely and whether this interest should be encouraged. Ideally, families traveling together through woods and fields or the parks and gardens of cities embark on journeys of mutual sharing, with children and adults drawing each other's attention to objects of fascination. The adults in charge, however, create the conditions for this sharing to occur.

Important as these questions about the validity of memory and lines of influence may be, the cognitive psychologist Ulrich Neisser (1988) has argued that to focus on them alone is to miss the most important function of memory, which is its utility in helping people meet the challenges of the present and anticipating the future. The fact that people identify special places and people in childhood as key reasons for their dedication to the environment—that they interpret these memories in this way and draw motivation from them—is important in itself.

Although the number of studies that reveal childhood antecedents of adult care and concern for the natural world have been growing, they remain almost silent when it comes to the question, *Why?* Why do people who take action for the environment or choose environmental vocations repeatedly look back to childhood places and people when they account for their behavior? To help answer this question, I have gone back to the transcripts of my interviews to look more closely at the exchanges with parents and other role models that people described. In addition to re-analyzing these segments of the interviews, I chart my path through developmental theory as I have sought to understand why these early experiences leave such lasting impressions.

The Relevance of Ecological Psychology

The best insights that I have found for the importance of free play in nature lie in the ecological psychology of James Gibson (1979), Eleanor Gibson (1969) and Edward Reed (1996a; 1996b). Their work also explains the essential role that adults play when they share an interest in nature with a child. Another ecological psychologist, Roger Barker (1968), suggests why experiences in organizations are also often formative. To understand why it is parents and other close caretakers who figure most often in people's accounts, I have drawn on the attachment

theories of John Bowlby (1969) and Donald Winnicott (1958). This section reviews components of ecological psychology that shed light on the salience of nature play, influential adults, and participation in organizations.

To begin, it is necessary to review principles of ecological psychology which make it an especially well-suited framework to understand childhood experiences associated with adult action for the environment. Most fundamentally, ecological psychology is grounded in evolutionary theory and a realist philosophy (Heft 2001). It views human beings like other creatures in the web of life with which they have co-evolved, and claims that humans, like other organisms, encounter the physical world directly, with the ability to perceive qualities of the world that are really there rather than merely mental constructions about the world. In this respect, it shares basic assumptions with the environmental movement: it assumes that human beings are dependent on intrinsic qualities of the physical world, its resources, and its limits, and they can discover what these resources and limits are through direct perception in order to adjust their behavior in adaptive ways.

This realist foundation of ecological psychology descends from the radical empiricism of William James (1912/1976). James held that we encounter the world through an ongoing stream of pure experience which contains many-faceted possibilities for knowing. From this stream of information, we select what we attend to. Guided by our interests, our society, and our culture, we focus on some features of the world at the expense of others, but the information that we notice reflects qualities of the world that are really there.

These ideas may sound like common sense, but in fact this realism of William James, ecological psychology, the environmental movement, and naïve common sense runs counter to dominant theories in psychology and the sociology of childhood, which propose that all that people can know are their mental representations of the world, which are constructed by gender, class, culture, ethnicity and other social contingencies (Heft and Chawla 2006). Although ecological psychology does not deny the powerful influence of socialization and culture (Reed 1996a), it argues that these influences affect how we select and use the information that we receive, but do not prevent us from receiving direct information about the world.

Ecological psychology also speaks to people's developing relations with the world because it emphasizes agency. According to James Gibson (1966; 1979), Eleanor Gibson and Anne Pick (E. Gibson and Pick 2000), to be a living animal means first and foremost to be *animate*, moving. This is the case whether we consider a paramecium, a sand crab, a seagull, or a child. A newborn human, for example, may have little control over its body, but it immediately begins to explore its surroundings with the movement of its eyes and its mouth. Under good conditions, young people in middle childhood and adolescence discover their world through wide ranging movement through their city or town. As animals move, they are acting on the world, and coordinating information from vision, touch and other senses. As a consequence, ecological psychology is interested in environmental learning and action in every setting—informal community settings as well as

classrooms—and it is particularly well-suited to describe what happens when people learn through autonomous movement and exploration, such as children at play outdoors.

By seeing people first and foremost as moving organisms in the environment, ecological psychology sees them as part of a relational system. This way of viewing the world is central to James Gibson's concept of *affordances* (Gibson 1979). Affordances are functionally significant properties of the environment which are defined by the relationship between the environment and an organism. For example, a tree affords climbing for a child only if its lower branches reach down to a child's grasp, relative to the child's height, and the child has strength to pull itself up, relative to its weight (Heft 1988). The affordance is neither in the tree, nor in the child, but in the relationship between them. So it is with all creatures' abilities to take advantage of the resources that the environment holds. Success depends not just on the qualities of the environment, but equally on the biological systems that creatures have evolved to detect and use information about these qualities, as well as the particular capabilities of individual organisms.

