University of Alberta

Seeing the Forest and the Trees:

A Multi-dimensional Exploration into Children's Experiences with Nature

by

Cara D. Linzmayer

A thesis submitted to the Faculty of Graduate Studies and Research
In partial fulfillment of the requirements for the degree of
Doctor of Philosophy

Faculty of Physical Education and Recreation

Fall 2011

Edmonton, Alberta

Dedication

This dissertation is dedicated to Keeya, my own little longitudinal study into children's attachment to nature. It's early in the process, but preliminary results are extremely positive. Thank you, Keeya, for your patience the last few years, and thank you for allowing me to share my passion and fascination for nature with you.

Abstract

This dissertation reports on a review of literature and empirical research that explored children's experiences with nature. This dissertation addressed four research questions: (1) How do children aged six to ten years experience nature in a botanic garden setting? What sensory, affective, cognitive and behavioral dimensions of this experience can be identified and explored? (2) What meanings, do children attach to their experiences in nature? (3) What are the broader social and cultural factors affecting a child's experiencing of nature that can be identified? and (4) Through methodological triangulation with drawings, clay sculptures and photographs, how well do sand trays appear to be an effective and appropriate tool for children to communicate their constructions of meaning of experiences with nature?

This dissertation reports qualitative data collected from five children aged 8-10 years during a 5-day camp experience in a botanic garden. Four data collection methods were used in this study: clay sculptures, drawings, photographs, and sand tray pictures. To answer Question 4 advantages and disadvantages of each method were examined. The use of sand trays for research was established as a particularly effective method in this study of children's subjective experiences with nature.

Optimal arousal theory and Russell's circumplex model of emotion framed the investigation into Question 1 that focused primarily on children's experiences and demonstrated that children are attracted to experiences that provide pleasurable sensations and tend to avoid experiences that afford

displeasurable sensations. Findings also demonstrated that children seek out optimally challenging and novel experiences. The broader socio-cultural contexts of these children's experiences were examined to answer Questions 2 and 3. Three relational themes emerged in this study: (1) children feeling protective toward nature (2) children feeling fearful of nature, and (3) children feeling either a part of or apart from nature. These themes were discussed using a theoretical framework that blends Vygotsky's socio-cultural development theory and activity theory and Gibson's theory of affordances. Findings here contribute to a more integrated understanding of how ecological psychology theory and social psychological theory can inform our understanding of children's relationships with nature.

Table of Contents

List of Tables

Page

List of Figures

Appendices

Chapter 1: In the Beginning

My world changed one day in January 2006 when someone suggested I read a book called "Last Child in the Woods" by Richard Louv. I had been looking for a preschool for my then three-year old daughter but did not want her stuck away in the basement of an old building, which sadly is where the majority of the preschools in our town are housed. My dissatisfaction grew into a motivation to start a preschool program that got kids outside. This was something I just felt was important and until the day I picked up Louv's book, I had never put much thought into why. The research Louv cited in his book convinced me of two things: (1) that a positive connection to nature was essential for children; and (2) that many children in today's North American society were experiencing an estrangement from nature. At the very least, Louv's book cites evidence that North American children appear to be spending less time in nature. This dissertation does not attempt to unpack all the complex forces creating this trend. Instead, it explores what encourages children to want to spend time in nature. A plethora of positive outcomes from interactions with nature were cited in Louv's book. Specifically, research has established that developing a healthy attachment to nature can serve both protective and restorative resiliency functions for individuals on physical, mental, social and emotional levels (Besthorn, 2005). Outdoor play and nature-based activities have been found to increase a child's physical activity levels and improve mental health by decreasing stress and anxiety (see Kahn & Kellert, 2002). Children that spend more time in nature also have improved cognitive skills and social and emotional competence (see

Faber Taylor & Kuo, 2006). That nature is good for children is not a mystery. But what do we not know about children's relationships with nature? I was left wondering.

Formulating My Research

I was sitting in a research methods class in what was now about my fourth year of my PhD studies. We were asked to complete a digital story of what had brought us to that class. The class was small, about eight students. This was a deeply moving experience – doing my own story but also listening to the stories of others. One story, in particular, resonated with me. One of my fellow students, I'll call her Delilah, shared a story that resounded so intensely with me, it invited me to reflect on a question that, after about another year of polishing, became my main research question. Delilah's story told of times during her childhood spent exploring the woods near her home, finding solitude, peace and connection in the shade of the spruce trees. Nature was her playground, but also her playmate. She talked about how now, as an adult, she seeks out nature to help her relax, re-focus and regenerate. As I reflected on the commonalities between my story and Delilah's story, the word "equifinality" kept creeping into my consciousness. Within the context of my work as a counselor, equifinality refers to "how different early experiences in life (e.g., parental divorce, physical abuse, parental substance abuse) can lead to similar outcomes" (http://en.wikipedia.org/wiki/Equifinality downloaded, July 21, 2010). Clearly, Delilah and I had both reached similar outcomes -- we both sought and found solace in nature. What intrigued me more was that her story illustrated how we had very different early experiences that led to this common end. Nature, often the forests and mountains west of Calgary, had been a place I experienced with my family. To me, nature was a place full of happy memories, feelings of acceptance, and

experiences of challenge. For Delilah, nature was a place to escape the daily abuse and conflict she experienced in her home, with her family. The question for me was "how do people form positive attachments to nature, where they seek out nature for positive benefits?" The converse was also true and equally as relevant – how do people form negative or fearful attachments to nature, where they avoid nature? My first step in developing this curiosity into a formal research proposal was to conduct a literature review. This review allowed me to identify several gaps in what we know about how children form relationships with nature. Research into attachment and child development suggested that there are critical or sensitive periods in early childhood where experiences have the most developmental impact (Hertzman & Boyce, 2010). A significant body of research with adults has established that early childhood nature experiences are correlated with a strong connection with nature in adulthood (Chawla, 1997, 1998, 2002; Sebba, 1991). Several questions arose for me from this: How do children form relationships with nature? How do children attach meanings to their experiences? What is it specifically about the experience itself that invites a child to feel positively or negatively towards nature?

What the Literature Said

The literature I consulted was multidisciplinary drawing from fields of geography, environmental psychology, environmental education, leisure and recreation, health and social work. The first thing that became obvious was a lack of research conducted from the child's perspective. Green and Hogan (2005) asserted, "children in most societies are valued for their potential and for what they will grow up to be but are devalued in terms of their present perspectives and experiences" (p.3). As Gurevitz (2000) stated, "there has

been relatively little work to investigate how children value and experience their environments from their own perspective since the seminal work of Hart, 1979" (p. 256). Many of the studies into children's experiences of nature have looked exclusively at external vantage points or objective phenomena utilizing such methods as behavior mapping, adult recollections, laboratory observations, parent reports, and questionnaires (Cosco & Moore, 1999; Crouter & Tucker, 2001; Cunningham & Jones, 1996; Dovey, 1990; Faber Taylor & Kuo, 2006; Fjortoft, 2001; Hofferth & Sandberg, 2001; Karsten, 2002; Kirby, 1989; Kylin, 2003; McHale, Rasmussen, 2004; Simmons 1994; Sobel, 1993; Thurber & Malinowski, 1999; Wells, 2000; Wells & Evans, 2003). The results of these methods reflect others' interpretations of children's experiences, or adults' recollections of their childhoods, and may not necessarily be accurate reflections of children's experiences. Green and Hogan (2005) argued, "the nature of any child's (or adult's) experience is always in part inaccessible to an outsider" (p. 5). This suggested to me that there is a need to research children's experiences from their own unique perspective. Therefore I decided that I needed to seek answers from children themselves and conduct this exploration within the context of children's direct experiences with nature. Details on the methods I employed are discussed in the methodology chapter (Chapter 3).

Having decided upon a vantage point from which to do the research, I needed to determine what to research specifically. It seemed apparent to me that if I was interested in studying how children form relationships with nature, I needed to explore their experiences with nature. But what did I mean by experiences? 'Experience' remains an elusive, poorly defined concept in the literature (Borrie & Birzell, 2001; Gunter, 1987;

Kaplan & Kaplan, 1989; Scott, 1974 Tinsley & Tinsley, 1986). Its highly inferential nature makes it problematic to research (Greene & Hill, 2005). While we know much about specific types of experiences, we lack comprehensive understanding of their complexity. What makes experiences complex is that there exists an experience and a context. We become cultured, gendered and classed beings at a very young age (Nelson, 2007). Broad social and cultural influences such as gender, class and culture impact the meanings children attach to their experiences in nature and must be considered (Chawla, 2002; Derr, 2002; Sebba, 1991). Chawla (1998) highlights the importance of adults sharing favourite "nature" places with children. This mentoring relationship is a key factor in developing an attachment to nature in children. Derr (2002) found that children's strongest attachments to nature seemed to come with an interweaving of nature, culture and family. Kellert (2005) stated

> traditionally, adults have served as the critical role model for a child's developing interests in the natural world mainly by introducing and familiarizing the child with various outdoor activities and communicating this knowledge from one generation to another. Certainly, significant people (parents, siblings, friends, teachers, neighbours) represent an irreplaceable core that encourages emotional receptivity and attachment. (p.71)

To adopt a familiar metaphor, I needed to explore both the forest and the trees.

What emerged from my preliminary literature review were four research questions: (1) How do children aged six to ten years experience nature in a botanic garden setting? What behavioural, sensory, affective and cognitive dimensions of their experiences can be identified and explored? (2) What meanings do children attach to their experiences with nature? (3) What are the broader social and cultural factors affecting a child's experiences with nature that can be identified? (4) Through methodological triangulation with drawings, clay sculptures and photographs, how well

do sand trays appear to be an effective and appropriate tool for children to communicate their constructions of meaning of experiences with nature? This dissertation outlines why these questions are significant, defines key concepts, discusses the findings, and makes recommendations for practice and research.

The Study

Working from a constructivist perspective (Dale & Lyddon, 2000; Guba,1990), I used qualitative methods that allowed me to explore the social and individual constructions involved in nature experiences of children. Data were collected from a small group of five children aged 6 to 10 years that spent five days in a botanic garden. Multiple methods were selected that allowed inquiry into the four dimensions of experience while being sensitive to the child participants' needs and limitations as identified in the literature. Visual expressive methods were used as ways to bridge any potential gaps between the children's expression and their communication. Data came from semi-structured interviews based on these visual expressions. The visually expressive methods included participant-employed photography, drawings, clay sculptures and sand tray pictures.

Preliminary Definitions and Constructs

Some explicit discussion of the terms I will be researching is warranted to allow a more complete understanding of the research that is reported in this dissertation. I have chosen to use the term *construct* rather than *definition*, to frame the discussion of these important elements of my research questions. A construct is defined as "an image, idea, or theory, especially a complex one formed from a number of simpler elements"

(http://en.wikipedia.org/wiki/Construct, downloaded, July 21, 2010). This differs from a definition, which is defined as "the formal statement of the meaning or significance of a word, phrase, etc." ((http://en.wikipedia.org/wiki/Definition downloaded, July 21, 2010).

Children

Green and Hill (2005) posited, "children in most societies are valued for their potential and for what they will grow up to be but are devalued in terms of their present perspectives and experiences" (p.3). Recently, children have been increasingly recognized as "social actors and cultural agents in their own right" (Mitchell, 2006, p. 70). The United Nations Convention on the Rights of the Child sanctified the view of children as their own unique individuals. The Convention distinguishes children from being merely "*people in the making"* and states their uniqueness deserves recognition and protection (United Nations Office of the High Commissioner for Human Rights, 2003). Relating specifically to this study, Chawla (1988, 1998, 2006) has written extensively about significant life experiences and cites convincing evidence that adults' relationships with the natural environment are based on early childhood experiences. Edith Cobb (1977, p. 123-124) stated:

> There is a special period, the little-understood, prepubertal, halcyon, middle age of childhood, approximately from five or six to eleven or twelve- between the strivings of animal infancy and the storms of adolescence when the natural world is experienced in some highly evocative way, producing in the child a sense of some profound continuity with natural processes and presenting overt evidence of a biological basis of intuition.

Sebba's (1991) review of adult recollection of important places found that 96.5% of adults identified a place outdoors, a place where they had been connected to for several years between the ages of four to ten years. Kellert (2005) argued that the middle childhood stage of development encompassing ages six through twelve years of age

"marks a time of rapidly developing humanistic, symbolic and aesthetic values of nature" (p. 76). During middle childhood, children also begin to, and are more often permitted to, explore outside of their immediate home environment. They can expand their interests, curiosities, and feelings of competence independent of adult supervision. Nixon (1997) wrote that this age group "heads for the woods, fields, ditches, or other unused places they may claim as their own, building forts, playing games and spying on the world from their hideaways" (p. 35). Prior to this, he stated, children are confined more to home environments and following this children are attracted more toward social and commercial environments (Nixon, 1997). Chawla (1992) examined Erikson's development stages and identified the middle childhood stage as a time of autonomy and initiative, which is reflected in children's exploratory behavior. Sobel (1993) suggested this age to be when children feel most comfortable with the earth and begin to understand their relationship with it. Researching from a child's perspective is important because research has demonstrated that children's experiences with nature are fundamentally different than adults' (Gurevitz, 2000; Matthews & Limb, 1999; Rasmussen, 2004).

Children in this study were between the ages of 6 and 10 years, all from intact two-parent middle-income families who lived in rural, Central Alberta. There were two boys and three girls. Specific demographics are noted in Table 1.1 below.

Table 1.1. Demographic Information on Research Participants

Name* (Children selected their own pseudonym)	Age at time of research	Family composition
Cloe	8 years	Mother, father, older brother (age 10 –Colton, also a research participant)
Colton	10 years	Mother, father, younger sister (age 8 – Cloe, also a research participant)

Pearl	9 years	Mother, father, younger brother (age 4)
Angelica	9 years	Mother, father, younger brother, (age 5)
Matthew	6 years (turned 7 during camp)	Mother, father, young sister (age 3)

Experience

As the focus of this research is examining the specific details of nature-based experiences, a more complex and explicit understanding of experience is needed. To delve deeper into the construct of experience, I drew from the psychology literature, which identifies four dimensions of experience: sensation, emotion, cognition and behavior (Braun, 1988; Sullivan, 2005; Turner, 2005; Wilson & Ryan, 2005). Simply put, our bodies take in information through our senses, process it using emotions and cognitions and react to it with behavior. In order to understand children's experiencing of nature, it was important to explore what they were sensing, feeling, thinking and how they were behaving. This construct is explored in considerably more depth in chapter two.

Nature

"Although conceptions of nature are informed by both personal experience and scientific understanding, nature and the natural environment are social constructs" (Clayton & Myers, 2009, p. 15). For many, nature represents the world free from human control while others argue that some human intervention does not take away from the 'naturalness' of nature, and in some instances can actually enhance one's enjoyment (Clayton & Myers). Much of the research on children and nature reviewed in this dissertation does not define nature explicitly. Some researchers left it up to the participants to define nature and did not provide any scholarly operationalization of the

term. Pollio and Heaps (2004) asked respondents to "list three different times when you are (or were) aware of nature" (p. 37). Similarly, Alerby (2000) asked her respondents "what do you think about when you hear the word environment?" (p. 210). Chawla (2006) also used the terms environment and nature with no explicit definition. In her study of place preferences, Simmons (1994) categorized nature as follows: "urban nature", "open fields", "county park", "rivers, ponds, and marshes" and "deep woods" (p.32). Looking more at place than nature specifically, Derr (2002) categorized nature in her analysis to include such elements as mountains, animals, plants, rivers, rocky places, and dry creek beds. The adolescents in Wals' (1994) study did not define nature but described it as including flowers, animals, trees and as embodying life, purity, peace, freedom, solitude, wildness, and spontaneity. Phenice and Griffore (2003) interviewed Anglo-American, African American, Latino and Asian preschool children and found that they understood nature as being primarily trees, animals, and plants that are located outside. Sebba (1991) listed:

> elements and phenomena characteristic of the natural environment, as stated by children and adults, includ[ed] the sky/ the sea; the unpaved earth; trees, grass and flowers (even if planted by people); various animals; wind, weather and light phenomena (when not regulated by people); birds singing, the sounds of waves, the crackle of leaves in the wind; rocks, stones and so on." (p. 416)

Some researchers provided a very specific view of nature which helps clarify and limit the scope of meaning. Harvey (1990) limited his study of nature to include only vegetation. He used researcher ratings of vegetation and distinguished children's experiences with vegetation according to "variety," "frequency," "enjoyment," "amount," "diversity," "complexity," and "accessibility" (p.11). Similarly, Kirkby (1989) limited her definition of nature to vegetation in her study of preschool children's refuges. A

comprehensive, explicit and universally accepted definition of nature is likely untenable. Several authors argue that the meaning of nature, and likely the definition of nature, is socially constructed (Castree, 2001; Demeritt, 2001; Greider & Garkovich, 1994).

The meaning of nature for this study was co-constructed between myself as researcher and the child participants, and was likely a reflection of myself as a white, middle-class female who has extensive experiences in nature. In my study, the use of a researcher-prescribed setting – a Botanic garden –limited the scope and provided a manageable boundary within which the research participants were able to construct meaning through their free time activities and interviews. This predefined nature setting was grounded in the research cited above regarding what lay people relate about nature and reflects how most people in North American culture describe nature. Specific areas used within the garden afforded experiences with a variety of natural elements including plants, animals and water. Contexts for activities included a sensory garden, a waterfall in a Japanese garden, treed and forested areas, and a butterfly pavilion. Table 1.2 provides a description, including a photograph, of each of the settings used.

Table 1.2. Description of Nature-based Contexts Used

Water fall in the Japanese Garden		▪ A waterfall and stream flowing into a pond where children could safely touch the water and climb up the side of the waterfall on large rocks. ▪ The Japanese Garden was an area with meticulously manicured grassy hills, lawns, streams, ponds, and waterfall with authentic Japanese ornaments and structures such as lanterns, pagoda, entrance gate, belfry, asumayas (viewing shelters), and pavilion.
Sensory garden		▪ Five raised bed gardens, each one dedicated to plants that stimulate each of the five senses. Children had the opportunity to use all their senses to explore these plants. There was also a maze made with hedges and a small pond in the area.
Wooded/treed area		▪ A dense growth of trees, plants, and underbrush covering a large area. Trees were a combination of deciduous and evergreen. A variety of trails ran throughout the area. Some areas were very "wild" and untouched.
Butterfly pavilion		▪ An indoor garden with flowers and tropical plants that housed a variety of butterflies. Children were permitted to observe the butterflies and butterflies landed on the children however children were cautioned against touching the butterflies in ways that may have damaged them.

What Lies Ahead: Review of the Chapters

Chapter 2 provides an overview of relevant literature. I explore the limitations of existing studies of experience and develop a conceptual model of a more complete view of experience that I used to guide my inquiry. Chapter 2 also frames my research theoretically drawing upon the circumplex model of emotion, optimal arousal theory, affordances theory, socio-cultural theory and activity theory. Chapter 3 discusses methodology including data collection, data analysis and ethical considerations. I describe the four visually expressive methods I employed to elicit interview data. I also describe my process of analyzing the data and identifying and organizing emerging themes. Chapter's 4, 5, and 6 were written for and submitted to three different refereed journals; the stylistic formatting found in each of these chapters follows the style guidelines of these journals. Reference lists are included at the end of each of these chapters; however, these references are also repeated at the end of the dissertation. Chapter 4 evaluates the visually expressive methods used in this study and pays particular attention to the use of sand tray pictures. Advantages and disadvantages are identified for each of the four data collection methods that were used in this study: clay sculptures, drawings, photographs, and sand tray pictures. The use of sand trays for research was established as a particularly effective method in this study of children's experiences with nature, addressing research question 4. Findings are detailed in Chapters 5 and 6. Chapter 5 focuses specifically on the four dimensions of experience expressed by the child participants. The circumplex model of emotion and theory of optimal arousal are used to understand findings that include children's reports about their experiences with nature in a botanic garden. Chapter 4 outlines the sensory, affective, cognitive and

behavioral dimensions that children identified as significant in their experiences, addressing research questions 1 and 2. These findings further illustrate the dynamic interaction these dimensions have in children's construction of meaning, addressing research question 3. Children identified being attracted to experiences dominated by sensing, novelty and challenge. These findings contribute to practitioners' efforts to foster healthy attachment relationships between children and nature. Chapter 6 examines the broader socio-cultural influences on these experiences and the meanings constructed from those experiences, addressing research questions 2 and 3. The three themes emerged that described the children's relationship with nature. These themes are discussed using a theoretical framework that blends Vygotsky's socio-cultural development and activity theories with Gibson's theory of affordances. These theories are used to frame an investigation into the complex question of what personal meanings the children constructed from their experiences in nature and what identifiable social and cultural factors impacted these meanings. Findings contribute to a more integrated understanding of how ecological psychology theory and social psychological theory can inform our understanding of children's relationships with nature. The final chapter, Chapter 7, identifies limitations of this study and suggests paths for future investigation and practice.

Chapter 2: Literature Review – Framing the Research

The first part of this chapter details the literature I reviewed in crafting my research questions. In studying children's experiences with nature it is helpful to first explore what is meant by and what is known about the term *experience*. I explore the limitations of existing studies of experience and explain the multidimensional conceptual model of experience that I used to guide my inquiry. The next section of this chapter provides the theoretical foundation that frames my findings. Consistent with Lincoln's (1990) statement, that in constructivist research "theory must arise from the data rather than preceding them," this theoretical foundation was developed subsequent to my data analysis. Nevertheless, it is reported in this chapter. Because children's experiences with nature are a complex phenomenon to study my theoretical framework is equally as complex. Ecological theory serves to represent this complexity and underlies the theoretical foundation for this research. Ecological theory, which draws from ecology, psychology and philosophy, focuses on how humans interact with their environment and views humans to be in a mutually and reciprocally interactive relationship with their environment. The natural environment is of particular importance here (Fisher, 2002). This is overlain by the circumplex model of emotion, optimal arousal theory, Vygotsky's sociocultural theory and activity theory, and Gibson's theory of affordances. These theories are discussed individually and woven together to provide an holistic framework from which findings resulting from my inquiry into children's experiences with nature can be understood.

Practical Implications

The importance of studying the relationship between nature and child development is timely. Families and children are becoming more and more overscheduled with less and less time available to just *be in nature*. Children's access to nature, appears to be diminishing (Faber-Taylor & Kuo, 2006; Kahn & Kellert, 2002). Children already at risk for not having their basic needs met are often the most at risk for being denied access to nature. The need for all children to have their basic needs met in a safe manner needs to be balanced with what Wilson (1984) argues is an innate need to spend time in and build caring relationships with nature. Many studies have established the developmental benefit for children of nature-based activities (Besthorn, 2005, Faber-Taylor & Kuo, 2006, Kahn & Kellert, 2002) but little research has been conducted from the children's perspective. Moore (1986) made a valid point when he asserted that many natural areas and parks are designed for "adult aesthetic pleasure rather than child use-places to look at and stroll in rather than to physically interact with. Bare dirt is lawned over and the grass cut; shrubs are clipped, fallen leaves raked; the only water available is in the drinking fountain or an occasional ornamental pool" (p.68). The understanding and knowledge gained from the research conducted for and reported in this dissertation will allow professionals in disciplines such as recreation, education, park management and social work to create and manage experiences that will better meet children's needs. By understanding more of how children construct meaning from experiences, professionals can help create opportunities for experiences that can lead to outcomes such as improved social skills and learning, and increased ability to manage emotional responses. From an ecological perspective, interactions between children and nature are mutual. Studies have

confirmed that healthy child-nature attachments can also benefit nature particularly when children develop sensitivity and stewardship values as a result of nature-based experiences (Chawla, 2006). It is important, then, for children and nature to inquire into the multidimensional experiences of children to determine which experiences translate into nature being anxiety and fear provoking (and repel children from nature) and which experiences translate into nature being calming and relaxing (and foster attachment to nature).

Experience: A Multidimensional Model

An investigation into children's experiences with nature does not come without some challenges. In reviewing the literature, I found that since the study of children's experiences with nature is an emerging field of study, the majority of studies reviewed in the literature were exploratory. Louv's book, *Last Child in the Woods*, has created a surge of interest in this area and at the time of completing this dissertation, there is starting to be a larger pool of published studies available to draw upon. One of the scholarly dilemmas facing the study of experience is that it does not fall under the traditional boundaries of scientific inquiry and has, until fairly recently, been isolated to either philosophical discussions or psychotherapeutic attention. Several theorists in psychology and child development agree upon four primary dimensions of experience, which are helpful in developing a conceptual model of experience needed for this research: sensory, affective, cognitive and behavioral (Braun, 1988; Nelson, 2007; Wilson & Ryan, 2005). Recent technical advances in neuropsychology and neurobiology have provided scientific support for this conceptualization (Schore, 2003; Sullivan,

2005). Barrett and Bliss-Moreau (2009) described the multidimensional character of experience:

> affect [affective dimension] is realized by integrating incoming sensory information [sensory dimension] from the external world with homeostatic and interoceptive information from the body. The result is a mental state [cognitive dimension] that can be used to safely navigate the world [behavioral dimension] by predicting reward and threat, friend and foe. (p. 173)

Figure 2.1 provides the authors' conception of the four dimensions of experience from a review of the literature around development, regulation and neurobiology (Barrett & Bliss-Moreau, 2009; Nelson, 2007; Schore, 2003; Sullivan, 2005; Wilson & Ryan, 2005). This model facilitated the gathering and organization of information throughout the research process.

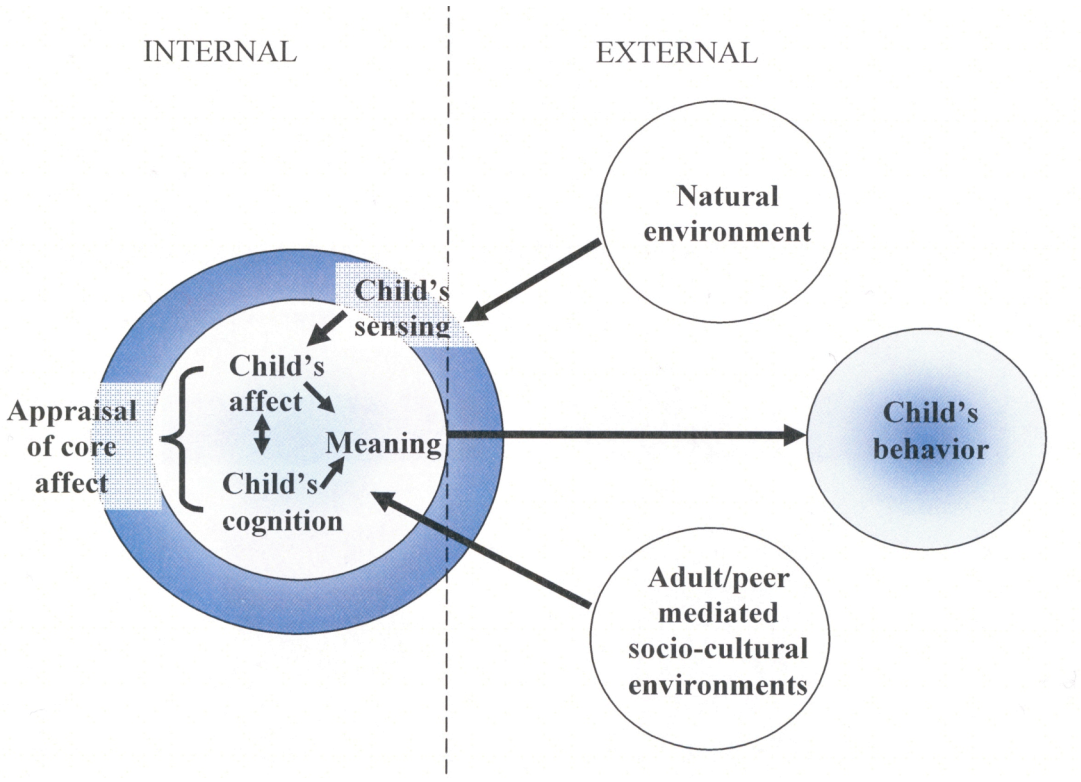


Figure 2.1. Experiencing Nature Model

In the above figure, a child's senses are situated as the intermediary between nature and the child. Sensory information is then processed by the child's affect system and integrated with cognitive schema developed from previous experiences stored in memory. Behaviors may be elicited based on needs identified by the affective and cognitive evaluation of the experience. Behavior is the dimension most directly observable by others in a child's social environment.

Unfortunately, most recent studies into children's experiences with nature investigate only one dimension and fail to reflect a conceptualization of experience that acknowledges the four dimensions of sensation, affect, cognitions and behavior. The literature reviewed on children's experiences with nature appears dominated by investigations into the cognitive and behavioural dimensions. Psychological and educational research tends to focus on cognitive functioning and knowledge gained in relation to the environment (see Terrible, 2000 for an extensive review). A large body of literature, particularly in the geography field, tends to focus on children's behavior in natural spaces (Cosco & Moore, 1999; Gharahbeighlu, 2007; Hart, 1979; Kylin, 2003; Moore, 1986; Valentine & McKendrick, 1997).

Comparatively few studies have explored the sensory dimension of children's experiences with nature despite the claim that a "child's sensory perception remains in adult memory as a central experience because its relative importance is at its peak at this stage of life" (Sebba, 1991, p. 416). Opportunities for sensory stimulation appear to be very prominent in natural environments. Sebba (1991) found that elements in the natural environment stimulate the senses in a way the abiotic environment is simply unable to do.

The manmade environment does not require adaptation and therefore does not engage sensory awareness in the same, beneficial way (Sebba, 1991).

Tapsell, Tunstall, House, Whomsley and Macnaghten (2001) noted that children's most meaningful experiences in a river environment included experiences of getting wet and splashing in the water. Youth in Milligan and Bingley's (2007) study of the restorative effects of woodland areas reported that their sensory experiences of seeing, hearing and touching nature contributed significantly to their feelings of relaxation. James and Bixler (2008) identified sensory interaction as one of the most significant experiences for children in their study of environmental education. They reported that the sense of touch was most significant, providing "intimate interaction with natural objects and animals, making the experience memorable to students" (p. 50). Given the strong connection between memory and the senses (Nelson, 2007), it is not surprising that sensation plays such an important role in experience.

Despite Russell's (1987) argument that affect is key to an individual's experience of their natural environment, investigations into this dimension of a child's experience with nature are rare. Bixler and Floyd (1997) studied youth's affective reactions to pictures of natural environments and attempted to draw correlations between affective reactions and behavior. They administered questionnaires to 450 high school students. Questions related specifically to affective reactions and activity preferences associated with slides of wildland environments. They found that negative affective reactions of fear and disgust were associated with a lower preference for and even an avoidance of activities in such environments. Cachelin, Paisley and Blanchard (2009) found that affective aspects of direct experiences with nature correlated with positive sensory

experiences when they evaluated a wetlands field visit program at a school in the United States. Conversely, they found that negative affective responses to nature were correlated with the lack of any direct, sensory experience with nature. In their study, Cachelin and colleagues administered open-ended questionnaires to measure affective responses to wetlands (qualitative, inductive data analysis) and a knowledge-based test of species identification (quantitative analysis). Their sample included 99 grade 4 students, 49 who visited a wetlands area and 50 who did not. Although the majority of these studies are exploratory, their findings suggest that the affective dimension of experience can be transformed by sensory information.

Contributions of Current Study to Existing Literature

One barrier to undertaking a thorough, multidimensional investigation into children's experience with nature may be the tendency for most research to be conducted by one or more researchers from the same discipline and therefore have a propensity to favor one of the four dimensions. Most studies reviewed for this thesis focused on one or two dimensions at the expense of others; as stated previously, cognition and behavior have been the predominant foci. These are important and can make significant contributions to our understanding of the four dimensions of children's experiences but may not represent the dynamism and complexity of this phenomenon. Without a clearer understanding from neuroscience about which dimension, if any one, exerts a stronger influence, an investigation into all four dimensions is necessary.

An Ecological Understanding of Experience with Nature within the Social Context

As already acknowledged, children's experiences with nature are a complex, dynamic phenomenon. Ecological theory provides a lens for examining experience that

recognizes this complexity. Experience, through an ecological lens, is understood as the "dynamic interrelation between a living thing and its environment, with the environment considered in its full complexity" (Heft, 2001). In terms of research from an ecological perspective Clayton and Myers (2009) advocated for researchers to "consider organism and physical environment not as entities to be analyzed by separate principles, but as mutually and reciprocally defined" (p. 75). For most scholars in the ecological tradition, *environment* is defined broadly to include all environments a child may be embedded in, including the natural environment and the social environment, among others (Brofenbrenner, 1994; Fisher, 2002; Gibson, 1979; Gibson, 1991). Fisher (2002) acknowledged children's experiences with nature and the socio-cultural influences on that experience as shared, overlapping processes and did not sacrifice one for the other as many other reductionist approaches do:

> While the life process never stops making its demands, the shape our experiencing actually takes obviously *does* have much to do with the specific social practices and cultural forms – ideological, philosophical, religious, aesthetic, scientific, historical, linguistic – that wind up 'occurring into' these demands. Our feelings, to be sure, are 'always already culturally patterned.' (p. 63)

The following table uses an example to illustrate how the four dimensions of experience complement findings from current neurobiological research (Solms & Turnbull, 2002) and ecological theory as described by Fisher (2002).

Table 2.1. Exploring Ecological Theory and Neurobiology Research.

Example	Ecopsychological process (Fisher, 2002, p. 68-69)	Neurobiological process (Solms & Turnbull, 2002)	Dimension of experience
Rain falls on my head, my body temperature drops slightly.	Feeling or meaningful sensation arises out of the relationship between body and world, the ground of our experience.	[Experience] is not only what you feel, it is what you feel *about* something (p. 92)	Sensation ↓ Affect

↓	↓	↓	
I am beginning to feel cold and wet, this is an uncomfortable feeling.	Awareness	What differentiates [cognitive] processing from [affective processing] is where we are selectively directing our attention to (p.88).	Affect ↓ Knowledge
↓	↓	↓	
I really dislike being cold and wet so I think of what I can do to stay or get dry and warm.	Mobilization "An important theoretical point is that we have the most vivid awareness and mobilize the most excitement (life force) only for those actions that are organismically important. Any other will suffer from a lack of motivation, interest, and vitality" (p. 68).	On this basis, a 'likely' course of action is planned, preliminary to action itself (p. 25). Although it is sometimes better for decisions about action to be taken rapidly without your having to think about them, the frontal lobes offer the potential to delay (inhibit) such decisions in the interest of thinking. Thinking may be regarded as imaginary action, whereby the outcome of a potential action is evaluated (p. 281).	Knowledge ↓ Behavior
↓	↓	↓	
I put on my raincoat.	Action.	The perceptual aspect of emotion has a compulsive effect on us. We cannot simply lie back and feel our emotions. They make us want to *do* something (p. 111).	Behavior (informed by affect and cognitions)
↓	↓	↓	
I am staying dry but it is still uncomfortable.	Final contact – need is met, meaning is formed	Short-term (or immediate or working) memories, then, are memories of events (or facts) that you are holding in mind *at this moment*. They may be there because you just learned them or experienced them …or they may be there because you are *actively* holding them in mind. (p. 143).	Sensation, affect, cognition.
↓	↓	↓	
My riding trip was more challenging, and more memorable,	Satisfaction/Assimilation (Post contact)…" The meaningfulness of an event is a matter of whether and	We all automatically reconstruct the reality we perceive from models we have stored in our memories.	Affect, cognition. (meaning making -

because it rained heavy from that first raindrop for two days straight. My friends and I continue to recount stories of our trip.	in what respects it carries our lives forward or satisfies our bodily [and developmental] demands.	We do not perceive the world anew every moment of the day and try afresh to discriminate recognizable objects and decipher meaningful words from the undifferentiated din of stimuli that constantly impinge on us. This, presumably, is what newborn babies have to do. We adults project our expectations (the products of our previous experience) onto the world all the time, and in this way we largely *construct* rather than perceive (in any simple sense) the world around us. (p. 155)	social).

Identifying Research Questions

After reviewing the literature and clarifying what I really intended to explore when studying "children's experiences with nature," I noted the following gaps in the literature:

- Researchers are only beginning to conduct investigations from the child's perspective.
- A lack of research that explores all four dimensions of children's experience with nature: sensory, affective, cognitive and behavioral.
- A lack of research from an ecological perspective that views children's experiences with nature as a mutual, transactional process embedded in a socio-cultural milieu.

From these gaps, I crafted my research questions:

1. How do children aged 6 to 10 years experience nature in a botanic garden setting? What sensory, affective, cognitive and behavioral dimensions of this experience can be identified and explored?
2. What meanings do children attach to their experiences in nature?
3. What are the broader social and cultural factors affecting a child's experiencing of nature that can be identified?
4. Through methodological triangulation with drawings, clay sculptures and photographs, how well do sand trays appear to be an effective and appropriate tool for children to communicate their constructions of meaning of experiences with nature? (See chapter 3 for a review of the literature pertaining to this question)

Framing the Research Findings in Theory

After analyzing the data, I needed to find theories that could explain my findings. Given that I was examining four dimensions of children's experiences with nature and the socio-cultural influences on those experiences, I needed to draw upon several theories. These theories needed to complement each other and fit within the ecological lens under which I had conducted my research. Figure 2.2 provides a visual representation of how I have framed my research in theory and provides an outline of the next section of this chapter. What I am really interested understanding more about is how one child is attracted to nature while another child is repelled by nature. Also, why one child may seek refuge in nature while another child may seek out nature for exhilaration and challenge. The circumplex model of emotion and optimal arousal theory help explain the reported sensory and affective dimensions of children's experiences in nature.

Vygotsky's sociocultural theory and activity theory provide a framework for understanding how children attach meaning to experiences, in particular the sensory and affective domains of experience, and the socio-cultural influences on those meanings. Gibson's theory of affordances helps explain the role of nature in this process.

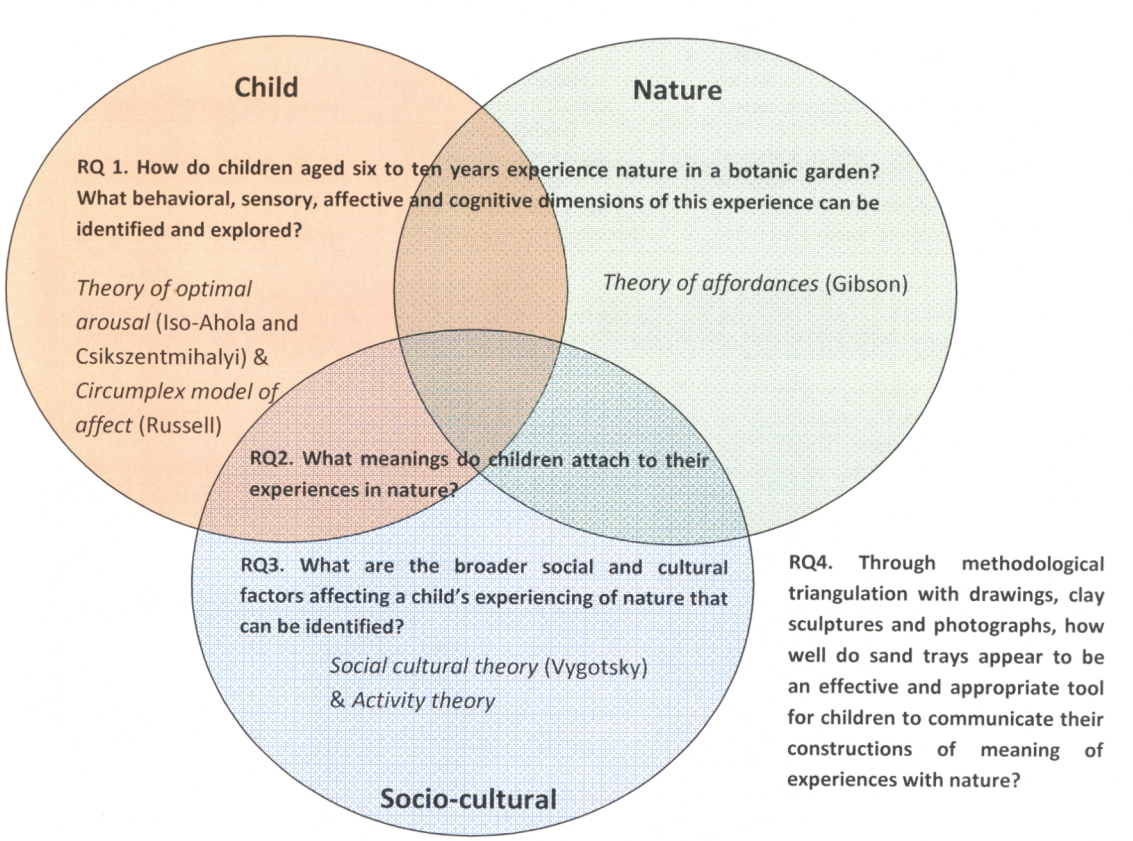


Figure 2.2. Diagrammatic Illustration of Research Questions and Theoretical Perspectives.

Children's Experiences with Nature

If the model provided in Figure 2.1 is an accurate depiction of the four dimensions of a child's experience, then one would suspect the sensory and affective dimensions of experience to be temporally primary to the cognitive and behavioral dimensions. Findings from this study are consistent with this premise. Children's reports were dominated by sensory and affective references. The circumplex model of emotions

and the theory of optimal arousal provide foundation upon which to better understand children's attraction to certain stimuli in nature and aversion from others.

Circumplex model of emotion.

Russell (1987) suggested that affect is key to interactions with our natural environment. Barrett and Bliss-Moreau (2009) also argued for the primacy of affect in our experience and noted it is what makes sensations meaningful. Russell's (1987) circumplex model of emotion provides a useful frame for understanding the affective dimension of children's experiences with nature. Many key researchers in the area of affect or its expression *emotion*, including Russell, argued that all emotions are the end result of a complex interaction between two neurophysiologic systems: one regulating valence, the other arousal (Barrett & Bliss-Moreau, 2009; Russell, 2003; Russell & Snodgrass, 1987; Schore, 2003). It is important to note here that while scholars in the field of emotion distinguish between emotion and affect, for the purposes of this dissertation, the two terms are used interchangeably to refer to the affective dimension of experience. As a result, Russell (Russell, 2003; Russell & Snodgrass, 1987) argued that every emotion, experienced by any individual in any situation, should be reducible to a point plotted on a bipolar, dual axis, circular map where one axis represents arousal and the other represents valence. This map was labeled the circumplex model of emotion (See Figure 2.3). Emotions can be plottable according to how arousing they are and how pleasurable they are. For example, according to the model, boring activities are slightly displeasurable and minimally arousing. Beautiful experiences are very pleasurable and slightly arousing. Panicky experiences are displeasurable and highly arousing. Emotions can also be compared with each other by observing their relative proximity on the map.

Monotony is slightly less displeasing and slightly less arousing than boredom. Calm and tense are on opposite poles for both arousal and valence.

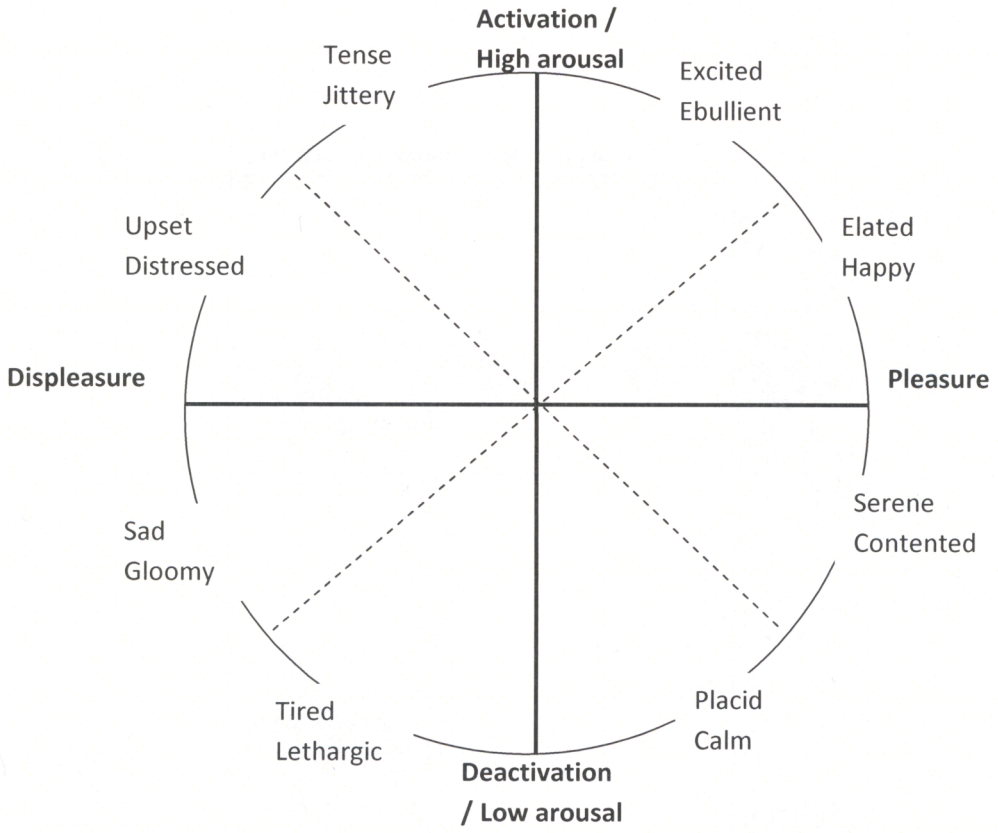


Figure 2.3: Circumplex Model of Affect Adapted from Russell, J.A. & Lanius, U.F. (1984). Adaptation level and the affective appraisal of environments. *Journal of Environmental Psychology, 4*(2), 119-135.

Theory of optimal arousal.

It is generally accepted that people tend to seek out pleasurable experiences. Our motivations along the arousal continuum are not as unidirectional. Iso-Ahola (1999) and Rathunde and Csikszentmihalyi (2006) suggested that people are motivated to engage in activities if they experience an optimal level of arousal. This optimal range varies for each individual and is dependant upon on many factors including mood, personality, and

situation. A thorough discussion of all the factors and how they determine one's optimal level of arousal is not possible here but suffice it to say that that it is variable, constantly changing and specific to each individual and each situation. According to Iso-Ahola (1999) and Rathunde and Csikszentmihalyi (2006), when individuals are over-aroused they tend to withdraw from the highly arousing stimulus or environment or engage in activities that will reduce their arousal. When individuals are underaroused, they will tend to withdraw from the activity or environment or they will engage in behavior that will increase their arousal, such as exploration. For example, a child feeling anxious during an activity is likely to make an attempt to reduce their arousal by disengaging from that activity. Conversely, if a child is under-aroused or bored, he or she may attempt to increase arousal through an increase of exploratory play. It is evident from these examples and from the discussion that follows that the boundary between valence and arousal is somewhat permeable.

Understanding the Role of Nature in Children's Meaning Making – Gibson's Theory of Affordances

Several researchers (Chawla, 2006; Fjortoft, 2004; Kellert, 2002; Kytta, 2004; Lee, 1999) have found that the natural environment provides opportunities for a diversity of experiences that can support a child's development and accommodate for the changing and ever increasing abilities and competencies of a child. Chawla (2007) suggested that the natural environment offers "many finely graduated levels of challenge that enable children to mark their developing physical competence" (p. 154). For example, "a stone that was too heavy to lift yesterday might budge today" (Chawla, p. 154). Nature affords many opportunities for development and mastery. Findings from several studies suggest that *affordances* play an important role in children's meaning making (Derr, 2002;

Korpela, Kytta & Hartig, 2002; Kyttä, 2002; Roe & Aspinall, 2011; Tapsell, Tunstall, House, Whomsley & Macnaaghten, 2001).

The term *affordance* emerged from Gibson's theory of affordances, which he used to explain the role nature plays in child-nature experiences. Gibson (1979) defined affordances as the relationship between an individual and the environment that has an impact on the individual's behavior. Not every aspect of a child-nature transaction is necessarily an affordance (Stoffgren, 2000). Chawla (2007) describes Gibson's notion of affordances as:

> Functionally significant properties of the environment that 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. 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. (p. 150)

Affective and sensory affordances.

Heft (1988) reviewed literature on children and their interaction with their environments and created a taxonomy of functional properties of these environments for children in terms of their behavioral function or significance. Scarantino (2003) describes these as goal affordances, and suggested that individuals ascribe meaning to an affordance based on their motivation to reach a goal. Affordance qualities related to psychological or emotional aspects of the experience are absent in Heft's taxonomy, and in most discussions of affordances. Roe and Aspinall (2011) claimed this is a serious omission. Given that emotional and psychological systems are primary in meaning making, this seems to be an important gap in the theory of affordances. Verbeek and de

Waal (2002) argued that "many aspects of animal-environment encounters [including human-environment encounters] are accompanied, or driven by emotion" (p. 9). They refer to this role of emotion as regulating a learning system they labeled as the investigation and discovery system. As mentioned, Russell (1987) also argued this point. Korpela, Kytta and Hartig (2002) mention the social and emotional affordances of children's favorite places but their study focused on place preferences, not on experiences with nature. They collected data from 55 children in Finland, twenty-eight 8-9 year olds and twenty-seven 12-13 year olds. Open ended and closed ended questionnaires, semi-structured interviews and participant-employed photography were used in this exploratory study. One interesting and relevant finding was that in over 27% of their respondents, children's favorite places were sought out for their affordances for relaxation after an emotionally challenging event. Tapsell, Tunstall, House, Whomsley and Macnaghten's (2001) summarized findings from their exploratory study into British children's experiences with rivers that included sensory and emotional affordances of rivers. Researchers in this study conducted small group discussions, observations, participant-employed photography, and questionnaires to explore children's perceptions and direct experiences with river environments. Tapsell et al. (2001) reported that "the activities enjoyed most by many children were those that involved direct contact with the rivers: getting wet, paddling and splashing in the river" (p. 187). Children in their study of rivers discovered new affordances of rivers that included places to play, places to escape and relax, and places to abandon the norms of land-based play. Roe and Aspinall (2011) completed an ethnographic study of eight boys aged 10-12 years. These boys were in a residential care program for children with behavioral issues and spent numerous

three-hour visits in a forested area. These researchers found that the forested area afforded opportunities for emotional development in these boys including feeling increased trust, improved behavioral and emotional regulation, more exploratory behavior and social cohesion. It was difficult to isolate the effects of the forested environment in this study as there was no comparison group, however, these results suggested that environments can provide emotional affordances. In the context of my research, elements of the natural environment can be understood as affording social, emotional and sensory developmental opportunities for children. Continuing with the example of the tree, a tree with many branches affords the opportunities to support a child's ability to climb higher. If the tree has branches at increasingly higher and more challenging levels, it will afford the opportunity for a child to increase his or her ability to climb higher, to increase the child's sense of competency, to join with friends, or perhaps to escape friends.

Socio-cultural influence on affordances.

Despite the fact that Gibson developed his theory to support his belief that perception could be direct and unmediated, he also acknowledged the influence of socio-cultural factors:

> It is also a mistake to separate the cultural environment from the natural environment, as if there were a world of mental produces distinct from the world of material produces. There is only one world, however diverse, and all animals live in it, although we human animals have altered it to suit ourselves. (Gibson, 1979, p. 130)

Social influences shape human activity, a primary determinant of affordances (Costall, 1995). The meaning of affordances are also jointly constructed between individuals or between an individual and their social and cultural environments (Costall, 1995;

Leont'ev, 1981; Leudar, 1991). As Leont'ev (1981) asserted, we do not encounter nature, we are introduced to it. Clearly, social and cultural forces shape the meaning children assign to affordances on many levels.

Valsiner (1984) argued that "the structure of the child's environment defines the set of possible actions that are available to the child at the given state of the environment" (p.66). Albrechtsen, Anderson, Bodker, and Petjerson (2001) argued that it is only through action or activity in that environment that one perceives affordances. As Bærentsen and Trettvik (2002) asserted "although affordances are in a sense constituted by objective physical features of the environment, these objective features *only* become affordances when some organisms relate to them in their activity. Affordances are therefore features of 'activity systems'"(p. 54). Bærentsen and Trettvik further argued that affordances can also be culturally and socially specific and that all affordances, in present human society, involve learned attunement to perceptual and sensory information. Children's perception of emotional affordance can also be a product of socialization. For example, Bixler and Floyd (1997) argued that fear of nature can be a product of socialization, "fears can be learned through direct experience, vicariously, or through instruction" (p. 446). In Milligan and Bingley's (2007) study, fears of wooded areas were linked to parental anxieties, about perceived risk of being trapped, being unable to see hidden or obscured risks, and media portrayals of the woods as being places were young women are attacked. These authors also reported that their respondents cited a history of woods being portrayed negatively in cultural myths and stories of fairies and monsters as contributing to their fears. More detail on how this socialization shapes the perception of

emotional affordances is given in a later discussion of joint attention and the social-cultural influence on the affective dimension of experience.

Social-Cultural Influences on Children's Meanings of Nature

Vygotsky's theory of social-cultural development.

Vygotsky's (1962) theory of social-cultural development is useful in understanding the broader influences on children's experiences with nature and the meanings they construct as a result. The following quote highlights a major theme of Vygotsky's theory:

> Every function in the child's cultural development appears twice: first on the social level, and later, on the individual level; first between people (interpsychological), and then inside the child (intrapsychological). This applies equally to voluntary attention, to logical memory, and to the formation of concepts. All the higher functions originate as actual relations between human individuals. (Vygotsky, 1978, p. 57)

Accordingly, one's experience and social context are in constant transaction and negotiation (Bidell, 1992). Vygotsky believed that interaction with and immersion in social, cultural and historical systems play a fundamental role in child development as social information is internalized through processes of mediation and scaffolding by more knowledgeable or skilled others (Daniels, 2001).

Shared experience and mediation.

According to Vygotsky, mediators provide the bridge between experience and social context and facilitate a process for which meaning is socially constructed (Daniels, 2001). Significant life experience research has established that strong connections to nature as adults originate with positive experiences in nature shared with a significant adult. (Chawla, 2007; Ewert, Place, & Sibthorp, 2005, Milton, 2002; Palmer, 1998). Adults do not necessarily need in depth knowledge about nature, just an ability to marvel

in or just notice things that they may or may not understand. Shared experiences facilitate the learning of affective responses to nature as well as being socialized into specific relationships with nature. Chawla (2007) argued that the process of *joint attention* is the basis for shared experiences. Joint attention is a term originating the field of developmental psychology and is defined as "…episodes of shared attention that are pictured variously as moments for the mutual regulation of affect and of problem solving, for the negotiation of communicative intentions, and for the sharing of cultural meaning" (Adamson & Bakeman, 1991, p. 9). Klaw (2009) claimed that children construct meaning by first perceiving information, then searching their memories for similar experiences and then acquiring emotional information through joint attention. Mirror neurons allow children to attune their affective responses to that of the adult they are sharing the experience with (Stern, 1985). This shared attention on objects begins in early infancy but has significant implications for older children and even adults. Milton (2002) argued for the social construction of emotions. She stated that we "learn from the emotions of others what it is appropriate to feel about particular things" (p. 69). This statement certainly explains her findings and those of others that have shown that strong environmentalists contribute their interest in nature to shared experiences with a significant other who expressed a similar interest or fascination with nature. Shared experiences such as these are primarily a sharing of emotion demonstrating the affective dimension of experience is, to some degree at least, a product of socialization.

Vygotsky argued that "both physical manipulation and social interaction are necessary for development" (Bodrova & Leong, 2007, p. 10) and the shared or social aspect of experiences actually "facilitates the internalization of mental processes" (p. 11).

Milton (2002) argued that "emotional intensity of an experience increases when that experience is shared" (p. 69), especially when shared with someone significant. Not only learning how to feel about nature, but also how strongly to feel it, is a socialized construction. Call and Tomasello (2005) stressed the importance of the experience being shared not just simultaneous. It is through this process of sharing that children become aware that the other person is also engaging in this shared experience of the world and that they are together in a relationship. This awareness implies a process of negotiation and co-construction.

Adult mediation – Scaffolding and the zone of proximal development.

The process of how shared experiences become internalized is what some scholars in the Vygotskian tradition have termed "scaffolding" (Daniels, 2001). To understand what scaffolding means, it is helpful to start with an explanation of another Vygotskian term, *zone of proximal development (ZPD)*. The zone of proximal development is described as a zone where the lower limit is what a child knows or can do alone and the upper limit is what is possible for the child to know or do with assistance or support (Bodrova & Leong, 2007). The upper and lower limits of the zone of proximal development are important to recognize because, according to Vygotsky, children cannot gain skills or knowledge that lie beyond the upper limit of their zone of proximal development. "When a skill is outside of the ZPD, children generally ignore, fail to use, or incorrectly use that skill" (Bodrova & Leong, 2007, p. 43). In these situations, children would not internalize the knowledge or skill and not develop the mental flexibility discussed earlier. For me, this resonated with the optimal level of arousal discussed earlier although I could find no empirical support for this parallel in the literature. If a

child is motivated to engage in activities that will allow him or her to gain a skill, he or she must be in a perceived zone of arousal that is neither too low nor too high. A child's perception of what they are able to do independently in their zone of proximal development, may be a function of his or her level of arousal. This speculation warrants further investigation. Assistance to move through one's zone of proximal development can come from a supportive adult, from peers, and even from imaginary sources. The goal of interactions between children and adults is always towards independence; as children gain more knowledge or skills, their zone of proximal development also shifts. The dynamic nature of this zone and the variation between individual children makes scaffolding challenging. Valsiner (1984) argued that the "major function of adult-child interaction from the perspective of child development lies in the regulation of child-environment relationships" or put into this context to facilitate experiences that lie within the child's zone of proximal development as defined by the child and the environment, or perhaps within their optimal level of arousal. Valsiner (1984) argued that "the structure of the child's environment defines the set of possible actions that are available to the child at the given state of the environment" (p.66) an idea she related to the concept of *affordances*.

Scaffolding of arousal.

The theory of optimal arousal presented earlier suggested that children seek out experiences that get them to or keep them in an optimal level of arousal. This optimal range varies between individuals and also within individuals depending on the situation. An understanding of arousal and how to scaffold arousal may be helpful in helping transform negative, over-arousing experiences with nature to manageable or even

positive experiences with nature. To explain this in context, I offer the following recount of a recent expedition my daughter and I took to pick wild raspberries:

> As we start to head for home my daughter spies a log that has fallen across a small gully. She asks if she can walk across it with me. I immediately perceive the log as *not walk-acrossable by two people.* I suggest that she walks on the log and I walk beside her on the ground. At first she insists she holds my hand. I suggest that she might be able to do it on her own but I notice the anxiety and worry in her voice as she disagrees. She holds my hand and walks across the log once. She cheers when she gets to the other side safely and jumps freely off the end of the log. She immediately wants to try again. I invite her the second time to just hold on to my finger. Now I notice a sense of excitement with only a hint of anxiety. The third time, I show her how to hold her arms out to the side to help her balance and tell her how people in the circus use a long stick to hold on to for balance. I find her a long stick among the deadfall and hand it to her. She uses the stick and walks along the log six times on her own without falling once. She discards the stick and walks across once on her own. She leaps off after this last trip and we head for home, stopping one last time to smell a wild rose that is blooming along the trail. We debate which flower would make the sweetest perfume, roses or sweet peas.

I noticed my daughter's level of anxiety lessen with each successful trip across the log. Her lessening state of anxiety, or arousal, allowed her to take my suggestions that were graduated steps aimed at her eventual independence. Had I failed to mediate her experience and forced her to go across the log on her own the first time, according to the theory of optimal arousal, she would have refused. I would agree that this would likely have been the outcome. Scaffolding her log crossing attempts, she was able to leave our raspberry picking adventure with a tummy full of raspberries, a new confidence in her ability to balance, and an appreciation of logs as affording circus-inspired tight-rope walking experiences.

Activity theory – An extension of Vygotsky's sociocultural theory.

Child development is now socially defined (Davydov, 1999). In much of North America, a major task of human development is no longer learning how to adapt to and

survive in our natural environment through the use of tools (Blunden, 2010). Our natural environment is now a tool that mediates our development in a social world where developmental goals are more likely to be defined by social skills and emotional regulation (Tolman, 1999). Jonassen and Rohrer-Murphy claimed, "just as environmental clues provide affordances for perceptions (Gibson, 1979), object(ive)s provide affordances for activity" (1999, p. 65). Affordances emerge through actions or activities with nature. This resonates with the focus on activity in activity theory.

Activity theory takes the entire activity as the unit of analysis. This includes a subject, an object (which is translated to mean the satisfaction of a need, or *objective*), and a mediator. A broader scope takes into account influences from the community and larger society: rules, community members and a division or hierarchy of power. Further, "because we are all simultaneously members of various communities …we must continuously alter our beliefs to adjust to the socially mediated expectations of different groups. Conflicts between our roles in the various communities often arise, leading to transformational activities required to harmonize those contradicting expectations"(Jonassen & Rohrer-Murphy, 1999, p.66). Diagrammatic representation of the theory is depicted below in Figure 2.4.

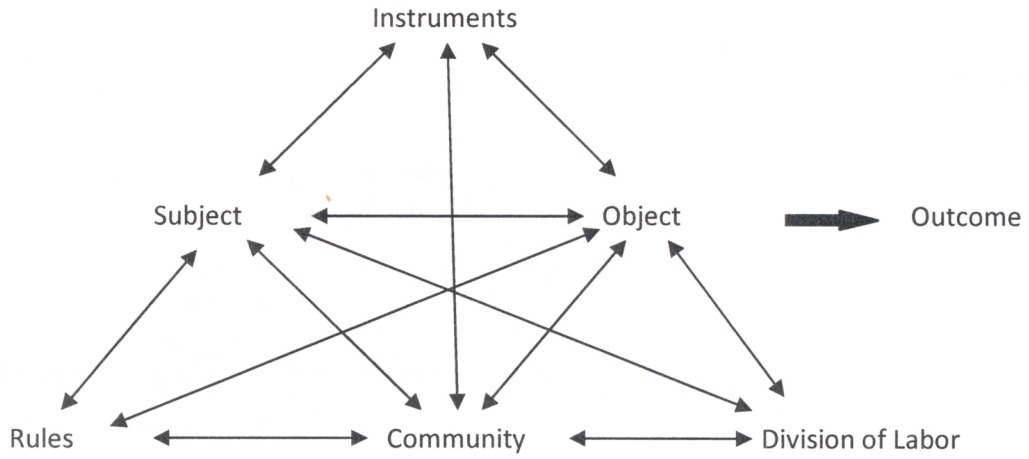


Figure 2.4. Activity Theory Illustrated. Adapted from Cole, M., & Engeström, Y. (1991). A cultural-historical approach to distributed cognition. In G. Salomon, Ed., *Distributed Cognition* (pp. 1-47). Cambridge: Cambridge University Press.

The top portion of the triangle primarily represents experience while the bottom of the triangle represents the shared, social dimension of the experience. The arrows illustrate the mutual reciprocity of relationships. For the purposes of this research, the child is the subject, developmental goals and outcomes would be the objective. The instrument would be the natural environment as a mediator.

The base of the triangle represents the community, which could be a family, an educational community, a cultural community and represents the shared meaning making aspect of an activity (Mappin, 1999). "The community negotiates and mediates the rules and customs that describe how the community functions, what it believes, and the ways that it supports different activities"(Jonassen & Rohrer-Murphy, 1999, p. 66). The community also defines the affordances available in a given child-environment interaction by influencing both the child and the perceived environment. For example, a parent can socialize a child to see a park as a collection of trees to hide behind, of puddles

to splash in, and ponds to throw pebbles into. They can also socialize that child to see themselves as someone who hides behind trees, splashes in puddles and throws pebbles into ponds. Returning to Figure 2.4, the community represents at least one community member that shares the objective with the child. This could be a parent, an educator, a park interpreter. Rules would include implicit family rules about bringing bugs into the house, or more explicit school rules like not getting your school uniform dirty. The division of labour would be the hierarchy of power that exists in those relationships; for example, the quality of attachment between child and parent, the level of respect between child and teacher. Because we are all simultaneously members of various communities….we must continuously alter our beliefs to adjust to the socially mediated expectations of different groups. Jonassen and Rohrer- Murphy (1999) argued, "conflicts between our roles in the various communities often arise, leading to transformational activities required to harmonize those contradicting expectations" (p. 66).

Vygotsky (1981) brings this process back to the individual in his argument that the individual's consciousness and identity formation is "acquired in the process of forming meaning through collaborative action together with others" (p. 226). This process of internalization is shaped significantly by the degree to which the individual buys into the collective identity. For example, children are more likely to internalize parental identities, motivations, and values, if they have a strong, healthy attachment with their parents. Children are more likely to internalize a fascination of or love for nature if they have a strong attachment to someone who demonstrates a fascination of or love for nature. This is the element of division of labour illustrated in the activity theory triangle.

Studying Both the Forest and the Trees

An ecological approach to studying children's experiences with nature can combat the psychological social dualism that currently exists in much of the literature relating to children and nature. A synthesis of complementary theories that acknowledge this complexity is presented in this dissertation and frames the findings presented in the remaining chapters. It is hoped that this synergy will result in a more complete understanding of this phenomenon and make a valuable contribution to this field of study. The research conducted for this dissertation asks several questions about how children experience nature, how they make meaning from those experiences, and what methods can be used to investigate children's experiences and meanings. The answers to these questions will help fill gaps found in the literature including a lack of research that investigates all four dimensions of experiencing simultaneously and a lack of research from children's perspectives. It will also add to the literature on the socio-cultural context of these experiences. While any study into such a complex phenomenon is bound to be met with many obstacles, an exploration into these questions can potentially benefit those interested in understanding how children form positive relationships with nature. This potential makes it a valuable and necessary investigation.

To summarize, in this dissertation I adopt a theoretical approach which integrates several complementary models and theories that weave together the three primary components of my research: children, experience and nature. These complementary theories offer an approach to child development that acknowledges the mutual role of the individual, the social/cultural environment, and the natural environment while avoiding the reductionist tendencies inherent in other theoretical frameworks. It situates nature in

an ideal position to positively impact child development outcomes. Most importantly, this dissertation provides a framework for the exploring the four dimensions of children's experiences with nature by bringing into focus both the forest and the trees.

Chapter 3: A Multi-method Investigation into Children's Experiences in a Botanic Garden

This chapter examines in more detail how I constructed and organized my research. My study design used constructivist, qualitative methods that allowed me to explore the social and individual constructions involved in nature experiences of five children. Data were collected from a small group of five children aged 6 to 10 years that spent five days in a botanic garden and their families. Multiple methods were selected that allowed inquiry into all four dimensions of experience, while being sensitive to a child participant's needs and limitations as identified in the literature review. After a brief introduction to my methodological framework, I will detail my study design including the methods and conclude with a discussion of my commitment to reflexivity.

A Constructivist Perspective

A constructivist approach guided my research design. "Constructivists assert that humans actively create their personal and social realities developing their own representational models of the world" (Dale & Lyddon, 2000). Guba (1990) described this perspective as "multiple constructions, socially and experientially based, local and specific, dependent for their form and content on the persons who hold them" (p. 27). My research was particularly concerned with the process of how children construct meaning through their experiences with nature and it acknowledged the influence of socio-cultural factors in the construction of meaning. Guba (1990) characterized the relationship between researcher and participants in this approach as interactive and stated research findings are "not a report of what is 'out there' but the residue of a process that literally creates them" (p. 26). This requires a high degree of reflexivity on the part of the

researcher in terms of his or her role. Lincoln (1990) described constructivist research as follows:

> Methodologically, constructivism demands that inquiry be moved out of the laboratory and into natural contexts, where organizational processes create naturally occurring experiments, dictates that methods designed to capture realities holistically, to discern meaning implicit in human activity, and to be congenial to the human-as-instrument be employed; that such methods are typically, although not exclusively, qualitative rather than quantitative; that designs for such inquiries can never be fully articulated until after the inquiry has been declared complete, because the design must emerge as salient issues emerge from research respondents and co participants; that theory must arise from the data rather than preceding them; and that the method must be hermeneutic and dialectic, focusing on the social processes of construction, reconstruction, and elaboration, and must be concerned with conflict as well as consensus. (p. 78)

This study consisted of many of the elements listed above: it was conducted in a natural setting, was concerned with exploring the meaning of children's experiences, used qualitative methods and to some degree had an emergent design that included acknowledgement of the influence of the social environment. A variety of qualitative methods can be employed under this perspective. To assist in visualizing the methodological steps I took during my research process, I have provided a flow chart (Figure 3.1).

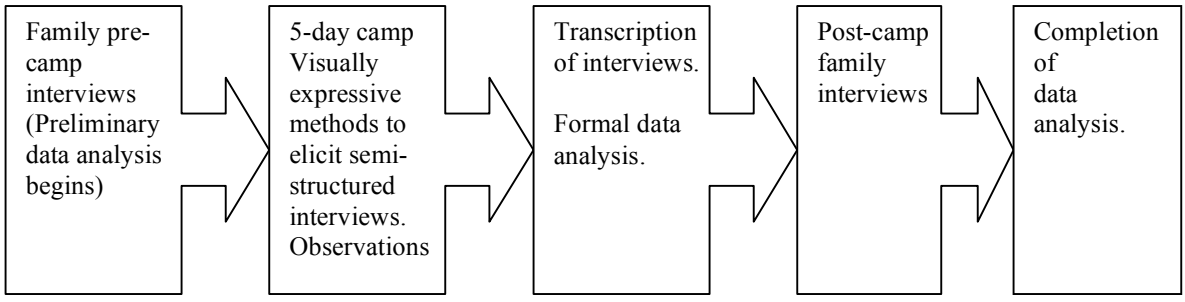


Figure 3.1. Data Gathering and Analysis Process

Methods

A variety of qualitative methods were used for this study that included semi-structured interviews elicited by visually expressive methods, naturalistic observations by the researcher and research assistant and family interviews. Naturalistic observations "provide invaluable evidence on children's real-life experiences and their reaction to those experiences" (Dunn, 2005, p. 87). Although observation reflects the lens of the researcher, observing children in their natural environments provides insight into emotional, cognitive and behavioral domains that cannot be accessed through self-reports alone (Dunn). Four visually expressive methods were used and included participant-employed photographs, drawings, clay sculptures and sand trays. Children were invited to take photographs or create drawings, clay sculptures or sand tray pictures that represented what was important to them about their experience in nature. Further details about the specific processes for each method are provided elsewhere. Semi-structured interviews elicited from these visually expressive methods generated the primary data for this study. Attached as Appendix A is a listing of the questions used to guide the semi-structured interviews. A review of the literature on researching children's experiences led me to choose visually expressive methods for this study because they,

- Are child centered;
- Can act as an effective bridge between children's experiences and their verbal reports; and
- Elicited the expression of all four dimensions of experience: sensory, affective, cognitive and behavioral.

For my research the methods were used as ways to visually express children's experiences and while they could be considered forms of "art," artistic expression was not the focus.

Visually Expressive Methods as Child Centered

Children are now increasingly recognized as "social actors and cultural agents in their own right" (Mitchell, 2006, p. 70) but researchers seem to be struggling with research methods that give voice to children's experiences. Oberg and Ellis (2006) stated, "conducting research with children and youth requires considerable sensitivity to proceed in ways that respect their competence while acknowledging their different life experience, knowledge and prior experiences of interacting with adults" (2006, p. 107). They cautioned that research with children must be interesting and engaging but at the same time non-judgmental and safe (Oberg & Ellis). In her critical analysis of drawing as a visual research method with children, Mitchell (2006) stated:

> as we search for methods that are 'fair and respectful to children as the subjects rather than the objects of research' (Barker & Weller 2003, p. 208), drawing may be especially compelling because of its powerful association for many of us with play and pleasure. Drawing is not an inherently child-centered activity, but one in which relationships of power, authority, and difference need to be acknowledged and integrated into analysis. (p. 70)

Although Mitchell was referring to drawing, her comments are just as relevant for other visually expressive methods.

Visually Expressive Methods Bridge Experience and Verbal Reports

A review of the literature demonstrated that many studies of children's nature experiences with children employ methods such as questionnaires or interviews that assume a certain developmental competence in language skills. One study used traditional question-answer interviews with children as young as 32 months (Phenice &

Griffore, 2003). According to Piaget's stages of cognitive development, some children, especially boys, do not have highly developed verbal skills until the age of 10 to 12 years of age (Keenan, 2002). Rasmussen (2004) wrote that the physical sensations children experience relate to places that "are not always verbally accessible, and they are often difficult or even impossible to communicate to others" (p. 159). Many other scholars conducting research with children advocate for visually expressive methods because they have observed that these methods can elicit a depth of expression that children are often incapable of achieving verbally (Clark, 1999; Clark-Ibanez, 2004; Dale & Lyddon, 2000; Epstein, Stevens, McKeever, & Baruchel, 2006; Mizen, 2005; Yamashita, 2002), For example, Mizen (2005) argued that in combination with their verbal accounts, children's photographs are packed with information and rich in detail and insight. This depth is crucial for qualitative research.

Visually Expressive Methods Facilitate Expression of Four Dimensions of Experience

Visual expression has a long history of use in the therapy field to elicit the multiple dimensions of children's experiences. Leaders in the field of children's therapy asserted:

> The map of verbal description does not fully represent the territory of lived experience, including the richness of visual symbolic processes, feelings, emotions, and sensations. Expressive arts therapies directly engage auditory, visual and kinesthetic senses as well as emotions. (Lobovits, Epston, & Freeman, 2008, p. 1)

Given that the aim of my research was to explore the sensory, affective, cognitive and behavioral dimensions of children's experiences in nature, methods that can facilitate the expression of these dimensions are vital. Research cited by Malchiodi (2005) and Steele (2003) suggested that visually expressive methods can facilitate the expression of

sensory, affective and cognitive experiences by providing a non-verbal, symbolic means of communicating something that is also non-verbal and often symbolic. Barraza's (1999) use of drawings to study children's concern for the environment was based on literature she reviewed that demonstrated that drawings reflect mental images and provide a "'window' into their thoughts and feelings" (p. 2). Bingley and Milligan (2007) found the sensory process involved in sand tray and clay work, the physical touching of the sand and the clay, reconnected people with the earth, the focus of their study. Bingley further argued that the tactile sense is the primal sense, present even before birth, and is a "powerful connection to bodily, sensory memories and to the 'lived moment'" (p. 334). Bingley also stated that participants' feedback "suggests that attending to tactile perception brings to conscious awareness multiple dimensions of experience of landscape – perhaps, rather paradoxically, brings the landscape into another focus" (p. 337).

Limitations of Visually Expressive Methods

Visually expressive methods have their limitations. Barry (1996) warned that with some populations and in some specific situations they could be "intrusive, time consuming, resistance prone, confusing, frustrating, and dependent on the clinical skills of the researcher" (p. 413). Barry further questioned whether symbols could be interpreted sufficiently or at all by either the artist/participant or researcher and cautioned researchers that by ascribing one meaning to a symbol, a researcher is potentially silencing other meanings. Barry offered a means for overcoming this challenge by using the symbol not as a static representation but as "a gateway to other understandings" (p. 415). This highlights the importance of the researcher to be reflective of his or her own

influences and understandings and to be open to explore all the possibilities of a child's understanding. Being aware of how questions are asked and keeping the dialogue as open as possible is important. As will be discussed at the conclusion of this chapter, reflexivity was something I was committed to throughout the research.

Review of the Individual Methods Employed

In this next section each visually expressive method used in my study is described briefly, followed by a review of their use in previous studies. As indicated, I chose four visually expressive methods: clay sculptures, drawings, participant-employed photographs and sand trays. Drawings and participant-employed photography were selected because of their dominance in the literature and the general consensus as to their value in researching with child participants. Sand trays were employed based upon my success with using them in therapy with children and limited evidence of their effectiveness as a research tool. Clay sculptures were used to provide another tactile method of expression that could provide some comparison for the sand tray method in terms of eliciting sensory data.

Clay Sculptures as Elicitation Tools.

Clay sculpting generally entails using one's hands and simple tools to mold a piece of clay into a physical representation of something. Interviews can follow the sculpting process to reveal meanings represented by the sculpture. Little research has employed the use of clay sculptures, however Bingley and Milligan (2007) used a similar method. In their study of young people's experiences with wooded or forested areas, they asked their research participants to create a three dimensional model that "represented some aspect of their experience of woodland" (p. 291). Participants used a

combination of sand, clay, branches, leaves, bark, wool, beads, plastics and cardboard and other materials. These authors found this method particularly effective and stated that the three dimensional models were "highly thought-provoking and stimulated expression of a wide range of aspects of childhood play experience, ideas and fantasies about woodlands and natural landscape" (p. 292).

Drawings as Elicitation Tools.

Drawing as a data collection method usually involves providing participants with a range of drawing implements, paper, and instructions on what the researchers wish the participant to illustrate or express. In some studies participants were given the drawing assignment ahead of a meeting with researchers, in other studies the drawing occurs at the interview. Some researchers interpret drawings without additional clarification from the illustrators, but more often a follow-up interview is warranted to facilitate understanding (Gharahbeiglu, 2007; Kendrick & McKay, 2004; Myers, Saunders, & Garrett, 2003; Yuen, 2004). Huss and Cwikel (2005) used drawings in their research with Bedouin women. They found several advantages to using drawings. They discovered that drawings "are constant and permanent fixtures that can be re-viewed and additional meanings gained with each viewing" (p. 13). They further found that drawings have the potential to encourage self-reflection and emotional expression that can be very valuable in researching experiences. While these researchers used this method with adults, the reported value is likely transferable to children. Alerby (2000) cautioned that drawings can be perceived as more a reflection of a child's artistic ability and not necessarily an accurate reflection of what the child was thinking about or wanting to express. Despite this, Alerby found that drawings were an effective means for children

to convey meaning. In her study of Mexican and British children's environmental perceptions, Barraza (1999) also used drawings and found them to be effective in achieving her research goals.

Participant-employed Photography as an Elicitation Tool.

With participant-employed photography participants are asked to photograph a subject matter with a disposable or digital camera. When the images are returned to the researcher, the pictures can be used in a follow up interview to expand exploration of the subject matter. This latter step is a photo-elicited interview (Clark, 1999; Clark-Ibanez, 2004; Epstein, Stevens, McKeever, & Baruchel, 2006). Epstein, Stevens, McKeever and Baruchel (2006) found photographs to be effective tools for creating comfort and encouraging participation among children. With children in particular, photographs can facilitate a balancing of power within an interview process by providing children a tool for expressing things they may be unable to do through words (Clark-Ibañez, 2004; Epstein, Stevens, McKeever, & Baruchel, 2006). In her use of participant-employed photography and photo-elicited interviews, Clark found that photographs allowed children to "actively interpret their own experience" (p. 49), "revisit feelings and experiences" (p. 48), and "externalize events" (p. 49). Clark-Ibañez (2004) asserted that photographs can foster rapport between researcher and participant, can help structure an interview and can help stimulate memories. Clark-Ibañez (2004) concluded that photographs empower "the interviewees to teach the researcher about aspects of their social world otherwise ignored or taken for granted" (p. 1524). She cited further examples of how photographs can access information from a different level of consciousness than words can. In arguing for the value of photographs, Rasmussen

stated, “when a photograph …becomes the subject of a narration, it can contribute to explaining something of what is unique about the place, even though feelings, atmosphere and spirit are difficult” (p. 159). Mizen (2005) reminded researchers to be reflexive and socially and culturally aware in their use of photographs with children, as with other visually expressive methods.

Sand Tray Pictures as an Elicitation Tool.

Sand tray work is described as creating “three dimensional scenes, pictures or abstract designs in a tray of specific size, using sand, water and a large number of miniature realistic figures” (Weinrib, 1983, p. 2). The figures used should include a diverse assortment of people representing diverse cultures, vegetation, animals, buildings, boundaries, vehicles, mythical figures, elements such as fire and water, and additional materials such as paper, clay and paint that children can use to construct a symbol that is not available but is desired (Bingley & Milligan, 2007; Dale & Lyddon, 2000). Participants use objects, figures, materials and sand to create a picture in the sand tray (See Figure 3.2 below).

Figure 3.2. Example of a Sand Tray Picture Created by the Author

From the author's own experience using art therapy with children, drawings can place unspoken pressure on a child to produce a 'good drawing.' Sand tray expressions eliminate this pressure by allowing children to create somewhat realistic pictures that do not rely so heavily on a child's artistic ability, development or manual dexterity. For example, I know that a toy miniature horse in Figure 3.2 resembles a real horse much more closely than my drawing of a horse would. Sand tray work is differentiated from sand play therapy by focusing on expression not therapy (Bradway & McCoard, 1997). The interpretation of the sand trays here is within a research, not therapeutic, context. Research has a goal of uncovering or discovering information whereas therapy uses this information specifically and explicitly to intervene or change the individual. Having used this method in their research into the mental health effects of childhood play experiences in nature, Bingley and Milligan (2007) stated, "the researcher has to have a clear sense of the differences between a therapeutic space and a research space" (p. 285).

Sand tray is a projective technique that was actually used in Frank's personality studies of the 1930's and later in Piaget's research of children's environmental reference systems in the 1950's (Hart, 1979). Time constraints prevented Hart from using this method in his pioneering study of children's place experiences in the 1970's. Bingley and Milligan (2007) further stated that despite the limitations of time, space and intensity, sand trays provide very valuable information for geographic research through a process where individuals can physically reconnect with the earth through touching the sand. The use of a sand tray and miniature objects makes children's symbols concrete, tangible and three-dimensional (Homeyer & Sweeney, 1998). Homeyer and Sweeney (1998)

described several benefits: sand trays facilitate expression of non-verbal, emotional issues, they have a unique kinesthetic quality, they facilitate the emergence of metaphors and they engage children in an interesting and playful process.

Russo (2006) found that the use of sand tray pictures increased the ability of children to tell stories. While this study was exploratory and had a very small sample size, the results are encouraging in that they show that having something concrete helps children develop details of their story. Dale and Lyddon (2000) reviewed a large number of qualitative studies that show, as a therapy tool, sand trays help elicit an expression of emotions that children with limited verbal skills would be unable to do so otherwise. Ramirez and Matthews (2008) used sand tray pictures in their study of children's refugee experiences. They reported that sand trays produced the basis for rich narratives and were the preferred medium of expression among sand trays, photographs and drawings as identified by their child participants. These authors found that sand trays "prompted creativity, communication, openness, questions and clarifications, and made conversations purposeful and enjoyable" (p. 96).

Despite the apparent value of using sand trays as a tool for facilitating the verbal expression of children's experiences in research, the use of this method is virtually unheard of. Its efficacy in therapy has been established (Dale & Lyddon, 2000) but the opinion of this researcher is that its value in research is yet to be fully realized. One goal of this research is to explore the value of sand trays in facilitating the interviewing of children on their experiences through methodological triangulation with the other three visually expressive methods used. A detailed evaluation is provided in chapter four.