Marketta Kyttä (2004; 2006) has observed that environments vary in the quality of the affordances that they provide for children. From Edward Reed (1996a), she has borrowed the concepts of "fields of free action," "promoted action," and "constrained action." In fields of free action, children can explore the world without guidance or interference from others. In fields of promoted action, other people encourage the child to act in certain ways: for example, by providing a stool so that a child can reach a basin of water, by placing a toy within reach, or by telling a child to go out to play. In fields of constrained action, people limit what a child can do: placing bars on cribs, locks on cabinets, or making rules against crossing the street.

Combining these concepts with her research on affordances for children in different communities in Finland and Belarus, Kyttä identified four types of places for children. Some can be described as "wastelands," where even if children have freedom to move about independently, there are few affordances to engage their interest. Other places may be described as "cells," where children's mobility is so restricted by physical and social constraints that they know very little about the world around them. In "glasshouses," children can see that the world is rich with possibilities for action, but they are excluded from accessing them. In the fourth and best place, which she terms a Bullerby (Swedish for "noisy village"), children can move freely through their world, and the world that they discover rewards their efforts. This setting, Kyttä notes, is characterized by positive cycles: the more widely that children move through their world, and the more satisfying encounters they have with engaging affordances, the more they feel motivated to explore yet further. As the next section will show, the natural environment is particularly rich in this kind of motivating resources.

Ecological psychology is also relevant to environmental activists' stories because it pays close attention to the dynamics of perceptual learning—an organism's ability to detect new information in its surroundings. In opposition to constructivist

theories that view the world as information-poor and dependent on the mind's interpretation and enrichment, an ecological perspective considers information in the world so rich and structured that perception is fundamentally about exploration, detection, and selection (Gibson and Gibson 1955). It shares this view with William James (1890, vol. 2: 78), who believed that the function of perception is discrimination, or the ability to notice fine-grained differences in information. In numerous experiments, Eleanor Gibson and colleagues (Gibson and Pick 2000) have shown that people have an innate drive to notice more and more about their environment, insofar as it relates to their interests. For example, when she and James Gibson asked children and adults to match cards with scribbles that sometimes differed in small details, both groups sorted the cards more and more accurately on successive trials, even though they received no explicit teaching or extrinsic rewards (Gibson and Gibson 1955). Improved competence at a task which engages people's interests, which involves attuning attention to the relevant features of a situation, appears to be its own reward.

Commonly, however, perception is shaped by processes of joint attention, when people notice the same thing together. Around six months of age, children begin to turn their attention to features of the environment to which another person is attending, and they soon begin to direct attention themselves by pointing and calling out the names of things. Much of this perceptual learning is informal, and it corresponds to the experiences described by the environmentalists in my study. Because a father pays attention to a passing thunderstorm, his son gives it his attention too. As a grandmother works in her garden, she shows her granddaughter the parts of flowers. As an uncle tracks the flight of a bird, his nephew follows it with his eyes. Later, all systems of apprenticeship and formal learning, including formal environmental education, are built on these basic processes of joint attention (see Figure 1). Children are most likely to stay attentive and engaged, however, when the features of the environment that they notice are responsive and give them immediate, pleasurable feedback about the effects of their actions (Heft and Chawla 2006). In this way, they learn simultaneously about properties of the world and their own capabilities, and they develop competence.

Figure 1. Processes of joint attention form the basis for apprenticeship in the tasks valued in a child's society, including care for the environment—such as this early lesson in composting that a father gives his son. Photo courtesy Reba Rye.



Another principle of ecological psychology relates to the value of organizations, which environmental activists also credited as important influences in their childhood and youth. Roger Barker (1968) developed the concept of “behavior settings,” which are customary patterns of behavior in designated places where people gather to engage in particular activities at particular times, such as a math class, a soccer game, or the meeting of an organization. These settings are constituted by the coordinated actions of the people there as well as the affordances of the place that support these actions. For example, a meeting of an environmental club requires members, officers, and a suitable room where people can sit in a circle and make plans without distractions. Barker found that the best predictors of people’s actions include the behavior settings that they occupy, for people quickly learn the programs for different settings and take up appropriate roles. Like larger-scale environments, however, behavior settings vary in the opportunities that they offer. Some relegate most participants to the passive roles of onlookers, audience, or members with potential rather than immediate power (for example, merely holding the right to vote for others who will represent them). In Barker’s words, people learn best in settings where they can assume the roles of “active functionaries” who have power over at least part of the setting, or leaders with decision-making authority over the whole setting. Just as children learn the most about the environment and their own competencies when they have a chance to engage with affordances which give them immediate feedback about the effects

of their actions, people who fill the roles of active functionaries in a setting get to propose and carry out different activities and observe the consequences.

The final principle of ecological psychology which helps explain the formative experiences of environmental activists is the importance of learning about the world first hand through one's own actions in it, rather than second hand as others represent it. Edward Reed (1996b) calls this "the necessity of experience." He has argued that *primary* or first-hand experiences expose people to inexhaustible possibilities for learning, including creative new discoveries. Outdoors especially, a person encounters a dynamic, dense, multi-sensory flow of diversely structured information, but some places are richer in this regard than others. For example, shoppers are bombarded by more varied smells, sounds, and sights in a traditional marketplace than in a supermarket, and there is more information in a woodlot than a parking lot. In contrast, in *secondary* experience, when others tell about the world second-hand through a text or an image, information is radically reduced—literally, in most cases, two-dimensional. Primary experience is also necessary because it occurs in the real world of full-bodied experiences, where people form personal relationships and place attachments, drawing motivation to protect the places and people they love and building alliances and competencies to do so.

The Advantages of Free Play in Nature

Putting these principles of ecological psychology together, they illuminate the formative childhood experiences that many environmental activists and educators recall. First, they suggest why active play in the natural world in childhood leaves such deep impressions. When children enjoy freedom to explore in nature, they are likely to encounter the best kind of environmental conditions for developing knowledge and competence, according to the place categories analyzed by Kyttä (2006). The fact that they have this freedom outdoors implies that their parents and other caretakers allow it and tolerate the scratches, muddy knees, wet shoes, and pockets full of pebbles and other collections that their children bring home. If these resources are not right outside the door, then some parents are able to make special arrangements like packing the children off to a grandparents' farm or to a cabin in the mountains or by the seashore. In this sense, children's free movement in nature is a "field of promoted action," a territory explored with their families' permission and encouragement. Once children head outdoors alone or with friends, however, it functions as a "field of free action" where they can make discoveries of their own with no one to tell them, "Don't touch that!" or "Don't get that dirty!"

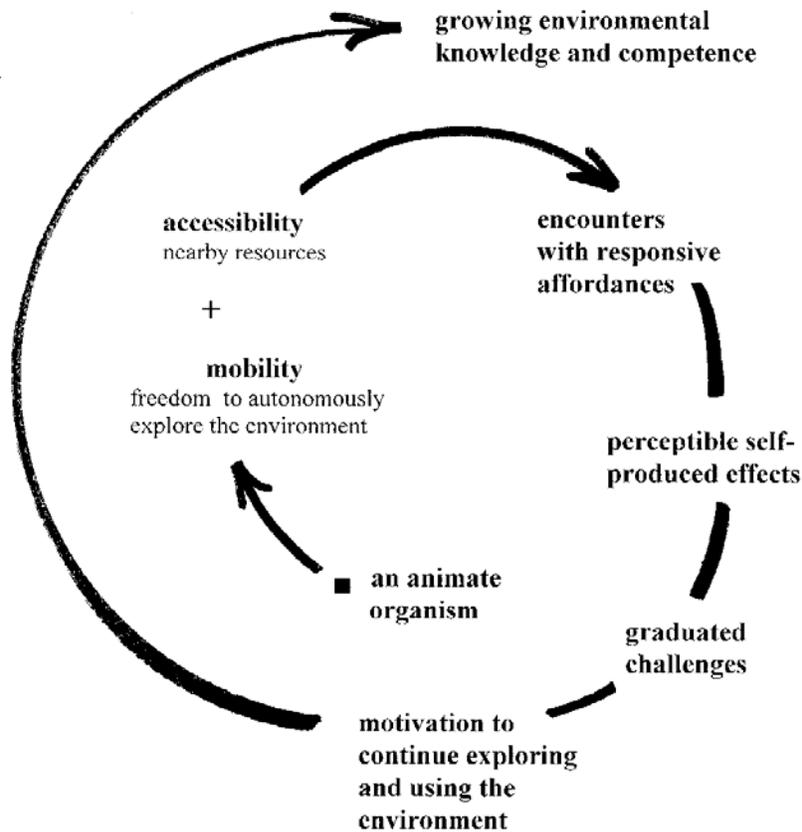
What children find in the natural world rewards their initiatives and encourages their continuing engagement, for nature is particularly rich in responsive affordances. It provides all the conditions for events that hold children's attention. Children see immediate, reinforcing effects of their actions, which simultaneously show them how the world works and their own capabilities. The wet earth keeps the shape they press it into—unless they add too much water and it turns to runny mud. That means try it again with less water next time. That leads to the next time . . . and when the earth molds just right, nearby stones and grasses make perfect decorative touches. And so the hours pass away, with children immersed in a world that affords a treasury of "loose parts" that they can use for experimentation and

construction. As Simon Nicholson (1971) observed, although children can also create with lego sets and building blocks, nothing else comes close to the loose parts of the natural world for the creative versatility that they afford.