Table 3.1. Comparison and Review of Visually Expressive Research Methods

Method and Description	Strengths	Limitations
Photo-elicited interviews Each participant had the opportunity on one day to take photographs for use in an interview that was conducted on the following day, or in one case, two days following. On their photograph day, each participant was given a 24-exposure disposable camera with the instructions to take photographs of anything they find important or meaningful during their hour of free time. Photographs were developed and interviews conducted the next day or two days following. Participants were asked to review their photographs and select 3 that best illustrated what was most important to them during their experience in that setting. Semi-structured interviews were elicited from these three photographs.	▪ Encourages the expression of thoughts/feelings that children may be unable to do with just words ▪ Fosters rapport between the researcher and participant ▪ Facilitates deeper and more detailed verbal expression ▪ Encourages narratives ▪ Externalizes events ▪ Allows participants to revisit experiences ▪ Helps trigger memories	▪ Cameras can be cumbersome, require instructions on how to use them. ▪ Taking photographs can be intrusive and can distract children from their experience in nature. ▪ Disposable cameras require developing so interviews must be conducted at a later time (which can also be seen as a strength). Digital cameras may require the use of additional equipment to view the photos. ▪ Requires reflexivity by the researcher not to impose his/her own interpretations.
Drawing-elicited interviews Participants were asked following their one-hour of free time on two days to draw a picture that illustrated what was important about their experience in that setting. A variety of drawing materials were made available including pencils, charcoal, oil pastels, crayons, pencil crayons and paints. The drawing then formed the basis of a semi-structured interview that was conducted later that same morning.	▪ Encourages the expression of thoughts/ feelings that children may be unable to do with just words ▪ Facilitates deeper and more detailed verbal expression ▪ Engaging ▪ Creates a permanent record that can be revisited	▪ Children worry about producing 'good drawings'. ▪ Expression may be limited by artistic ability, manual dexterity, developmental stage, drawing materials etc. ▪ Requires reflexivity by the researcher not to impose his/her own interpretation
Sand tray elicited interviews Each participant had the opportunity on one day to make a sand tray. Immediately following their one hour of free time, the participants were asked to create a sand tray picture that illustrated what was important to them about their experience in that setting. Participants were instructed to select any of the objects available (materials were made available to make objects that are not available) and arrange them in the sand in a way that makes a picture. The sand tray picture then formed the basis of a semi-structured interview immediately following the making of the sand tray.	▪ Encourages the expression of thoughts/ feelings/sensations that children may be unable to do so with just words ▪ Facilitates deeper and more detailed verbal expression ▪ Very engaging and playful. Children enjoy working in the sand. ▪ Children create a three dimensional picture (generates increased depth of information than two dimensional drawings). ▪ Kinesthetic – tactile process that may help make connections to the natural environment	▪ Requires a significant amount of materials (sand trays, large collection of figurines, etc.) ▪ Can be time consuming and cumbersome. ▪ Requires space to complete the sand tray picture. ▪ Requires reflexivity and cultural sensitivity by the researcher not to impose his/her own interpretations
Clay sculpture elicited interviews Each participant had the opportunity	▪ Encourages the expression of	▪ Requires a certain amount of

Method and Description	Strengths	Limitations
on one day to make a clay sculpture. Immediately following their one hour of free time, the participants were asked to create a clay sculpture that illustrated what was important to them about their experience in that setting. Children were provided with a small block of moldable, earthen clay and several basic sculpting tools.	thoughts/ feelings that children may be unable to do so with just words ▪ Facilitates deeper and more detailed verbal expression ▪ Very engaging and playful. Children enjoy working with the clay. ▪ Children create a three dimensional representation ▪ May access sensation. ▪ Kinesthetic – tactile which may increase expression of relationship with natural environment	skill to mold the clay into something satisfactory to the child

Study Design

Research Setting

This dissertation reports research on children's experiences of nature in a local public, botanic garden setting. Devonian Botanic Gardens affords a diverse range of contexts for nature-based experiences because it includes wetland areas, treed areas, grassy areas, floral garden areas and a butterfly pavilion. The educational director of Devonian Botanic Gardens provided verbal consent in advance to conduct this research there. The researcher directed experiences in specific areas of the garden and therefore was responsible for defining, in part, the scope of what is meant by *nature* in this research. The literature reviewed earlier on lay definitions was used as a guide for identifying these boundaries (see Chapter 1). Actual contexts for activities included a sensory garden, a waterfall in a Japanese garden, treed and forested areas, and a butterfly pavilion. The primary object of this research was to discover the meanings children attach to their experiences of this predefined nature. While the larger contexts were controlled and defined by the researcher, participants had the opportunity to co-construct

meanings of nature within those contexts through play, exploration and the interview process.

Several factors came into play in organizing which areas of the garden would be utilized on which days. The first day we started in an area where there was some variety of experiences, there was a pond, a grassy area, a hedge maze, and a sensory garden. The sensory garden consisted of five raised beds, each one containing plants that appealed to one of the five senses. The children were immediately drawn to the sensory garden and appeared very engaged in using their senses to explore the different plants. The raised bed gardens may have seemed familiar to those children who may have had experiences with vegetable, herb or flower gardens at home, or at the homes of friends or extended family. The butterfly garden was selected for the second day because of the weather. Although on the first day, rainy weather actually appeared to enhance the children's experience, the risk of lightning storms on the second day made the indoor butterfly garden a safer location. On the third day we headed to the forested area at the back of the gardens. To get there we had to walk through the Japanese Garden. On the way, we walked past the waterfall which immediately enticed children and as a group, the children decided to stay at the waterfall. Given the rainy weather that day, there were few other visitors present in that area and staff were not visible until the end of the day, allowing the children to explore the waterfall in a different, perhaps freer, way than if staff and visitors had been present. On the fourth day we struck out for the forested area again and reached our destination. Spending the three previous days in more pristine and controlled areas of the garden may have impacted the children's perceived sense of freedom to explore. In fact, two of the children were yelled at by one of the staff in the Japanese

Garden at the end of the previous day for harmlessly touching a hanging chain. This frightened the children and may have resulted in those children feeling a bit more reserved or tentative in terms of exploring the forested area. On the fifth day, the children were given their choice of where to explore. They decided as a group on the forested area, however, after discovering a pathway that took them back to the sensory garden they ended up spending a considerable portion of their free-time back in the sensory garden. This summary is provided as a context to understanding how the order of areas visited in the garden may or may not have impacted the children's experiences.

Ethics Approval

Researching with human subjects, and children in particular, necessitates due diligence in meeting specific ethical standards. An application was made to the Faculty of Physical Education and Recreation's Research Ethics Board. Attached as Appendix B is a copy of the advertisement I ran in the community newspapers to recruit participants. This advertisement was run in the communities of Devon, Spruce Grove and Stony Plain, Alberta – three communities within a 30-minute drive from Devonian Botanic Gardens. Upon contact from interested parties by phone or email, I made phone contact to conduct an initial screening where I provided more detailed information about the project and determined interest in the project by the family. Following this, if families were interested and their child met the age guidelines, I arranged to meet with the family at the public library in their community. This ensured the safety of the researcher as well as the comfort of the participants. Public libraries in each of the three communities had public boardrooms that were available for use and were an acceptable location for all parties. At this meeting I conducted family interviews with interested families two to three weeks

prior to the camp, obtained informed consent and assent, explained to the family and the child what to expect from participating in this research, and obtained some basic demographic information. Attached as Appendix C and D are the consent and assent forms I had participants and their parents/guardians sign. Demographic information collected included family composition, employment of parents/guardians, cultural/ethnic background, and family experience with nature (quantity and quality). Children were also screened to ensure they had basic developmental capabilities to engage in a group research process including adequate focusing skills, communication skills and social skills. Additional questions determined any safety risks including allergies and medical conditions that may interfere with a child's experience of nature. It was important for me to meet face to face with families so that I could answer any questions and address any concerns. It was also important that the families developed a sense of trust with me prior to assigning care of their children to me.

Informed Consent and Cost to Participants

Families needed to consent for their child to participate. Families also needed to consent to the researcher taking photographs of their child. Two levels of photographic consent was obtained – the first level provided consent for the researcher to take and use photographs that depicted the child's face and identifying features and would be viewed by the researchers only; the second level provided consent for the researcher to take and use photographs that depicted the child's face and identifying features and may be viewed by multiple scholarly audiences. Families also needed to provide transportation to and from the Garden each day. The Garden is located in a rural area without access to public transportation. This excluded participation of families that did not have access to

transportation, however, given the limited scope and budget of this research as a thesis project, it was not financially viable to provide transportation. In order to protect against allergies and food sensitivities, families were asked to provide a lunch, snacks and a drink. To reduce the socio-economic constraints as much as possible, there was no cost for the day camp and the researcher covered all additional costs for activities including admission to the garden.

Sample

Child participants ranged in age from 6-10 years. Children of this age are likely to have more prior experiences exploring their environment somewhat independently. They also should be more comfortable with spending considerable time away from home in a group setting (Pressley, 2006) and have some mastery of the communication skills necessary to participate in an interview process. While I intended to rely primarily on visually expressive methods that compensate for developing language skills, it was still important that the children had some basic verbal communication skills.

I chose to limit the group to five participants, in part to make the analysis of data more manageable, and in part to take advantage of the benefits of small group research. McGregor (2005) found that research with small groups "can provide unique insights into feelings and emotions, as well as values and attitudes, far beyond that which can be gained from a once-only 'focus group', individual interview or surveys" (p. 424). Barry (1996) also argued for the benefits of collecting "multiple symbolic readings and portrayals within and across settings and/or around a given phenomenon" (p. 419). He stated that these multiple constructions can provide a much more complete view and

understanding of something. The use of small groups in research limits generalizability, though, given this was an exploratory inquiry, I decided that this design was appropriate.

Participant Activities - Schedule

The daily schedule involved an hour of free time where children had the opportunity for direct, self-exploratory experiences within a selected area of the garden. Following the free-time activity, children engaged individually in one of the visually expressive methods (drawings, clay sculptures, sand trays, and selected photographs developed from previous day) and subsequent interviews (one at a time) as assigned by the researcher. The four children who were not engaged in the interview process at any one time participated in a scheduled activity organized and supervised by a research assistant. It was the role of the research assistant to supervise the children for safety purposes during the free-time activity and at all other times during the day, to supervise and facilitate the structured activity and to participate in debriefing discussions with the researcher at the end of each day. This research assistant had some University education and experience working with children of this age group.

The researcher digitally recorded and later personally transcribed the interviews. The researcher made her own observations, took her own photographs, and recorded her own thoughts and reflections in a journal. Observations – either in writing or by photographs – depicted something that the researcher saw and interpreted as reflecting an element of a child's experience that appeared meaningful from the researcher's perspective. These observations were explored with the participant to determine what meaning, if any, the participant applied to that element of the experience. Having a research assistant responsible for supervising the children enabled the primary researcher

to complete her observations, personal reflections and interviews. Each of the children attended all five days of the camp. Table 3.2 provides an overview of the week.

Table 3.2. Research Camp Daily Schedule

Day 1	Monday	Sensory Garden
9:30 – 10:00 am	Introductions (to the garden, to the week, to each other)	
10:00 – 11:00 am	Free time in Sensory Garden and surrounding area. Participants D & E were given disposable cameras.	
11:00 – 11:30 am	Participants completed visually expressive activities as assigned.	
11:30 – 1:30 pm	Interviews were conducted consecutively as children finished their visually expressive projects. The four children not being interviewed at any one time either had an opportunity to eat their lunch or engage in recreational activities facilitated and supervised by the research assistant.	
1:30 pm – 2:00 pm	Closure for the day, pick up by parents.	
2:00 pm – 2:30 pm	Debriefing between researcher and research assistant.	
Day 2	Tuesday	Butterfly Garden
9:30 – 10:00 am	Greetings and orientation to area of the garden.	
10:00 – 11:00 am	Free time in the Butterfly Garden. Participant A was given a disposable camera.	
11:00 – 11:30 am	Participants completed visually expressive activities as assigned.	
11:30 – 1:30 pm	Interviews were conducted consecutively as children finished their visually expressive projects. The four children not being interviewed at any one time either had an opportunity to eat their lunch or engage in recreational activities facilitated and supervised by the research assistant.	
1:30 pm – 2:00 pm	Closure for the day, pick up by parents.	
2:00 pm – 2:30 pm	Debriefing between researcher and research assistant.	
Day 3	Wednesday	Japanese Garden/Waterfall
9:30 – 10:00 am	Greetings and orientation to area of the garden.	
10:00 – 11:00 am	Free time around the waterfall and surrounding area. Participant B was given disposable camera.	
11:00 – 11:30 am	Participants completed visually expressive activities as assigned.	
11:30 – 1:30 pm	Interviews were conducted consecutively as children finished their visually expressive projects. The four children not being interviewed at any one time either had an opportunity to eat their lunch or engage in recreational activities facilitated and supervised by the research assistant.	
1:30 pm – 2:00 pm	Closure for the day, pick up by parents.	
2:00 pm – 2:30 pm	Debriefing between researcher and research assistant.	
Day 4	Thursday	Forested area
9:30 – 10:00 am	Greetings and orientation to area of the garden.	
10:00 – 11:00 am	Free time in forested area.	

	Participant C was given a disposable camera.
11:00 – 11:30am	Participants completed visually expressive activities as assigned.
11:30 – 1:30 pm	Interviews were conducted consecutively as children finished their visually expressive projects. The four children not being interviewed at any one time either had an opportunity to eat their lunch or engage in recreational activities facilitated and supervised by the research assistant.
1:30 pm – 2:00 pm	Closure for the day, pick up by parents.
2:00 pm – 2:30 pm	Debriefing between researcher and research assistant.
Day 5	Friday Children's choice – wooded area/sensory garden
9:30 – 10:00 am	Greetings, choosing of and orientation to areas of the garden.
10:00 – 11:00 am	Free time in the forested area, paths, and sensory garden. No participants were given disposable cameras.
11:00 – 11:30am	Participants completed visually expressive activities as assigned.
11:30 – 1:30 pm	Interviews were conducted consecutively as children finished their visually expressive projects. The four children not being interviewed at any one time either had an opportunity to eat their lunch or engage in recreational activities facilitated and supervised by the research assistant.
1:30 – 2:30 pm	Closing activity.
2:30 – 3:00 pm	Closure for the day, pick up by parents.
3:00 – 3:30 pm	Debriefing between researcher and research assistant.

Data Analysis

As has been described in the previous section, several forms of data were generated and analyzed for this project including: a) digitally recorded interviews elicited by visual expressions; b) photographs of the visual expressions created by the children as well as copies of the photographs taken by the children; c) photographs taken by the researcher of the children while they are at the Garden; d) the researcher's notes and observations written while in the field and during periods of reflection and e) interview notes taken during pre-camp and post-camp family interviews. The analysis conducted for this study is best characterized as qualitative in nature and entails reorganizing the information from the interviews and other methods into ways that connect with the main concepts of the research (Rothe, 2000). While engaged in data collection the researcher took limited notes in order to conduct a daily interpretive analysis. Given the amount of

data that was gathered over the five-day period from each of the five participants, it was important to make daily notes and reflections. Daily interpretive analysis protects important insights and constructions from being lost over time. "A great deal of understanding comes from the context of the interview, and from a range of cues that are simply not captured on tape" (Lewin, Taylor, & Gibbs, 2005, p.3). Daily analysis helped inform the interview in subsequent days (Lewin, Taylor, & Gibbs). These observations also helped inform the final stages of data analysis.

The children's interviews, which served as the primary source of data for this study, were digitally recorded and transcribed by the researcher. Notes were taken during pre-camp and post-camp family interviews. Transcribed interviews and interview notes were examined for meaning and connection to the main research questions. Pictures photographed by the researcher, as well as photographs of the visual expressions created by the participants and copies of the participants' pictures, were used by the researcher to support the analysis of the in-person interviews. This visual evidence served as memory cues and inspiration for further reflection as the researcher moved through the analysis process.

The researcher employed a case study approach to organizing the data; each child represented one case. "Case data consist of all the information one has about each case" (Patton, 2002, p. 448), this approach allowed the researcher to analyze each case in depth and to make comparisons with the other cases. Boeije (2002) recommends a systematic plan of analysis be developed for complex combinations of case interviews. Cases were compared in the following manner:

(a) Comparison of interviews that were derived from the same visually expressive method (e.g., all sand tray elicited interviews) (between cases – single method);

(b) Comparison of interviews that were informed by a similar free-play garden environment (e.g., all interviews that took place after an hour of free-play in the Garden's wooded area) (between cases – single setting);

(c) Comparison of all interviews conducted with a single child (within-case – all methods); and,

(d) Comparison of all interviews with each child (between-cases – all methods).

As the interview data were reviewed the researcher explored the data inductively and deductively for themes that revealed how children aged 6 to 10 years experienced nature in a botanic garden. Deductive categories (Schwandt, 2001) based on the previously identified dimensions of experience (sensory, affective, cognitive and behavioral) framed part of this analysis. Inductive analysis (Patton, 2002; Strauss & Corbin, 1998) involved the identification of categories and themes arising from the descriptions provided by each child participant; in essence, inductive analysis is the deriving of concepts, their properties and dimension from data (Strauss & Corbin). Inductive analysis was conducted first followed by deductive analysis based on the four dimensions of experience.

Coding entailed the identification of patterns and themes that emerged from an initial reading of the data. Patton (2002) describes patterns as "descriptive findings" and an example from this study is a series of passages from the texts that described children's reported discomfort at exploring the woods on their own, while a theme is an overarching

"category" such as fear. Subsequent examination of the data identified passages of text that fit (or not) within these categories. Revision of categories and the identification of concepts that did not fit within identified categories was also part of this process.

Several read-throughs of the transcripts were required. The first read-through involved making comments in the margin and attaching post-it notes in an attempt to identify preliminary categories (Patton). Consistency of the interview as a whole was also examined (e.g., a child may have stated she was attracted to nature in one part of the interview, but repelled by nature in another part of the interview) (Boeije, 2002). Subsequent reviews of the transcripts involved coding passages as they fit with the categories identified. Coloured highlighters and coloured post-it notes were used in this stage. Categories were refined, delineated and connected through subsequent readings.

Constant comparison method (Glaser & Strauss, 1998) was utilized in this analysis process. Tesch (1990) outlines the importance of comparison in analyzing data:

> The main intellectual tool is comparison. The method of comparing and contrasting is used for practically all intellectual tasks during analysis: forming categories, establishing the boundaries of the categories, assigning the segments to categories, summarizing the content of each category, finding negative evidence, etc. The goal is to discern conceptual similarities, to refine the discriminative power of categories, and to discover patterns. (p. 96)

Comparison was also conducted between initial categories and the data collected during the post-camp family interviews.

Analysis was also informed by Seidel's (1998) framework for conducting qualitative data analysis that depicts a circular process involving noticing, collecting and thinking about interesting things.

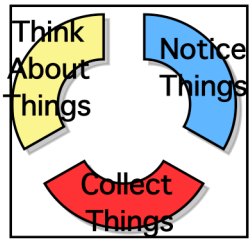


Figure 3.3. Data Analysis as a Circular Process. Adapted from Seidel, J (1998). Qualitative data analysis. *The Ethnograph v5 Manual, Appendix E*. Downloaded February 26, 2008 from: http://www.qualisresearch.com/.

As this model illustrates, coding is often a process of reviewing the data, applying codes that identify themes, reviewing the data, and re-identifying codes. Two types of patterns were looked for: convergence and divergence (Patton, 2002). Convergence is how things fit into categories and divergence refers to how things are differentiated among categories. The entire process of data analysis is best seen as a circular process with continual movement between the data, the analysis and the researcher. Themes identified are discussed in detail in chapters four, five and six.

Reflexivity in Research

As mentioned at the beginning of this chapter, constructivist research demands a commitment to reflexivity on the part of the researcher, in some cases to minimize the influence of personal bias on the research process, and in other cases to acknowledge it. My personal experiences inevitably shaped my research in several ways. First of all, through reflecting on my deep connection to nature and understanding it in the context of

my childhood as well as the context of my experiences with my daughter, I acknowledged a personal interest and curiosity in children's relationship with nature. Further, the context of my childhood and my current endeavors are shaped by my role as a white, middle-class Canadian woman, social worker, preschool director, and mother who has a passionate interest in children and nature. Reflecting on how nature has benefited me personally helped me appreciate the positive effects nature can have on emotional regulation, physical activity and even spirituality. For me, nature is often a place to relax, to become grounded, to be active and to connect with something larger than myself. Reflecting on my family's experience with nature and observing how other families and individuals are different has shown me that relating and connecting with nature, and respecting nature, is developed within a social and cultural context. Reading Richard Louv's book, *Last Child in the Woods*, introduced me to the scholarly potential of this subject and I began to consider it as an area of research. I have since developed a passion for this topic that needs to be transparent and addressed during every stage of my research. I kept a reflexive journal in which I recorded personal reflections on how I understand my experiences in the larger social-cultural context and engaged in continuous dialogue with my supervisors and research assistant.

I have explained in my introduction how I understood my personal experiences to have impacted my choice of research questions. The effect does not end there; my personal experiences also shaped how I conducted my research. Lincoln (1990) suggested:

> the values that inhere in the research process – in the choice of a problem, the choice of an overall design strategy, the choice of setting, and the decision to honor and present the values that inhere in the site(s) – be explicated and explored as a part of both initial and final research processes and products. (p. 78)

I attempted to minimize the influence my personal biases had on what literature I chose to review and what I considered important in each of the studies. I chose a variety methods that would allow for flexibility in expression and hopefully to meet the needs of my participants as well as myself as researcher. I tested a particular visually expressive method – sand trays-- that has received relatively little attention in the research field but is well known in the therapeutic fields as an effective tool for non-verbal communication and expression of cognitive, emotional, and social constructions (Hormeyer & Sweeney, 1998). I remained aware of my own personal feelings about the effectiveness of this method in an attempt to ensure that this did not cloud my evaluation of its effectiveness as a research tool. I also continually engaged in personal reflection that enabled me to use this method exclusively as a research tool.

Ellis and Berger (2003) asserted that during the interview process, researchers must be aware that it is a process that involves the interaction of thoughts, feelings, attitudes and behavior of both the researcher and participant. This interactive view of research acknowledges and explores the emotional content of interviews rather than traditional approaches that ignore or avoid it (Ellis & Berger). This approach also allows for "interactively produced meanings" that emerge when interviews are "conducted more as a conversation between two equals than as a distinctly hierarchical, question-and-answer exchange" (Ellis & Berger, p. 162). While I interviewed my participants I noted, formally and informally, how participants' reports resonated or did not resonate with me and how this resonance may have been expressed implicitly or explicitly to the research participant. I adhered to Etherington's (2004) recommendations to personally transcribe the interviews, recognizing the importance to take note of the non-verbal communication

that transpired such as hesitations and tone of voice. She also advocated for giving participants an opportunity to verify meanings, which I did throughout the interviews by exploring the meanings of the children's visual expressions. I also sought feedback on themes identified in the analysis stage with families at the post-camp interviews.

During the analysis stage, the researcher must acknowledge that they are the filter and mechanism that determines which themes get highlighted and which get left out (Etherington). Continually seeking participant feedback throughout this process assisted me with this. My reflexivity needed to remain present in the writing and dissemination of results. While this concludes my discussion of reflexivity, the process of reflection remained an integral part of writing every chapter of this dissertation. The chapters that follow are my attempts to represent children's experiences but this presentation will inevitably be a reflection of their experience through my words.

Chapter 4: "It was Fun": An Evaluation of Visually Expressive Methods Including Sand Tray Pictures

This paper examines the performance of four data collection methods used in documenting children's experiences in nature. Experiencing was conceptualized as having four dimensions, sensory, affective, cognitive, and behavioral (Braun, 1988; Nelson, 2007; Turner, 2005; Wilson & Ryan, 2005). Data collection was conducted with the following visually expressive methods: Participant-employed photography, clay sculpting, drawing and sand tray creations. Each creative activity was followed by interviews between the researcher and child participant, who discussed what element or elements of the child's experience with nature that day the visual creation represented. Special focus was made to assess the utility of sand tray work in eliciting children's experiences in nature, as it has not been commonly used in past research to collect data. The visual expressions created by the children in this study were used to elicit interview data, which served as the primary source of data for this study. Ethical considerations dictated that the actual creations be retained by the children and not comprise part of the publishable data in this study. This visual evidence served as memory cues and inspiration for further reflection as the researcher moved through the analysis process. In the following section visually expressive methods are described, their utility in studying children's experiences is reviewed, and observations made in previous studies of the strengths and weaknesses of the four data collection methods used in our study is outlined.

Literature Review

A Case for Visual-Expressive Methods – Exploring Experience and Their use in Research with Children

Green and Hill (2005) stated that, "children in most societies are valued for their potential and for what they will grow up to be but are devalued in terms of their present perspectives and experiences" (p.3). When researching children's experiences, especially their subjective experiences, researchers need to use methods that can study those experiences while at the same time being developmentally appropriate for children. In this section we argue that visual expressive methods are ideally suited to explore the multi-faceted nature of children's experiences in nature; however, we also note some caveats associated with their use. We stress here that the pictures and creations were used as ways to visually express children's experiences and while they could be considered forms of "art," artistic expression was not the focus here.

Given that the aim of our research is to explore the sensory, affective, cognitive and behavioral dimensions of children's experiences in nature, methods that can facilitate the expression of these dimensions are vital. Research cited by Malchiodi (2005) and Steele (2003) suggested that visual expressive methods can facilitate the expression of sensory, affective and cognitive experiences by providing a non-verbal, symbolic means of communicating something that is non-verbal and often symbolic. Sullivan (2005) argued that visual arts methods are better equipped to access the right hemispheric relational processes which may be predominant in children's experiences in nature in terms of developing an emotional relationship, or attachment, with nature. Barraza's (1999) use of drawings to study children's concern for the environment was based on literature she reviewed that demonstrated that drawings reflect mental images and provide a "'window' into their thoughts and feelings" (p. 2). Rasmussen (2004) wrote

that the physical sensations children experience relate to places that "are not always verbally accessible, and they are often difficult or even impossible to communicate to others" (p. 159). Through sand trays "we see and touch symbols" and "prominent among the features of symbols is the *feelings* they evoke" (Turner, 2005, p. 313).

Arts-based or visual expressive methods have limitations. Barry (1996) warned that with some populations and in some specific situations they could be "intrusive, time consuming, resistance prone, confusing, frustrating, and dependent on the clinical skills of the researcher" (p. 413). Barry further questioned whether symbols could be interpreted sufficiently or at all by either the artist/participant or researcher and reminds researchers that by ascribing a meaning to a symbol, one is potentially silencing other meanings. Barry offered a means for overcoming this challenge by using the symbol not as a static representation but as "a gateway to other understandings" (p. 415). This highlights the importance of the researcher to be reflexive of his or her own influences and understandings and be open to explore all the possibilities of a child's understanding. Being aware of how questions are asked and keeping the dialogue as open as possible is important.

Review of the Methods

In this next section each visually expressive method used in our study is described briefly followed by a review of their use in previous studies to elicit individual's experiences.

Clay Sculptures as Elicitation Tools

Clay sculpting usually entails using one's hands and simple tools to mold a piece of clay into a physical representation of something. Interviews can follow the sculpting

process to reveal meanings represented by the sculpture. Little research has employed the use of clay sculptures, however Bingley and Milligan (2007) used a similar methodology. In their study of young people's experiences with wooded or forested areas, they asked their research participants to create a three dimensional model that "represented some aspect of their experience of woodland" (p. 291). Participants used a combination of sand, clay, branches, leaves, bark, wool, beads, plastics and cardboard and other materials. These authors found this method particularly effective and stated that the three dimensional models "proved highly thought-provoking and stimulated expression of a wide range of aspects of childhood play experience, ideas and fantasies about woodlands and natural landscape" (p. 292).

Drawings as Elicitation Tools

Drawing as a data collection method generally involves providing participants with a range of drawing implements, paper, and instructions on what the researchers wish the participant to illustrate or express. In some studies participants were given the drawing assignment ahead of a meeting with researchers, in other studies the drawing occurs at the interview. Some researchers interpret drawings without additional clarification from the illustrators, but more often a follow-up interview is warranted to facilitate understanding (Gharahbeiglu, 2007; Kendrick & McKay, 2004; Myers, Saunders, & Garrett, 2003; Yuen, 2004). In her critical analysis of drawing as a visual research method with children, Mitchell (2006) stated:

> as we search for methods that are 'fair and respectful to children as the subjects rather than the objects of research' (Barker & Weller 2003, p. 208), drawing may be especially compelling because of its powerful association for many of us with play and pleasure. Drawing is not an inherently child-centered activity, but one in which relationships of power, authority, and difference need to be acknowledged and integrated into analysis. (p. 70)

Huss and Cwikel (2005) used drawings in their research with Bedouin women. They found several advantages to using drawings. They discovered that drawings "are constant and permanent fixtures that can be re-viewed and additional meanings gained with each viewing" (p. 13). They further found that drawings can encourage self-reflection and emotional expression that can be very valuable in researching experiences. While these researchers used this method with adults, the reported value is likely transferable to children's art. Alerby (2000) cautioned that drawings can be more a reflection of a child's artistic ability and not a reflection of what the child was thinking about or wanting to reproduce. Despite this, Alerby found that drawings were an effective means for children to convey meaning. In her study of Mexican and British children's environmental perceptions, Barraza (1999) was satisfied that the drawings elicited sufficient data to significantly confirm her hypothesis that children did feel concern about the environment. This research study generated a total of 741 drawings, 432 drawings from Mexican and 309 from British children that communicated whether or not children were concerned about the environmental crisis.

Participant-employed Photography as an Elicitation Tool

With participant-employed photography participants are asked to photograph a subject matter with a disposable or digital camera. When the images are returned to the researcher, the pictures can be used in a follow up interview to expand exploration of the subject matter. This latter step is a photo-elicited interview (Clark, 1999; Clark-Ibanez, 2004; Epstein, Stevens, McKeever, & Baruchel, 2006). Photo-elicited interviews and participant-employed photography have been shown to be effective in working with children and assisting them to express in pictures what they are initially unable to do with

words (Clark, 1999; Clark-Ibanez, 2004; Epstein, Stevens, McKeever, & Baruchel, 2006; Yamashita, 2002). Mizen (2005) praised the value of children's photographs in providing visual expression and facilitating verbal expression of much that has been unknown about children's experiences. Mizen further argued that in combination with their verbal accounts, children's photographs are packed with information and rich in detail and insight. This depth is crucial for research because it produces data that are significant and relevant. Epstein, Stevens, McKeever and Baruchel (2006) found photographs to be effective tools for creating comfort and encouraging participation among children. With children in particular, photographs can facilitate a balancing of power within an interview process by providing children a tool for expressing things they may be unable to through words (Clark-Ibañez, 2004; Epstein, Stevens, McKeever, & Baruchel, 2006). In her use of participant employed photography and photograph-elicited interviews, Clark found that photographs allowed children to "actively interpret their own experience" (p. 49), "revisit feelings and experiences" (p. 48), and "externalize events" (p. 49). Clark-Ibañez (2004) asserted that photographs can foster rapport between researcher and participant, can help structure an interview, and can help stimulate memories. Clark-Ibañez (2004) concluded that photographs empower "the interviewees to teach the researcher about aspects of their social world otherwise ignored or taken for granted" (p. 1524). She cited further examples of how photographs can access information from a different level of consciousness than words can. In arguing for the value of photographs, Rasmussen stated "when a photograph …becomes the subject of a narration, it can contribute to explaining something of what is unique about the place, even though feelings, atmosphere and spirit are difficult" (p. 159). Mizen (2005) reminded researchers to be

reflexive and socially and culturally aware in their use of photographs with children, as with other visually expressive methods.

Sand Tray Pictures as an Elicitation Tool

Sand tray work is described as creating "three dimensional scenes, pictures or abstract designs in a tray of specific size, using sand, water and a large number of miniature realistic figures" (Weinrib, 1983, p. 2). The figures used should include a diverse assortment of people representing diverse cultures, vegetation, animals, buildings, boundaries, vehicles, mythical figures, elements such as fire and water, and additional materials such as paper, clay and paint that children can use to construct a symbol that is not available but is desired (Bingley & Milligan, 2007; Dale & Lyddon, 2000). Participants use objects, figures, materials and sand to create a picture in the sand tray (See Figure 4.1). From the author's own experience using art therapy with children, drawings can place unspoken pressure on a child to produce a 'good drawing'. Sand tray expressions eliminate this pressure by allowing children to create pictures that do not rely so heavily on a child's artistic ability, development or manual dexterity.

Sand tray work is differentiated from sand play therapy by focusing on expression not therapy (Bradway & McCoard, 1997). Sand tray is a projective technique that was actually used in Frank's personality studies of the 1930's and later in Piaget's research of children's environmental reference systems in the 1950's (Hart, 1979). Time constraints prevented Hart from using this method in his pioneering study of children's place experiences in the 1970's. The interpretation of the sand trays here is within a research, not therapeutic, context. Research has a goal of uncovering or discovering information whereas therapy uses this information specifically and explicitly to intervene or change

the individual. Having used this method in their research into the mental health effects of childhood play experiences in nature, Bingley and Milligan (2007) stated, "the researcher has to have a clear sense of the differences between a therapeutic space and a research space" (p. 285). Bingley and Milligan further stated that despite the limitations of time, space and intensity, sand trays provide very valuable information for geographic research through a process where individuals can physically reconnect with the earth through touching the sand.

The use of a sand tray and miniature objects makes children's symbols concrete, tangible and three-dimensional (Homeyer & Sweeney, 1998). Homeyer and Sweeney (1998) described several benefits: sand trays facilitate expression of non-verbal, emotional issues, they have a unique kinesthetic quality, they facilitate the emergence of metaphors and they engage children in an interesting and playful process.

Figure 4.1. Example of a Sand Tray Picture Created by the Author.

Russo (2006) found that the use of sand tray pictures increased the ability of children to tell stories. While this study was exploratory and had a very small sample

size, the results are encouraging in that they show that having something concrete helps children develop details of the story. Dale and Lyddon (2000) reviewed a number of qualitative studies that show sand trays as a therapy tool help elicit an expression of emotions that children with limited verbal skills would be unable to do so otherwise. Ramirez and Matthews (2008) used sand tray pictures in their study of children's refugee experiences. They reported that sand trays produced the basis for rich narratives and were the preferred medium of expression among sand trays, photographs and drawings, as identified by their child participants. These authors found that sand trays "prompted creativity, communication, openness, questions and clarifications, and made conversations purposeful and enjoyable" (p. 96).

Despite the apparent value of using sand trays as a tool for facilitating the verbal expression of children's experiences in research, the use of this method is virtually unheard of. Its efficacy in therapy has been established (Dale & Lyddon, 2000). Its value in research is yet to be fully realized. One goal of this research is to explore the value of sand trays in facilitating the interviewing of children on their experiences.

In conclusion, four visually expressive methods were chosen for this study. After a review of this literature we concluded that these four visual arts methods are ideal for working with children because they: (1) help facilitate communication with children who may not have mastered the communication skills needed for other methods; (2) help engage children because they are playful and fun; and (3) help balance power differentials that may exist between researcher and researched. Through methodological triangulation, this research will help determine whether sand trays are an effective elicitation tool for interviewing children and for expressing dimensions of experience.

The Study

For this study, a group of five children aged 6 years through 10 years were recruited through ads in local newspapers. The children consisted of three girls and two boys all from white, middle-class, two-parent families. The children participated in a day camp for five consecutive days at a nearby botanic garden. Following an hour of free time, or during the hour in the case of participant-employed photography, children were invited to take photographs, or produce drawings, sculptures or sand tray pictures that illustrated what was important to them about their experience in nature. The photographs, drawings, clay sculptures and sand trays were then used to elicit semi-structured interviews. Children were interviewed separately with interviews ranging from 10 to 25 minutes. A research assistant facilitated nature-based activities with the remaining children while the researcher conducted her interview with each child.

Questions included:

- Tell me about your experience drawing/sculpting/taking photographs, etc.?
- What does your picture/photograph/sculpture/sand tray say about what is important in your experience of nature earlier today?
- What does your picture/photograph/sculpture/sand tray tell about how you felt during your free time?
- What do you think you will remember the most about your experience in nature earlier today?

The interviews were structured around the emotional, cognitive and sensory content of the children's visual expressions. Children were invited to make meaning of their own expressions with the researcher simply being curious and inviting the verbal expression

of meanings for the child, rather than attempting to interpret the expression residing in the researcher's experience. Each child participated in at least five interviews throughout the week.

Implementation of Visually Expressive Methods in Study

In this study, children were given a piece of red air-dry modelling clay. Three wooden sculpting tools were made available to the children as well. The clay was much stiffer in consistency than "play dough" type clay but was easily manipulated by the children's hands and more closely resembled natural, earthen clay. Children were invited to create something in the clay that represented an important, or perhaps the most significant part of their experience in nature over the preceding hour. Importance and significance were defined or explained to all the children as something that had a special meaning, perhaps something that would be remembered or retold to a family member. Children were given the opportunity to work with the clay and become familiar with the tools available for shaping or etching in the clay.

For the drawing exercise, the children were provided with sketch paper (9" by 13") and a variety of art materials that included pencils, charcoal pencils, crayons, pastels and markers. Children were invited to choose whatever materials they wanted to use and again were asked to draw something that represented what was important to them about their preceding time in nature.

During the participant-employed photography session each child was provided with a 24-exposure disposable camera. Cameras were of high quality and had a built in flash. Children were given the cameras at the beginning of their time in nature on one day each and were invited to take pictures of what they found important. Children were

given basic instructions on how to snap a picture and how to use the built-in flash. All five children indicated they had used disposable and other cameras before and were familiar with their general operation.

For the sand tray session each child was provided with a 24" by 18" plastic sand tray with white sand and a large assortment of miniature toys as described earlier. These toys were spread out on blankets in no particular order. Children were asked to create a picture or scene using whatever objects they wanted that represented what was important to them about their preceding time in nature. Materials including paper, tape, cardboard and clay were also available and children were informed that they could use these to make something that they wanted to include in their picture but that they could not find in the collection supplied.

Data Management and Interpretation

Researchers should take care to respect the ownership of children's visual creations, to co-construct meaning rather than interpret meaning, and be aware of how visual methods "can make children's thoughts, desires and concerns visible to public and adult scrutiny" (Mitchell, 2006, p. 70). Above all, researchers need to protect children's safety in their expressions. In this study the children's art and photographs remained property of the children and were not used directly in the data analysis. Digital photographic records of the children's photographs, drawings and sand trays were kept by the researcher and used only as a reflective aid in the analysis stage.

The researcher transcribed the digitally recorded interviews verbatim. The researcher also took limited notes during the interviews and conducted daily interpretive analyses at the end of each day. Daily interpretive analysis protects important insights

and constructions from being lost over time. "A great deal of understanding comes from the context of the interview, and from a range of cues that are simply not captured on tape" (Lewin, Taylor, & Gibbs, 2005, p. 3). The researcher employed a case study approach to organizing the data; "[c]ase data consist of all the information one has about each case" (Patton, 2002, p. 448). This allowed the researcher to analyze each case in depth and to make comparisons with the other cases. Content analysis was conducted for each case to identify major themes and meanings. We looked for themes relating to product (answers to our research questions) and process (examination of methods). The content analysis was comprised of inductive analysis and deductive analysis. In inductive analysis, the categories were identified and named by the participants, in this case the children, and emerged out of the data. It is important to these researchers that the findings accurately represent the co-constructed meanings developed through the interview process; as a result, a combination of indigenous (child-identified) and sensitizing (researcher identified) concepts were used. Examples of sensitizing concepts include the four dimensions of experience: cognitive, behavioral, affective and sensual. The data were coded using these categories and themes. Lewins, Taylor and Gibbs (2005) defined coding as:

> the identification of passages of text (or other meaningful phenomena, such as parts of images) and applying labels to them that indicate they are examples of some thematic idea. At its simplest, this labelling or coding process enables researchers quickly to retrieve and collect together all the text and other data that they have associated with some thematic idea so that they can be examined together and different cases can be compared in that respect. (p.1)

Several read-throughs of the transcripts were required. The first read through involved making comments in the margins in an attempt to identify preliminary categories (Patton, 2002). Subsequent reviews of the transcripts involved coding

passages as they fit with the identified categories. We modeled our analysis on Seidel's (1998) circular process involving noticing, collecting and thinking about interesting things. We would notice recurrent themes, we would identify and collect them and then after reflecting upon them we would think about those themes as we noticed the data again. The entire process of data analysis is best seen as a circular process with continual movement between the data and the analysis and the researcher.

Visual Expression as Research

The researchers viewed the investigation as a collaborative process between researcher and research participants. It is important that any evaluation of methods takes into account the needs of both perspectives. As argued earlier in this paper, research methods with children must be engaging and non-judgmental (Oberg & Ellis, 2006). The children evaluated the methods in terms of the degree of "fun" they provided and by their evaluation or judgment of what was good or "realistic". From the researchers' perspective, methods needed to be practical, to be able to elicit interview data (communication) and to balance the power differentials between researcher and participant (balance power).