Nor, it can be added, does any other environment offer so many finely graduated levels of challenge that enable children to mark their developing physical competence. The stone that was too heavy to lift yesterday might budge today. *This* tree branch is still just out of reach, but—success!—today *these* branches are spaced just right. In many cases, children are exploring this world along with a brother, sister or friends, and it is then a medium for coordinating their efforts to overcome challenges and develop social competence as well—such as moving the really big stone together, helping each other into trees, or setting up shop to bargain over shells and feathers. Observations show that children engage in more creative and dramatic social play in natural spaces than they do in built playgrounds or spaces without trees or grass (Kirkby 1989; Taylor et al. 1998).

Building on Kytta's (2006) notion of "positive cycles" of mobility, access and engagement, free play in the natural world offers impressive interactive cycles—and therefore it should not be surprising that these experiences leave deeply engraved impressions in people's memories. As Figure 2 shows, such a cycle begins with an animate organism that investigates its world and avails itself of surrounding resources through self-initiated movement. No person is more animate in this regard than a growing child. If a family is fortunate, parents and children alike can find release through the simple command, "Go play outside!" But this mobility requires access to a safe world of engaging affordances and graduated challenges that a child can master—not fast traffic or warring gangs outside the door. When children encounter the surrounding world in satisfying ways, they are motivated to explore further; and with each feature of the environment that they come to understand and each challenge that they overcome, they expand their levels of environmental knowledge and competence.

Figure 2. Positive interactive cycle of accessibility, mobility and engagement with the environment



Given its base in evolutionary theory, ecological psychology also bids us to reflect on the nature of the world that a child encounters. A child at play outdoors is a perfect example of Reed's (1996b) category of primary experience, when people move and act in the real world with their full-bodied powers, encountering inexhaustible sources of information that offer opportunities for creative discovery. In natural habitats, children discover infinitely new iterations. No two crickets and no two birds sing exactly the same song. No two rotting logs hold exactly the same constellation of insects. No stream pools and floods the same way twice when children dam it, nor does the water flow with the same music and force, or reflect the same gleam of light, on different days in different weathers. No bank of earth has exactly the same consistency, nor smells exactly the same, at different points along its length. Thus even down in the *same* stream and the *same* mud bank for the 237th time, children can discover a world that is inexhaustibly new (Figure 3). It is also the world in which human beings evolved, with which children have a connection as ancient as the chemistry of their cells. It is the world for which they are adapted, on which human existence depends.

Figure 3. In the natural world, nothing ever happens in exactly the same way twice—especially not the chemistry of mud and water.
Photo by Louise Chawla.



Along with this ever-fresh novelty, the natural world provides continuity. Although not precisely the same, the smell of wet earth in certain weather can sweep us back to memories of a special childhood place. Despite their variety, the forests that activists seek to protect as adults most likely bear some resemblance to the first forests where they ventured. The moistness of sea winds touch all beaches, past and present. Nature's newness is composed of repeating elements and patterns, so that in an approximate way, people can revisit and act to protect places consecrated by their first memories of the world.

At their best, city streets offer similar opportunities for safe exploration and graduated challenges in settings full of variety and vitality. In these places, children come to know their society, see how it works, and try out different roles. As the research of Barker and Schoggen (1973) has shown, the more—and the more various—the behavior settings that children can enter in their community, the more likely it is that children will play a variety of roles. In this way, they develop social competence. Like natural areas, neighborhoods of this kind can inspire lasting allegiance (Ward 1990). In the most child-friendly cities, the discovery of nature, society and the built environment are compatible. Historically, cities contained a mosaic of natural areas: not only formal parks, but also riverbanks, kitchen gardens, fields for horses and milk cows, and on the periphery, working farms (Chawla 1995). To this day, children around the world identify both friendly streets

and safe, accessible natural areas as important components of a good place in which to grow up (Chawla 2002).

A Contagious Attitude of Attentiveness

In processes of joint attention, the social and physical realms function together. People around a child foster a bond with nature not only by giving the child freedom to move about and engage autonomously with natural areas, but also by their own example. What they need to do, it appears, is to set an example of noticing nature in an appreciative way. By the direction and quality of their attention, they communicate nature's value and promote the child's interest in this world too.

In my interviews with Norwegian and Kentucky environmentalists, people told story after story about family members who took them into woods or gardens as a child and showed close attention to plants and animals there. Even when people described hunting or fishing with their family, their parents showed a quality of attention that was not purely instrumental. As a Norwegian woman said, when she grew up in the 1950s, all Norwegians were out hiking, picking berries, and fishing, but what distinguished her family was that "my mother knew the names of the plants more than other mothers did. So we talked more deeply about things. We didn't only fetch berries and fish, but talked about it" (Chawla 1999, 20). That, she believed, was one key to understanding why she grew up to become a biologist who specialized in the knowledge of riparian systems and fought against damming wild rivers—someone who sought to "let the river live."

In a similar fashion, a Kentucky lawyer who became a leading organizer of the struggle to save the wild and scenic Red River from damming mused about what made him different from proponents of the dam. Many of them, like him, must have grown up fishing and hiking in Kentucky's woods and fields. "Maybe a lot has to do with who you go fishing with," he suggested, "or who you're talking to when you're walking" (Chawla 1999, 20). In his case, he fished with a father who took time to "appreciate what's there," who didn't just catch fishing bait but watched the insects and worms and noticed the details of surrounding plants and trees. "It was something that he appreciated," the son said, "but he wasn't a preacher of it or a teacher of it, it's just a very subtle thing. And, you know, him with his garden and his plants and all the things that he loved." Through what they attend to with care or fascination, role models indicate that elements of nature have value.

This quality of attention has been captured in a phrase from a study of amateur entomologists by Janice Mathews (1992). When she asked them how their passion for insects began, 80 percent credited their adult avocation to experiences in childhood and adolescence—and like the activists, their formative experiences were encounters with a rich natural environment and the example of other people. What characterized these examples, Mathews noted, was "a contagious attitude of attentiveness on the part of those adults who have meaningful relationships with the child" (326).

There is a need for research which probes precisely what happens during these moments of joint attention. Although this was not the focus of my study, a close

analysis of activists' interview transcripts revealed that significant adults gave attention to the environment in four ways: by expressing care for the land as a limited resource essential for family identity and well-being; by disapproving of destructive practices; by sharing pleasure at being out in nature; and through their own fascination with details of the earth, sky, and living things (see Appendix A). These forms of attention were not mutually exclusive, but tended to reinforce each other. The same people who taught care for the land were also likely to express disapproval of other people's destructiveness, and when they showed fascination with the details of things, it underscored lessons about the value of family land, or general expressions of pleasure at heading out into forests or fields.

Future research should look at how these forms of attention combine, for in many cases it may be the combinations which are critical. For example, the same grandfather who perched his grandson on the front of his motorbike for family expeditions into the countryside for the sheer pleasure of it, also expressed his disapproval when people shot roe deer, elk and reindeer. A woman who grew up on a small Appalachian farm recalled that her father did not just point out different trees and what was planted in different fields, but explained how the family needed to plant certain things in certain areas to preserve the land for the long term. "Hang on to your land," was her father's sermon when he took his daughter on Sunday walks to inspect the farm. "The Lord's not making any more land."

What none of these significant adults demonstrated was fear of nature, heedlessness, or destructiveness. It is also noteworthy that their "attitude of attentiveness" to a world of primary experience stands at the opposite pole from a culture of consumerism which sees other things as nothing but a stock for people's taking, and which primarily represents the resources that it consumes—if it renders them visible at all—as two-dimensional images in advertisements.

Bonds of Attention and Attachment

A final feature of the activists' stories that deserves attention is who these exemplary adults were and the nature of their relationship with the child. Most often, they were family members: usually a parent, but sometimes a grandparent, an uncle "like a second father," or other close relative. Five of the influential childhood figures mentioned during my study were teachers—but in each case, they were part of the Norwegian educational system in which teachers stayed with the same class for two or three years as it moved through elementary school or middle school. These teachers had extended relationships with their students, and in former students' accounts, they took their classes out to natural areas and taught through processes of joint attention to the surrounding world, as family members did.

To adequately address this social context of perceptual learning, we need to complement ecological psychology with interpersonal theories of object relations and attachment (Greenberg and Mitchell 1983). Ecological psychology acknowledges that the affordances of the world evoke a range of emotions, that there is inherent pleasure in achieving competence, and that children's access to the world and processes of joint attention are embedded in social relations. The

quality of these relations, however, is not the focus of ecological psychology—whereas interpersonal theories of object relations concentrate on the quality of a child's developing bonds with primary caregivers.

Like ecological psychology, theories of object relations descend from Darwin, and view the world as a place of real resources and risks that a child and its family must negotiate. A difference is that object relations are associated with Freudian theory and ecological psychology does not accept this context as a whole—but nevertheless, object relations theory is compatible with ecological psychology insofar as it directs attention to the quality of a child's bonds with its caregivers. Thus, this body of theory illuminates why activists often talked about the influence of parents and other close relatives.

The two theorists who are most relevant to the activists' accounts are John Bowlby and Donald Winnicott. Bowlby (1969) argued that a deep bond between a child, its mother, and other primary caregivers is essential for a child's survival and healthy development. Inspired by Bowlby, Mary Ainsworth and other researchers (reviewed by Colin 1996) have observed how a caregiver's watchful responsiveness creates a safe space from which a young child can begin to reach out, investigate the world, and develop its powers. In this regard, interpersonal theories of object relations and attachment add emotional depth to ecological psychology's concepts of "fields of free action," "promoted action" and "constrained action." Many observations of young children and their mother or other close caregiver show that a child moves back and forth from its caregiver to the attractions of the world around it, pivoting around the adult as a "secure base" that the child keeps in sight and often returns to touch (Colin 1996). The caregiver sets limits to this movement and is quick to draw near if there is any sign of danger (creating a "field of constrained action"), but when the environment appears safe, she encourages the child's exploration and allows an expanding range (creating the conditions for "fields of promoted action" and "free action"). When young children feel securely attached to their mother or other primary figure, they explore the world more confidently. Under good conditions, this back and forth movement opens out with time to encompass children's wide ranging exploration of their community and natural areas, confident that they can always return to the secure base of their home (Hart 1978).