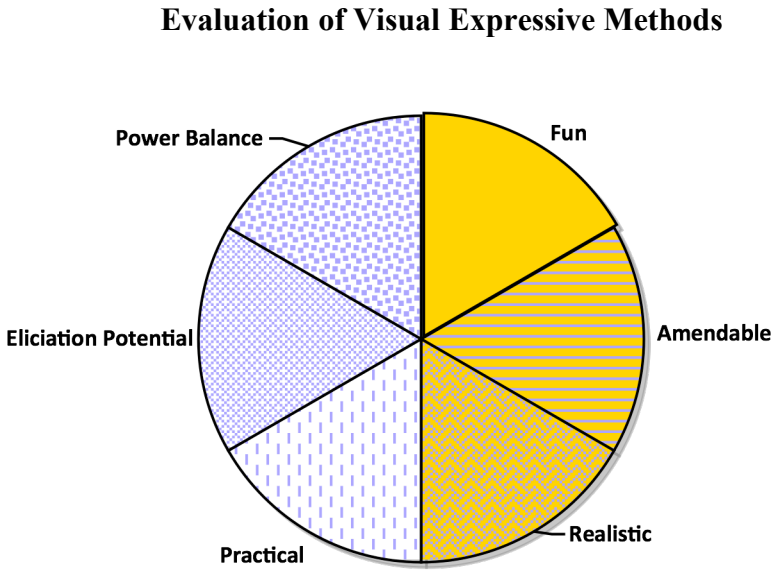


Figure 4.2. Evaluation Criteria used for Evaluating Visually Expressive Methods

Children's Perspective

From our analysis of the data there emerged three factors that children identified as important to them during the data collection phase: (1) the activity needed to be fun; (2) the children needed to be able to make changes to the end product; and (3) it needed to be a realistic depiction of what they wanted to portray. It is interesting to note that children as young as six have developed an expectation of art as needing to be "realistic". This need to depict "realness" may be a cultural construct reflected by our Western North American culture. As with their experiences in nature, fun was an important component to the visually expressive methods employed in this study. While children were unable to clarify in any more verbal detail what was meant by fun, it appeared that novel experiences that are enjoyable contribute to the *funness* of a method.

Clay Sculptures

One participant noted that a benefit of clay was its ability to be changed throughout the process:

> Matthew : [Clay] is different from drawing 'cause you can make, it's a lot longer and I like to take long crafts and I like to do long crafts because it's a lot funner. Once you've drawn, it's kind of done.
> *Researcher observation*: Matthew kept adding and changing his clay sculpture – it appeared to be more of a dynamic process. Eventually the clay will dry. However for the purposes of this research, it remained malleable for the entire time the children were using it.

The kinesthetic experience provided by the clay was a further advantage as illustrated in the above example. Children reported enjoyment with using their hands to sculpt the clay.

Children were highly self-critical of their sculptures, as they were with their drawings (see next section).

> Colton: I made this butterfly because we went into the butterfly room today and I saw lots of different kinds of butterflies. I was going to make a 3 dimensional one and put it on a leaf but instead I made a drawing of one with the clay.
> Researcher: So how did you decide to do a 2 dimensional butterfly and not the 3 dimensional one like you first thought?
> Colton: Because the three dimensional one, I tried it but I couldn't get the legs big enough, I had to make them really thick, Butterflies don't have thick legs, their legs are really thin. So it's harder to do that. I wanted to make it look more real.

Drawings

By the time they have reached the age of six to ten years of age, most Canadian children have had considerable experience drawing. Drawing is not a novel experience and therefore appeared to be less engaging than other methods. Children may have experienced judgment and criticism related to their drawings in the past and this may inhibit children's exploration of drawing as expression. Children spent less time creating

their drawings than the other creations. Children often could not draw something the way they wanted or needed to in order to communicate what they wanted. Being unable to erase mistakes created a feeling of dissatisfaction in the end result.

(Discussing her drawing of the forested area)
Pearl: I tried to erase it but I couldn't.
Researcher: Oh, I see. You tried to erase it but you couldn't with the charcoal.
Pearl: Mmhmm.
Researcher: Why would you erase that?
Pearl: Because I don't want it. Umm, 'cause…it didn't really look that good.

Children's satisfaction was negatively affected by factors including their drawing ability and satisfaction with the materials provided or selected.

Researcher: So was there anything else you would have drawn if you wanted to add anything or if you wanted to do it differently?
Colton: I would do more detail. Like I would have drawn the tree like exactly like they were…like this one I'd draw the red on it. Sometimes I just sketch it with no colour.
Researcher: Just black. So why did you decide to use colours?
Colton: Because the markers there aren't flat like the ones at home, when I have the flat ones I can get some thin lines.

Providing a diverse selection of materials appeared to be beneficial.

Cloe: (talking about drawing during photo interview)
I liked drawing better. There's these really cool markers. And paints and stuff.

Children wanted their pictures to look realistic and were disappointed if their drawings did not meet their expectations.

Researcher: What makes them your best?
Pearl: Cause they really look like…real, a little bit real.

Photographs

Overall, the children indicated they enjoyed using cameras and taking

photographs. Self-determination appeared to be an important factor in the enjoyment of taking photographs.

Researcher: What else made the camera fun?
Matthew: You could take a picture of anything you want.

Of all the methods used in this study, photographs provided the most "realistic" results. This was important for the children and appeared to be linked to remembering their experiences.

Matthew: Because taking pictures is like very cool 'cause I can remember things that I've been to and if I can't remember them I can draw them or take a picture of them.
Researcher: Ok, so why does taking a picture of them help you remember better than drawing?
Matthew: 'Cause it looks real.

All five children had had previous experience using cameras and did not require extensive orientation to the cameras, which was beneficial. Disposable cameras were used which did not provide the immediate feedback that digital cameras do but this researcher felt that this would allow the children to focus more on their experience than on getting the "perfect" shot. In the case of one participant, many photographs did not turn out as a result of technical difficulties and this resulted in a disappointing experience for the child and a lack of materials upon which to base the interview.

Colton: The flash went off and so it made that really bright [commenting on why he thinks his picture did not turn out]. It went off on all of them. I tried to make it not to. I tried opening that thing. It made it even brighter.

The diversity of settings and variation in lighting and subject matter made it difficult for a "one-size-fits-all" camera to be sufficient in all situations. Disposable cameras also limited the number of photographs that could be taken. Four of the five

children used up all their photographs within the first 15 minutes of their "free time". The fifth child, the oldest of the group at age ten, consciously made a choice to save a few pictures for the "end" of his time. This raises questions about the validity of the photographs taken in representing the most significant or important aspects of the children's time in nature.

Because the time required for film processing delayed the interviews by one and in some cases, two days, it is possible that the photograph elicited a different level of reflection or integration of the experience than the other methods where interviews were completed very soon after their time in nature. Additional social and cultural influences may also impact a child's reflection over time. Time may have some effect, what the effect is was not determined by this study. One risk with photographs is that children may pay more attention to the camera and the photographs than, in this case, nature.

Sand Tray Pictures

The children all reported that the sand tray pictures were their preferred visually expressive activity at the camp. This was likely due in part to the novelty associated with it. Very few children have had experience with sand tray pictures as a visually expressive experience. Most have likely had some experience with sand in general, playing in a sandbox or making sandcastles at the beach and playing with miniature toys. This act of play was likely less regulated and less judged by adults than acts that formed the basis of the other methods that are more 'artistic'. The following is an excerpt from Cloe's sand tray elicited interview. During the other interviews, she was difficult to engage because she was concerned she was missing out on what the other children were doing while she was being interviewed. She often appeared to rush through her art processes and the sand

tray was the exception. Cloe spent a considerably longer amount of time on her sand tray and her interview was three times as long and contained much more detail than her other interviews, despite the fact that the other children were concurrently engaged in a craft that Cloe had expressed interest in earlier in the day.

Cloe:	Making the sandbox was the most fun part of the day.
Researcher:	What did you like about it (making the sand tray picture).
Cloe:	I liked how we got to put stuff in it. It's 3-D.
Researcher:	And what do you like about it?
Cloe:	It looks like its real and coming out at me.
Researcher:	Is there anything else that you can do with the sand that you can't do when you draw?
Cloe:	You can put it on top of stuff. You like just pick it up and then put it on top of stuff (the sand). I like how it goes through your hands.
Researcher:	Do you like touching the sand?
Cloe:	Yeah.

The sand provided a very kinesthetic experience that was noted by all the participants.

Pearl:	It was cool to make a….white sand, all the white sand is so soft. Umm, I liked the colors of all of it, and this is what I liked, the shiny sand (running hand through sand).
Researcher:	What do you like – you like to touch it, you like to look at it?
Pearl:	I like to touch it, I like going like this (running through fingers).

Sand trays appeared to allow children to make sufficiently realistic pictures.

Angelica:	Well, I wanted to bury the roots because I didn't really like them staying on top because that makes me feel like you can still see the roots. It makes me feel weird, like why would you see the roots above the ground. ….Because it made it taller and easier to see like the real trees…..I just want to add things that make it more real (adding sand).
Researcher:	What did you like about working in the sandbox?
Angelica:	Well, it was like, in the clay, you could mold one thing. Squish, Squash. You can mold one thing. And then in here you can make like a thousand, like you can put, like you don't have to stick just one huge thing, you can stick little tiny, like lots of things. You can stack it on top, you can stack it here, you can go in there….

Researcher: And what about drawing a picture, how would this be different than drawing a picture?

Angelica: Drawing a picture you can't really make it so 3-D. Then it seems more life like. Its easier to talk about, you can say, like, then like, it just pops up and you can see and say "okay here's one thing, here's another thing, here's one, here's the sun on a black stick, here's a pond with a little hole" or stuff like that.

Researcher: And what about how you've been sprinkling the sand, how …or is that important?

Angelica: I just wanted to do that because it made it look more life like to me.

Researchers' Perspective

The rationale for choosing visually expressive methods was established earlier in this paper. The relative worth of these methods, while discussed in previous research, warrants further evaluation and comparison. What follows is a critique from the researchers' perspective of each method according to the practicality, the effectiveness in eliciting communication and generating data and the potential to balance power.

An important factor from the researchers' perspective is the ease with which the method can be implemented. As established in the literature review, methods must also facilitate communication with children who may have limited verbal competencies. Good qualitative methods must generate or elicit data that are of sufficient breadth and depth to facilitate the development of a deeper understanding into the subject matter (Johnson, 1995). This was determined by examining how many significant passages were identified and coded under product themes in the data for each method. Those findings were later compared between methods to reach conclusions, albeit tentative ones. Visually expressive methods used in this study also needed to balance power differentials that may have arisen between researcher and participant. Referring to this balance, Clark-Ibañez (2007) stated that "eliciting responses through images brings the 'subject' into the

research process as an interpreter or even an active collaborator, rather than a passive object of study" (p. 15). Evidence of this was established through reviewing transcripts for passages relating to children's experiences of being the subject of the research. Again, these are provisional conclusions.

Clay Sculptures

Practicality.

The benefit of clay is that it can require comparatively little preparation or planning. Providing the child with some clay may be sufficient, and adding carving tools, even simple ones can be helpful. This is dependent on the assumption, like many of the methods, that children have had previous experience molding and sculpting clay or clay like materials.

Communication.

Of the methods used in this study, the clay sculptures elicited the least amount of detail in the interviews. The children's sculptures were of single things like a squirrel or a butterfly. Clay sculptures did not elicit extensive discussion by the children, especially related to sensory aspects of the children's experiences as was anticipated. This method would work best if the researcher were looking for basic ideas or over-all, *big picture* themes. For example, one child sculpted his representation of the forest where he had spent his time that day. His sculpture included primarily trees and grass. The interview based upon his sculpture was very descriptive of what his sculpture was but did not generate information about what was important about his time in nature. What he later reported was having fun looking for bugs and trying to find new trails. In the end, the details about what was meaningful for him was not the trees and the grass but the

experiences of discovery of bugs and his confidence in finding familiar trails. In the majority of cases, the interviews on the sculptures were related only loosely to the sculpture and more directly to the child's recollection. Visually expressive methods were selected for their applicability in bridging a communication gap between children and researcher. Interview data based upon recollection do not help bridge this gap and becomes more of a verbal interview method.

Power.

Findings were inconclusive as to whether sculptures helped balance power in the research relationship.

Drawings

Practicality.

Like the sculptures, drawings were relatively easy to implement. While the effectiveness may be improved by the variety of materials provided, drawing does not necessarily require any specialized equipment. While some children appreciated the variety of markers and art materials, others simply used a pencil and paper.

Communication.

In some cases, the resulting drawing was largely a product of the child's ability to draw, a caution made by Alerby (2000).

> Researcher: How did you decide to draw a picture of the trees and the flowers and not all the other stuff we saw?
> Colton: Because the other things like hedges, I couldn't really draw those. Some things are really, really detailed and are kind of hard to draw; you have to be like up close and sitting down beside them to draw them.

This limitation raises questions as to how effective drawings were in eliciting detailed interviews relating to the child's experience with nature. Elements that might have been

important may not have been portrayed in the drawing, because of the child's perceived inability to draw them accurately enough. This expectation also has an implication relating to power as discussed in the next section. In several cases, drawings did not elicit a significant amount of verbal discussion and interviews tended to be elicited more from the child's recollection of aspects of their time in nature not depicted in their drawing. As with the clay sculpture elicited interviews, these interviews were biased towards the child's verbal skills.

Power.

An important consideration when using drawing is to use caution when interpreting children's drawings. The following excerpt highlights the importance of the child interpreting the drawing, not the researcher alone.

Researcher:	How did you decide to draw…an owl?
Pearl:	'Cause I wanted to draw an owl because I don't know how to make a bird.
Researcher:	So an owl is a type of bird you know how to draw?
Pearl:	Yeah.
Researcher:	So it kind of just represents a bird that you saw?
Pearl:	Yeah – a chickadee.

This confirms the assertion made by Mitchell (2006) that care needs to be taken by the researcher to ensure that the power, which in this case lies in the interpretation, is a cooperative activity between the researcher and the participant. When interpretation resides with the researcher alone, visually expressive methods do nothing to balance the power potentially arising in the research process.

Providing more detailed instructions to the children at the start of the drawing process may help to mitigate the drawbacks of this method. These instructions should include reminding children several times that their visual expressions are not being

judged for quality, that certain materials have limitations such as not being able to be erased, and if possible, exploring with the children in advance what sort of drawing materials they prefer. Scheduling time before the research camp began for the children to explore the methods and materials using all five senses may also have been beneficial.

Photographs

Practicality.

Photography can add a dimension of technical difficulty not inherent with the other methods. In one case, the majority of a child's photographs did not turn out because of poor lighting or camera malfunction. In another case, the flash did not work properly on all the photographs. Overall, photographs did provide detailed data, in particular as it related to memories. Technical considerations affected the practicality of this method in a negative way and more care should be taken to ensure this is not the case in future studies.

Communication.

In all cases, when compared with other methods, photographs provided a significant amount of detail. Several times, the children indicated that their photographs reminded the child of something from their past or were taken to remind them of something in the future. This supports findings by Clark-Ibañez (2004) that photographs trigger memories.

Researcher: But looking at that picture might remind you of other times you've been around bees?
Matthew: Yes.

Also,

Researcher: Yeah? What do you like best about pretty flowers?
Pearl: Well… I don't know. Its pretty and they're really cool to see.

Researcher: Ok.
Pearl: So and they smelled so good.
Researcher: Oh. And what makes them pretty? What makes a flower pretty versus one that's not so pretty?
Pearl: I don't know really.
Researcher: How do you decide what one is pretty then? How did you decide these two were pretty?
Pearl: 'Cause they are mostly one of my favorites.
Researcher: You've seen those flowers before?
Pearl: Yep.
Researcher: Ok.
Pearl: These are one of my favorite flowers in the world.
Researcher: Ok. Where have you seen these flowers before?
Pearl: Grandma and Grandpa's house.
Researcher: Oh Grandma and Grandpa's house?
Pearl: Grandma and Grandpa's house in Sherwood Park.
Researcher: Ok. So what else do these pictures help you remember about what we did in the butterfly house?
Pearl: Umm I remember the butterflies and I remember flowers but my grandma doesn't grow these flowers anymore.

Photographs appeared to represent more of what the children wanted to remember than specifically what was important or significant to them about their experiences. A question remains of whether what children remember, or choose to try to remember, is the same as what is significant to them. For example, Pearl took pictures of flowers that reminded her of flowers her grandmother grew. She indicated in her interview that the time she spent in the past with her grandmother tending to her flowers was important. Pearl did not share that her interactions with the flowers at the Gardens were significant for any reason other than that they triggered this memory.

Power.

Photography is a much different process than the other methods used in this study. Photographs were taken during the children's time in nature, not afterwards, which may or may not be significant. For some children, taking a series of photographs was a process in and of itself that influenced the children's experiences either in a positive or negative way. Since this study was interested in children's experiences, anything that influenced their experiences is salient. The following is an example of how the process appears to have deepened the child's experience with nature.

Researcher:	What made it (photography) interesting?
Colton:	That I could take all the pictures of different things that I couldn't touch because like those (pointing at a photo of prickly plants), because they're all prickly. I could see them, but I couldn't' touch them.
Researcher:	And the camera allowed you to do that?
Colton:	Yeah.

In this case, photographing something helped the child explore plants in a way that he could not, or perhaps would not, otherwise. This changed his experience with those plants and transformed the child into what Clark-Ibañez (2007) referred to as an "active collaborator" (p. 15). In the next example, the camera was starting to detract from the experience. Fortunately, the child found a solution to mitigate this.

Researcher:	Yeah but why did you have (the research assistant) hold (the camera)?
Angelica:	Because I didn't want to lose it in the water.
Researcher:	Oh ok.
Angelica:	Because when I was climbing up I had it tight. So then I knew I was not going to drop it. 'Cause on the first few seconds, minutes, I had to give it to (the research assistant) just to get used to the slippery [rocks].
Researcher:	Oh so you had to kind of focus on the rocks.
Angelica:	Yeah more than holding on to a camera.

A further excerpt shows how using the camera shaped the nature experience in another manner.

> Angelica: I thought wow and then I was on camera today so when I started back at the beginning of the waterfall and I got down I was like beginning, middle, click, click, click and then when I got to the bridge I clicked and looked under and when I got out, when I was in the middle I just clicked and then when I got out clicked finally daylight. And then I saved the last three pictures and then I couldn't help it so I wound it then wound it, wound it again and then sort of backed up to get that picture and clicked and I got the rest of the way.

Here the child was attempting to create a story with a series of photographs. This raises a question of whether the camera just records the child's experience or whether it determines the child's experience with nature.

Sand Tray Pictures

Practicality.

Of all the methods used, sand tray pictures were the least practical for the researcher as they required the most materials. A sandbox and sand are required and in this study needed to be transported to different areas within the botanic garden. In addition, a diverse enough collection of miniature toys were needed to afford children the opportunity to create the scenes they wanted. Such a collection of toys can be both expensive and cumbersome to transport.

Communication.

Children took significantly longer to complete their sand tray pictures than the other visual expression products. Observations by the researcher revealed that children were less distracted by the other participants when they were making their sand tray pictures than when they were drawing. There was less talking among the group and there

was less comparing their creations with others afterwards. As indicated earlier, the sand trays allowed children to create what they believed were realistic, three dimensional pictures. They were able to manipulate and change their creations, unlike their drawings that are "unerasable". The interviews elicited from the sand trays had considerably more detail than interviews elicited from other methods. In all cases, the sand tray-elicited interviews were at least fifty percent longer in word count than the longest interview using other methods for each child. In the case of Cloe, the sand tray-elicited interview was more than three times as long. Sand tray-elicited interviews also contained significantly more sensory references than interviews elicited by other methods. These sensory references included, but were not limited to, the sense of touch. Sensory references were coded in each interview and sand tray interviews on average contained over forty percent more sensory references than the other methods combined for each child participant. This was likely a result of the sensory nature of the sand tray process however, interestingly, similar observations were not made as with the clay sculptures. Some of the sensory references included:

Pearl:	I water them [flowers in her grandma's garden]. I look at them. I smell them, a lot things. They're very cool.
	Well, the rain. It feels a little bit good, especially the rain going splish, splash, splish splash on your hat.
Angelica:	They [slugs] were slimy.
Cloe:	We got to like find flowers and eat wild berries…..They tasted good
Colton:	But they [his rubber boots] didn't suction cup on to their feet like my dad's boots do.
Matthew:	'cause I remember my feet got wet.

Power.

Children were definitively more engaged in the sand tray process than the drawing or clay sculptures. It is difficult to compare it with photography since photography took place at a different time in the process. This engagement, and the apparent strength of sand trays to elicit sensory data, in our opinion, gave children greater power to communicate a more complete picture of their experience. As children told the story of their stand tray picture, their experience seemed to be validated and strengthened in the retelling. Like the other methods, the value of this method in balancing the power of the research process lies in the ability of the researcher to collaborate with the child participant in interpreting the meaning of their pictures. The detail offered throughout the sand tray-elicited interviews invited the collaboration in meaning-making between researcher and participant.

Discussion

Table 4.1. Evaluative Review of Methods

	Fun	Flexible	Real	Communication	Power	Practicality
Drawing	✓	✗	✗	?	?	✓
Clay	✓	✓	✗	✗	?	✓
Photograph	✓	✗	✓	✓	✓	✗
Sand trays	✓	✓	✓	✓	✓	✗

Note: ✓ = strong tool; ✗ = poor tool; **?** = not enough data to determine method effectiveness

Each of the visual expressive methods used to elicit data in this study has its own strengths and weaknesses depending on the context of the research being conducted (Barry, 1996). Table 4.1 provides a summary of our observations of the effectiveness of four visually expressive methods used to elicit information and represent findings about children's experiences in nature. Each method has advantages and disadvantages and decisions on which method or methods to use must balance the needs of the research participants, in this case, the children and the researcher. To return to Mitchell's statement (2006), "drawing is not an inherently child-centered activity, but one in which relationships of power, authority, and difference need to be acknowledged and integrated into analysis" (p. 70), this statement could be applied to each of the visually expressive methods used in this research.

Creative and visual methods are not inherently ideal for researching children's experiences. The value of a particular visual method lies, in part, in how and when these methods are used to co-construct data. Research cited earlier in this paper suggests the visual expressive methods are engaging for children and the engagement of one's research participants is an important consideration in doing research. This study lends support to this. The visually expressive methods used in this study were all identified by the child participants as being fun. The effectiveness of these methods were evaluated for other criteria such as their flexibility, their ability to depict realness, their practicality to implement, their ability to elicit data and their ability to balance power between the researcher and the participant. In this study, sand tray pictures were the most effective in meeting the needs of both the child participant and the researcher with the only drawback being the ease of facilitation.

The children in this study identified sand trays as their favourite visually expressive activity, which mirrors findings found by other researchers using this method (Bingley & Milligan, 2007; Ramirez & Matthews, 2008). Ramirez and Matthews (2008) found that sand trays generated more meaningful and deep data and invited sharing of information, which met with cultural barriers inherent in the other methods. Perhaps the most significant strength of sand trays in this study was its apparent ability to uncover more information about children's sensory experiences. Bingley (2003) observed similar results, asserting that the kinesthetic nature of the sand does not privilege visual experiences the way other methods do, "emphasizing different senses, with the tactile as the fulcrum, appeared to hone people's awareness, bringing out insights and reflections about their sense of place from a number of different sensory and psychic perspectives" (p. 336). Like the anecdotal evidence in this study, Bingley (2003) found that "the language used in feedback was markedly rich and sensual" (p. 337) with the sand tray and brought "to consciousness awareness of multiple dimensions of experience of landscape" (p. 337). Bingley and Milligan's (2007) work explored youth's and adult's recollections and found that sand tray work was "engaging and facilitated access to embodied memories and ideas" (p. 295). If sensory experiences play more prominently in one's memories as Cachelin, Paisley and Blanchard (2009) and Sebba (1991) suggested, then the sensory experiences uncovered through sand tray pictures in this study are potentially very significant and valuable. While this study involved a very small sample and the results are not generalizable to larger populations, it does strongly suggest that sand trays as a visually expressive method warrant further investigation,

especially with respect to its application in studying sensory dimensions of subjective experiences.

Conclusion

This study demonstrated that using visually expressive methods to elicit interviews and generate understanding are effective. Overall, these methods, to a varying degree, did facilitate communication, were engaging, and did help balance power differentials between adult researchers and child research participants. All four methods produced valuable data needed to better understand children's subjective experiencing of nature including the four dimensions of sensation, emotion, cognition and behavior.

The use of sand trays for research was established as a particularly effective method in this study of children's subjective experiences with nature. Using sand provided a kinesthetic experience that was able to effectively elicit information about the sensory aspects of the children's experiences with nature and provided the fun, novelty and realness sought by the child participants. The effectiveness of sand trays in this particular study invites immense potential for sand trays to be used as an effective research method when working with children and warrants further investigation.

Two methods, photography and sand trays, stood out for their potential to impact what information was elicited during the interviews which leads these researchers to revisit how much impact the method has on the data generated. For example, the researchers observed that most of the children took pictures early in their hour of free-time, not documenting all phases of their nature experience that day, or perhaps not their most meaningful experiences. As a result, the photography method may have constrained the children's ability to document the most meaningful aspects of their experiences in

nature then because they ran out of photos. The photo-elicitation interview, which occurred one to two days later, may or may not have revealed this as the photos served as strong memory cues for the children; their recounting of experiences in nature the day they snapped their photographs were rooted in the content of the photographs.

When considering selecting methods, researchers working with child participants need to balance their needs and competencies with the needs and competencies of their child research participants, while being reflexive enough to ensure the methods used are, and remain, child-focussed. Technical difficulties, like those encountered with the disposable cameras, should be considered and managed as effectively as possible in advance. Digital cameras may have helped mitigate the risk. Training of the children in each of the visual methods in advance may have been helpful to familiarize the children with the materials. Digital cameras were not chosen for this study because we worried that children might have put more emphasis on their satisfaction with the quality of the photograph which may or may not have been an accurate depiction of an important aspect of their experience. It may have been more effective to have children take the photographs after their experience in nature, as was done with the other methods. Further research into the effect of the method on the experience, as was observed in this case with the photographs, may be valuable. Given the small sample size in this study and the relatively homogeneous make up of study participants (from two parent families who are white, middle class, and have a shared Anglo/European cultural background), these results cannot be generalized, although they do provide some direction for further study, including calling for:

- Larger evaluative studies of sand trays as a research method.

- Investigations into the effect, if any, of taking photographs concurrently with the experience being studied.
- Studies of whether individual visually expressive methods vary in their effectiveness in eliciting each of the sensate, emotional cognitive and behavioral dimensions of experience.

References

Alerby, E. (2000). A way of visualizing children's and young people's thoughts about the environment: A study of drawings. *Environmental Education Research, 6*(3), 205-222.

Barraza, L. (1999). Children's drawings about the environment. *Environmental Education Research, 5(1),* 49-67.

Barry, D. (1996). Artful inquiry: A symbolic constructivist approach to social science research. *Qualitative Inquiry, 2*, 411-438.

Bingley, A. & Milligan, C. (2007). Sandplay, clay and sticks: Multi-sensory research methods to explore the long-term mental health effects of childhood play experience. *Children's Geographies, 5*(3), 283-296.

Bingley, A. (2003). In here and out there: sensations between self and landscape. *Social and Cultural Geography, 4*(3), 329-345.

Bradway, K. & McCoard, B. (1997). *Sandplay – Silent workshop of the psyche.* New York: Routledge.

Braun, B.G. (1988). The BASK model of dissociation. *Dissociation, 1*(1), 4-23.

Cachelin, A., Paisley, K., & Blanchard, A. (2009). Using the significant life experience framework to inform program evaluation: The Nature Conservancy's Wings & Water Wetlands Education Program. *Journal of Environmental Education, 40*(2), 2-14.

Clark, C. (1999). The autodriven interview: A photographic viewfinder into children's experience. *Visual Sociology, 14*, 39-50.

Clark-Ibáñez, M. (2007). Inner-city children in sharper focus: Sociology of childhood and photo elicitation interviews. In G.C. Stanczak, (Ed.), *Visual research methods: Image, society and representation (*pp. 1-22). Thousand Oaks, CA: Sage Publications, Inc.

Clark-Ibáñez, M. (2004). Framing the social world with photo-elicitation interviews. *American Behavioural Scientist, 47*(12), 1507-1527.

Dale, M.A. & Lyddon, W.J. (2000). Sandplay: An investigation into a child's meaning system via the self-confrontation method for children. *Journal of Constructivist Psychology, 13*, 135-154.

Epstein, I., Stevens, B., McKeever, P., & Baruchel, S. (2006). Photo elicitation interviews (PEI): Using photos to elicit children's perspectives. *International Journal of Qualitative Methods5 (3)*, 1-9.

Gharahbeiglue, M. (2007). Children's interaction with urban play spaces in Tabriz, Iran. *Visual Studies, 22(*1), 48-52.

Greene, S. & Hill, M. (2005). Researching children's experience: methods and methodological issues. In S. Greene, S. & D. Hogan (Eds.)*, Researching children's experience: Approaches and methods* (pp. 1-21). Sage Publications: London.

Hart, R. (1979). *Children's experience of place*. New York: Irvington Publishers.

Homeyer, L. & Sweeney, D. (1998). *Sand tray: A practical manual*. Canyon Lake, TX: Lindan Press.

Huss, E. & Cwikel, J. (2005). Researching creations: Applying arts-based research to Bedouin women's drawings. *International Journal of Qualitative Methods, 4*(4), 1-16.

Johnson, S. D. (1995, Spring). Will our research hold up under scrutiny? *Journal of Industrial Teacher Education, 32*(3), 3-6.

Kendrick, M. & McKay, R. (2004). Drawings as an alternative way of understanding young children's constructions of literacy. *Journal of Early Childhood Literacy, 4*(1), 109-128.

Lewins, A., Taylor, C. and Gibbs, G.R. (2005). What is Qualitative Data Analysis (QDA)? Downloaded February 26, 2008 from: http://onlineqda.hud.ac.uk/Intro_QDA/what_is_qda.php

Malchiodi, C.A. (2005). The impact of culture on art therapy with children. In E. Gil and A.A. Drewes (Eds.). *Cultural issues in play therapy* (pp. 26-71). New York: The Guildford Press.

Mitchell, L.M. (2006). Child Centered? Thinking critically about children's drawings as a visual research method. *Visual Anthropology Review, 22*(1), 60-73.

Mizen, P. (2005). A little 'light work'? Children's images of their labor. *Visual Studies*, 20(2), 124-139.

Myers, O.E., Saunders, C.D., & Garrett, E. (2003). What do children think animals need? Aesthetic and psychosocial conceptions. *Environmental Education Research, 9*(3), 305-325.

Nelson, K. (2007). Young minds in social worlds: Experience, meaning and memory. Massachusetts: Harvard University Press.

Oberg, D. & Ellis, J. (2006). Theme: Researching with children and youth. *The Alberta Journal of Educational Research, 52*(3), 107-110.

Patton, M.Q. (2002). *Qualitative research and evaluation methods.* Thousand Oaks, CA: Sage Publications Inc.

Ramirez, M. & Matthews, J. (2008). Living in the NOW: Young people from refugee backgrounds pursuing respect, risk and fun. *Journal of Youth Studies, 11*(1), 83-98.

Rasmussen, K. (2004). Places for children – children's places. *Childhood, 11*(2), 155-173.

Russo, M.F., Vernam, J. & Wolbert, A. (2006). Sandplay and storytelling: Social constructivism and cognitive development in child counseling. *The Arts in Psychotherapy, 33*, *229-237.*

Sebba, R. (1991). The landscapes of childhood: The reflection of childhood's environment in adult memories and in children's attitudes. *Environment and Behaviour, 23*(4), 395-422.

Seidel, J (1998). Qualitative data analysis. *The Ethnograph v5 Manual, Appendix E*. Downloaded February 26, 2008 from: http://www.qualisresearch.com/

Steele, W. (2003). Using drawing in short-term trauma resolution. In C.A. Malchiodi (Ed.), *Handbook of art therapy* (pp. 139-150). New York. Guilford Press.

Sullivan, G. (2005). Art practice as research: Inquiry in the visual arts. Thousand Oaks: Sage Publications.

Turner, B. (2005). *The handbook of sandplay therapy*. California: Temenos Press.

Weinrib, E. (1983). *Images of the self: The sandplay therapy process*. California: Temenos Press.

Wilson, K. & Ryan, V. (2005). Play Therapy: A Non-directive Approach for Children and Adolescents. Toronto: Elsevier.

Yamashita, S. (2002). Perception and evaluation of water in landscape: use of photo-projective method to compare child and adult residents' perceptions of a Japanese river environment. *Landscape and Urban Planning, 62*, 3-17.

Yuen, F.C. (2004). "It was fun…I like drawing my thoughts": Using drawings as part of the focus group process with children. *Journal of Leisure Research, 36*(4). 461-482.

Chapter 5: A Multidimensional Investigation of Children's Experiences with Nature

A strong attachment to nature can serve both protective and restorative resiliency functions for children (Besthorn, 2005). Outdoor play and nature-based activities have been shown to increase a child's physical activity levels (Kahn & Kellert, 2002), improve mental health by decreasing stress and anxiety (Kahn & Kellert, 2002), advance cognitive and social competence (Faber-Taylor & Kuo, 2006) and have a positive impact on nature itself if those children develop sensitivity and stewardship values as a result of those experiences (Chawla, 1998). For many of us, some of our favorite childhood memories include time spent in nature (Chawla, 1998; Vadala, Bixler, & James, 2007). For others, nature experiences have elicited fear, disgust or discomfort and resulted in an avoidance of nature (Bixler & Floyd, 1997). This study draws upon previous research to develop a multidimensional model of experience that frames an investigation into five children's experiences with nature in a botanic garden. The circumplex model of affect (Russell 1980; Russell & Snodgrass, 1987) and the theory of optimal arousal (Iso-Ahola 1999; Rathunde & Csikszentmihalyi, 2006) inform a discussion of findings. Primary research questions in this study included: (1) How do five children aged 6 to 10 years experience nature in a botanic garden setting? And (2) what sensory, affective, cognitive and behavioral dimensions of this experience can be identified and explored? Findings contribute to practitioners' efforts to foster healthy attachment relationships between children and nature.

Researching Children's Perspectives: Review of the Literature

Much of the recent literature around children's experiences with nature has focused on children's cognitive outcomes (Faber-Taylor & Kuo, 2006; Gotch & Hall, 2004; Harvey, 1990; Heft & Wohlwill, 1987; Salmivalli, 1998; Terrible, 2000), behavior in natural spaces (Dovey, 1990; Fjortoft, 2001; Karsten, 2002; Moore, 1986), or the long-term effects of childhood experiences in nature (Chawla, 1998, 2006; Sebba, 1991). Many of these studies rely on questionnaires, adult observations, or adult recollections, which may or may not be accurate reflections of children's experiences. While these studies contribute to a broader understanding of children's experiences with nature, they add little to our understanding of children's *perspectives* of their experiences with nature at the time they are experiencing it. This study adds to this body of research by exploring four dimensions of a child's experience with nature from the child's perspective.

A Theoretical Framework for Understanding Children's Experiences With Nature

A Multidimensional Model of Experience

An investigation into children's experiences with nature does not come without some challenges. One of the scholarly dilemmas facing the study of experience is that it does not fall under the traditional boundaries of scientific inquiry and has, until fairly recently, been isolated to either philosophical discussions or psychotherapeutic attention. Several theorists in psychology and child development agree upon four primary dimensions of experience. These dimensions, which provided helpful conceptual guidance needed for this research include: sensory, affective, cognitive and behavioral (Braun, 1988; Nelson, 2007; Wilson & Ryan, 2005).

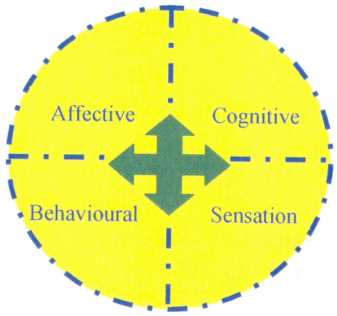


Figure 5.1. Multidimensional Model of Experience

Recent technical advances in neuropsychology and neurobiology have provided scientific support for this conceptualization (Schore, 2003; Sullivan, 2005). Barrett and Bliss-Moreau (2009) described the multidimensional character of experience:

> affect is realized by integrating incoming sensory information from the external world with homeostatic and interoceptive information from the body. The result is a mental state that can be used to safely navigate the world by predicting reward and threat, friend and foe (p. 173).

Unfortunately, most recent studies into children's experiences with nature investigate only one dimension and fail to reflect a conceptualization of experience that synthesizes the four dimensions of sensation, affect, cognitions and behavior. The literature reviewed on children's experiences with nature appears dominated by investigations into the cognitive and behavioral dimensions. Psychological and educational research tends to focus on cognitive functioning and knowledge gained in relation to the environment (see Terrible, 2000 for an extensive review). A large body of literature, particularly in the geography field, tends to focus on children's behavior in natural spaces (Cosco & Moore, 1999; Gharahbeighlu, 2007; Hart, 1979; Kylin, 2003; Moore, 1986; Valentine & McKendrick, 1997).

Comparatively few studies have explored the sensory dimension of children's experiences with nature despite the claim that a "child's sensory perception remains in adult memory as a central experience because its relative importance is at its peak at this stage of life" (Sebba, 1991, p. 416). Opportunities for sensory stimulation appear to be very prominent in natural environments. Sebba (1991) found that elements in the natural environment stimulate the senses in a way the built environment is simply unable to do. The built environment does not require adaptation and therefore does not engage awareness in the same, beneficial way (Sebba, 1991). Chawla (2006) explains this by saying that in nature, nothing is the same twice.

Tapsell, Tunstall, House, Whomsley and Macnaghten (2001) noted that children's most meaningful experiences in a river environment included experiences of getting wet and splashing in the water. Tapsell et al. (2001) completed an extensive exploratory study of children's experiences with rivers in the United Kingdom. They gathered data from approximately 150 children through group discussions, observations, participant employed photography and questionnaires. Data were collected before, during and after the river visits. Youth in Milligan and Bingley's (2007) study of the restorative effects of woodland areas reported that their sensory experiences of seeing, hearing and touching nature contributed significantly to their feelings of relaxation. Milligan and Bingley used therapeutic arts to elicit group discussions about youth's experiences in woodland areas. Sixteen youth aged 16-21 comprised the sample. Data were collected one day with a follow-up interview being conducted one month later. James and Bixler (2008) identified sensory interaction as one of the most significant experiences for children in their study of environmental education. They reported that the sense of touch was most significant,

providing “intimate interaction with natural objects and animals, making the experience memorable to students” (p. 50). Their data consisted primarily of interview data of 20 children in grades 4 to 5, approximately aged eight through 10 years who attended a three-day residential environmental education program. Given the strong connection between memory and the senses (Nelson, 2007), it is not surprising that sensation plays such an important part in experience.

Although Russell and Snodgrass (1987) argued that affect is key to individuals’ experience of their natural environment, investigations into this dimension of a child’s experience with nature are comparatively rare. Bixler and Floyd (1997) studied youth’s affective reactions to pictures of natural environments and attempted to draw correlations between affective reactions and behavior. They administered questionnaires to 450 high school students. Their questions related specifically to affective reactions and activity preferences associated with slides of wildland environments. They found that negative affective reactions of fear and disgust were associated with a lower preference for and even an avoidance of activities in such environments. Cachelin, Paisley and Blanchard (2009) found that affective aspects of direct experiences with nature correlated with positive sensory experiences. Conversely, they found that negative affective responses to nature were correlated with the lack of any direct, sensory experience with nature. In their study, Cachelin and colleagues administered open-ended questionnaires to measure affective responses to wetlands (qualitative, inductive data analysis) and a knowledge-based test of species identification (quantitative analysis). Their sample included 99 grade 4 students, 49 who visited a wetlands area and 50 who did not. These findings

suggest that the affective dimension of experience can be transformed by sensory information.

Contributions of Current Study

One barrier to undertaking a thorough, multidimensional investigation into children's experience with nature may be the tendency for most research to be conducted by one or more researchers from the same discipline. This disciplinary framing of research questions and design appears to result in the exploration of just one or two of the four dimensions of experience. Most studies reviewed for this article focused on one or two dimensions, for example children's knowledge of nature or their play behavior, at the expense of other dimensions. These studies are important and can make significant contributions to our understanding of the four dimensions of children's experiences but may not represent the dynamic and complex nature of this phenomenon. Without a clearer understanding from neuroscience about which dimension, if any one, exerts a stronger influence, an investigation into all four dimensions is needed. In summary, a multidimensional model of experience that includes sensory, affective, cognitive and behavioral dimensions guided the collection and analysis of data for this study. While the literature reviewed above explored one or two of these dimensions, the four dimensions have been understudied in a simultaneous manner. This paper reports findings from a study that explored all four dimensions of five children's experience with nature: sensory, affective, cognitive and behavioral from a child's perspective making a significant contribution to the current literature around children and nature.

A Conceptualization of Experiencing Nature

Figure 5.2 provides the authors' conception of children's experience in nature synthesized from a review of the literature around development, regulation and neurobiology (Barrett & Bliss-Moreau, 2009; Nelson, 2007; Schore, 2003; Sullivan, 2005; Wilson & Ryan, 2005). The model incorporates the four-dimensions previously represented in Figure 5.1, but depicts them temporally, suggesting the sequence in which a child might experience nature.