Interpersonal theories of object relations also add an emotional dimension to perceptual learning. They bring to the fore what ecological psychology can accommodate but does not stress: that people bring to their encounters with the world their histories, memories, and "residues of relationships," beginning most formatively with their bonds with parents and other primary caregivers. These theories note that infants come into the world primed to seek close human relationships. Related research shows that children build bonds of secure attachment when they find that their caregivers also notice *them* responsively: appropriately responding to their hunger and cries, meeting their gaze, smiling when they smile, talking back to their babble when they are infants (Stern 1985), and as they grow, continuing to attend to what they seek to communicate. In the words of the British pediatrician and psychoanalyst Donald Winnicott, "When I look I am seen, so I exist" (1971, 134). When children learn that they are noticed

responsively and their needs are accurately read, they gain confidence to look outward and respond openly to their surroundings. In contrast, anxiety makes children self-preoccupied (Sarason 1975), or preoccupied with scanning the horizon for threats, including the loss of a parent's love.

According to Winnicott (1958), a great gift that a "good enough" mother and other caregivers provide is a "holding environment" where an infant is cuddled and contained, and where people "bring the world to the child" in ways that appropriately meet its needs. In later childhood, friendly city streets full of engaging activities to observe and join, and nearby nature, form "holding environments" of larger kinds (Cosco and Moore 2002). Also important, Winnicott (1965) claims, is that when a child is not experiencing needs and making demands, caregivers should remain available but allow the child opportunities to be on its own, enabling it to experience a state of needlessness and "going-on-being" in which it is free to establish its own playful and creative relationship with the world. This state is the genesis of a child's ability to lose itself for hours in play and exploration.

Interpersonal theories of object relations suggest that the emotional qualities of children's relationships with primary caregivers color the world that they share—that children do not simply look to their caregiver to see whether something should be feared or embraced, but the quality of these human bonds imbue the whole field of their experience. In this respect, these theories fit the suggestion of William James (1890, I), who said that out of the "millions of items of the outward order," (402) we select those that interest us because we have an instinctive relation with them, they are associated with strong sensations or feelings, or they are "connected by previous experience and education with things that are so" (417). Relationships with parents and other close caregivers are instinctive bonds charged with strong feelings. The activists' accounts suggest that these feelings continue to mark places of the kind that a child and its caregivers shared, as well as the elements of nature that they admired together.

These interpersonal theories also bid us to be attentive to the mutuality of relationships. The very fact that parents or grandparents choose to take a child to a place where they themselves find interest and pleasure, to share what engages them there, suggests not only care for the natural world, but equally, care for the child. No wonder such experiences resonate in memory. It is likely that the child's responses, in turn, magnify the parent's or grandparent's enjoyment. We can imagine that children make such a place their own field of promoted action, rewarding the adult's introductions with their own expressions of attention and seeking to return ("Let's go there again!").

These interpersonal relationships extend the functionalism of ecological psychology beyond its usual range. With its emphasis on affordances, the functional value of things in ecological psychology usually refers to material conditions for successful adaptation to the environment for the sake of survival. Thus, ecological psychology can readily account for a parent or grandparent who shows a child how to preserve the family farm or raise a garden. It is less adept at explaining a father who does

not just show his son how to find fishing bait, but gets lost in appreciating the insects under rocks, whether or not they are good for bait. Or a grandmother who draws her granddaughter into the close study of flowers. Or an uncle and nephew captivated by the flight of a bird. Or the theory of Arne Naess (1995/1973), which several of the Norwegians endorsed, which says that the flourishing of other species has intrinsic value independent of human purposes. The ability to care for things in themselves, apart from their practical human use, is an essential aspect of environmentalism, but it strains the sense in which "functionalism" is typically applied.

Care for things in themselves, however, is consistent with theories of interpersonal object relations, which include the emotional dimension of things. Emotionally, the function of a place may be pleasure. In this sense, one function of natural areas for people may be the sheer pleasure of discovering this world that is the matrix of being, in which humans have evolved with all other living things, and where children and their caregivers deepen their human bonds by sharing pleasure together. These emotions then become enduring aspects of the meaning of this place. Similar places, later in life, may serve as archives for these feelings.

According to these theories, a secure relationship with caregivers enables children to explore the world with confidence and turn their attention outward. The directions they ultimately pursue depend on what other people point them to, the resources and opportunities they find available, and their own interests, abilities and intentions. The environmental activists' stories suggest that when children have access to the natural world, and close family members encourage them to explore it and demonstrate by their own example that it deserves attention, children develop an eager interest in it. To turn this interest into activism, people need to build on this foundation through education, membership in organizations, or career choices. From their childhood experiences of free play in nature and significant role models, they bring to their adult work a legacy of memories which affirm that the natural world is a place of such full and positive meaning that it justifies their most persistent efforts to protect it.

Applying Theory to Prediction and to Understanding the Past

The theories presented in this article have acquired personal resonance for me. A few years ago I received an unexpected delivery: a large box of family papers and pictures that the executor of my step-grandmother's estate had found mixed among his own basement boxes by mistake. Its holdings contained my grandmother's writings, including her evocative descriptions of the longleaf pine forest in the Florida panhandle where she raised me as a baby. Reading her accounts of animals wild and tame, weathers stormy and tranquil, the fertile life of forest and swamp, changing flowers and colors of the landscape, and the stars of the night sky, I thought, "But this is me! This is exactly how I relate to the world, my whole way of attending and responding to it." We left this backwoods "interlude," as my grandmother called it with affection, when I was not quite one. I continued to live with her and her way of being in the world until she died when I was four, although in the very different environments of densely built Durham, North Carolina and Oak Ridge, Tennessee. I then found myself transported to the

home of a great-aunt and great-uncle in metropolitan New York. My great-aunt, my grandmother's younger sister, shared her love for animals and plants, and she and my great-uncle left me legacies of their spirit for which I have always been grateful. Yet, if I were to describe life in this suburban home, drawing on my large bank of memories, it would not come close to my grandmother's writings in terms of portraying my most intimate ways of relating to the world.

This unexpected glimpse into my infant past has left me wondering how much all of us may be formed by our first experiences of the world that precede the acquisition of language and conscious memory, including the cues we receive from those who first carry us outside into the world in their arms, showing us by their example what to notice, how to notice it, and how to respond. Theories about mental schema and representations do not speak to this dawn of awareness of the world in the way that discussions of perceptual learning in ecological psychology do, where we respond to qualities of the world that are actually there, in the company of other people who guide our perceiving. Interpersonal theories of attachment speak to the depth of the bonds that sharpen young children's attention to caregivers' cues.

As I grew up in my new home in suburban New York, the place that captured me for countless hours was the brook that marked the back boundary of our yard. I knew it inch by inch from the marsh at the top of the hill, out of which it flowed, to the culvert at the end of the street where it disappeared. It was a place of enthrallingly responsive affordances, loose parts, and graduated challenges for exploration and creative play, and its stream of multi-sensory images remains vivid in my memory.

So, yes, I chose the theories that I have reviewed in this article not only because they fit existing studies of the sources of people's motivation to protect the natural world, but also because they fit my own experience. For most people, the caregivers who first introduced them to the world remain their exemplars of what to notice in the environment and how to respond throughout their growing years. The discontinuities in my own childhood highlight the importance of these processes of perceptual learning, beginning even before we acquire language to articulate what we find.

As noted above, the theories described in this article descend from Darwin. If one accepts Darwin's theory of evolution, then some of the claims made here follow as a corollary, including the assertion that a special advantage of free play in the natural world is that children discover elements of life with which they have a connection that no technologies or built constructions can ever replace. The images on a television or computer screen or illustrations in a book, no matter how green, will never feed us or give us air to breathe or water to drink. Neither will city streets, no matter how vibrant and formative they may be for social reasons. Only living landscapes do that, and therefore it is important for children to have opportunities to know and value places of this kind.

Other aspects of the theories presented here invite testing. Studies of perceptual learning (E. Gibson and Pick 2000) and infant-caregiver attachment (Colin 1996)

have typically involved observations of behavior under the controlled conditions of the laboratory. Through observations of infants and caregivers in the home, Patricia Zukow-Goldring (1997) has shown how to take similar studies into naturalistic and cross-cultural settings. She has found that caregivers educate infants' attention all day long, with an early emphasis on gestures to direct looking, listening and feeling, joined by language later. Similar research could focus on interactions with natural environments, with a longitudinal sequence of observations. When a child enters a natural environment in the company of another person, exactly what happens? In the terms of Zukow-Goldring, what is the relationship between the "saying-and-showing" of the caregiver and the seeing, hearing and doing of the child? How do the child and caregiver begin to reciprocally share information and select affordances for action? What does this child do when it later enters the same place on its own? Will a child be more likely to reproduce the environmental behaviors it has seen if they come from a parent or other close caregiver rather than someone unrelated?