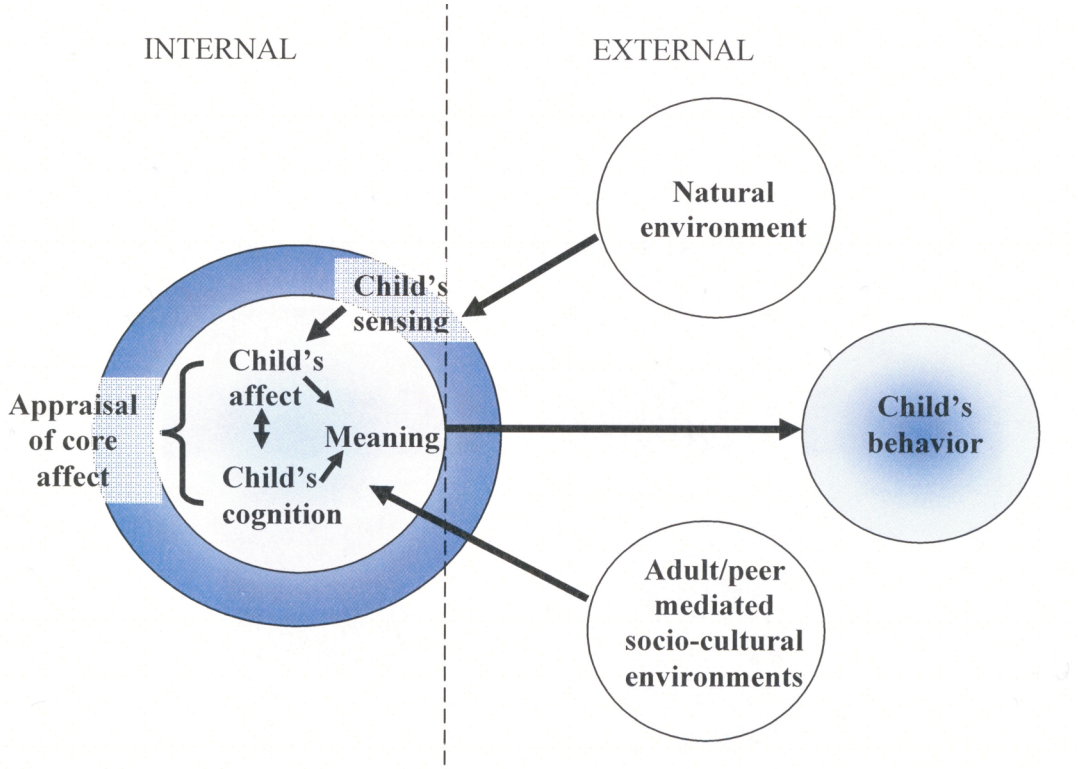


Figure 5.2. Experiencing Nature Model

In the above figure, a child's senses are situated as the intermediary between nature and the child. The primacy of senses in experience is supported theoretically and empirically (Schore, 2003; Solms & Turnbull, 2002). Sensory information is then processed by the child's affect system and integrated with cognitive schema developed from previous experiences stored in memory (Barrett & Bliss-Moreau, 2009; Schore, 2003; Siegel, 1999). Core affect is evaluated and meaning begins to be constructed. Behaviors may be elicited based on needs identified by the affective and cognitive evaluation of the experience (Nelson, 2007; Solms & Turnbull, 2002). Behavior is the dimension most directly observable by others in a child's social environment, hence its positioning in Figure 5.2 within the "external" sphere. The model depicted in Figure 5.2 also acknowledges that social, cultural and historical processes shape all dimensions of experience. These processes, as identified in this present study, are explored in a separate article (Authors, submitted).

Circumplex Model of Affect

While this paper argues for a study of experience that includes the sensory, affective, cognitive and behavioral dimensions, some researchers have suggested that the affective dimension, in particular, might play a primary role in children's experiences with nature. As mentioned earlier, Russell (1987) argued that affect is key to interactions with our natural environment. Barrett and Bliss-Moreau (2009) also indicated the primacy of affect in our experience and suggested it is what makes sensations meaningful. Russell (2003) also held that affect both guides cognitive processing and influences behavior. Russell makes an important distinction between affect, or what he terms *core affect*, and emotion. Russell (2003) defines core affect as the most basic

building block of anything emotional. It is objectless, meaning it is not *about* or *directed at* anything; it is the affect taken out of the context. He differentiates core affect from emotional episodes, which involve perceptual and cognitive processing of the object and include appraisal. Russell and Snodgrass (1987) described emotional episodes as "prototypical examples of what is ordinarily meant by an 'emotion' and have therefore been the focus of psychological inquiry on emotion (Izard, 1977)" (p. 251). Similarly, Silvia suggested "emotions are thus caused by how people appraise what is happening, not by what is actually happening" (Silvia, 2008, p. 58).

The circumplex model of affect (Russell, 1980; Russell & Snodgrass, 1987) provides a useful frame for understanding the affective dimension of children's experiences with nature. Russell and his colleagues argued that core affect, and thus its expression, emotion, is the end result of a complex interaction between two neruophysiological systems: one regulating valence, the other arousal (Barrett & Bliss-Moreau, 2009; Russell, 1980, 2003; Russell & Lanius, 1984; Russell & Snodgrass, 1987; Schore, 2003). As a result, Russell (1980, 2003; Russell & Lanius, 1984; Russell & Snodgrass, 1987) argued that every emotion, experienced by any individual in any situation, should be reducible to a point plotted on a bipolar, dual axis, circular map where one axis represents arousal and the other represents valence. This map was labeled the circumplex model of affect (See Figure 5.3). Emotions can be plotted according to both how arousing they are and how pleasurable they are. Emotions can also be compared with each other by observing their relative proximity on the map.

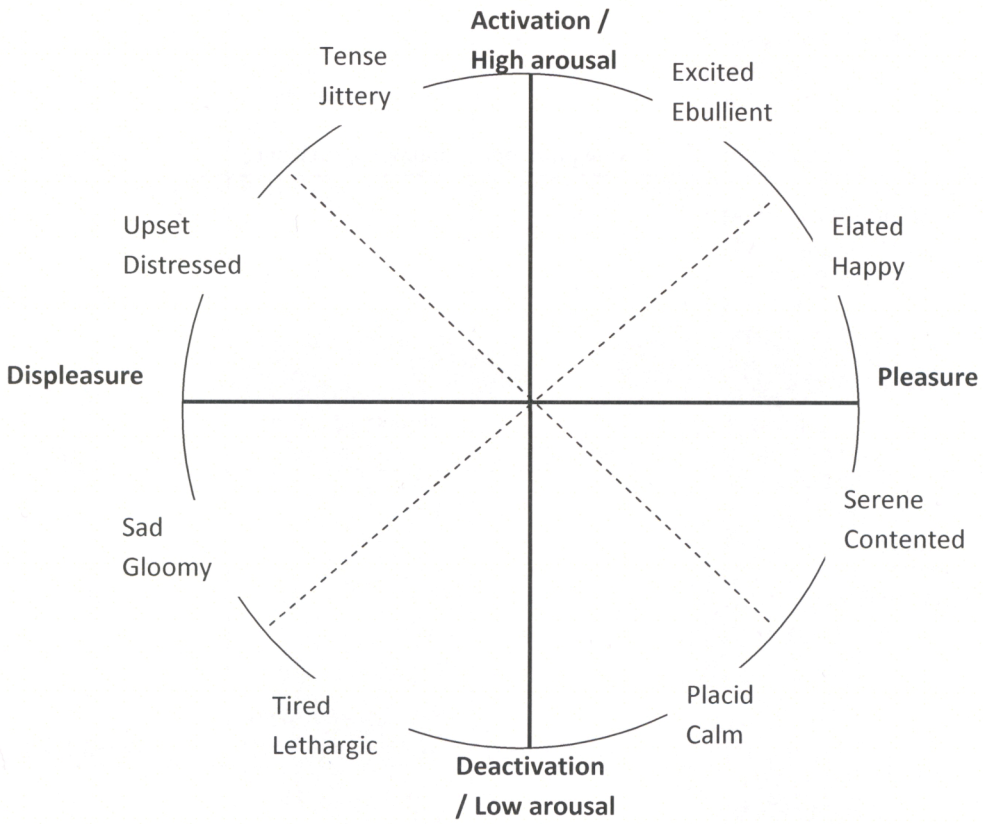


Figure 5.3. Circumplex Model of Affect. Adapted from Russell, J.A. & Lanius, U.F. (1984). Adaptation level and the affective appraisal of environments. *Journal of Environmental Psychology, 4*(2), 119-135.

Theory of Optimal Arousal

It is generally accepted that people tend to seek out pleasurable experiences. Our motivations along the arousal continuum are not as unidirectional. Arousal is perceived through the senses with a person's arousal level "mostly a function of how stimulating the environment is" (Reeve, 2005, p. 367). Arousal contributes directly to a person's motivation in an inverted-U relationship (see Figure 5.4).

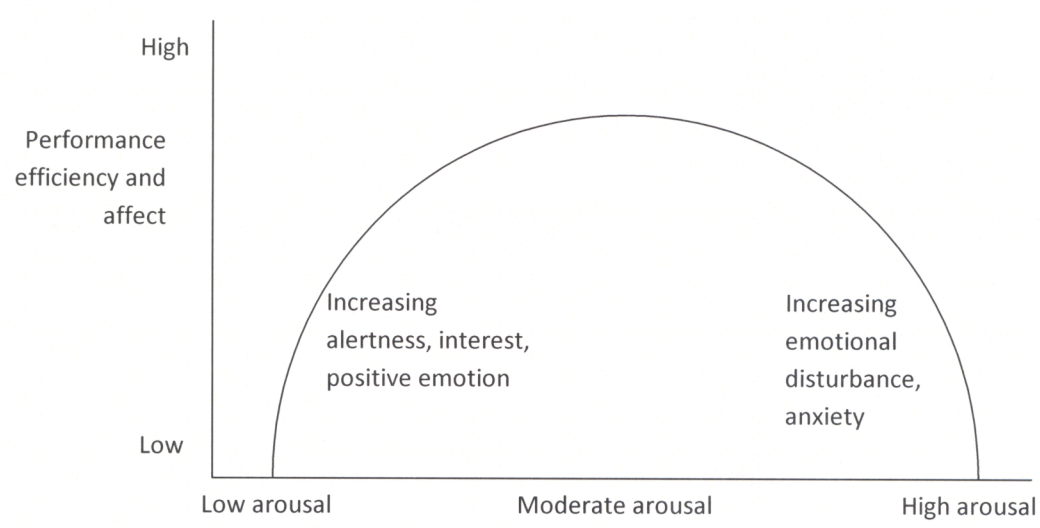


Figure 5.4. Inverted-U Curve: Relationship between Arousal Level and Performance/Well-Being. Adapted from Reeve, J. (2005). Understanding motivation and emotion. p. 367. New Jersey: John Wiley & Sons.

The inverted-U curve predicts when increases and decreases in stimulation will lead to positive affect and approach behavior and when they will lead to negative affect and avoidance. Iso-Ahola (1999) and Rathunde and Csikszentmihalyi (2006) suggested that people are motivated to engage in activities if they experience an optimal level of arousal. Rathunde and Csikszentmihalyi (2006) defined these optimal experiences as experiences where "there is a fit between the *skills* of the self and the *challenges* afforded by the environment" and mark a "balance between arousal-increasing and arousal decreasing processes" (p. 477). The optimal level of arousal varies for each individual and is dependant upon on many factors including mood, physical health, personality, and situation (Russell, 2003). A thorough discussion of all the factors and how they determine one's optimal level of arousal is not possible here but suffice it to say that a

person's optimal level of arousal is variable. According to Iso-Ahola (1999) and Rathunde and Csikszentmihalyi (2006), when individuals are over-aroused they tend to withdraw from the highly arousing stimulus or environment or engage in activities that will reduce their arousal. For example, a child feeling anxious during an activity is likely to make an attempt to reduce their arousal by disengaging from that activity. Conversely, if a child is under-aroused or bored, he or she may attempt to increase arousal through an increase of exploratory play. It is evident from these examples and from the discussion that follows that the boundary between valance and arousal is somewhat enmeshed.

A Study of the Four Dimensions of Children's Experiences with Nature

Methodology

A constructivist (Crotty, 1998) epistemology and interpretive theoretical perspective (Crotty, 1998; Schwandt, 2001) characterized this study. The theoretical models of experience depicted in Figures 5.1 and 5.2 facilitated the gathering, organization and analysis of information throughout the research process. The circumplex of affect (Russell, 1980, 1988, 2003) and the theory of optimal arousal (Iso-Ahola, 1999; Rathunde & Csikszentmihalyi, 2006) provided additional guidance during the data analysis process. To better understand the four dimensions of children's experiences with nature, a variety of methods were selected including naturalistic observations (Dunn, 2005) and visually expressive methods. Visually expressive methods enable an exploration of the four dimensions of children's experiences and are child-centered, addressing two methodological gaps in the existing literature (Bingley & Milligan, 2007; Bingley, 2003; Clark-Ibanez, 2004; Epstein, Stevens, McKeever, & Baruchel, 2006; Mitchell, 2006; Rasmussen, 2004; Steele, 2003; Sullivan, 2005;

Yamashita, 2002; Yuen, 2004). This study employed photographs, drawings, clay sculptures and sand tray pictures to elicit semi-structured interviews. The effectiveness of these methods was assessed as part of this study, and is reported in another paper (Authors, submitted).

Study Participants and Setting

A group of five children aged 6 through 10 years of age was recruited through ads in local newspapers. The children consisted of three girls and two boys from White, middle-class, two-parent families. The five children participated in a day camp for five consecutive days at a botanic garden located in a rural setting near the city of Edmonton, Alberta. Parents provided informed consent on behalf of themselves and their child(ren). Children also provided their assent to participate in the research by signing a child-friendly assent form. The issue of informed consent and assent was revisited throughout the research process to ensure continuity of agreement. None of the child participants nor their families at any point declined to participate or wished to withdraw from the study. Participants' names were changed to protect confidentiality.

Data Collection

On each of the five days the children were given one hour of free time during which they had the opportunity for direct, self-exploratory experiences alone or together, within a selected area of the garden. Each day a different area of the garden was selected. These areas included a sensory garden (designed to engage the five human senses: taste, smell, hearing, sight, and touch), a waterfall area in a Japanese garden, a butterfly pavilion, and a wooded area. On the fifth day, the children collectively selected the areas of the garden in which to spend time and included the wooded area and trails, sensory

garden and waterfall. As described earlier, this research study employed four types of visually expressive methods to elicit interviews. Following the hour of free time, or during the hour in the case of participant-employed photography, children were invited to take photographs, or produce drawings, sculptures or sand tray pictures that illustrated what was important to them about their experience with nature. Children were then interviewed separately with interviews ranging from 10 to 25 minutes. Interviews were conducted in the same area of the garden where the children had their free time, but were conducted away from the other participants in order to not distract either the interviewee or the other child participants. The visual expressions created by the children in this study were used to elicit interview data, which served as the primary source of data for this study. Ethical considerations dictated that the actual creations be retained by the children and not comprise part of the publishable data in this study. This visual evidence served as memory cues and inspiration for further reflection as the researcher moved through the analysis process.

While the primary researcher conducted the interviews, a research assistant engaged the remaining four children in a nature-based activity such as a scavenger hunt or hike. The researcher and research assistant recorded their own observations and reflections in a research journal each day. The recorded observations and written transcripts of the digitally recorded interviews comprised the data for this paper. The children's art and photographs in this project remained property of the children and were not used directly in the data analysis. Digital photographic records of the children's photographs, drawings, sculptures and sand trays were taken by the researcher and used only as a reflective aid in the analysis stage. Interviews were based upon the children's visual

expressions and explored such things as what their representations said about what was important to them, and what their picture expressed about what they sensed, felt, thought or did during their time with nature that day. Each child participated in at least five interviews throughout the week (drawing-elicited interviews were conducted twice). Questions included:

- What does your picture/photograph/sculpture/sand tray say about what is important in your experience with nature earlier today?
- What do you think you will remember the most about your experience with nature earlier today?

Data analysis

The primary researcher transcribed the digitally recorded interviews verbatim. The primary researcher also took limited notes during the interviews and conducted daily interpretive analyses at the end of each day. Daily interpretive analysis protects important insights and constructions from being lost over time. "A great deal of understanding comes from the context of the interview, and from a range of cues that are simply not captured on tape" (Lewin, Taylor, & Gibbs, 2005, p. 3). Daily analysis can help inform the interview in subsequent days (Lewin, Taylor, & Gibbs).

Qualitative data analysis entails reorganizing the information from the interview into ways that connect with the main concepts of the research (Rothe, 2000). Interview transcripts were examined for meaning and connection to the main research question of how children aged 6 to 10 years experienced nature sensorily, affectively, cognitively and behaviorally in a botanic garden. Interviews were coded by labeling passages and identifying categories and themes (Lewins, Taylor, & Gibbs, 2005). Constant

comparison method (Glaser & Strauss, 1998) was utilized in this analysis process between initial categories and the data. Two types of patterns were looked for: convergence and divergence (Patton, 2002). The entire process of data analysis was a circular process with continual movement between the data, the analysis and the researcher (Seidel, 1998).

Findings

The primary aim of this research was to investigate how five children aged 6 to 10 years experienced nature in a botanic garden setting sensorily, affectively, cognitively and behaviorally. Three themes emerged from the data. These themes, which characterized the children's engagement with or disengagement from nature, were: significance of sensing, novelty as arousing, and challenge as arousing. Specific quotations extracted from the children's interviews are used to demonstrate these emergent themes.

Significance of Sensing

When children were asked what was important or memorable about their experiences at the botanic gardens, their answers were consistently and significantly filled with sensory references. Children of both genders reported being attracted to aesthetic visual beauty, resonating with Plato's words "the most effective kind of education is that a child should play amongst lovely things."

> Matthew: Umm…The flowers were so beautiful because I like purple.
>
> Angelica: I just thought the flowers were pretty.
>
> Matthew: [The waterfall was] very beautiful…'cause there was white water and clear water.

Sound was also significant.

> Colton: [Talking about why he likes getting his boots stuck in the mud]. The way it makes your boots go when you take them out it sounds like "ckkllckhll" and then they kind of stick."
>
> Matthew: I like the bees buzzing around it and it's funny because the bees make noise, weird buzzy noise.

The sense of touch was found to afford both positive and negative experiences.

> Pearl: Well, the rain. It feels a little bit good, especially the rain going splish, splash, splish splash on your hat.
>
> Cloe: I don't like when they do that [land on me] because then it tickles me [talking about butterflies]. [Later, talking about what she doesn't like about slugs]…They're slimy and they feel weird.
>
> Pearl: I got a little bit scared because I think 'it's a dead end'. It was a dead end and I don't' want to go and get scratched all over.
>
> Angelica: Then we came back ….because we couldn't find the trail...because it was getting too prickly.

Two locations in this study afforded opportunities to taste nature. In one area of the garden there was a sensory garden where a series of raised bed gardens invited children to touch, hear, smell and even taste the plants. Several of the children commented on their experience tasting the various plants in the sensory garden. In a wooded area of the garden, wild berries grew which the researcher knew were safe to eat. Two of the three children who tasted the berries reported this experiences to be significant. Overall, the children found opportunities to engage their sense of taste significant.

> Angelica: … then also when we were at the sense fields or whatever they were, the sense gardens, the, that pepper, that pepper plant didn't taste so good.
>
> Angelica: We got to find flowers and eat wild berries. They tasted good and you don't get to eat them all the time.

Novelty as Arousing

The children in this study were attracted to new and different experiences; newness appeared to foster interest in and attention to nature amongst the children. The children repeatedly expressed feelings of excitement brought on by discovering something novel. All of the children talked in every interview about the excitement felt by seeing different kinds of butterflies and flowers, noticing new ways for water to flow, discovering new paths, doing new activities, having different feelings, noticing different heights of trees, tasting plants with different flavors, and having new play experiences such as the sand trays.

> Ben: Because you can see something new that you haven't seen before.. It's neat.
>
> Colton: I like new experiences. But only sometimes.
>
> Pearl: I never see, I never saw one of those plants. ….I like seeing different kinds of stuff.
>
> Angelica: We got to like go on different paths... I just like going on different trails.
>
> Researcher: *What made it fun?...* (Expanding on Angelica's self report of having fun.)
> Angelica: I don't really get to go on trails at my house. Well I do have these trails but they're not in the woods.

These examples illustrated how the children enjoyed different, new or novel, experiences and identified them as significant. For Colton, the novelty of the waterfall "coming out of the side of a rock" encouraged his exploration:

> Colton: Because I wanted to see how it was working 'cause normally they wouldn't have a normal waterfall coming out of the side of a rock and some, like…..no holes in it.

The following three excerpts from Colton's interviews illustrate how his familiarity with the paths impacted the arousal he felt when he encountered new, unfamiliar paths. In the first two excerpts, Colton perceived too much familiarity and an absence of novelty, which was not sufficiently arousing for him. He subsequently quit exploring the paths.

> Colton: It wasn't quite as exciting because I had been here before.
>
> Colton: Because if we go somewhere I've already been then we kind of already know it and its not as exciting.

The third quotation illustrates how Colton later used his familiarity with a portion of the path to sustain his engagement in exploring the forested area of the garden. Earlier in his interview, he had expressed a fear of getting lost in this area and almost returning back to the main meeting area, ending his exploration.

> Colton: We kept going on our own because we got past the part where we weren't sure which way to go. We got past that part and we just got to the bridge and we knew the rest of the way.

Challenge as Arousing

The children's arousal was also influenced by the degree of challenge afforded by the environment. The children in this study used challenge, and conversely skill, to optimally manage their arousal as shown in the excerpts below. This balance of challenge and skill to maintain optimal levels of arousal is consistent with Csikszentmihalyi's description of flow experiences. Flow experiences are characterized by complete absorption in an activity that results from a balance of higher than average perceived challenge and higher than average perceived skill (Csikszentmihalyi,1990). Challenge in the following examples was evident in a variety of settings, and was

perceived as physical or psychological. In the following illustrations Colton, Angelica and Pearl were all excited by the challenge of finding rare or camouflaged butterflies.

> Colton: And I saw one caterpillar….it was hard to see though, he was hiding on a leaf.
>
> Angelica: Really excited, I wanted to find the glass wing…it was a cool butterfly….I wanted to see him because they said he was supposed to have transparent wings, and a black body was my guess..it was more like a challenge.
>
> Pearl: What I was doing [that] was fun was seeing, finding the ghost butterfly….because he's so mysterious….because whenever you see him, like on one of those leafs and then you look back and he's gone….he was hard to find…I like finding things that are hard, but not really super hard.

Further examples demonstrate how children sought out challenge by interacting with natural settings that presented them with constraints such as not seeing well or tests of skill such as not slipping or tripping, and not getting water in their boots.

> Colton: Well, it's neat to go through walking through them (mazes) and all the taller grass, it's neat to be walking through them because you can't see where you're going too well.
>
> Researcher: *What was fun?*
> Cloe: Climbing on the rocks and climbing on the waterfall. It felt like I was going to slip. Mmm…when I actually got up to the waterfall it felt kind of neat.
>
> Colton: I was just trying to go as far as I could without sinking my boots. I went in all the way up to the rim on my boots.
>
> Angelica: Well, I don't have trees on my trails, so this was more fun. And its more a tripping hazard so you have to be more careful. Because on my trails, it's just all smooth and lawn mowed.

At times, the level of challenge was too arousing, resulting in the termination of the activity. The children in the following examples reported that the potential need to navigate big holes, avoid getting hurt or encountering wild animals, was too arousing, creating feelings of fear and anxiety, to warrant a continuation of their exploration.

> Colton: [Talking about turning around on a trail and choosing not to continue exploring]…Umm, because there could be big holes there or something because no one's been on it for a while…. Um, you could trip, fall into them, and not be able to get out of them, you could break your leg or something.
>
> Colton: Like I got halfway and then I started slipping and stuff and I didn't want to go up any further. I might hurt myself.
>
> Matthew: 'Cause I was tired….Because I just wanted to come back here for rest…because I was thinking umm, an animal would come and kind of …yeah….I was afraid if something would come and attack me.

On the other hand, a lack of challenge resulted in the children being underaroused. As with the examples of overly challenging situations described above, low arousal associated with garden contexts and nature camp pursuits that lacked challenge also resulted in the children disengaging from their activity. For example, Pearl and Matthew found the monotony of searching for insects and not finding many was boring (i.e., displeasurable and under stimulating).

> Pearl. Umm, we were like trying to find bugs, that's the only thing…but that got a bit boring …because all the bugs were hiding.
>
> Matthew. It was boring because I was doing it a lot [referring to looking for bugs].

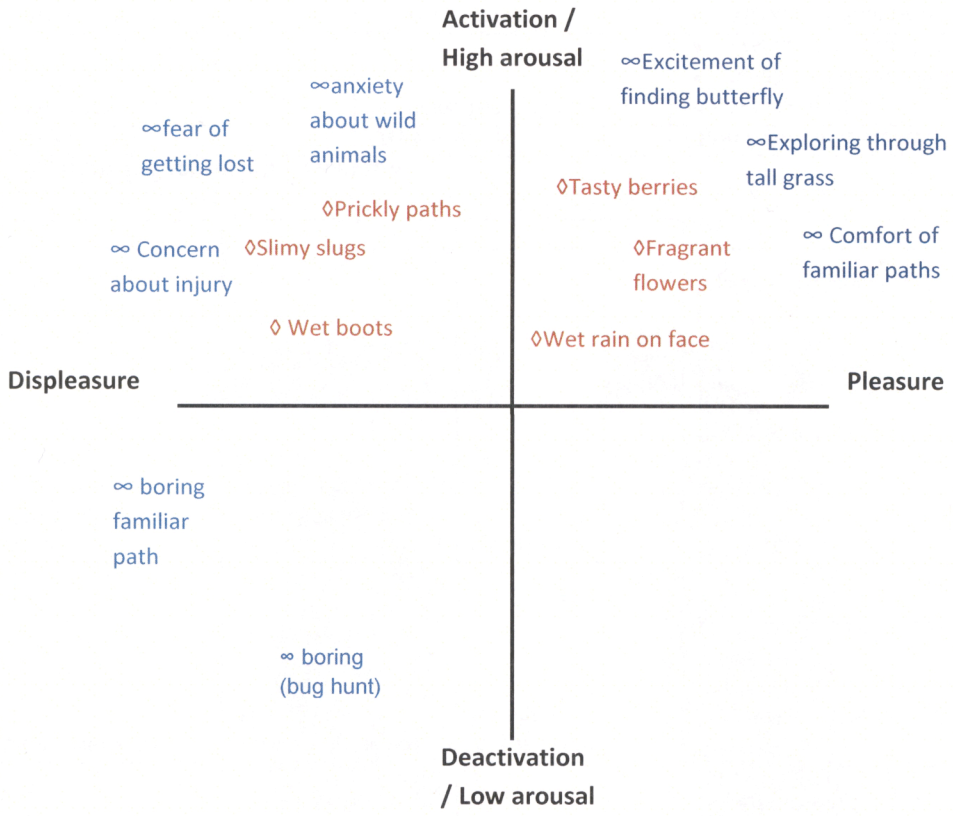
Another example of attempts made by the children in this study to optimally manage their arousal came in a group context where children used their relationship with the researcher to manage their high arousal in the 'wilder' area of the garden. Children were given time and freedom to explore a relatively untouched area of the garden, an area clearly different from the tended sensory and ornamental gardens visited earlier in the week. It was a forested area with some rudimentary, not well-traveled paths. Contrary to our expectations, children did not venture far from our meeting point, did not venture out for long periods, and tended to stay together in small groups. When one group did

venture away from the researcher and research assistant, they played a game of "Marco Polo" to enable them to maintain a connection, albeit auditory, to the researcher. This is a childhood game where one person calls out "Marco" and the other person echoes with "Polo." It is usually played with one participant blindfolded and having to rely on his or her sense of hearing to locate the other participants. The fact that the children played this game in the "wildest" part of the garden suggests it was initiated because of feelings of fear or anxiety where the children needed a stronger connection to the researcher in order to regulate their arousal and continue their exploration. It was unclear whether the children's arousal here was a result of novelty, challenge, a combination of the two, or some other stimulus.

Discussion

The sample size of this study is admittedly too small to draw any generalizable conclusions, however several observations emerged that appear to support the utility of several of the theories for examining children's experiences in nature and reveal important opportunities for fostering children's positive interactions with nature. The first of these observations was that affect appears to be a primary component of children's experiences and that sensation is a salient feature of what bridges a child's affective experience with their contact with the natural environment. Children experienced pleasure and displeasure directly through their senses. Their sensory references were affectively laden and can easily be mapped on the circumplex model of affect (See Figure 5.5). "Beautiful" and "pretty" are situated in the circumplex model as highly pleasurable and slightly arousing. Tastes were identified as good or not good,

which could be interpreted as pleasant and unpleasant. "Tickly" and "prickly" were mapped as unpleasant and moderate to highly arousing.



Note: Children's sensing (◊) and affect (∞) mapped on the circumplex model of affect

Figure 5.5. Children's Sensing (◊) and Affect (∞) Mapped on the Circumplex Model of Affect

Cognitions and behavior also emerged as important dimensions of these children's experiences, however they appeared to be secondary to the affective and sensory dimensions. Cognitions appeared to be more closely related to the meanings the children constructed from their experiences and the influence of socio-cultural factors. This is expanded on in a separate article (Authors, submitted). Behavioral aspects of their experience were important in terms of managing their arousal levels, but were not

reported by the children in this study as being significant on their own. These findings suggest that these children's experiences were dominated by affective and sensory dimensions.

A second main observation was that the children in this study appeared to be drawn towards pleasure and away from displeasure. This is the continuum of attraction and repulsion that Russell and Snodgrass (1987) suggested. This was evidenced most directly through their sensory reports of what was significant suggesting that the sensory domain is directly related to appraisal of positive and negative valence. Pleasant sensations like pretty flowers and the rhythmic splash of rain invited the children's engagement. Unpleasant sensations such as prickly paths and slimy slugs, appeared to repel children. This is consistent with Russell and Snodgrass's (1987) claim that core affect is dependent on "initial sensory registration" (p. 148).

Third, the children in this study reported seeking optimal levels of challenge and novelty, two factors that have been shown to stimulate arousal (Schore, 2003). The waterfall had to be conquered in a different way by Pearl and Colton who each chose different paths up to the waterfall the second time they visited it. Rathunde and Csikszentmihalyi (2006) stated that an individual "cannot enjoy the same activity with the same intensity more than once" (p. 479) for it to be an optimal experience. Children in this study were attracted to novelty such as different paths and trails, different plants and unusual waterfalls. Activities or trails that were not novel enough did not sustain prolonged attention. Too much novelty, such as Colton's experience with unfamiliar trails, could be too highly arousing and potentially result in disengagement. In Colton's example, familiarity with a portion of the trail allowed him to maintain his arousal at an

optimal level, which permitted him to continue his exploration. Children were also drawn to challenge and appeared motivated to maintain it at an optimally arousing level. Children described the challenge of running on hazardous trails and slipping on wet rocks as fun. Challenging butterfly hunts were exciting as long as they were, in Pearl's words, "hard, but not super hard." Situations that posed too much challenge resulted in the children abandoning their exploration of the waterfall and wooded paths. Activities that did not present enough challenge, like boring bug hunts, had similar behavioral outcomes. In summary, children sought optimal levels of challenge and novelty and avoided overly high or overly low levels of arousal. They appeared motivated to engage in behavior that maintained their levels of arousal within an optimal range. The diversity and flexibility of natural environments supports the pursuit of optimal arousal by providing children a plethora of opportunities to increase or decrease their perceived arousal. Chawla (1992) states, "children can explore and manipulate the natural environment with a liberty denied them amid constructed places and possessions" (p. 145), rendering the natural environment ideal for affording optimal experiences.

While the previous discussion relates to understanding and explaining the core affect of the children's reports, the stories of their experiences also relate information about the children's emotional episodes in nature. As emotional episodes, these accounts resonate with the description of the emotion of interest. Izard and Buechler (1980) identified interest (and enjoyment) among their list of ten fundamental emotions. Silvia (2005, 2008) has extensively studied interest and argued that it is a cognitive appraisal reflecting an interrelation between novelty, which can be described as anything new, sudden, uncertain, unpredictable, and coping potential, which is the estimation of

resources, abilities, knowledge or control. Interest's primary impact on behavior is to motivate and sustain exploratory and seeking behaviors. Silvia (2005) argued that the appraisal dimension of interest can transform other emotions into interest. For example, if an experience that elicited anxiety was appraised with a high coping potential, then the emotion may transform into one of interest. This can be seen in Colton's experience with the unknown paths. When familiarity with a section of the path increased his perceived coping potential, his anxiety transformed into interest, and exploration continued. Similarly, when the girls engaged the primary researcher in a game of Marco Polo, the increase in their perceived coping that resulted from the researcher's participation in the game, allowed their anxiety to be transformed into interest and their investigation of the wooded area to continue. This transformational ability of interest has significant potential for practitioners who want to cultivate interaction with and attraction to nature.

Another emotion often related to our relationship with nature is enjoyment (Milton, 2002), which tends to result in an attraction to something familiar, rather than the exploration of something new (Turner & Silvia, 2006). Turner and Silvia argued that enjoyment requires a positive valence whereas interest does not. The children's sensory reports of pleasantness would reflect enjoyment. Enjoyment and interest appear to be common emotions in children's experiences with nature in this study. What impact these different emotions have on children's relationships with nature is undetermined but is an area that may benefit from further study.

This discussion of interest and enjoyment does not contradict the circumplex model of affect and optimal arousal theory; they simply explain another level of the affective experience. It is through the appraisal component of these emotions, that the

cognitive dimension is melded with the affective dimension of the children's experience. The resulting cognitive-affective appraisal prepares the children to act – either exploring or disengaging from their current activity. This adds support to the value in examining all four dimensions of children's experience in order to have a more complete understanding of this complex phenomenon.

Resonance of Study with Recent Literature

Several studies that did not propose a multidimensional model of experience to frame their research a priori, nevertheless reported results that mirror the significance of the sensory and affective dimensions of children's experiences in nature. Tapsell et al. (2001) noted that children enjoyed their experiences with rivers because they were challenging and "mildly dangerous" (p. 183). The environment allowed children to learn what they could and could not manage. Direct sensory experiences with the water figured prominently in children's reports. James and Bixler (2008) identified themes in children's experiences with nature that included sensory experiences and novelty. In their program evaluation of a wetlands field visit program for grade 4 students, Cachelin, Paisley and Blanchard (2009) found that the children identified their sensations as being significant. These researchers concluded that there was increased learning when there was physiological, sensory engagement in the learning process. These authors also found that positive affect emerged from direct interactions with nature while negative affect was demonstrated by children who did not visit the wetland area. These three studies were all conducted with children of approximately the same age as the children in our study. Their findings all appear to support, to some degree, the findings in our study that

children enjoy sensory interactions with nature and are drawn to optimally arousing challenge and novelty.

Conclusion

As an exploratory study, this research had several limitations, including the size and uniformity of the sample population. This may have resulted in an inability of the data to demonstrate the level of variability that may exist between children of this age group. Studies with larger sample sizes and more diverse populations along dimensions of race, culture, socio-economic status, rural versus urban dwellers, and family composition would generate additional clarity.

Given the exploratory nature of this study however, the findings are still valuable in that they raise some important questions to inform future investigations. Larger scale studies using this multidimensional model of experience are therefore warranted. A comparison of children's interest and enjoyment of nature to determine if either exerts a stronger long-term effect may be beneficial to the field of child and nature studies. A comparison between children's experiences with natural environments and built environments using the four-dimensional model developed here may reveal whether natural environments are more pleasurable and more optimally arousing than built environments. Longitudinal studies of children's experiences and meaning making would add to our understanding of how children construct meaning from their experiences with nature over time. The effects of socialization and acculturation on the meaning children construct from nature-based experiences also warrant further investigation. Given the children's emphasis of sensory and affective aspects of their experiences, more research into these is necessary. Perhaps most importantly, more

research from a child's perspective is required in order to inform practitioners and policy makers about how children experience nature. This will allow for the creation of interventions that meet the needs of children and are not simply adult interventions offered on a smaller scale.

Children's experiences with nature in this study were dominated by sensory reports. Pretty flowers, beautiful water, funny sounding bees, interesting sounding mud were among the reports of significance among the children. It is apparent from the above examples that sensing was affectively laden, at least on the valence continuum (Russell & Snodgrass, 1987). Affect and cognitions also tended to be an integral part of the children's appraisal of the emotional episodes of their experiences with nature. Walking on new trails was fun and finding camouflaged butterflies was challenging. These appraisals then resulted in certain behaviors such as seeking out new ways up a waterfall or tasting berries for the first time. This interrelationship between the four domains of a child's experience with nature supports the argument made earlier for the necessity of studying children's experiences with nature using a multidimensional model of experience that includes sensory, affective, cognitive and behavioral dimensions. This study has made it clear that the four dimensions of experience do not have rigid boundaries, but instead are interconnected and mutually related. To study only one or two of these dimensions at a time assumes an ability to isolate each of these dimensions, which as illustrated in this study, cannot produce results that reflect the complex reality of experience.

These findings have important implications for practitioners and parents attempting to foster a positive attachment between children with nature. Nature

experiences for children must include experiences that engage the five senses. Sensory experiences, both pleasurable and displeasurable were clearly very important and memorable for children. Environments need to allow and invite children's natural interest and enjoyment. Nature experiences must also invite and allow children to engage in developmentally based problem-solving activities that optimally manage their levels of arousal. Creating opportunities at a variety of skill levels and with a diverse amount of novelty is important. The waterfall was a good example from this study where children had a variety of ways to reach the top, each with a varied level of difficulty. Each child selected a different way according to their perceived coping abilities and their previous experience with the path. Assisting children to master potentially negative experiences by increasing their perceived coping abilities is another important role for practitioners. For example, for Cloe in this study, a slow and gradual desensitization to butterflies or slugs within a manageable level of arousal may have alleviated some of the negative reaction to these animals. If children are attracted to pleasurable and optimally arousing experiences in nature, in order to create positive attachments with nature, practitioners need to create, or in some cases transform, opportunities for such experiences.

In conclusion, the research reported herein highlights the importance for children of having positive multi-sensory experiences with nature. It also appears to confirm that children are motivated to achieve an optimal level of arousal, and that maintaining this optimal level of arousal was a significant part of their experience and may potentially inform the relationships children form with nature. If children are repeatedly over-aroused in a negative way, a fear or repulsion to nature may result. On the other hand, when children engage in activities that are optimally arousing and pleasant, a positive

relationship may result. Optimal arousal and interest appeared to support children's exploration of nature. These findings suggest important ways to restructure children's experiences. By concentrating more attention on sensory and affective dimensions of children's experiences, practitioners may have more success in reaching their cognitive and behavioral goals. Perhaps if we want to build a generation of children interested in protecting the forest, we need to start with inviting those children to notice the sights, smells, textures, sounds and tastes of the forest and go from there.

References

Barrett, L.F. & Bliss-Moreau, E. (2009). Affect as a psychological primitive. *Advances in Experimental Social Psychology. 41*; 167-218.

Besthorn, F.H. (2005). Beetles, bullfrogs and butterflies. In M. Unger, (Ed.*), Handbook for working with children and youth: Pathways to resilience across cultures and contexts (pp. 121-132)*. Thousand Oaks, CA: Sage Publications.

Bingley, A., & Milligan, C. (2007). Sandplay, clay and sticks: Multi-sensory research methods to explore the long-term mental health effects of childhood play experience. *Children's Geographies, 5*(3), 283-296.

Bingley, A. (2003). In here and out there: sensations between self and landscape. *Social and Cultural Geography, 4*(3), 329-345.

Bixler, R.D., & Floyd, M.F. (1997). Nature is scary, disgusting and uncomfortable. *Environment and Behavior, 29*(4), 443-467.

Braun, B.G. (1988). The BASK model of dissociation. *Dissociation, 1*(1), 4-23.

Cachelin, A., Paisley, K. & Blanchard, A. (2009). Using Significant Life Experience Research to Inform Program Evaluation: A Case Study of The Nature Conservancy's Wings & Water Wetlands Education Program. *Journal of Environmental Education, 40*(2), 2 - 14.

Chawla, L. (2006). Learning to love the natural world enough to protect it. *Barn nr. 2*, 57-58.

Chawla, L. (1998). Significant life experiences, revisited: A review of the research. *Journal of Environmental Education, 29*(3), 11-22.

Chawla, L. (1992). Childhood place attachments. In I. Altman & S.M. Low (Eds*). Place attachment* (pp. 63-86). New York: Plenum Press.

Clark-Ibáñez, M. (2004). Framing the social world with photo-elicitation interviews. *American Behavioral Scientist, 47*(12), 1507-1527.

Cosco, N. & Moore, R. (1999). Playing in place: Why the physical environment is important in playwork. 14th Play education Annual Play and Human Development Meeting: Theoretical Playwork. Ely, Cambridgeshire, UI, January 26-27, 1999. Retrieved October 16, 2007 from www.naturalearning.org/PlayingPaper.html.

Crotty, M. (1998). *The foundations of social research: Meaning and perspective in the research process.* Thousand Oaks, CA: Sage Publications.

Csikszentmihalyi, M. (1990). Flow: The Psychology of Optimal Experience. New York: Harper and Row.

Dovey, K. (1990). Refuge and imagination: Places of peace in childhood. *Children's Environmental Quarterly, 7*(4), 13-17.

Dunn, J. (2005). Naturalistic observations of children and their families. In S. Green & D. Hogan (Eds.), *Researching children's experience: Approaches and methods* (pp. 87-101). Sage Publications: London.

Epstein, I., Stevens, B., McKeever, P., & Baruchel, S. (2006). Photo elicitation interviews (PEI): Using photos to elicit children's perspectives. *International Journal of Qualitative Methods, 5*(3), 1-9.

Faber-Taylor, A., & Kuo, F. E. (2006). Is contact with nature important for healthy child development? State the evidence. In C. S. M. Blades (Ed.), *Children and their environments* (pp. 124-140). Cambridge: Cambridge University Press.

Fjortoft, I. (2001). The natural environment as a playground for children: The impact of outdoor play activities in pre-primary school children. *Early Childhood Education Journal, 29*(2), 111-117.

Gharahbeiglue, M. (2007). Children's interaction with urban play spaces in Tabriz, Iran. *Visual Studies, 22(*1), 48-52.