As children become old enough to articulate what they have done, what they have noticed, what a place means to them, and why, observations can be supplemented by children's drawings, interviews, writing, and guided tours in which they talk about a place as they move through it. How do they represent the natural areas that they use, in the context of observations of what they do there and the social cues that they receive about what to notice and how it should be treated and valued? Clifford Blizzard's (2007) research with schoolchildren in a forest indicated that their responses differed depending on the emphases of their teachers. Consistent with ecological psychology's concepts of affordances and perceptual learning, a longitudinal series of observations could be combined with qualitative methods to examine how children's responses to places develop. Consistent with interpersonal theories of object relations, do people who are primary objects of attachment shape children's environmental interests and behaviors with particular influence?

The concept of positive interactive cycles of accessibility, mobility and engagement with the world is also open to observation and manipulation in naturalistic experiments. Kyttä (2004) introduced the concept on the basis of interviews and questionnaires with children and their parents in different neighborhoods in Finland and Belarus. More directly, it would be possible to inventory affordances for children's play in actual places, beginning with a taxonomy that Heft (1988) initiated and Kyttä (2002) extended, and then compare children's behavior in places of different kinds. Do places hold children's concentration and engagement longer when they are richer in freedom for autonomous movement, immediately perceptible self-produced effects, and graduated challenges? How are these ingredients observable in natural environments in comparison to built settings for children's play?

This article argues that the theories of ecological psychology and interpersonal object relations, in combination, offer a framework for interpreting major findings in studies of childhood sources of people's environmental concern and action, and that they have the potential to productively guide further research on this topic. Apart

from a collection by Kahn and Kellert (2002), research on children's experiences of nature has been conspicuously thin on theory. The field is open for alternative theories to be advanced and tested to determine whether they fit the evidence in more persuasive ways, but until this has been done, the theories presented here are serious candidates for application and evaluation.

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Appendix A. Significant adults' forms of attention to the natural world

1. Care for the land

Through example or direct instruction, a person teaches that the land should be cared for because it is a limited resource and essential for family identity and well-being.

I grew up on a farm. One of the things that you were allowed to do instead of going to church on Sunday morning, if you were asked, was to go on these long walks with my dad over our farm. Because Daddy didn't go to church, Mother did. And I'll never forget those. . . . He would talk about how to distinguish the different types of trees and plants and some of the wildlife, and he talked about what you had to do to really manage the farm for the long-term. You know, he planned to grow the walnut trees for us. . . . It was a sort of constant consideration of the renewing of the earth, of the need to plant certain kinds of things in certain years and in certain areas and protecting the little stream and that sort of thing (Karen Armstrong Cummings, Kentucky).

Some of these episodes become family stories that are passed down through generations.

I've heard my dad talk about his father after a gully-washing rain one time, standing down in the lower field of the farm where I live and that I own today, crying and looking at the sheet erosion that occurred in a corn field there. And that sort of said to me that there must be something very valuable about that dirt (John Berry, Jr., Kentucky).

2. Disapproval of destructive practices

With a tone of criticism, a person indicates that certain practices harm the environment.

I was born and raised in west Tennessee . . . and in cotton country, and if there ever was a crop that wore the land out, that was one of them. And as far as a conservation ethic, my father had one. . . . I can remember him saying about a particular farmer that all he knows how to do is to kill the mules because he thinks that to wear a mule out is being a successful farmer, and to wear the land out is a successful farmer. And he would say it with some sarcasm (Bill Martin, Kentucky).

3. Pleasure at being out in nature

Through word or deed, a person shows that the natural world is a source of enjoyment.

My parents, they were taking me out in nature very often. We had a cabin in the mountains. Also my grandfather, he had a motorbike, so together with him we had lots of picnics in the local environment. He put me in the front of

the bike, on the gas locker. A little bit dangerous, but every time when he came, it was just, Enjoy! (Pål Kristian Selbo, Norway).

4. Fascination with elements of the natural world

A person gives close attention to details of plants or animals, earth, water or sky.

I had a grandmother always working out in the garden and teaching me about the birds and the flowers, when I was a very little girl. . . . When I started to study [biology and eventually ecology], I remember, I thought lots about my grandma. . . . But also my father was very interested in everything about nature. So I think I learned a lot about it when I was a child. We always were out. I grew up in Norway—gå tur [go for a hike] is a national sport in Norway. We always did. Picking berries and fishing and everything. So I don't think that is something special. But my mother knew the names of the plants more than other mothers did. So we often talked more deeply about things. We didn't only fetch berries and fish, but talked about it (Kari Anderson, Norway).

About a father:

Just that he was raised up in the country and had an appreciation of it, and could teach you how to make a willow whistle or a pop gun out of certain things or how to find the fishing bait under the rocks and appreciate what's there. Or takes you out on the porch when a thunderstorm comes in so you can enjoy it. . . . It was something that he appreciated, but he wasn't a preacher of it or a teacher of it, it's just a very subtle thing. And, you know, him with his garden and his plants and all the things that he loved (Oscar Gerald, Kentucky).