Gotch, C. & Hall, T. (2004). Understanding nature-related behaviors among children through a Theory of Reasoned Action approach. *Environmental Education Research*, *10*(2), 157-177.

Hart, R. (1979). *Children's experience of place*. New York: Irvington Publishers.

Harvey, M. (1990). The relationship between children's experiences with vegetation on school grounds and their environmental attitudes. *Journal of Environmental Education, 21*, 9-15.

Heft, H., & Wohlwill, J.F. (1987). Environmental cognition in children. In D. Stokols & I. Altman (Eds.), *Handbook of environmental psychology* (pp. 175-204). New York: John Wiley & Sons.

Iso-Ahola, S. (1999). Motivational foundations of leisure. In E.L. Jackson & T. Burton (Eds.), *Leisure Studies: Prospects for the twenty-first century* (pp. 35-51). State College, PA: Venture.

Izard, CE, & Buechler, S. (1980). Aspects of consciousness and personality in terms of differential emotions theory. In R. Plutchik & H. Kellerman (Eds*.), Emotion:*

Theory, research, and experience (Vol. 1, pp. 105-187). San Diego, CA: Academic Press.

James, J.J. & Bixler, R.D. (2008). Children's role in meaning making through their participation in an environmental education program. *Journal of Environmental Education, 39(*4), 44-59.

Kahn, P. H., & Kellert, S. R. (2002). *Children and nature: Psychological, sociocultural and evolutionary investigations.* Cambridge, MA: MIT Press.

Karsten, L. (2002). Mapping childhood in Amsterdam: The spatial and social construction of children's domains in the city. *Journal of Economic and Social Geography, 93*(3), 231-241.

Kylin, M. (2003). Children's dens. *Children, Youth and Environments, 13*(1), Retrieved October 2, 2007 from http://colorado.edu/journals/cye.

Lewin, A., Taylor, C., & Gibbs, G.R. (2005).What is Qualitative Data Analysis (QDA)? Downloaded February 26, 2008 from: http://onlineqda.hud.ac.uk/Intro_QDA/what_is_qda.php

Milligan, C., & Bingley, A. (2007). Restorative places or scary spaces? The impact of woodland on the mental well-being of young adults. *Health and Place, 13*, 799-811.

Milton, K. (2002). Loving nature: Towards an ecology of emotion. New York: Routledge.

Mitchell, L.M. (2006). Child Centered? Thinking critically about children's drawings as a visual research method. *Visual Anthropology Review, 22*(1), 60-73.

Moore, R. C. (1986). The power of nature: Orientations of girls and boys toward biotic and abiotic play settings on a reconstructed school yard. *Children's Environments Quarterly, 3*(3), 52-69.

Nelson, K. (2007). *Young minds in social worlds: Experience, meaning and memory*. Massachusetts: Harvard University Press.

Rasmussen, K. (2004). Places for children – children's places. *Childhood, 11*(2), 155-173.

Rathunde, K., & Csikszentmihalyi, M. (2006). The developing person: An experiential perspective. In R.M. Lerner (Ed.), *Handbook of child psychology* (pp. 465-515). New Jersey: John Wiley & Sons, Inc.

Rothe, J.P. (2000). *Undertaking qualitative research: Concepts and cases in injury, health and social life.* Edmonton: University of Edmonton Press.

Russell, J.A. (2003). Core affect and the psychological construction of emotion. *Psychological Review, 110*(1), 145-172.

Russell, J.A. (1980). A circumplex model of affect. *Journal of Personality and Social Psychology, 39*, 1161-1178.

Russell, J.A. & Snodgrass, J. (1987). Emotion and the environment. In D. Stokols & I. Altman (Eds.), *Handbook of environmental psychology* (pp. 245-280). New York: John Wiley & Sons.

Russell, J.A. & Lanius, U.F. (1984). Adaptation level and the affective appraisal of environments. *Journal of Environmental Psychology, 4*(2), 119-135.

Salmivalli, M. (1998).Children's environmental response inventory among Finnish adolescents. *Journal of Environmental Education, 29*(3), 49-55.

Schore, A. N. (2003). *Affect dysregulation and disorders of the self.* New York: W.W. Norton & Company, Inc.

Schwandt, T.A. (2001). *Dictionary of qualitative inquiry.* Thousand Oaks, CA: Sage Publications, Inc.

Sebba, R. (1991). The landscapes of childhood: The reflection of childhood's environment in adult memories and in children's attitudes. *Environment and Behavior, 23*(4), 395-422.

Seidel, J. (1998). Qualitative data analysis. *The Ethnograph v5 Manual, Appendix E*. Downloaded February 26, 2008 from: http://www.qualisresearch.com/

Siegel, D.J. (1999). *The developing mind: How relationships and the brain interact to shape who we are*. New York: The Guildford Press.

Silvia, P. J. (2008). Interest, the curious emotion. Current Directions in Psychological Science, 17, 57-60.

Silvia, P.J. (2005). What is interesting? Exploring the appraisal structure of interest. *Emotion, 5*, 89-102.

Solms, M., & Turnbull. O. H. (2002), The Brain and The Inner World: An Introduction to the Neuroscience of Subjective Experience. New York: Other Press/Karnac Books.

Steele, W. (2003). Using drawing in short-term trauma resolution. In C.A. Malchiodi (Ed.), *Handbook of art therapy* (pp. 139-150). New York: Guilford Press.

Sullivan, G. (2005). *Art practice as research: Inquiry in the visual arts*. Thousand Oaks: Sage Publications.

Tapsell, S., Tunstall, S., House, M., Whomsley, J., & Macnaghten, P. (2001). Growing up with rivers? Rivers in London children's worlds. *Area, 33*(2), 177-189.

Terrible, R.S. (2000). An annotated bibliography of literature concerning children and their knowledge of the environment. *Journal of Planning Literature, 14*(3), 489-498.

Turner, S. A. & Silvia, P. J. (2006). Must interesting things be pleasant? A test of competing appraisal structures. *Emotion, 6*, 670-674.

Vadala, C.E., Bixler, R.D., & James, J.J. (2007). Childhood play and environmental interests: Panacea or snake oil? *Journal of Environmental Education, 39*(1), 3-17.

Valentine, G. & McKendrick, J. (1997). Children's outdoor play: Exploring parental concerns about safety and the changing nature of childhood. *Geoforum, 28*(2), 219-235.

Wilson, K., & Ryan, V. (2005). *Play therapy: A non-directive approach for children and adolescents*. Toronto: Elsevier.

Yamashita, S. (2002). Perception and evaluation of water in landscape: use of photo-projective method to compare child and adult residents' perceptions of a Japanese river environment. *Landscape and Urban Planning, 62*, 3-17.

Yuen, F.C. (2004). "It was fun…I like drawing my thoughts" Using drawings as part of the focus group process with children. *Journal of Leisure Research, 36*(4), 461-482.

Chapter 6: "I might know when I'm an adult": Making sense of children's relationships with nature.

One touch of nature makes the whole world kin.

William Shakespeare

Shakespeare's words suggest the powerful influence nature can have on the meanings we construct about our identities and relationships. While romantic, this quote is far too simplistic and fails to take into account the complex mediating processes that bridge our experiences with nature and the meaning we attach to those experiences. Many argue that this mediating process involves the internalization of our social, cultural and historic environments (James and Bixler 2008; Nelson 2007; Vygotsky 1962). Nelson (2007) asserted "the life long adventures of gathering meaning from experience is in the service of two overriding motivations: to make sense and to make relationships" (14). She describes meaning as the bridge between the internal, personal experience and the broader social and cultural environment through shared experiences with members of that broader environment. The research reported herein explores five children's subjective experiences with nature in a botanic garden as reported by these children and their families and observed by the researcher. This research explored the meanings children constructed from nature-based experiences and the socio-cultural influences on those meanings. Several theories have been developed to help understand the impact of socialization factors on children's meaning making. Three theories that are the most relevant to this study are Vygotsky's socio-cultural development theory and activity theory and Gibson's theory of affordances. In this paper these theories were used to frame an investigation into the complex question of what personal meanings children

construct from their experiences in nature and what identifiable social and cultural factors impact these meanings. Findings will contribute to a more integrated understanding of how ecological psychology theory and social psychological theory can inform our understanding of children's relationships with nature.

Framing the Research: Nature, Meaning and Theories

Nature as the Research Context

Children's relationships with nature have been shown in previous studies to encourage pro-environmental and stewardship attitudes and behaviors (Chawla 1998) as well as result in positive health and development outcomes for children (Besthorn 2005; Faber-Taylor and Kuo 2006; Kahn and Kellert 2002). While many studies of children's relationship with their environment have discussed the importance of nature to children, very few studies specifically focus on nature, choosing instead to examine children's wider physical or outdoor environment such as sports fields and playgrounds (Dovey 1990; Kirkby 1989; Gharahbeiglu 2007; Korpela, Kytta, and Hartig 2002; Sobel 1993). In this current study, the use of a researcher prescribed setting – a botanic garden – limited the scope and provided a manageable boundary within which the research participants were able to construct meaning. This predefined nature setting was grounded in research that suggests that nature includes a dynamic collection of elements including rocks, animals, trees and other vegetation, water, and so on (Alerby 2000; Derr 2002; Pollio and Heaps, 2004; Sebb, 1991).

Children's Meanings of Nature in the Literature – Direct Experiences or Social Constructions?

Direct experiences. The research reviewed in this section suggested that children construct positive relational meanings from direct experiences with nature. Kals and

Ittner (2003) review literature that suggested that relationships with natural environments can be developed from direct experiences in nature. Bixler, Carlisle, Hammitt and Floyd (1994) surveyed environmental interpreters working with children in wildland areas and asked them to report fears and discomforts reported by children. Their findings suggested "that individuals with the fewest direct experiences may be the most frightened of being in wildland areas" (30). This is supported, in part, by Tapsell, Tunstall, House, Whomsley and Macnaghten's (2001) research on river environments. Researchers in this study conducted small group discussions, observations, participant-employed photography, and questionnaires to explore children's perceptions and direct experiences with river environments. Tapsell et al. (2001) reported that "the activities enjoyed most by many children were those that involved direct contact with the rivers: getting wet, paddling and splashing in the river" (187). Children constructed meanings of rivers as dangerous, marginal, interesting and fun. Children found new ways of experiencing rivers through their experiences. They discovered new affordances of rivers that included places to play, places to escape and relax, and places to abandon the norms of land-based play. Children's direct experiences have the potential to be transformative.

Milligan and Bingley (2007) reported findings from a qualitative study of sixteen British youth about their experiences in wooded areas. Their data were derived from interviews and group discussions. They stated that for some of their participants, "the relaxing elements of woodland were found in their diversity and in the sensory experience of being in woodlands – being able to look at, and touch, individual trees, mosses, leaves and flowers, opening up opportunities to watch birds and wildlife in natural habitats and to experience the woodland colors, sounds and smells" (805). Given

the strong connection between memory and the senses (Nelson 2007), it is not surprising that sensation played such an important part in experience and construction of meaning in this study.

Cachelin, Paisley and Blanchard (2009) evaluated an environmental education program for fourth graders. Groups that visited a wetlands area were compared with groups not visiting the wetlands area using measures of affect and cognitions. Findings revealed that conservation sentiments were communicated only by those students who actually visited the wetlands. Similar to previous studies (Bixler et al. 1994; Milligan and Bingley 2007), they found that negative responses to nature resided primarily in participants who had never visited the wetlands area. These studies illustrate that direct experiences can have a significant and transformative effect on meaning making.

Social construction. Human relationships with nature have been explored in philosophical discussions for decades with no agreed upon conclusion about whether these relationships are internally or externally driven (Bateson and Bateson 1987; Callicott 1999; Soper 1995). Our relationships with nature, like all relationships, are largely socially constructed and therefore vary widely between individuals and situations. Schultz, Shriver, Tabanico and Khazian (2004) argued that our relationship with nature is implicit and while it does influence our attitudes and actions, it remains beneath our awareness. Schultz et al. further suggested that if environmental attitudes are related to implicit assumptions about our relationship with nature, then social psychological literature may be a worthwhile avenue to investigate in terms of self-construal. “Perhaps a connection with nature is simply an extension of an interdependent self; not only is who I am dependent on my relationship with other people, but who I am is also

dependent on my relationship with the environment around me" (Schultz et al. 2004, p. 41). This suggests that children may be constructing relationship meanings as well as identity meanings through their interactions with nature.

Several researchers, reviewed ahead, have suggested that the meanings children construct about nature are mediated by relationships with important adults. Chawla (2006) studied current environmentally sensitive behaviors in the context of childhood experiences and found that frequent and positive experiences with nature as children shared with an important adult encouraged environmental stewardship behaviors in adults. Wyndham (2010) studied the effect of cultural knowledge curriculum on indigenous knowledge of native plants with Rarámuri children in Mexico. Findings demonstrated that adult mentorship was the strongest indicators of a child's native plant knowledge (Wyndham 2010). Derr (2002) conducted a study of sense of place among children in New Mexico. Derr concluded that when children had positive experiences in a place, including natural places, as well as positive stories through family and culture, their connection and attraction to that place were stronger. Derr's study adds to the understanding of the quality of experiences that are important to children and incorporates the effect of culture, an element absent in most studies. Further, it makes a significant contribution to our understanding of the process of meaning construction as a combination of personal and social stories. Youth in Milligan and Bingley's (2007) study indicated that experiences in woodlands elicited feelings of fear and anxiety. Several social and cultural factors were identified as increasing children's anxieties about being in wooded areas including parental anxieties about safety, fairy tales and myths about monsters and fairies living in the woods, and media influences on 'stranger danger'.

Understanding the Role of Nature in Children's Meaning Making – Gibson's Theory of Affordances

Several researchers (Chawla 2006; Fjortoft 2001; Kellert 2002; Kytta 2004; Lee 1999) have found that the natural environment provides opportunities for a diversity of experiences that can support a child's development and accommodate for the changing and ever increasing abilities and competencies of a child. Chawla (2007) suggested that the natural environment offers "many finely graduated levels of challenge that enable children to mark their developing physical competence" (154). For example, "a stone that was too heavy to lift yesterday might budge today" (Chawla 2007, 154). Nature affords many opportunities for development and mastery. In the studies reviewed earlier, Derr (2002) found that meanings of places were developed from the activities afforded by a place and the needs met by it. Tapsell et al. (2001) also found that meanings were applied to rivers according to the activities they afforded. These findings suggest that affordances play an important role in children's meaning making.

The term 'affordance' emerged from Gibson's theory of affordances which he used to explain the role nature plays in child-nature experiences. Gibson (1979) defined affordances as the relationship between an individual and the environment that has an impact on the individual's behavior. Not every aspect of a child-nature transaction is necessarily an affordance (Stoffgren 2000). Chawla (2007) describes Gibson's notion of affordances as:

> Functionally significant properties of the environment that 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. 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. (p. 150)

Heft (1988) reviewed literature on children and their interaction with their environments and created a taxonomy of functional properties of these environments for children in terms of their behavioral function or significance. Scarantino (2003) describes these as goal affordances, and suggested that individuals ascribe meaning to an affordance based on their motivation to reach a goal. Affordance qualities related to psychological or emotional aspects of the experience are absent in Heft's taxonomy, and in most discussions of affordances. Roe and Aspinall (2011) identify this as a serious omission. Given that emotional and psychological systems are primary in meaning making, this seems to be an important omission to the notion of affordances. Korpela, Kytta and Hartig (2002) mention the social and emotional affordances of children's favorite places but evidence of such a discussion in the literature relating to children and nature is surprisingly absent. In the context of this research, elements of the natural environment can be understood as affording social and emotional developmental opportunities for children. Continuing with the example of the tree, a tree with many branches affords the opportunities to support a child's ability to climb higher. If the tree has branches at increasingly higher and more challenging levels, it will afford the opportunity for the child to increase his or her ability to climb higher, to join with friends, and to increase the child's sense of competency.

Despite the fact that Gibson developed his theory to support his belief that perception could be direct and unmediated, he also acknowledged the influence of socio-cultural factors:

> It is also a mistake to separate the cultural environment from the natural environment, as if there were a world of mental produces distinct from the world of material produces. There is only one world, however diverse, and all animals live in it, although we human animals have altered it to suit ourselves. (Gibson 1979, 130)

Social influences shape human activity, a primary determinant of affordances (Costall 1995). The meaning of affordances are also jointly constructed between individuals or between an individual and their social and cultural environments (Costall 1995; Leont'ev 1981; Leudar 1991). As Leont'ev (1981) asserted, we do not encounter nature, we are introduced to it. Clearly, social and cultural forces shape the meaning children assign to affordances on many levels.

Valsiner (1984) argued that "the structure of the child's environment defines the set of possible actions that are available to the child at the given state of the environment" (66). Albrechtsen, Andersen, Bodker, and Pejterson (2001) argued that it is only through activity that one perceives affordances. As Bærentsen and Trettvik (2002) asserted "although affordances are in a sense constituted by objective physical features of the environment, these objective features *only* become affordances when some organisms relate to them in their activity. Affordances are therefore features of 'activity systems'"(54). Bærentsen and Trettvik further argued that affordances can also be culturally and socially specific and that all affordances, in present human society, involve learned attunement to perceptual and sensory information. Vygotsky's theory of socio-cultural development and activity theory acknowledge the role of activity and compliment ecological theory quite effectively (Bærentsen & Trettvik). These theories also support the social context of affordances asserted by Bærentsen and Trettvik. While a comprehensive review of these theories is not possible here, a brief review of how these

theories complement the ecological theory of affordances will provide a more complete theoretical foundation for this study, allowing us to answer the questions posed *including what meaning children construct from nature experiences* and *what social and cultural influences on these meanings can be identified*.

Vygotsky's Theory of Social-Cultural Development

Vygotsky's (1962) theory of social-cultural development is useful in understanding the broader influences on children's experiencing of nature and the meanings they construct as a result. The following quote highlights a major theme of Vygotsky's theory:

> Every function in the child's cultural development appears twice: first on the social level, and later, on the individual level; first between people (interpsychological), and then inside the child (intrapsychological). This applies equally to voluntary attention, to logical memory, and to the formation of concepts. All the higher functions originate as actual relations between human individuals. (Vygotsky 1978, 57)

Accordingly, one's personal self and social self are in constant transaction and negotiation (Bidell 1992). Vygotsky believed that interaction with and immersion in social, cultural and historical systems play a fundamental role in child development as social information is internalized through processes of mediation and scaffolding by more knowledgeable or skilled others (Daniels 2001). Social mediators assist and support children in their *zone of proximal development*, the range of activities between what a child can do independently and the highest level of what they can achieve with support (Daniels). Mediators, according to Vygotsky, provide the bridge between individual consciousness and social learning; this suggests a process for which meaning is socially constructed (Daniels).

Activity Theory – An Extension of Vygotsky's Sociocultural Theory

Child development is now socially defined (Davydov 1999). In much of North America, a major task of human development is no longer learning how to adapt to and survive in our natural environment through the use of tools (Blunden 2010). Our natural environment is now a tool that mediates our development in a social world where developmental goals are more likely to be defined by social skills and emotional regulation (Tolman 1999). Jonassen and Rohrer-Murphy (1999) claimed, "just as environmental clues provide affordances for perceptions (Gibson 1979), object(ive)s provide affordances for activity" (65). Affordances emerge through actions or activities with nature. This resonates with the focus on activity in activity theory.

Activity theory takes the entire activity as the unit of analysis. This includes a subject, an object (which is translated to mean the satisfaction of a need, or *objective*), and a mediator. A broader scope takes into account influences of the community and larger society: rules, community members and a division of power. Further,

> because we are all simultaneously members of various communities …we must continuously alter our beliefs to adjust to the socially mediated expectations of different groups. Conflicts between our roles in the various communities often arise, leading to transformational activities required to harmonize those contradicting expectations. (Jonassen and Rohrer-Murphy 1999, 66)

Diagrammatic representation of the theory is depicted below in Figure 6.1.

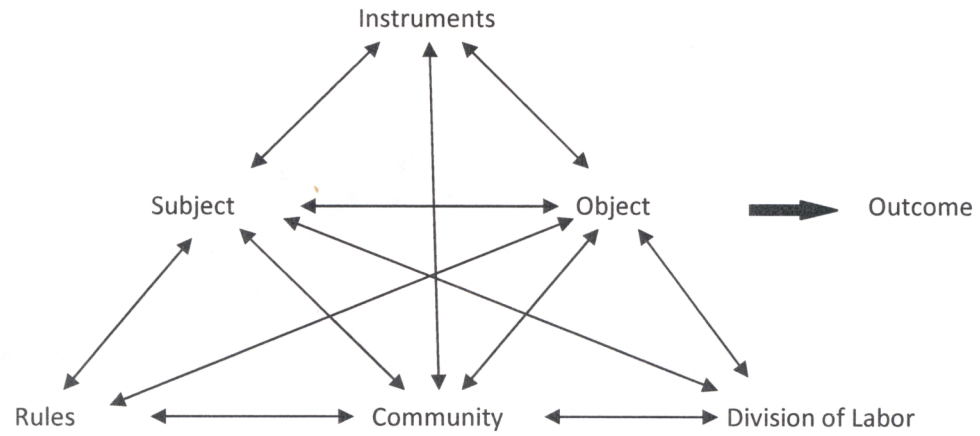


Figure 6.1: Activity Theory Illustrated. Adapted from Cole, M., & Engeström, Y. (1991). A cultural-historical approach to distributed cognition. In G. Salomon, Ed., *Distributed Cognition* (pp. 1-47). Cambridge: Cambridge University Press.

To summarize, in this article we adopt a theoretical approach which integrates sociocultural and activity theories with affordance theory. Nature's diversity affords limitless opportunities for children to achieve developmental and mastery goals. Nature acts as a socially constructed mediator in this developmental process. These complementary theories offer an approach to child development that acknowledges the mutual role of the individual, the social/cultural environment, and the natural environment. The synergy of these theories provides a valuable way to understand the complexity of child and nature interactions. By taking a more holistic view of child and nature experiences, this article provides deeper insights and makes valuable contributions to the fields of research and practice. This theoretical framework moves this research away from purely behaviorist models that reduce our understanding of children and nature experiences to simple descriptions of behavior and provides important implications for practice. The remainder of this article explores findings from an investigation into the socio-cultural influences on five children's meanings of their

experiences in nature at a botanic garden. As argued, the two realms of experiences (personal and socio-cultural) cannot be taken in isolation, but for the practicality of this article, attention is focused on the socio-cultural realm. Detailed results of our investigations relating to children's personal experiences of nature have been reported elsewhere (Authors, submitted).

Methodology

For this study, a group of five children aged 6 years through 10 years were recruited through ads in local newspapers. The children consisted of three girls and two boys all from white, middle-class, two-parent families living in rural, Central Alberta. Families participated in a pre-camp interview that included taking a history of each family's nature-based interactions and relationships. The children participated in a day camp for five consecutive days at a nearby botanic garden. Children were given an hour of free time either together, or individually as they chose in one of the following areas of the garden: a waterfall in a Japanese garden, a sensory garden, a butterfly pavilion, and a forested area with trails. Visually expressive methods (photographs, drawings, clay sculptures and sand trays) were used to elicit semi-structured interviews based on their previous hour of free time in nature. Children were interviewed separately with interviews ranging from 10 to 25 minutes. Questions included:

- What does your picture/photograph/sculpture/sand tray say about what is important about your experience of nature earlier today?
- What does your picture/photograph/sculpture/sand tray tell about how you felt during your time in nature?

- What do you think you will remember the most about your experience in nature earlier today?

Children were invited to make meaning of their own visual expressions instead of the primary researcher relying on her own interpretations. Each child participated in at least five interviews throughout the week; drawing activities and drawing-elicited interviews were conducted twice. This allowed methodological triangulation among the various methods used. Three months after the camp experience, children and their families were invited to participate in a follow-up interview. In all cases the child attended the interview with their mother, in one case the child's father and younger sibling also attended and participated in the follow-up interview. Children were asked to reflect on what was important for them in remembering the camp. Preliminary research findings and themes were presented and families were invited to comment on how the findings and themes resonated for them in the context of their family, as well as social and cultural contexts.

In this study, the children's art and photographs remained property of the children and were not used directly in the data analysis. Digital photographic records of the children's photographs, drawings and sand trays were kept by the researcher and used only as a reflective aid in the analysis stage. The primary researcher transcribed the digitally recorded interviews verbatim. The primary researcher also took limited notes during the interviews and conducted daily interpretive analyses at the end of each day. The researcher employed a case study approach to organizing the data; "[c]ase data consist of all the information one has about each case" (Patton 2002, 448). Each child represented one case. This allowed the researcher to analyze each case in depth and to

make comparisons with the other cases. Content analysis (Patton, 2002) was conducted for each case to identify major themes and meanings. We looked for themes relating to product (answers to our research questions) and process (examination of methods). The content analysis was comprised of inductive analysis and deductive analysis. In inductive analysis, the categories emerged out of the interviews with the children. It was important to the study's authors that the findings accurately represented the co-constructed meanings developed through the interview process; as a result, a combination of indigenous (child-identified) and sensitizing (researcher identified) concepts were used. Deductive analysis was framed by the four dimensions of experience, namely cognition, behavior, affect and sensing. Affordance theory and Vygosky's activity and social-cultural development theory were consulted after the initial analysis of data to explain observations. Coding entailed the identification of patterns and themes that emerged from an initial reading of the data. Subsequent examination of the data indentified passages of text that fit (or not) within these categories. Revision of categories and the identification of concepts that did not fit within identified categories was also part of this process.

Several read-throughs of the transcripts were required. The first read through involved making comments in the margins in an attempt to identify preliminary categories (Patton, 2002). Subsequent reviews of the transcripts involved coding passages as they fit with the identified categories. We modeled our analysis on Seidel's (1998) circular process involving noticing, collecting and thinking about interesting things. We would notice recurrent themes, we would identify and collect them, and then after reflecting upon them, would think about those themes as we noticed the data again.

The entire process of data analysis is best seen as a circular process with continual movement between the data.

Observations and Discussion

Data collected from the children during the 5-day camp experience in a botanic garden revealed several thematic clusters of observations related to children's experience of nature including what they selected to pay attention to, and why, as well as different aspects of their relationships to nature. All the relationships with nature identified appeared to be founded in part on the child's personal experiences but were likely influenced by larger social and cultural forces that shaped the meaning children make of nature and their relationship with it. The three relational themes that emerged in this study were (1) children feeling protective toward nature, (2) children feeling fearful of nature, and (3) children feeling either a part of or apart from nature. These relationships highlight what attracted and repelled the children to/from nature, enabling and/or disenabling an attraction to nature and a desire to interact with it. Each theme is described next and accompanied by a discussion of its implications and links with previous research. Additionally the importance of affordances, adult and peer mediation and scaffolding are highlighted.

Theme 1: Feeling Protective of Nature

All the children in this study demonstrated potential for empathy and concern for certain parts of nature. Underlying feelings appeared to shape the relationships these children formed with nature and demonstrated that an ethic of environmental care may exist in children within this age range. Whether this ethic of care is *anthropocentric* (human-centered) or *biocentric* (life-centered) (Kahn and Kellert 2002) is indeterminable

from this study. An interaction with geese and ducks on the first day elicited these responses:

Colton: I was thinking that I just decided I wasn't going to try to pet them (the geese) or anything, I just wanted to chase them, just for fun, even if I could catch one, I wouldn't try to. Because if you hurt their wings too bad then they can't fly. One of my friends has a bird as a pet and you can't touch their wings too much.

Similarly,

Matthew: Umm, I umm, felt a lot curious about that (when one duck seemed to help another duck stuck in the mud). And then I was sad to think "maybe I should take care of nature more often".

Butterflies also invited protective efforts.

Colton: Well, I think that one (butterfly) got on my finger because he was injured a bit. So I just put him on my finger and then I just put him on a leaf so he wouldn't be in the middle of the path. Because people aren't supposed to go past the sidewalk.
Researcher: So he wouldn't get stepped on if he was over there?
Colton: No, there's less of a chance of it. I felt good because I was helping one of the butterflies so he wouldn't get stepped on.
….. (continuing on, replying to a comment confirming that he enjoyed his time in the butterfly house).
Except for seeing the dead butterflies.
Researcher: Yeah, so what didn't you like about that?
Colton: Seeing them smooshed on the sidewalk. I didn't like seeing that.
Researcher: How come?
Colton: Because that means that people are stepping on them and stuff and didn't really care.
Researcher: So how did that make you feel?
Colton: Sad.
Researcher: Sad?
Colton: If they just die by themselves and they're just lying on a rock or something, then I don't really care but if I see some that are smooshed, I don't like that.
Researcher: Why is that different?
Colton: If they die by themselves, they've had their life. Like they've been able to live.

A further participant, female this time, communicated sensitivity towards a frog.

Researcher: Okay, How did it feel when you were catching that frog?
Pearl: Oh, it feels like I shouldn't do this, I shouldn't do this, but I did.
Researcher: So, why were you thinking "I shouldn't do this?"

Pearl: Uhh, I don't' know, because it was my second time and I never catched a little frog before …well, uhh, because maybe the little frog didn't want to be in my hands for a while so I like yeah, but I put it back so it hopped away.

Researcher: Okay, so how did you decide then, if you had this message in your head thinking well maybe the frog doesn't want to be caught. How did you still decide to catch it?

Pearl: Umm, I just wanted to see how the lines were because I saw a little heart (pattern) on his leg. …So then I let him go because it wanted to be back to its family.

This ethic of care did not apply only to animals; it also extended to plant life.

Researcher: What do you think about when you think about flowers; what sorts of thoughts do you have about flowers?

Matthew: I think about how to save it.

Researcher: Oh really. So how do you save flowers?

Matthew: You don't pick them and let them grow.

It appears from the children's interviews that they view nature as being "delicate" and needing protection. They also see themselves as being situated where they can take an active role in protecting the environment. Some of the children may see this as an opportunity or even a responsibility, leading to a more detailed discussion of anthropocentric and biocentric ethics, which is best left for another paper. What is important here is that these children expressed care for nature. It is likely that social and cultural forces influenced this relationship. Even in this study, the children's behaviour towards nature was likely impacted by the framing of the research, the taken-for-granted messages inherent in the garden setting and the limits the researcher may have explicitly and implicitly set.

Identified Socio-cultural Influences on Children's Feeling Protective of Nature

Several scholars have claimed that the meanings we attach to nature are a result of the relationship we have with nature and do not exist inherently in nature itself (Gibson 1979; Greider and Garkovich 1994; Kyle and Chick 2007). Colton's time in the

butterfly pavilion illustrated how he had learned that sidewalks constrain human activity. Research reviewed earlier established that nature experiences shared with an important adult contribute significantly to children's meaning making. A striking example of this mediated development of a caring relationship was with Pearl, whose interviews consistently contained references to her love of flowers, a love that has been seeded and tended to by her grandmother. In reading the following two excerpts, one might expect, as the primary researcher did, that her grandmother has an extensive flower garden.

Pearl:	And I like the flowers, different colors, all the colors.
Researcher:	What did you like best about the flowers we saw today because I see lots of flowers in your sandbox today.
Pearl:	Well, because I love flowers. My grandma always plants flowers. She lets us pick one flower to take home.
Researcher:	Oh neat. So what do you like about that?
Pearl:	It's fun. And then I put it in water in my room.
Researcher:	And then what do you do with it when its in your room.
Pearl:	I smell it. Sometimes I look at it.
Researcher:	Oh. So how does it make you feel when you smell it and look at it.
Pearl:	I feel happy.
Researcher:	Happy?
Pearl:	Yeah.
Researcher:	Okay, and what about today, when you were looking at the flowers, how did it make you feel?
Pearl:	Good….
Researcher:	Okay. So what else do you do with the flowers at your grandma's house.
Pearl:	I water them. I look at them. I smell them, a lot things. They're very cool.
Researcher:	So lots of flowers. So it looks like flowers are obviously an important thing for you.
Pearl:	Yeah.

On a subsequent day:

Researcher:	Oh. And what makes them pretty? What makes a flower pretty versus one that's not so pretty?
Pearl:	I don't know really.
Researcher:	How do you decide what one is pretty then? How did you decide these two were pretty?
Pearl:	'Cause they are mostly one of my favorites.

Researcher: You've seen those flowers before?
Pearl: Yep.
Researcher: Ok.
Pearl: These are one of my favorite flowers in the world.
Researcher: Ok. Where have you seen these flowers before?
Pearl: Grandma and Grandpa's house.

When the primary researcher conducted the family interview with Pearl's family, she asked her mother to describe Pearl's grandmother's flower garden. She chuckled, replying that it was nothing more than a very small raised bed garden in their backyard. This was definitely not what I had assumed given Pearl's description and her current passion for flowers. This example supports claims that this child's meanings were mediated by her social relationships, and were not dependent on the size of the garden, or the remoteness of the wilderness, or the grandness of the waterfall. Nature really is in our own backyards. It would be interesting to follow Pearl's relationship with flowers throughout her lifetime to see how important these early experiences with flowers, mediated by her grandmother, might be long term.

In the context of activity theory, Pearl's identity development has been mediated by her experiences with flowers, an activity influenced strongly by the relationship with her grandmother. The following figure illustrates how these elements fit into an activity system:

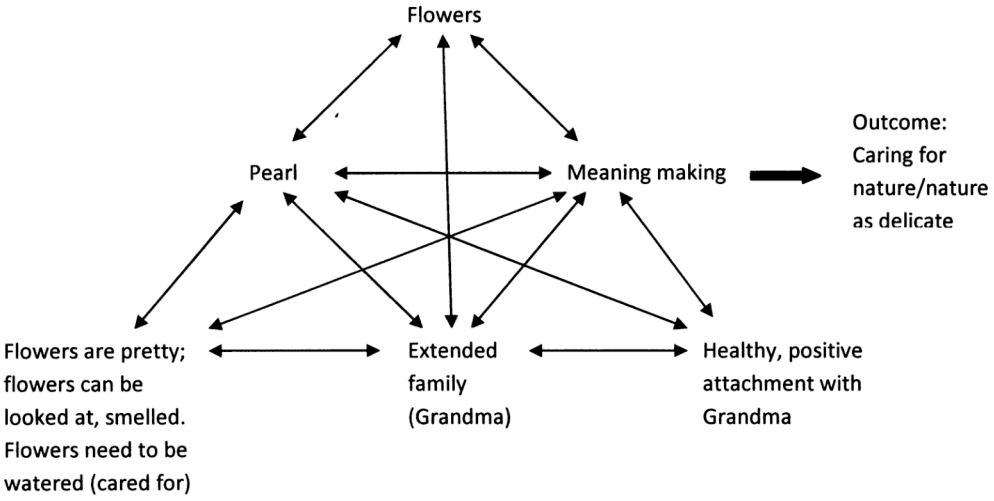


Figure 6.2: Pearl's Experience with Flowers Conceptualized by Activity Theory

Theme 2: Feeling Fearful of Nature

As outlined earlier in this article, this study was conducted in a public botanic garden and while it provides adequate interaction with nature, it is far from "wild." From an adult's perspective, it is easy to view the gardens as a relatively safe place, free of hazards. Despite this, a second prominent theme that emerged from the children's interviews was one of danger and risk inherent in their exploration of nature.

For some children in this study, danger arose from the perceived possibility of wild animals, from nature itself.

> Researcher: OK, why did you come back here (the meeting place) for a rest?
> Matthew: Because I was thinking umm, an animal would come and kind of ….yeah…I was afraid if something would come and attack me.

Interestingly, during other times throughout the research camp, the principal researcher observed that this participant often spent time alone, just sitting quietly in nature and did not appear afraid or worried and did not seek out others to comfort his fears.

On the final day when the group was exploring trails from the forested area that led back into a familiar area of the garden, one child noticed a paw print in the mud, likely belonging to a dog. When asked what the children thought it belonged to, two responded that they thought it might belong to a bear or a wolf. Nature appeared to these children to be inherently dangerous, possessing risk for other animals as well as humans.

Matthew:	(Talking about the duck stuck in the mud)…. ”Umm, because there was one (duck) that was like “Ahh, I’m stuck, help me, someone help me…”.
Researcher:	Do you think he was scared?
Matthew:	Yeah, that maybe a bird would come and eat him or something.

In the following example, the presence of people communicated a sense of safety and security.

Researcher:	So what does it tell you when you see a path then?
Colton:	That people have been there quite a bit now, and that’s good, it’s safe.

This reasoning suggests that ideas about safety and danger are socially constructed, at least in part. Somewhere this child has learned that if other people have been somewhere, then it is likely safe. This is an example of a social construction of the affordance of a worn path as a “safe place to go.”

Identified Socio-cultural Influences on Children’s Feeling Fearful of Nature

Throughout the week, Cloe’s brother Colton was teasing her with slugs. Her behavior illustrated feelings of fear or disgust towards the slugs. Cloe’s repeated torment from her brother with slugs and other slimy creatures may intensify her fear of these animals. Conversely, repeated positive experiences with slugs where Cloe is able to manage her anxiety levels and experience the slug in a different way, may help foster an appreciation of these animals or at least a reduction of fear. Another example came when

the three girls discovered wild berries. Two of the girls decided to taste the berries (after confirmation from the adult researcher that they were safe). Pearl was very cautious and chose not to try any the first time she was offered, possibly out of fear that they were poisonous. Tasting them apparently held too much risk for her. After watching the other two girls and the researcher eat the berries, Pearl's experience with the berries changed and she either regarded them as "probably safe" or disregarded her sense of caution to fit in with the group. This mirrored the earlier example of labeling the path as safe because there was evidence of people having taken it before. It was at this point she tried the berries and enjoyed the taste. This was a new experience with the berries that resulted in a very pleasurable experience and one that Pearl later identified as significant. This example shows how a direct experience with nature transformed Pearl's relationship with one part of nature from one of fear, to one of pleasure. Further, as with the example of Cloe and the slugs, it mirrors Tapsell et al.'s (2001) findings that direct experiences with nature and social scaffolding, can transform the meaning children construct of nature.

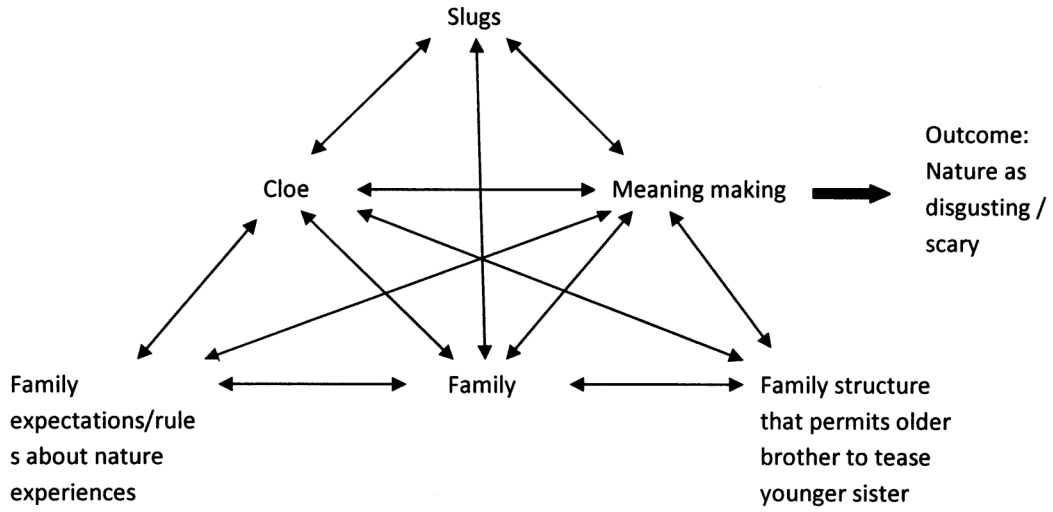


Figure 6.3: Cloe's Experience with Slugs Conceptualized by Activity Theory

The experience itself was a personal experience for Pearl, but the process that facilitated this experience relied on Pearl's interaction with her peers and the adult researcher. This example illustrates the concept of scaffolding, which is revisited in a later section. It also illustrates how the berries' affordance of being "eatable" for Pearl was mediated by her peers and the adult researcher.

Pearl's experience with the berries is another interesting example that illustrates what Jonassen and Rohrer-Murphy (1999) referred to as a transformational activity resulting from a conflict between two systems as depicted in Figure 6.4:

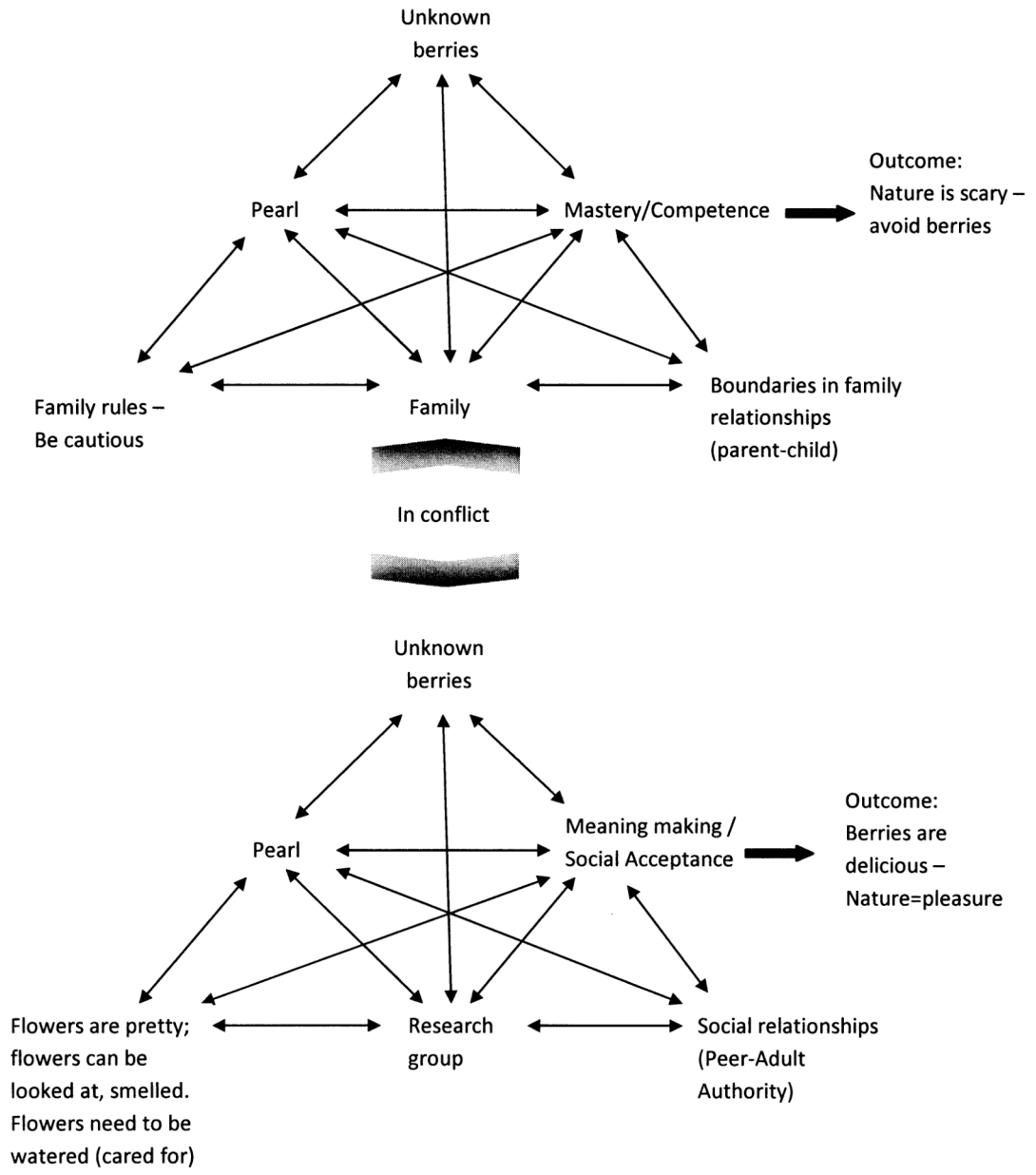


Figure 6.4: Pearl's Transformational Experiences with Berries Conceptualized by Activity Theory.

Theme 3: Apart From/ A Part Of – Where to draw the line: Boundaries and Nature

Another theme that became very apparent in these children's visually expressive products was the obvious boundaries that existed between the children and nature.

One participant noted this in his sand tray picture:

Researcher: So tell me about the Keep Out and the No Trespassing Signs, who are these signs for?
Matthew: I don't want anybody in those parts because it's very delicate

At one entrance of the Japanese Garden there was a sign warning people not to touch or disturb anything in the Japanese Garden. The children did not see this sign yet there was an assumption made by at least one child that this area of the garden was not to be touched. These messages do not need to be contained in explicit, physical signs but can be and frequently are communicated quite effectively in very implicit ways. For example, in how the garden is structured -- pathways provide clear boundaries on where to walk and where not to walk.

Researcher: I thought I heard you saying once to [the research assistant] that you were worried that maybe you shouldn't be in there [the waterfall]. Were you worried about that?
Colton: A bit. Ummm, because sometimes when lakes and stuff like that are in places like this, people don't want you to go in and stuff.
Researcher: Uh huh, and why do you think those people don't want you going in?
Colton: 'Cause you might wreck something.
Researcher: Uh huh, and did anything happen today that sort of confirmed that idea?
Colton: Afterwards [another child participant] was playing with the chain. He barely touched it actually and that guy (a garden employee) started screaming. I had heard that guy yell at another person too.
Researcher: OK. So where did you get that idea, that when you're in a place "like this" [The Japanese Gardens], what is a place "like this"?
Colton: A place where people work on, it's not just like wild. It's not like in the trees and stuff.
Researcher: Why do you think adults like that [the employee that yelled] get mad when you're doing stuff like that [walking in the waterfall/creek]?
Colton: I don't know. I might know when I'm an adult.

This example also illustrates the social constraints of what affordances a waterfall in a Japanese garden could offer Colton.

Another aspect of the awareness of these person-nature boundaries emerged out of the children's visually expressive products. Throughout the initial four days of research, it became apparent that some children were consistently finding ways of including themselves, and in some cases, their fellow research participants and researchers, in their visual expressions. This sparked curiosity in the researcher to explore whether children saw themselves as part of nature or separate from nature. On the final day, at the conclusion of their interviews, children were asked one final question – whether they saw themselves as being a part of nature or something separate from it. The resulting answers, while potentially affected by the wording of the question and the children's understanding of the word "nature," were interesting and were supported by the children's artistic products. Children who replied that they were a part of nature had at least one art product that included a depiction of himself or herself, a fellow research participant, or the researcher. Children, who replied that they were separate from nature, never included themselves or elements of themselves, their peers or the researchers, in their pictures. It is helpful to examine each of the children's replies to this question.

Pearl:	I don't really know the answer about that. Feels like we're not nature.
Researcher:	Yeah? Why do you feel that way?
Pearl:	I don't know, just don't feel like we're nature, because but we are with nature, learning about nature but we're not like a plant or a tree.
Researcher:	So how are we different?
Pearl:	Cause we're not a plant.
Researcher:	What about squirrels, are they nature?
Pearl:	Not really.

Pearl's pictures did not contain any images representing herself, peers or the researcher.

Cloe:	Not really part of nature. 'Cause we're not plants.

As with Pearl, Cloe did not portray herself or others in her pictures.

Angelica: We are nature. We're like animals, we're mammals.

Angelica consistently included herself in her pictures. For example, in one drawing, she included the back of her head as if she was viewing the scene. In her sand tray she put in a small stuffed horse she had been carrying throughout the day.

Matthew: Not a part of nature
Researcher: OK, so how come we're not a part of nature.
Matthew: Because we're humans and we're not plants.

With the exception of his photographs, which he indicated if he could take another photograph, he would have wanted a picture of the researcher and research assistant in one just so that he could remember them, Matthew's pictures did not include any representation of himself, his peers or the researchers.

Researcher: If this was nature, where would we be in the picture?
Colton: More on the side of the picture.
Researcher: More on the side?
Colton: Yeah.
Researcher: OK. So we'd still be part of nature but we're more on the side, more on the edge, do you think?
Colton: Yeah.
Researcher: Okay, so what does it mean to be at the edge?
Colton: Most of the time there'd be us. If you asked a person what's nature, they usually say like plants and trees and stuff first. They don't usually say animals, that usually one of the last ones.
Researcher: Do you think most people think people are a part of nature?
Colton: A bit.
Researcher: A bit? So what part of nature would we be a part of?
Colton: Animal nature.

The story that Colton told in relation to his sand tray picture reflected his understanding of humans inhabiting the liminal spaces between different elements of nature. In this passage he seemed to capture the complexity of his relationship with nature and perhaps why it is so difficult to argue definitively for one side or the other – is he a part of or a part from nature? Perhaps he is both at the same time.

Greider and Garkovich (1994) argued that our relationship with nature is socially constructed and symbolic. Often the social processes that shape our meanings are so "taken for granted, so implicitly obvious to the individual, that it is indistinguishable from the person's self-definition" (Greider and Garkovich 1994, 7). Chawla's (2006) study of Norwegian environmentalists found that their relationship to nature is so embedded in their cultural and self-identity that many of her respondents could not even recognize it as being significant. It is the implicitness of these processes that make their effects difficult to identify and measure. Schneekloth (1989) stated:

> the culture in which our children live communicates meanings of what plants are, how one feels about them, and how one treats them. Children receive conflicting messages from adults: vegetables are good for you, eat them; parks and forests are wonderful, protect them; weeds are awful, spray them; trees are for making products, cut them down; we need to build something here, bulldoze the trees. (14)

Adult are not always aware of the implicit, culturally-based messages that are communicated to children. These conflicting messages can result in confusion and ambivalence, as we saw with Colton and the waterfall.

Discussion of Findings in Context of Theoretical Foundation

Socio-cultural Mediation of Children's Experiences with Nature

What follows is one attempt at explaining the above themes in the context of social and cultural influences reported in the family interviews. One strategy the parents of the children in this study employed to shape their children's play experiences was by choosing to live near nature. They invited opportunities for direct, shared experiences. They sent their children to nature-based camps and traveled with their children to "wild" places. Pearl's mother noted that the boundaries that separate them from nature are at times quite extreme describing how her family often travels from their heated (or air-

conditioned, depending on the season) homes, into their heated garages, into their heated cars, into their heated offices or schools or shopping malls. Another parent described her family's experience as one with more flexible boundaries between themselves and nature. Angelica's mother stated "I encourage the children to bring in abandoned birds' nests they find outside, or feathers, or sticks. We hang them up on our walls and put them on our shelves." What effect these subtle differences have on one's relationship with nature is unclear from this study but is something worth further investigation.

Scaffolding of Children's Experiences with Nature

The incident of the girls tasting the wild berries illustrates how peers and the adult researcher scaffolded an experience that was at the upper limit of Pearl's zone of proximal development. By observing her peers tasting the berries and having a positive experience with positive emotions enabled Pearl was able to try something new and discover a new affordance of wild berries. A further example of scaffolding occurred during the day in the forested area of the garden. Interestingly, observations from this day suggest that overall, the experiences afforded by the forested area of the garden were at the upper limits of what most children felt comfortable with as they sought out assistance from more competent peers or the adult researcher, in several situations. For example, at the beginning of their free time, the group of three girls went off exploring together and initiated a game of what they called "Marco Polo" with the researcher and assistant. The girls would call out "Marco" and expected the researcher or her assistant to reply by calling out "Polo." This was the only day they played this game and it appeared to be a way to stay "connected" with the adults while they were out of "sight." This game appeared to offer the girls a sense of security enabling them to explore the

environment independently. When they got out of earshot from the researcher and assistant, they returned back to where the researchers awaited.

Role of the Environment as Mediator of Children's Experience

The following is an example of an experience of one of the research participants where the environment mediated his sense of mastery and competence. Here the researcher asked Colton about his exploration of the trails in the forested area of the botanic garden.

Researcher:	What was it like today when you were finding that trail?
Colton:	It was really neat because I was walking down there and I saw the gate and I was like "I think I remember this place", so we kept going on the same trails we took yesterday and we got to the stairs and then we just knew where we were.
Researcher:	Okay. So did that help, knowing that you kind of knew where you were?
Colton:	Yeah.
Researcher:	So what if you didn't know where you were, would you have kept going?
Colton:	Yeah, …I would just go straight though, I wouldn't have taken all the turns, I would just keep going straight. Because if I take too many turns then I get lost, I can't remember them all.

In this situation, the adult researcher and assistant consciously limited the constraints placed on the child. His decision to take a specific trail depended on the affordances of the environment (the straightness or amount of turns in the trail and the amount of 'established trail'), the ability of the child to find his way and his confidence to be okay if he took a wrong turn, and his relationship with the environment (the familiarity of the trail leading to the ice cream shop). This enabled the child to discover that the trail he was on initially met up with a portion of a trial he had taken a couple of days previous.

Reflections and Limitations to this Study

Given that this article is examining the socio-cultural influences on children's experiencing of nature, it would be negligent to ignore the potential socio-cultural influence of the research process on the participants' experiences in this study. Children's interactions with the researcher and research assistant may have influenced their interaction with nature. Instructions given to the children participants around some of the "rules" of the garden may also have had an impact. For example, in the butterfly garden, children were asked to not touch the butterflies. If a butterfly landed on them, the children were permitted to observe it without using their hands to handle the butterflies. This may have influenced children's feelings of protection to nature, or the perception of nature as delicate, as discussed earlier. A further example of influence is the posing of the question "are you a part of or separate from nature?" The wording of this question implied an absolute dualism that may not accurately reflect these children's relationship with nature. The taken-for-granted messages in the cultural environments of these children around gardens and wild areas may also have played a role in their responses. Since it is impossible to remove participants entirely from the social, cultural and historical environments within which they live, it is impossible to isolate the effects of various socio-cultural influences on children's meaning making.

Conclusion

The purpose of this study was to explore the meanings of nature that five children constructed during their time at a botanic garden and the socio-cultural influences on those meanings. This paper re-conceptualizes children's experiences with nature as being socially constructed and situates the natural environment in a key position to affect developmental outcomes in children. Nature plays a valuable role in mediating child

development outcomes and the development of an ecological identity in children. This contradicts other research that holds on to biophilic notions that children have an unmediated relationship with nature. Children in this study constructed meanings of nature being delicate and needing protection, and nature being scary. These meanings likely shape and constrain their use of nature as a mediator in their own development and mastery of activities. These five children also communicated meanings related to their perceived relationship with nature. These meanings were shaped by social and cultural factors inherent in these children's family, school setting, and broader social and cultural environments. The theoretical framework used in this study, which was a synergy of socio-cultural and activity theories and affordance theory situates the role of nature as a socio-cultural mediator of child development objectives. This is in stark contrast to much of the research that examines children's experiences with nature from a more behavioral model that sees children and their nature experiences as more a direct, purely psychological, stimulus response relationship. These models however fail to take into account the complexity and mutuality of children's experiences with nature that occur within a social and cultural context.

Whatever the relationship is between a child and nature, it is shaped by the socio-cultural forces relevant for that particular child and is constructed within a developmental context. Through shared nature experiences, children learn to define their interactions, make meaning of their relationships and create a sense of self-identity. The potential for natural environments to effectively mediate child development has significant implications for children's access to nature if it can be established that natural environments are more effective than built environments. Further investigation of this is

warranted. Given the small sample size of this study, generalizable conclusions are not possible but study observations do bring to light the need for further research in this area. If different community environments can facilitate children's use of nature differently, it would be interesting to see how different systems interact and whether certain systems exert a stronger effect. Of particular interest is the transformational opportunities that exist when children's various communities are in conflict. An examination of the transformative experiences, such as Pearl's with the berries, where systems conflict but result in transformation, would be of great value to those professionals interested in cultivating more positive environmental relationships. It would also be valuable to examine these variables over time. We would suspect that in a child's early years, the family system would exert a stronger influence, while older children may experience a stronger influence from their peer community or educational community. A multitude of socialization agents and factors including gender, class, and race also warrant more extensive investigation as to how they impact children's constructed relationships with nature. The theoretical framework provided herein also points the way to how this research should be undertaken. Davydov (1999) stated that the "study of activity is interdisciplinary by nature. These should be specified philosophical, sociological, culturalogical, psychological and physiological aspects here" (50). Children's experiences with nature are complex and demand approaches that acknowledge and investigate this complexity in sufficient depth.

Important practical implications can also be drawn from this research. This research points to the need to change environmental relationships at the macro level. Society and cultures at a macro level need to support an ethic of care for the environment,

if pro-environmental outcomes are to be expected on a large scale. On a micro level, adults who live and work with children in natural settings have ample opportunities to create and facilitate transformational experiences. Encouraging children to explore nature, joining them physically and mentally in this exploration, and providing scaffolded support when needed, can potentially, help construct proenvironmental relationships and meanings. Pearl, one of the research participants, reminds us that to be a powerful mediator, nature does not need to be on a grand scale. Backyard flower gardens, an empty lot next door, or a secret fort in the corn patch outside may be sufficient. These nature-mediated experiences with nature are important, in part because, as Sobel (1996) wrote, "authentic environmental commitment emerges out of first hand experiences with real places on a small, manageable scale" (32). Future environmental stewards emerge from this interaction (Chawla 1998).

References

Albrechtsen, H., H.H.K. Andersen, S. Bodker, and A.M. Pejterson (2001). *Affordances in Activity Theory and Cognitive Systems Engineering.* Roskilde, Denmark: Riso National Laboratory.

Alerby, E. (2000). "A Way of Visualizing Children's and Young People's Thoughts about the Environment: A Study of Drawings." *Environmental Education Research* 6(3): 205-222.

Bærentsen K.B. and J. Trettvik (2002). "An Activity Theory Approach to Affordance. In NordiCHI'02: *Proceedings of the second Nordic conference on Human-computer interaction, Aarhus, Denmark: October 19-23, 2002*. ACM Press, pp. 51-60.

Bateson, G. and M.C. Bateson (1987). *Angels fear: Towards an Epistemology of the Sacred.* New York: Macmillan.

Besthorn, F.H. (2005). "Beetles, bullfrogs and butterflies." In Unger, M. ed. *Handbook for Working with Children and Youth: Pathways to Resilience Across Cultures and Contexts.* Thousand Oaks, CA: Sage Publications, pp. 121-132.

Bidell, T.R. (1992). "Beyond Interactionism in Contextualist Models of Development." *Human Development* 35: 306-315.

Bixler, R.D., C.L. Carlisle, W.F. Hammitt, and M.F. Floyd (1994). "Observed Fears and Discomforts among Urban Students on School Field Trips to Wildland Areas." *The Journal of Environmental Education* 26(1): 24-33.

Blunden, A. (2010). *An Interdisciplinary Theory of Activity*. The Netherlands: Koninklijke Brill NV.

Cachelin, A., K. Paisley and A. Blanchard (2009). "Using Significant Life Experience Research to Inform Program Evaluation: A Case Study of The Nature Conservancy's Wings and Water Wetlands Education Program." *Journal of Environmental Education* 40(2): 2-14.

Callicott, J.B. (1999). *Beyond the Land Ethic: More Essays in Environmental Philosophy.* Albany NY: State University of New York Press.

Chawla, L. (2007). "Childhood Experiences Associated with Care for the Natural World: A Theoretical Framework for Empirical Results." *Children, Youth and Environments* 17(4): 144-170.

Chawla, L. (2006). "Learning to Love the Natural World Enough to Protect It." *Barn nr* 2: 57-58.

Chawla, L. (1998). "Significant Life Experiences, Revisited: A Review of the Research." *Journal of Environmental Education* 29(3): 11-22.

Cole, M., and Y. Engeström (1991). "A Cultural-historical Approach to Distributed Cognition." In Salomon, G. ed., *Distributed Cognition.* Cambridge: Cambridge University Press, 1-47.

Costall, A. (1995). "Socializing Affordances." *Theory & Psychology* 5(4): 467-481.

Daniels, H. (2001). *Vygotsky and Pedagogy.* New York: RoutledgeFalmer.

Davydov, V. (1999). "The Content and Unsolved Problems of Activity Theory." In. Engeström, Y. (ed.), *Perspectives on Activity Theory.* Cambridge: Cambridge University Press, 39-52.

Derr, V. (2002). "Children's Sense of Place in Northern New Mexico." *Journal of Environmental Psychology* 22: 125-137.

Dovey, K. (1990). "Refuge and Imagination: Places of Peace in Childhood." *Children's Environmental Quarterly* 7(4): 13-17.

Faber-Taylor, A., and F.E. Kuo (2006). "Is Contact with Nature Important for Healthy Child Development? State the Evidence." In Blades, C. S. M., ed., *Children and Their Environments.* Cambridge: Cambridge University Press, 124-140.

Fjortoft, I. (2001). "The Natural Environment as a Playground for Children: The Impact of Outdoor Play Activities in Pre-primary School Children." *Early Childhood Education Journal* 29(2): 111-117.

Gharahbeiglu, M. (2007). "Children's Interaction with Urban Play Spaces in Tabriz, Iran." *Visual Studies* 22*(*1): 48-52.

Gibson, J.J. (1979). *The Ecological Approach to Visual Perception.* Boston: Houghton-Mifflin.

Greider, T. and Garkovich, L. (1994). "Landscapes: The Social Construction of Nature and the Environment." *Rural Sociology* 59(1): 1-24.

Heft, H. (1988). "Affordances of Children's Environments: A Functional Approach to Environmental Description." *Children's Environments Quarterly* 5(3): 29-37.

James, J.J. and B.D. Bixler (2008). "Children's Role in Meaning Making Through their Participation in an Environmental Education Program." *Journal of Environmental Education* 39*(*4): 44-59.

Jonassen, D. and L. Rohrer-Murphy (1999). "Activity Theory as a Framework for Designing Constructivist Learning Environments." *Educational Technology, Research & Development* 47 (1): 61-79.

Kahn, P. H., and S.R. Kellert (2002). *Children and Nature: Psychological, Sociocultural and Evolutionary Investigations.* Cambridge, MA: MIT Press.

Kals, E. and H. Ittner (2003). "Children's Environmental Identity: Indicators and Behavioral Impacts." In Clayton, S. and S. Opotow, eds. I*dentity and the Natural Environment.* Cambridge: MIT Press, 135-158.

Kellert, S.R. (2002). "Experiencing Nature: Affective, Cognitive and Evaluative Development in Children." In Kahn, P.H. and S.R. Kellert, eds. *Children and Nature: Psychological, Sociocultural and Evolutionary Investigations* Cambridge: MIT Press, 117-151.

Kirkby, M. (1989). "Nature as Refuge in Children's Environments." *Children's Environments Quarterly* 6: 1-12.

Korpela, K., M. Kytta and T. Hartig (2002). "Restorative Experience, Self-Regulation, and Children's Place Preferences." *Journal of Environmental Psychology* 22: 387-398.

Kyle, G. and G. Chick (2007). "The Social Construction of a Sense of Place*." Leisure Sciences* 29(3): 209-225.

Kytta, M. (2004). "The Extent of Children's Independent Mobility and the Number of Actualized Affordances as Criteria of a Child-friendly Environment." *Journal of Environmental Psychology* 24: 179-198.

Lee, S.H. (1999). "The Cognition of Playground Safety and Children's Play: A Comparison of Traditional, Contemporary, and Naturalized Playground Types." In Christiansen, M.L., ed. *Proceedings of the International Conference of Playground Safety.* State College, PA: Pennsylvania State University, August 18-21.

Leont'ev, A.N. (1981). *Problems of the Development of Mind.* Moscow: Progress Publishers.

Leudar, I. (1991). "Sociogenesis, Coordination and Mutualism." *Journal for the Theory of Social Behavior* 21: 197-220.

Milligan, C. and A. Bingley (2007). "Restorative Places or Scary Spaces? The Impact of Woodland on the Mental Well-being of Young Adults." *Health and Place* 13: 799-811.

Nelson, K. (2007). *Young Minds in Social Worlds: Experience, Meaning and Memory.* Massachusetts: Harvard University Press.

Patton, M.Q. (2002). *Qualitative Research and Evaluation Methods.* Thousand Oaks, CA: Sage Publications Inc.

Pollio, H.R. and C. Heaps (2004). "Themes in the Human Experience of Nature." *Psychological Reports* 94: 35-47.

Roe, J. and P. Aspinall (2011). " The Emotional Affordances of Forest Settings: An Investigation in Boys with Extreme Behavioural Problems." *Landscape Research (36):* 1-18.

Scarantino, A. (2003). "Affordances Explained." *Philosophy of Science* 70(5): 949-961.

Schneekloth, L. H. (1989). "Play Environments for Visually Impaired Children." *Journal of Visual Impairment and Blindness* 83(4): 196-201.

Schultz, P.W., C. Shriver, J. Tabanico, and A.M. Khazian (2004). "Implicit Connections with Nature." *Journal of Environmental Psychology* 24: 31-42.

Sebba, R. (1991). "The Landscapes of Childhood: The Reflection of Childhood's Environment in Adult Memories and in Children's Attitudes." *Environment and Behaviour* 23(4): 395-422.

Seidel, J (1998). "Qualitative Data Analysis." *The Ethnograph v5 Manual, Appendix E*. Downloaded February 26, 2008 from: http://www.qualisresearch.com/.

Sobel, D. (1996). *Beyond Ecophobia.* Massachusetts: Orion Society.

Sobel, D. (1993). *Children's Special Places*. Tucson: Zephyr Press.

Soper, K. (1995). *What is Nature?* Oxford: Blackwell Publishers, Inc.

Stoffregen, T.A. (2000). "Affordances and Events." *Ecological Psychology* 12(1): 1-28.

Tapsell, S., S. Tunstall, M. House, J. Whomsley, and P. Macnaghten (2001). "Growing up with Rivers? Rivers in London Children's Worlds." *Area* 33(2): 177-189.

Tolman, C. (1999). "Society versus Context in Individual Development: Does Theory Make a Difference?" In Engestrom, Y, R. Miettenin and R. Punamaki, eds. *Perspectives on Activity Theory (pp. 70-86).* NY: Cambridge University Press.

Valsiner, Jaan (1984). *The Childhood of the Soviet Citizen: Socialization for Loyalty*. Ottawa: Carleton University Press.

Vygotsky, L. (1962). *Thought and Language.* Cambridge, MA. MIT Press.

Vygotsky, L. S. (1978). *Mind in Society: The Development of Higher Psychological Processes.* Cambridge, MA: Harvard University Press.

Wyndham, F.S. (2010). "Environments of Learning: Rarámri Children's Plant Knowledge and Experience of Schooling, Family and Landscapes in the Sierra Tarahumara, Mexico." *Human Ecology* 38: 87-99.

Chapter 7: Back to the Beginning – Concluding Remarks

Having collected and analyzed my data, sought out theories and a conceptual model and presented the results, it is now time for me to reflect on the cases of my fellow graduate student, Delilah of whom I wrote about in the introduction and how we each took different paths and ended up at the same beautiful place in nature. I would guess that, as young girls we were both attracted to pleasurable sensations through interactions with nature: the sight of beautiful flowers, the sound of water trickling over a rock, the sweet scents of fallen autumn leaves, the crisp taste of winter's first snow. For me, experiences in nature often heightened my arousal: crossing a flowing creek with water up to my knees or playing hide and go seek among the trees. Apparently for Delilah, nature experiences were ameliorative relative to experiences in an abusive home. Nature became, for me, endowed with meaning as a *family place*. For Delilah, nature became a *safe place*. For each of us nature was pleasurable and optimally arousing.

Of course I recognized nature as being somewhat dangerous. The creek could sweep me away if I was not careful, like it did to one of my father's hiking boots. For me, the dangers inherent with time spent in nature were manageable, especially because I had my family nearby. I never thought about the fact that the only defence my father had against an overprotective mother grizzly bear, had we encountered one, was an empty pop can with a few small rocks inside! I just felt safe. I did not have to think about it. I was not explicitly hit over the head with messages to recycle and reduce my footprint. It was just what we did, because we could. We helped butterflies out of puddles. We took our garbage to the garbage bin. We stopped and marveled at the tiny pink shooting star flowers, being careful not to step on them. There was no distinction made between

nature and us. Such a question – to be apart from or a part of – would not even have crossed my mind. Delilah likely saw nature not as dangerous, at least not as dangerous as the reality that awaited her at home. She may well have identified with the fragility of nature and likely felt a closer connection to the chickadees that chicka-dee-dee-deed for her or the squirrels that scampered across branches over her head. Perhaps she longed to be on the back of the Canada goose, heading south for the winter. Like me, Delilah was afforded opportunities by her family to spend time in nature: to explore, to be curious, to sense things, to feel things, and to learn about things. While I was sharing this with my family, Delilah was experiencing nature alone. Both of our experiences, though, were framed in a larger social and cultural context.

I would suppose that Delilah may have had a teacher like Mr. Morton in Grade 7 who took 26 students camping for a weekend as part of an outdoor education class. Or maybe a brownie leader that took her to an annual camp where she slept in teepees and cooked over a fire. Or maybe a favorite uncle that would look up at the night's sky and make up his own constellations. Whether I am more interested in nature and she enjoys it more may not be relevant, as the results look the same….we both seek out nature because we have learned that our experiences with nature are beneficial, and that it enhances our feelings of well-being.

But this research was not conducted just so that I could figure out why Delilah and I like to spend time in nature. My intent is that the value of this research lies in its contributions to further study and resultant practical implications. The remainder of this chapter will acknowledge the limitations of this study, its contributions to the field of child and nature studies and make suggestions for future practice and research directions.

Limitations of this Research

The most obvious limitations of my study lie in the size and uniformity of the sample. Clearly, the experience of five white children from two-parent, middle class, semi-rural families is not a representative sample by any means. However, given that the aim of this study was exploratory, this sample did provide some interesting, albeit, tentative conclusions. Similarly, the length of time over which observations and data were collected was relatively small: five days. The children's reports, then, are representations of their experiences at one point in time and may not be an accurate or complete reflection of their experiences with nature. Research conducted over such a short period of time may not account for variations within children because of personal factors such as mood, physical health, family functioning or environmental factors such as the weather and programming. My study also represents children's experiences in a botanic garden, which as I discovered has some very distinct implicit and explicit messages about how to interact with nature. It is possible that schoolyards, back yards and hiking trails in national parks may all elicit significantly different experiences.

As indicated throughout this dissertation, the visual expressions created by the children in this study were used to elicit interview data, the primary source of data for this study. Ethical considerations dictated that the actual creations be retained by the children and not comprise part of the publishable data in this study. It is acknowledged here that the reader's understanding may have been enriched by the inclusion of reproductions of the visual representations. Without these data being reported, the reader is unable to critique my interpretation of these expressions.

A further limitation of this study may exist in the definition of the term "nature" provided in the introductory chapters of this dissertation and how this may have impacted the data. By describing nature as anything not built, I may have inadvertently inferred that nature is something separate from humans. By asking children the question of whether they considered themselves to be a part of or apart from nature, I may have confirmed this dichotomy. As indicated earlier, this question emerged from the visual expressions and was included in the interviews without perhaps sufficient reflection on how best to elicit the information I was interested in which was how children see themselves in relation to nature. This limitation illustrates the complexity of how individuals, including researchers, are impacted by socialization. The implicitness of the effects is difficult, if not impossible to be entirely aware of at all times. Humans are so embedded in the cultural and social environments that to undertake research completely unencumbered by one's environment is a significant challenge. This reflection also highlights the importance of consistency between ontological and methodological considerations.

This study also had an underlying assumption, that to some degree, nature could be studied as an isolated factor affecting children's experiences. This is unrealistic, given the argument made throughout this dissertation on the, sometimes imperceptible, influence of the social environment. As reflective as I attempted to be throughout the research process, there were undoubtedly instances of my personal bias affecting the research process that I was not aware of, could not be aware of. For example, viewing the interviews as shared experiences between the children and myself, the impact that my emotional state had on their emotions may have had an impact on their experience. If

unconsciously my body communicated that I shared a child's fascination with the waterfall, their evaluation of that experience may have been slightly more positive as a result. Despite these limitations, this study made a valuable contribution to the child and nature literature in a number of ways. These are discussed next.

Key Study Contributions

Children's Perspective

Several authors argued that children have unique perspectives on nature-based experiences. Despite this, until recently much of the research has reviewed literature pertaining to adult themes, has been conducted from an adult's perspective and has made suggestions based on adult objectives. The research presented here elicited information on five children's experiences with nature in a botanic garden during five days in July 2009. While I acknowledged that these five children do not constitute a representative sample, the data collected from them are valuable for the directions it suggests for future practice and research. Children's perspectives on their experiences are important because they provide insight into a process that may be quite different than an adult's or an adult's remembered experience as a child.

Sand Trays as a Method

The value of the children's perspective was particularly useful in the evaluation of the visually expressive methods. As researchers undertake increasingly more research with children, information on child-friendly research methods will assist in developing a research agenda that respects the needs and strengths of child research participants. Methods that are fun and engaging for children and that at the same time meet the needs of the researcher can be challenging to find. Sand trays emerged as one such method in

this study. Children were very engaged with the sand trays and the sand trays appeared to elicit a high degree of sensory data, a significant component in children's experiences. The evaluation of sand trays as a visually expressive research method appears as an area for further study.

Multidimensional Conceptualization of Children's Experience

One of the main contributions this research makes to the field of children and nature is the multidimensional view of experience that guided this investigation. A model of experience was conceptualized that included four dimensions: sensory, emotional, cognitive and behavioral. Sensation emerged as a primary bridge between the child and the natural environment. Sensory information registers as being pleasurable (or not) and arousing (or not), thus breaking down into, what Russell (2003) termed, core affect. It is through the appraisal of core affect that the cognitive dimension is melded with the affective dimension of a child's experience. The resultant cognitive-affective appraisal prepares the child to act – either exploring or disengaging from his or her previous activity. This information also becomes integrated with other messages stored in memory to construct meaning from the experience. This process illustrates the value in examining all four dimensions of children's experience in order to have a more complete understanding of this complex phenomenon. These dimensions do not have rigid boundaries between them; each informs and is informed by the other dimensions. To study only one or two of these dimensions at a time assumes an ability to isolate each of these dimensions, which as illustrated in this study cannot produce results that reflect the complex reality of experience.

Transdisciplinary Approach

On a very small scale, this investigation exhibited characteristics of transdisciplinarian research, albeit conducted by one researcher. Literature reviewed and theories relied upon were drawn from a diverse range of fields including neurobiology, psychology, social psychology, child development, human ecology and education. Given the complexity of children's experiences with nature, the internal and external aspects of these experiences and diversity of socio-cultural influences, a transdisciplinarian approach is useful and is discussed in more detail later in this chapter in the section dealing with implications for future research. In order to better understand children's experiences with nature, it is vital that researchers see the forest AND the trees.

Implications for Practice

Practitioners as Socializers

The findings in this dissertation have many implications for practitioners who are concerned with improving and increasing children's connection with nature. While *practitioners* generally refers to professionals working with children, I also consider parents and other extended family members to be important practitioners in the child-nature connection. Practitioners working with children explicitly and implicitly mediate those experiences. Through their construction and personal meanings of nature, adults transmit familial, community, social, cultural and historical meanings of nature to the children they interact with. This can be done explicitly through the structure of educational programs and activities they provide, or implicitly, for example, by the tone of voice practitioners use when children cross their boundaries. To some degree, it is the implicit messages practitioners transmit, particularly if they are negative, that can do the

most harm to attempts to connect children to nature in a positive way because these occur at a level below our conscious awareness. If I show consistent fascination with sunsets when I am with my daughter, she is more likely to internalize a similar fascination with sunsets. If I anxiously tell my daughter not to touch that dirty feather she just noticed in the grass, and sternly instruct her not to pick up that dirty leaf, and similarly forbid her from bringing that dirty bug into my house then she is likely to develop avoidant behavior towards nature because it is perceived as dirty. The tone of my voice in those interactions connotes that dirty is bad, anxiety provoking and should be avoided. Practitioners therefore need to engage in a constant process of reflection and peer discussions to uncover their own implicit constructions and meanings of nature and determine if they are in harmony or conflict with their goals for connecting children with nature. Practitioners should notice whether they are joining children in connective and pleasurable experiences in nature. Are they getting wet with the children? Are they lying on their back seeing images in clouds? Or are they standing in the background, sipping their coffee, watching the children? Practitioners need to share experiences with children in order facilitate optimal experiences, scaffold learning and help children make meaning.

Scaffolding Arousal and Self-Efficacy

On an individual level with children, in order to foster interest and approach behaviors, practitioners can intervene by either reducing children's arousal or increasing a child's perceived ability to cope with their arousal. Since arousal is largely a function of environmental stimulation, increasing a child's self-efficacy appears to be the most effective course of action and therefore, practitioners would benefit from understanding

their involvement with children from the context of scaffolding children's experiences within children's constantly evolving zone of proximal development. This study has suggested that the focus of scaffolding should be on the affective dimension, particularly children's level of arousal and perceived ability to cope or maintain that arousal in an optimal range. It would also be helpful for practitioners to learn to be aware of when children need autonomous, self directed activities and when they require more social support. Sometimes an optimal experience can be facilitated simply by a practitioner's engaged presence. In this study, when the girls began playing Marco Polo, if the researcher had not joined in the play, thereby providing the needed support, the girls' exploration would likely have diminished or even ceased. They would have missed a valuable opportunity to increase their perceived sense of competence which may have lead to increased exploration during subsequent experiences. In order to facilitate such complexly balanced experiences with nature, practitioners need to be willing to share, really share, those experiences with the children they are working with and engage with children, not just stand at the front of the group and direct them. When practitioners are observant and in tune with children they can notice the behavioral cues that may be reflecting a child's level of arousal. Sometimes a child will not say they are feeling scared, they might not even be aware of or understand their feelings accurately, but an attentive practitioner may be able to observe non-verbal signs of how the child is feeling. This attunement to a child's emotion can be vital in scaffolding experiences that move a child upwards in their zone of proximal development. Such acknowledgements and timely offers of support can help a child develop an improved sense of confidence, emotional regulation, social and physical activity skills.

The Power of Nature

Acknowledging the powerful role nature can play in mediating developmental outcomes for children would be another related goal for practitioners. Nature affords powerful opportunities for social, emotional, cognitive, sensory, and physical development. As has been argued, the natural environment provides the graduated diversity that allows children to seek out experiences that fit within their zone of proximal development and affords adults a plethora of resources to support children's development within this zone. But this acknowledgment depends largely on practitioners' awareness of their own relationship with nature. How comfortable is the practitioner with going outside during cold, snowy winters, or wet muddy springs? How relaxed is the practitioner in examining spiders and ants? How excited does the practitioner get when the first duck returns to the North after a long winter's absence? Practitioners need to teach by feeling about, not just by knowing about, nature. This discussion risks the criticism of feeling circular, but in a way it is. The interconnectedness of children's experiences with nature and the socio-cultural influences on those experiences makes interventions focused on children and nature circular as well.

Renewed Focus on the Sensory and Affective Dimensions of Experience

Perhaps most significantly and fundamentally, practitioners need to accept that children regulate environmental stimuli first through their senses, and that this sensory processing informs their affect, their cognitions and ultimately their behavior. This is important for all child-focused practitioners whether their desired outcomes are for increased knowledge of plant species or for the camp counselor who wants the child to be faster at an obstacle race. As Knapp (1989) argued, "the components of the affective

domain are sometimes considered to be private matters, not the concern of the schools" (p. 41). In the Western world, the education system is a system outside the family where children spend a considerable amount of time in and are influenced to a considerable degree by. Experiences in all systems, including the education system, need to be provided to children, which give ample opportunities to interact with nature using all their senses. Nature needs to be seen and touched and heard and felt and even sometimes tasted. Even something as simple as schools allowing children do outside for recess when it's raining. Allow children to feel the rain, allow them get wet. In order to allow these engagements, practitioners need to be willing to deal with the barriers: the muddy boots, the dirty clothes, the time it takes to dress eighteen 3-year olds to go out in the snow. At a more direct level, practitioners may need to first ignite the senses by inviting children to notice what they smell or hear outside. They could design activities for children to explore their environment using their senses or just ask questions about what children are sensing when out in nature. Lessons from my own daily routine illustrate how any experience can engage the senses. As my daughter was baking brownies the other day, she spent over 5 minutes feeling the eggs with her hands, letting the white run through her fingers, poking the yolk until it broke. Meals provide an easy way to engage the senses yet at my daughter's school, teachers either read to the children or put on a DVD for them to watch distracting their attention away from the sensory experience of eating.

When children are able to have pleasurable sensations or confidently manage negative sensations, the experience is registered affectively as pleasurable. This can result in enjoyment or interest in the experience and will motivate the child to seek out

more such experiences. This will lead to meanings being developed from those experiences that positively connect the child to nature, like sunsets are beautiful, and cloud watching is fun. Children behave in ways consistent with internalized meanings such as spending their weekend picking up garbage if they hold an internalized meaning that supports those actions. Desensitizing displeasurable experiences that repel children from nature, like the slimy experience of slugs for Cloe, is another way practitioners can transform nature experiences for children and help strengthen the connection between child and nature. As Knapp (1989) suggested, if we want children to become avid bird watchers and defenders of bird habitats, then we must start with first noticing with the child the beauty of the bird's feathers and the enjoying the melody of its song.

The Importance of Reflection

Perhaps if the current socio-cultural mindset were to change, as Knapp suggested, then more public systems might be freer to engage in effective nature-based programming for children and youth that focuses its attention on the sensory and affective dimensions of experience. Consistent with such an approach, which is often labeled as a humanistic approach to education, Knapp and Goodman (1981) outlined many activities that they argued promote the interconnectedness between the sensory and affective dimensions and the cognitive and behavioral dimensions of experience. Knapp further stated (1981) "learning will be internalized to a greater extent when: both the experiential (actively participating) and reflective (relating to one's own life experience) modes are employed" (p. 8). According to Knapp (Knapp & Goodman, 1981; and Knapp, 1992), it is the reflective process that makes experience personally meaningful. The methodology used in this study provides some direction for nature-based educational

practitioners with respect to reflection. The visually expressive methods allowed children to express themselves in a way not often recognized as expression in most educational environments. These visually expressive activities allowed the children to add one more layer to their experience with nature. The interview or conversation around their visual expression and their experience in nature also had pedagogical value. The reflective process involved in these conversations helped scaffold these children's learning about their experience and relationship with nature. It made the implicit, explicit. As previous of authors have suggested, we teach children to know about things, but not always to feel about things (Knapp & Goodman, 1981; Knapp 1992). I know I have taught children not to break branches of trees without exploring with them what the branch means to the tree and how the child feels about trees. Rarely do we engage children in conversations about how they feel about nature. These types of conversations are an example of joint attention, the children and I shared experiences of talking about their time in nature. It would be another interesting study, to see if having these conversations has an effect on outcomes relates to learning about nature and developing a relationship with nature. Knapp (1992) offers many suggestions for guiding a reflective conversation including role taking, inviting visual representation and using different types of questions to guide a discussion.

Implications for Research

While this dissertation has elicited new understandings related to children's experiences with nature, it also reveals many new questions that point the way for further research. One of the strongest suggestions for further research would be larger scale projects using the multidimensional model of experience that can produce generalizable

results. Larger samples would also be able to demonstrate within-group variability such as to whether boys and girls experience nature differently. Are girls more drawn to enjoying experiences while boys are drawn to more arousing experiences that cultivate interest?

Cross-cultural investigations into children's experiences with nature would also generate a wealth of important information for those delivering services to children of different cultures. It would be interesting to uncover the cultural impacts on children's sensory experiences, their emotional and cognitive appraisals, and their related behaviors. Cross-cultural studies may also provide insight into how culture influences one's definitions of nature and relationships with nature. It is likely that some cultures would be unable to conceptualize a separateness from nature. Certainly Chawla's research with Norwegian environmentalists found this (Chawla 2006).

Longitudinal studies that explore children's experiences with nature throughout the lifespan would also produce a great deal of valuable information such as, whether the dominance of sensory and affective dimensions of experience changes over time. Longitudinal studies of the four dimensions of children's experiences and meaning-making would add to our understanding of how children construct meaning from their experiences over time and how these meanings change over time.

Chapter 5 reported conclusions that children were drawn to arousing pleasurable experiences and away from arousing and de-arousing displeasurable experiences. What is interesting is that the data did not illustrate any significance related to de-arousing pleasurable experiences, or what could be described as relaxing or calming experiences. Previous research has suggested that children do seek out calming experiences (Korpela,

Kytta & Hartig, 2002). It is also possible that the camp structure or perhaps the questioning did not elicit calming experiences that were significant. Further research into children's calming experiences in nature may add to the knowledge base on how to help children cope with stress.

Chapter 6 alluded to the transformational opportunities that exist when children's various communities or environments are in conflict. A more thorough examination of these transformative experiences would be of great value to those professionals interested in cultivating more positive environmental relationships. Chapter 6 of this dissertation also suggested that the meanings children hold about nature are socially constructed. It would therefore be prudent to explore in more depth the effect of such socialization agents and factors as gender, class and race on how nature is defined by children.

With respect to the concept of social mediation of child development, it would be valuable to know if social mediation has a stronger influence on any one dimension of experience. This could provide important direction to practitioners if there is a benefit to focusing more attention on socializing children's sensory experiences, emotions, cognitions or behavior. While much of the previous research has been focused on children's behavior and cognitions, this current study suggests that children's experiences are biased towards sensory and affective dimensions. If this is the case and in order to have the most significant impact, perhaps efforts should be directed more to sensory and affective dimensions of children's experiences in nature. Continuing in the realm of social-cultural mediation of children's relationships with nature, it would also be valuable to better understand what factors encourage or, conversely, prevent adults from engaging in shared nature experiences with children. Are practitioners too busy with work

demands to be present for the children? What are the conditions under which practitioners can and do engage more easily with children?

A comparison between children's experiences with natural environments and built environments would demonstrate whether natural environments are more interesting, enjoyable and developmentally beneficial than built environments. It would be valuable to know whether natural environments, such as naturalized playgrounds, afford better developmental opportunities and produce improved developmental outcomes for children than built environments. These findings would have important implications for social planners and policy makers. Several researchers have argued that nature's diversity provides graduated levels of challenge and novelty that can support the scaffolding of experiences for children. If this is true and natural environments are better suited for achieving improved developmental outcomes for children then the implications at a system level are significant. This would provide motivation and support for teachers to develop and utilize outdoor classrooms and field-based learning opportunities. Perhaps more public funding in support of initiatives that utilize nature in child and youth programming such as preschool programs, therapy programs for children and youth, and public schools could be beneficial.

Transdisciplinary Approach to Researching Children's Experiences with Nature

The study of children's experiences with nature is complex. The literature reviewed for this dissertation illustrates the diversity in perspectives that have expressed or invested an interest in studying children's experience with nature. What might be deemed valuable is transdisciplinary research into children's experiences with nature.

Dankwa-Mullan, Rhee, Stoff, Pohlhaus, Sy, Stinson, & Ruffin (2010) outline three major tenets of transdisciplinary research:

- A team approach that integrates disciplines , not just shared discussions as in interdisciplinary or multidisciplinary research where researchers "remain silos of their respective fields" (p. S22)
- Transcends traditional disciplinary perspective
- Results in the creation of a new integrated framework perspective, sometimes a new, integrated discipline.

A new perspective that acknowledges the mutual role of children, of nature and of the broader social environment could potentially be a transformational step in our understanding of how to connect and reconnect children with nature. Borrowing from the fable of the five blind men and the elephant Figure 7.1 allows the depiction of how multiple disciplines may contribute to new and unified approach to child and nature studies. This figure lists several suggested areas of transdisciplinary research however this is by no means an exhaustive list.

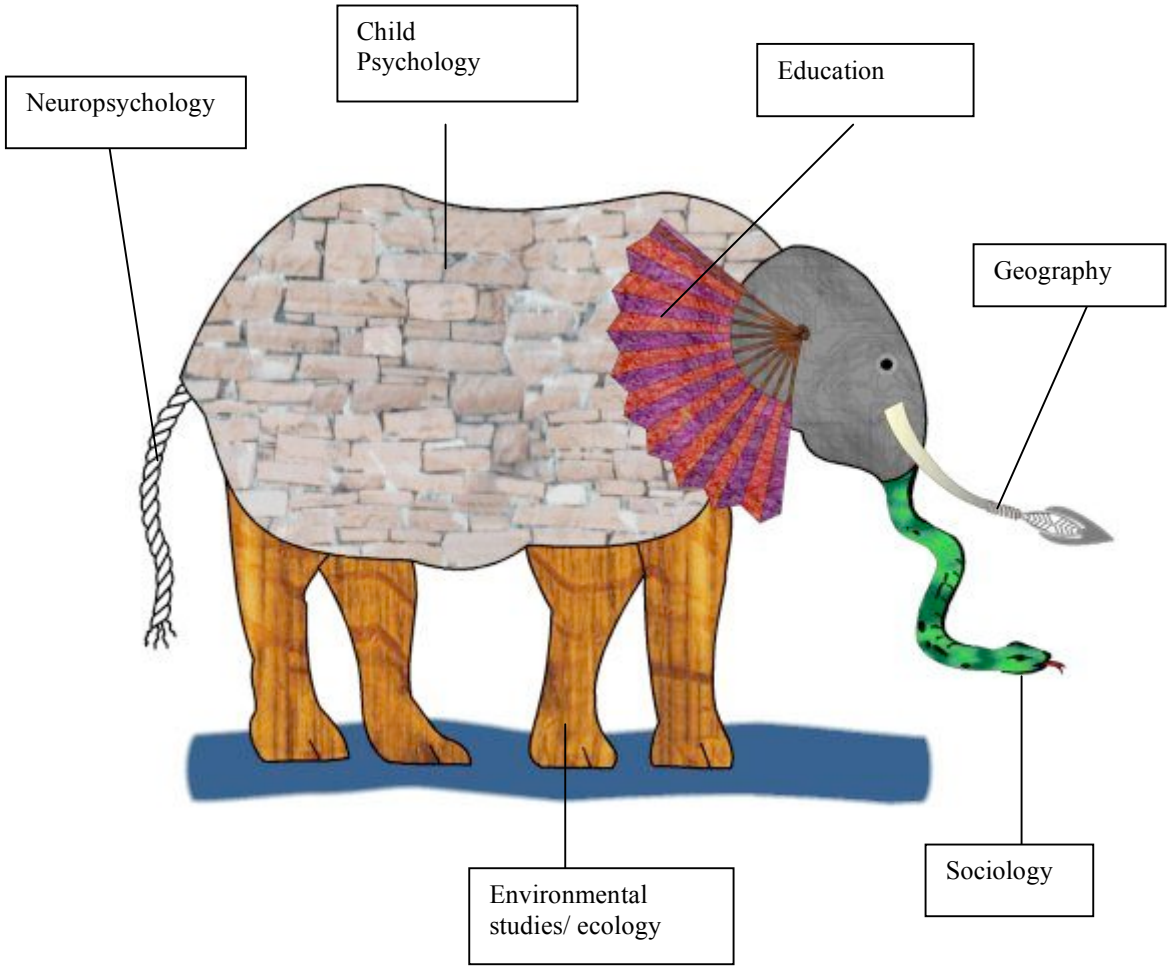


Figure 7.1. The Elephant in the Garden: A Transdiscplinary Approach to Child-Nature Studies

Each discipline involved contributes a valuable perspective, however together they provide a more holistic understanding of children's experiences with nature that can potentially produce more holistic knowledge. For example, in my study, examining the socio-cultural influence on the children's experiences with nature allowed me to uncover ways that children's social interactions with family members informed the affective and cognitive dimensions of their experience. This provided a more complete perspective of children's experiences. Overall, this dissertation deepens the field of knowledge and understanding of children's experiences with nature by highlighting the mutual

relationship between the four dimensions of experience and the natural and socio-cultural environments of children.

Final Reflections

While I was completing the final editing of this chapter, I attended a conference on mindfulness in therapy. Mindfulness is defined as a practice of attuning to one's moment-to-moment experience and clearing one's mind from negative evaluations (Siegel, 2010). What struck me as interesting during the lecture was that the aim of mindfulness practice appears to be to focus one's attention to the space between the sensory and emotional dimension and the cognitive and behavioral dimensions. It was all about noticing the feeling and the sensation without holding any thoughts in tandem. If this is in fact the case, then children of the age participating in my study were participating in mindfulness (or, perhaps more accurately, mindlessness) most of the time.

For me, one of the most significant contributions of this research came from research participant Pearl and the strength of her connection with her grandmother's relatively tiny flower garden. Thank you Pearl for reminding us that nature is not "out there," it's all around us including us, if we just take the time to smell the flowers!

References

Albrechtsen, H., Andersen, H.H.K., Bodker, S., and Pejterson, A.M. (2001). *Affordances in activity theory and cognitive systems engineering* (pp. 1-37). Riso National Laboratory: Roskilde, Denmark.

Alerby, E. (2000). A way of visualizing children's and young people's thoughts about the environment: A study of drawings. *Environmental Education Research, 6*(3), 205-222.

Bærentsen K.B. and J. Trettvik (2002). "An Activity Theory Approach to Affordance. In NordiCHI'02: *Proceedings of the second Nordic conference on Human-computer interaction (*pp. 51-60). Aarhus, Denmark*:* ACM Press.

Barraza, L. (1999). Children's drawings about the environment. *Environmental Education Research, 5(1),* 49-67.

Barrett, L.F. & Bliss-Moreau, E. (2009). Affect as a psychological primitive. *Advances in Experimental Social Psychology. 41*, 167-218.

Barry, D. (1996). Artful inquiry: A symbolic constructivist approach to social science research. *Qualitative Inquiry, 2*, 411-438.

Bateson, G. & Bateson, M.C. (1987). Angels fear: Towards an epistemology of the sacred. New York: Macmillan.

Besthorn, F.H. (2005). Beetles, bullfrogs and butterflies. In M. Unger, (Ed.*), Handbook for working with children and youth: Pathways to resilience across cultures and contexts* (pp. 121-132*)*. Thousand Oaks, CA: Sage Publications.

Bidell, T.R. (1992). Beyond interactionism in contextualist models of development. *Human Development, 35,* 306-315.

Bingley, A. (2003). In here and out there: sensations between self and landscape. *Social and Cultural Geography, 4*(3), 329-345.

Bingley, A., & Milligan, C. (2007). Sandplay, clay and sticks: Multi-sensory research methods to explore the long-term mental health effects of childhood play experience. *Children's Geographies, 5*(3), 283-296.

Bixler, R.D., Carlisle, C.L., Hammitt, W.E. & Floyd, M.F. (1994). Observed fears and discomforts among urban students on school field trips to wildland areas. *The Journal of Environmental Education, 26*(1), 24-33.

Bixler, R.D., & Floyd, M.F. (1997). Nature is scary, disgusting and uncomfortable. *Environment and Behavior, 29*(4), 443-467.

Blunden, A. (2010). *An Interdisciplinary Theory of Activity*. Koninklijke Brill NV: The Netherlands.

Bodrova, E. & Leong, D. (2007*). Tools of the mind: The Vygotskian approach to early childhood education (2nd Edition*). New Jersey: Prentice Hall.

Boeije, H. (2002). A purposeful approach to the constant comparative method in the analysis of qualitative interviews. *Quality and Quantity, 36*, 391-409.

Borrie W.T. & Birzell, R.M. (2001). Approaches to measuring quality of the wilderness experience. *USDA Forest Service Proceedings RMRS-P-20*, 29-38.

Bradway, K. & McCoard, B. (1997). *Sandplay – Silent workshop of the psyche.* New York: Routledge.

Braun, B.G. (1988). The BASK model of dissociation. *Dissociation, 1*(1), 4-23.

Cachelin, A., Paisley, K. & Blanchard, A. (2009). Using Significant Life Experience Research to Inform Program Evaluation: A Case Study of The Nature Conservancy's Wings & Water Wetlands Education Program. *Journal of Environmental Education, 40*(2), 2 - 14.

Call, J. & Tomasello, M. (2005). What chimpanzees know about seeing, revisited: An explanation to the third kind. In N. Eilan, C. Hoerl, T. McComrack, and J. Roessler (Eds.). *Joint attention: Communication and other minds*, (pp. 45-64). Oxford: Clarendon Press.

Callicott, J.B. (1999). Beyond the land ethic: More essays in environmental philosophy. Albany: State University of New York Press.

Castree, N. (2001). Socializing nature: Theory, practice, and politics. In N. Castree and Braun, B. (Eds.). *Social nature: Theory, practice, and politics (pp. 1-21).* Massachusetts: Blackwell Publishers.

Chawla, L. (2007). Childhood Experiences Associated with Care for the Natural World: A Theoretical Framework for Empirical Results. *Children, Youth and Environments*, *17*(4), 144-170.

Chawla, L. (2006). Learning to love the natural world enough to protect it.," *Barn nr. 2*, 57-58.

Chawla, L. (1998). Significant life experiences, revisited: A review of the research. *Journal of Environmental Education, 29*(3), 11-22.

Chawla, L. (1992). Childhood place attachments. In I. Altman & S.M. Low (Eds*). Place attachment* (pp. 63-86). New York: Plenum Press.

Clark, C. (1999). The autodriven interview: A photographic viewfinder into children's experience. *Visual Sociology, 14*, 39-50.

Clark-Ibáñez, M. (2007). Inner-city children in sharper focus: Sociology of childhood and photo elicitation interviews. In G.C. Stanczak, (Ed.), *Visual research methods: Image, society and representation (*pp. 1-22). Thousand Oaks, CA: Sage Publications, Inc.

Clark-Ibáñez, M. (2004). Framing the social world with photo-elicitation interviews. *American Behavioural Scientist, 47*(12), 1507-1527.

Clayton, S. & Myers, G. (2009). *Conservation psychology: Understanding and promoting human care for nature.* New Jersey: Wiley-Blackwell.

Cobb, E. (1977). *The ecology of imagination in childhood*. New York: Columbia University Press.

Cole, M., & Engeström, Y. (1991). A cultural-historical approach to distributed cognition. In G. Salomon, Ed., *Distributed Cognition* (pp. 1-47). Cambridge: Cambridge University Press.

Cosco, N. & Moore, R. Playing in place: Why the physical environment is important in playwork. 14th Play education Annual Play and Human Development Meeting: Theoretical Playwork. Ely, Cambridgeshire, UI, January 26-27, 1999. Retrieved October 16, 2007 from www.naturalearning.org/PlayingPaper.html.

Costall, A. (1995). Socializing Affordances. *Theory & Psychology, 5*(4), 467-481.

Crotty, M. (1998). *The foundations of social research: Meaning and perspective in the research process.* Thousand Oaks, CA: Sage Publications.

Cunningham, C. & Jones, M. (1996). Play through the eyes of children: Use of cameras to study after-school use of leisure time and leisure space by pre-adolescents. *Society and Leisure*, *19*, 341-361.

Dale, M.A. & Lyddon, W.J. (2000). Sandplay: An investigation into a child's meaning system via the self-confrontation method for children. *Journal of Constructivist Psychology, 13*, 135-154.

Daniels, H. (2001). *Vygotsky and pedagogy*. New York: RoutledgeFalmer.

Davydov, V. (1999). The content and unsolved problems of activity theory. In Y. Engeström (ed.), Perspectives on activity theory. Cambridge: Cambridge University Press, p. 39-52.

Demeritt, D. (2001). Being constructive about nature. In N. Castree and Braun, B. (Eds.), Social *nature: Theory, practice, and politics (pp. 22-40)*. Massachusetts: Blackwell Publishers.

Derr, V. (2002). Children's sense of place in Northern New Mexico. *Journal of Environmental Psychology. 22*, 125-137.

Dovey, K. (1990). Refuge and imagination: Places of peace in childhood. *Children's Environmental Quarterly, 7*(4), 13-17.

Dunn, J. (2005). Naturalistic observations of children and their families. In S. Green & D. Hogan (Eds.), *Researching children's experience: Approaches and methods* (pp. 87-101). Sage Publications: London.

Ellis, C. & Berger, L. (2003). Their story/ my story/ our story: Including the researchers' experience in interview research. In J.F. Gubrium and J.A. Holstein (Eds.), (pp. 157-186). *Postmodern interviewing*. Thousand Oaks: Sage Publications.

Epstein, I., Stevens, B., McKeever, P., & Baruchel, S. (2006). Photo elicitation interviews (PEI): Using photos to elicit children's perspectives. *International Journal of Qualitative Methods, 5*(3), 1-9.

Etherington, K. (2004). *Becoming a reflexive researcher: Using our selves in research.* London: Jessica Kingsley Publishers.

Faber-Taylor, A., & Kuo, F. E. (2006). Is contact with nature important for healthy child development? State the evidence. In C. S. M. Blades (Ed.), *Children and their environments* (pp. 124-140). Cambridge: Cambridge University Press.

Fjortoft, I. (2001). The natural environment as a playground for children: The impact of outdoor play activities in pre-primary school children. *Early Childhood Education Journal, 29*(2), 111-117.

Gharahbeiglu, M. (2007). Children's interaction with urban play spaces in Tabriz, Iran. *Visual Studies, 22(*1), 48-52.

Gibson, E. J. (1991). An Odyssey in Learning and Perception Cambridge, Massachusetts: The MIT Press.

Gibson, J.J. (1979). *The ecological approach to visual perception.* Boston: Houghton-Mifflin.

Gotch, C. & Hall, T. (2004). Understanding nature-related behaviors among children through a Theory of Reasoned Action approach. *Environmental Education Research*, *10*(2), 157-177.

Greene, S. & Hill, M. (2005). Researching children's experience: methods and methodological issues. In S. Greene, S. & D. Hogan (Eds.)*, Researching children's experience: Approaches and methods* (pp. 1-21). Sage Publications: London.

Greider, T. & Garkovich, L. (1994). Landscapes: The social construction of nature and the environment. *Rural Sociology, 59*(1), 1-24.

Guba, E.G. (1990). The alternative paradigm dialogue. In E.G. Guba (Ed.). *The Paradigm Dialog* (pp. 17-30). London: Sage Publications.

Gunter, B.G. (1987). The leisure experience: Selected properties. *Journal of Leisure Research*, 1*9*(2), 115-130.

Gurevitz, R. (2000). Affective approaches to environmental education: Going beyond the imagined worlds of childhood? *Ethics, Place and Environment, 3*(3), 253-268.

Hart, R. (1979). *Children's experience of place*. New York: Irvington Publishers.

Harvey, M. (1990). The relationship between children's experiences with vegetation on school grounds and their environments: A functional approach to environmental attitudes. description. *Children's Environments Quarterly*, *5*(3), 29-37.

Heft, H., & Wohlwill, J.F. (1987). Environmental cognition in children. In D. Stokols & I. Altman (Eds.), *Handbook of environmental psychology* (pp. 175-204). New York: John Wiley & Sons.

Hertzman C. & Boyce T. (2010). How Experience Gets Under the Skin to Create Gradients in Developmental Health. *Annual Review of Public Health, 31*, 329- 47.

Hofferth, S.L. & Sandberg, J.F. (2001). How American children spend their time. *Journal of Marriage and Family, 63,* (May), 295-308.

Homeyer, L. & Sweeney, D. (1998). *Sand tray: A practical manual*. Canyon Lake, TX: Lindan Press.

Huss, E. & Cwikel, J. (2005). Researching creations: Applying arts-based research to Bedouin women's drawings. *International Journal of Qualitative Methods, 4*(4), 1-16.

Iso-Ahola, S. (1999). Motivational foundations of leisure. In E.L. Jackson & T. Burton (Eds.), *Leisure Studies: Prospects for the twenty-first century* (pp. 35-51). State College, PA: Venture.

Izard, CE, & Buechler, S. (1980). Aspects of consciousness and personality in terms of differential emotions theory. In R. Plutchik & H. Kellerman (Eds*.), Emotion: Theory, research, and experience (Vol. 1, pp. 105-187*). San Diego, CA: Academic Press.

James, J.J. & Bixler, R.D. (2008). Children's role in meaning making through their participation in an environmental education program. *Journal of Environmental Education, 21*, 9-15.. *39(*4), 44-59.

Johnson, S. D. (1995, Spring). Will our research hold up under scrutiny*? Journal of Industrial Teacher Education*, 32(3), 3-6.

Jonassen, D. & Rohrer-Murphy, L. (1999). Activity theory as a framework for designing constructivist learning environments*. Educational Technology, Research & Development*, 47 (1), 61-79.

Kahn, P. H., & Kellert, S. R. (2002). *Children and nature: Psychological, sociocultural and evolutionary investigations.* Cambridge, MA: MIT Press.

Kals, E. & Ittner, H. (2003). Children's Environmental Identity: Indicators and behavioural impacts. In S. Clayton and Opotow, S. (Eds.). Identity and the Natural Environment. Cambridge: MIT Press, pp. 135-158.

Kaplan, R. & Kaplan, S. (1989*). The experience of nature: A psychological perspective.* New York: Cambridge University Press.

Karsten, L. (2002). Mapping childhood in Amsterdam: The spatial and social construction of children's domains in the city. *Journal of Economic and Social Geography, 93*(3), 231-241.

Keenan, T. (2002). *An introduction to child development*. Sage: Thousand Oaks, CA.

Kellert, S.R. (2005) Nature and childhood development. In S.R. Kellert (Ed.) *Building for Life: Designing and understanding the human-nature connection* (pp. 63-89). Washington: Island Press.

Kellert, S.R. (2002). Experiencing nature: Affective, cognitive and evaluative development in children. In Kahn, P.H. & Kellert, S.R. (Eds.), *Children and Nature: Psychological, sociocultural and evolutionary investigations* (pp. 117-151). Cambridge: MIT Press.

Kendrick, M. & McKay, R. (2004). Drawings as an alternative way of understanding young children's constructions of literacy. *Journal of Early Childhood Literacy, 4*(1), 109-128.

Kirkby, M. (1989). Nature as refuge in children's environments. *Children's Environments Quarterly, 3*(3), 52-69.*6,* 1-12.

Knapp, C.E (1989). Humanizing outdoor education--Exploring the affective domain. *Journal of Physical Education, Recreation & Dance, 60*(2), 40-43.

Knapp, C.E. (1992). *Lasting lessons: A teacher's guide to reflecting on experience.* Charleston: Clearinghouse on Rural Education and Small Schools.

Knapp, C.E. & Goodman, J. (1981). *Humanizing environmental education: A guide for leading nature and human nature activities.* Martinsville, IN: American Camping Association.

Korpela, K., Kytta, M. & Hartig, T. (2002). Restorative experience, self-regulation, and children's place preferences. *Journal of Environmental Psychology*, *22*, 387-398.

Kyle, G. & Chick, G. (2007). The social construction of a sense of place. *Leisure Sciences, 29*(3), 209-225.

Kylin, M. (2003). Children's dens. *Children, Youth and Environments, 13*(1), Retrieved October 2, 2007 from http://colorado.edu/journals/cye.

Kyttä, M. (2004). The extent of children's independent mobility and the number of actualized affordances as criteria of a child-friendly environment". *Journal of Environmental Psychology, 24*, 179-198.

Lee, S.H. (1999). The cognition of playground safety and children's play: A comparison of traditional, contemporary, and naturalized playground types. In M.L. Christiansen (Ed.), *Proceedings of the international conference of playground safety.* State College, PA: Pennsylvania State University.

Leont'ev, A.N. (1981). *Problems of the development of mind.* Moscow: Progress Publishers.

Leudar, I. (1991). Sociogenesis, coordination and mutualism. *Journal for the Theory of Social Behavior, 21,* 197-220.

Lewin, A., Taylor, C., & Gibbs, G.R. (2005).What is Qualitative Data Analysis (QDA)? Downloaded February 26, 2008 from: http://onlineqda.hud.ac.uk/Intro_QDA/what_is_qda.php

Lincoln, Y.S. (1990). The making of a constructivist: A remembrance of transformations past. In E.G. Guba (Ed.), *The paradigm dialog* (pp. 67-87). London: Sage Publications.

Lobovits, D., Epston, D. & Freeman, J. (undated). Expressive arts: Narrative therapy with children and their families. Downloaded January 23, 2008 from http://www.narrativeapproaches.com/narrative%20papers%20folder/art_therapy.htm/

Malchiodi, C.A. (2005). The impact of culture on art therapy with children. In E. Gil and A.A. Drewes (Eds.). *Cultural issues in play therapy* (pp. 26-71). New York: The Guildford Press.

Matthews, H. & Limb, M. (1999). Defining *an* agenda for the geography of children: review and prospect. *Progress in Human Geography, 23*(1), 61-90.

McGregor, A. (2005). Negotiating nature: Exploring discourse through small group research. *Area, 37,*(4), 423-432.

McHale, S.M., Crouter, A.C., & Tucker, C.J. (2001). Free-time activities in middle childhood: Links with adjustment in early adolescence. *Child Development, 72*(6). 1764-1778.

Milligan, C., & Bingley, A. (2007). Restorative places or scary spaces? The impact of woodland on the mental well-being of young adults. *Health and Place, 13*, 799-811.

Milton, K. (2002). Loving nature: Towards an ecology of emotion. Routledge: New York.

Mitchell, L.M. (2006). Child Centered? Thinking critically about children's drawings as a visual research method. *Visual Anthropology Review, 22*(1), 60-73.

Mizen, P. (2005). A little 'light work'? Children's images of their labor. *Visual Studies*, 20(2), 124-139.

Moore, R. C. (1986). The power of nature: Orientations of girls and boys toward biotic and abiotic play settings on a reconstructed school yard. *Children's Environments Quarterly, 3*(3), 52-69.

Myers, O.E., Saunders, C.D., & Garrett, E. (2003). What do children think animals need? Aesthetic and psychosocial conceptions. *Environmental Education Research, 9*(3), 305-325.

Nelson, K. (2007). *Young minds in social worlds: Experience, meaning and memory*. Massachusetts: Harvard University Press.

Nixon, W. (1997). How nature shapes childhood. *Amicus Journal*, *19*(2), 31-35.

Oberg, D. & Ellis, J. (2006). Theme: Researching with children and youth. *The Alberta Journal of Educational Research, 52*(3), 107-110.

Palmera, J.A., Suggateb, J., Bajdc, B., Hartd, P., Hoe, R.P.K., Ofwono-Orecho, J.K.W., Periesf, M., Robottomg, I., Tsaliki, T., Van Stadenh, C. (1998). An overview of significant influences and formative experiences on the development of adults' environmental awareness in nine countries. *Environmental Education Research, 4*(4), 445 – 464.

Patton, M.Q. (2002). *Qualitative research and evaluation methods.* Thousand Oaks, CA: Sage Publications Inc.

Phenice, L.A. & Griffore, R.J. (2003). Young children and the natural world. *Contemporary Issues in Early Childhood, 4*(2), p. 167-171.

Pollio, H.R. & Heaps, C. (2004). Themes in the human experience of nature. *Psychological Review, 110*(1), 145-172.*Reports, 94*, 35-47.

Pressley, M. (2006). Child and Adolescent Development for Educators. New York: The Guilford Press.

Ramirez, M. & Matthews, J. (2008). Living in the NOW: Young people from refugee backgrounds pursuing respect, risk and fun. *Journal of Youth Studies, 11*(1), 83-98.

Rasmussen, K. (2004). Places for children – children's places. *Childhood, 11*(2), 155-173.

Rathunde, K., & Csikszentmihalyi, M. (2006). The developing person: An experiential perspective. In R.M. Lerner (Ed.), *Handbook of child psychology* (pp. 465-515). New Jersey: John Wiley & Sons, Inc.

Roe, J.A. & Snodgrass, J. (1987). Emotion and the & Aspinall, P. (2011). The emotional affordances of forest settings: An investigation in boys with extreme behavioural problems . *Landscape Research, 36,* 1-18.

Rothe, J.P. (2000). *Undertaking qualitative research: Concepts and cases in injury, health and social life.* Edmonton: University of Edmonton Press.

Russell, J.A. (2003). Core affect and the psychological construction of emotion. *Psychological Review, 110*(1), 145-172.

Russell, J.A. (1980). A circumplex model of affect. *Journal of Personality and Social Psychology, 39*, 1161-1178.

Russell, J.A. & Snodgrass, J. (1987). Emotion and the environment. In D. Stokols & I. Altman (Eds.), *Handbook of environmental psychology* (pp. 245-280). New York: John Wiley & Sons.

Russell, J.A. & Lanius, U.F. (1984). Adaptation level and the affective appraisal of environments. *Journal of Environmental Psychology, 4*(2), 119-135.

Russo, M.F., Vernam, J. & Wolbert, A. (2006). Sandplay and storytelling: Social constructivism and cognitive development in child counseling. *The Arts in Psychotherapy, 33*, *229-237.*

Salmivalli, M. (1998).Children's environmental response inventory among Finnish adolescents. *Journal of Environmental Education, 29*(3), 49-55.

Scarantino, A. (2003). Affordances explained. *Philosophy of Science, 70*(5),949-961.

Schneekloth, L. H., (1989). Play Environments for Visually Impaired *Children. Journal of Visual Impairment and Blindness*, *83*(4), 196-201.

Schore, A. N. (2003). *Affect dysregulation and disorders of the self.* New York: W.W. Norton & Company, Inc.

Schultz, P.W., Shriver, C. Tabanico, J. & Khazian, A.M. (2004). Implicit connections with nature. Journal of Environmental Psychology, 24, 31-42.

Schwandt, T.A. (2001). *Dictionary of qualitative inquiry.* Thousand Oaks, CA: Sage Publications, Inc.

Scott, N.R. (1974). Toward a psychology of wilderness experience. *National Resources Journal, 14*, 231-238.

Sebba, R. (1991). The landscapes of childhood: The reflection of childhood's environment in adult memories and in children's attitudes. *Environment and Behavior, 23*(4), 395-422.

Seidel, J. (1998). Qualitative data analysis. *The Ethnograph v5 Manual, Appendix E*. Downloaded February 26, 2008 from: http://www.qualisresearch.com/

Siegel, R.D. (2010). *The mindfulness solution: Everyday practices for everyday problems.* New York: The Guilford Press.

Silvia, P. J. (2008). Interest, the curious emotion. Current Directions in Psychological Science, 17, 57-60.

Silvia, P.J. (2005). What is interesting? Exploring the appraisal structure of interest. *Emotion, 5*, 89-102.

Simmons, D.A. (1994). Urban children's preferences for nature: Lessons for environmental education. *Children's Environments, 11*(3), 28-40.

Sobel, D. (1996). Beyond Ecophobia. Massachusetts: Orion Society.

Sobel, D. (1993). *Children's special places*. Tucson: Zephyr Press.

Solms, M., & Turnbull. O. H. (2002), The Brain and The Inner World: An Introduction to the Neuroscience of Subjective Experience. New York: Other Press/Karnac Books.

Soper, K. (1995). What is nature? Oxford: Blackwell Publishers, Inc.

Steele, W. (2003). Using drawing in short-term trauma resolution. In C.A. Malchiodi (Ed.), *Handbook of art therapy* (pp. 139-150). New York. Guilford Press.

Stoffregen, T.A. (2000). Affordances and events. *Ecological psychology, 12*(1), 1-28.

Strauss, A.L. & Corbin, J. (1998). *Basics of qualitative research: Techniques and procedures for developing grounded theory*. Thousand Oaks, CA: Sage Publications, Inc.

Sullivan, G. (2005). Art practice as research: Inquiry in the visual arts. Thousand Oaks: Sage Publications.

Tapsell, S., Tunstall, S., House, M., Whomsley, J., & Macnaghten, P. (2001). Growing up with rivers? Rivers in London children's worlds. *Area, 33*(2), 177-189.

Terrible, R.S. (2000). An annotated bibliography of literature concerning children and their knowledge of the environment. *Journal of Planning Literature, 14*(3), 489-498.

Tesch, R. (1990). *Qualitative research: analysis types and software tools, Volume 337.* London: RoutledgeFarmer.

Tinsley, H.E.A. & Tinsley, D.J. (1986). A theory of the attributes, benefits and causes of leisure experiences. *Leisure Sciences, 8,* 1-45.

Thurber, C.A. & Malinowski, J.C. (1999). Environmental correlates of negative emotions in children. *Environment and Behavior, 31*(4), 487-513.

Tolman, C. (1999). Society versus context in individual development: Does theory make a difference? In Engestrom, Y, Miettenin, R., & Punamaki, R. (eds.) *Perspectives on Activity Theory (pp. 70-86*). NY: Cambridge University Press.

Turner, B. (2005). *The handbook of sandplay therapy*. California: Temenos Press.

Turner, S. A. & Silvia, P. J. (2006). Must interesting things be pleasant? A test of competing appraisal structures. *Emotion, 6*, 670-674.

United Nations Office of the High Commission of Human Rights (2003). Convention of the Rights of the Child, downloaded from http://www.unhchr.ch/html/menu3/b/k2crc.htm on November 6, 2007.

Vadala, C.E., Bixler, R.D., & James, J.J. (2007). Childhood play and environmental interests: Panacea or snake oil? *Journal of Environmental Education, 39*(1), 3-17.

Valentine, G. & McKendrick, J. (1997). Children's outdoor play: Exploring parental concerns about safety and the changing nature of childhood. *Geoforum, 28*(2), 219-235.

Valsiner, Jaan (1984). *The Childhood of the Soviet citizen: Socialization for Loyalty*. Ottawa: Carleton University Press.

Verbeek, P. & de Waal, F.B.M. (2002). Experiencing nature: The primate relationship with nature: Biophilia as a general pattern. In Kahn, P.H. & Kellert, S.R. (Eds.), *Children and Nature: Psychological, sociocultural and evolutionary investigations* (pp. 117-151). Cambridge: MIT Press.

Vygotsky, L. (1962). Thought and language. Cambridge, MA. MIT Press.

Vygotsky, L. S. (1978). Mind in society: The development of higher psychological processes. Cambridge, MA: Harvard University Press.

Wals, A.E.J. (1994). Nobody planted it, it just grew! Young adolescents' perceptions and experiences of nature in the context of urban environmental education. *Children's Environments*, *11*(3), 177-193.

Weinrib, E. (1983). *Images of the self: The sandplay therapy process*. California: Temenos Press.

Wells, N. M. (2000). At home with nature: Effects of "greenness" on children's cognitive functioning. *Environment and Behavior, 32*(6), 775-795.

Wells, N. M., & Evans, G. (2003). Nearby nature: A buffer of life stress among rural children. *Environment and Behavior, 35*(3), 311-330.

Wikipedia (nd). Equifinality. Downloaded July 21, 2010 from (http://en.wikipedia.org/wiki/Equifinality.

Wikipedia (nd). Construct. Downloaded July 21, 2010 from http://dictionary.reference.com/browse/construct).

Wikipedia (nd). Definition. Downloaded July 21, 2010 from http://dictionary.reference.com/browse/definition.

Wilson, K., & Ryan, V. (2005). *Play therapy: A non-directive approach for children and adolescents*. Toronto: Elsevier.

Wyndham, F.S. (2010). Environments of learning: Rarámri Children's plant knowledge and Experience of Schooling, Family and Landscapes in the Sierra Tarahumara, Mexico. *Human Ecology, (38)*, 87-99.

Yamashita, S. (2002). Perception and evaluation of water in landscape: use of photo-projective method to compare child and adult residents' perceptions of a Japanese river environment. *Landscape and Urban Planning, 62*, 3-17.

Yuen, F.C. (2004). "It was fun…I like drawing my thoughts": Using drawings as part of the focus group process with children. *Journal of Leisure Research, 36*(4). 461-482.

Appendix A

Interview Guide

The following questions will provide the basis for eliciting responses. Further probes will be used depending upon the child's response to the questions.

1. Tell me about your picture/photograph/sand tray?
    a. What was important about _____ (specific element in the photo/drawing/sand tray)? How did you choose to include this?
    b. Is there anything that you would have taken a photograph of/drawn about/or put in your sand tray that you did not for some reason?
2. What does your picture/photograph/sand tray say about what is important in your experience of nature earlier today?
3. What does your picture/photograph/sand tray tell about what you saw, heard, felt, tasted, and smelled while you were out in nature earlier today?
4. What does your picture/photograph/sand tray tell about what you think about your experience in nature earlier today?
5. What does your picture/photograph/sand tray tell about what emotions/feelings you experienced during your time in nature earlier today?
6. What activities were you doing in nature that are important?
7. What do you think you will remember the most about your experience in nature earlier today? What will you tell your parents/siblings/friends about your experience at the Garden today?
8. If you had to sum up what was most important about your experience in nature earlier today in one word or sentence – what would it be?

Appendix B: Newspaper Advertisement Recruiting Participants

Appendix C

UNIVERSITY OF ALBERTA

Faculty of Physical Education and Recreation

E488 Van Vliet Centre
Edmonton, Alberta, Canada T6G 2H9

Research Consent Form

Title of Study: The Acorns from Which Great Oaks Grow: Uncovering the Affective, Cognitive, Behavioral and Sensate Experiences of Children in Nature

Principal Investigator: Cara Linzmayer, PhD Candidate
Faculty of Physical Education, Recreation and Leisure Studies
University of Alberta
caral@ualberta
(780) 643-7224

Introduction

We invite you to take part in a research study being conducted by Cara Linzmayer, who is a PhD Candidate at the University of Alberta. Your participation in this study is voluntary and you may withdraw from the study at any time. The study is described below. This description tells you about the risks or inconvenience which you might experience. Participating in the study will provide a recreational opportunity for your child to be out in nature and it will be helpful to the research by informing the research in the are of children and nature. You should discuss any questions you have about this study with Cara Linzmayer.

Purpose of the Study

This study aims to explore how children experience nature. Little is known from a child's perspective how or what they experience when they are in nature. This knowledge can inform a diverse range of disciplines by providing a deeper understanding of what is important to children and how children construct meaning out of their experiences in nature. This study also employs methods that encourage and allow children to communicate their experiences through visual arts. The natural environment selected for this study is Devonian Botanic Gardens, which is located on Highway 60, north of Devon, Alberta.

Study Design

Families will be invited to participate in an introductory meeting prior to the camp to discuss the study, obtain consent and answer any question. Families will also be asked to complete a short interview to give the researcher a short history on family background. Child participants will participate in a summer camp for five days from July 14-18th

(Monday to Friday) from 9:30 am – 2:00 pm.

Who can participate in the study?
We are recruiting children aged 6 to 10 years of age that are able to attend the camp at Devonian Botanic Gardens.

Who will be conducting the research?
The principal investigator is Cara Linzmayer who is a registered Social Worker and a PhD Candidate at the University of Calgary. The data will be analyzed only by Cara Linzmayer. The data will be stored for a minimum of five years and destroyed after this time.

What will you be asked to do?
You will first be asked to provide your consent after reading this form. The first interview that
you will be asked to complete will be a demographic interview. During this interview Cara will ask you questions about where you live, your family composition, educational background and occupational status. This information is important so that the results can be applied to the appropriate groups. Your child will be asked to attend a summer camp at Devonian Botanic Gardens from July 14- 18th, from 9:30 am to 2:00 pm. Children will be given an hour of free time in the morning following which they will be asked to engage in an art activity that involves creating a picture in a sandbox, drawing a picture, or taking photographs of their experience. These pictures will then provide the basis of a 30 minute interview between Cara Linzmayer and your child each day. While each child is being interviewed, the remaining four children will be engaged in another activity or craft supervised by a research assistant who has experience working with children of this age. On the final day, all children and the researcher will engage in a joint art activity where they produce an artistic representation of their week at camp.

Possible Risks and Inconveniences, and Benefits
There are no known or anticipated risks. Children will be closely supervised with the adult to child ration being 2:5. The only inconvenience anticipated is the requirement of having to provide transportation to the Gardens (which are located in a rural area) and meals for your child. The direct benefits of participating in the current study include an opportunity for your child to engage in free-time exploring a garden setting and art activities which are fun and engaging activities for children. This should be a fun experience for your child. Another benefit is that their participation will inform the academic and professional communities on children's experience in nature.

Compensation/Expense Reimbursement
Each child participating in the study will receive a $25.00 gift certificate for Chapters Book Store. . Families will be expected at their expense to provide transportation to and from the Gardens and to provide a lunch, snacks and a drink for their child each day. The

families will incur no other expenses for their child attending the camp as the cost of all materials and admission into the Gardens will be covered by the researcher.

Confidentiality and Anonymity

Anonymity will be achieved through the assignment of a participant code after providing consent.

The data will only be analyzed by Cara Linzmayer, and will be stored for a minimum of five years. You will not be identified in any reports or publications of this study.

Questions

You may have your questions addressed at any time privately by contacting the researcher whose phone number and e-mail address are listed at the beginning of this consent form. You will receive a copy of this form for your own records.

Problems or Concerns

In the event that you have any difficulties with, or wish to voice concern about, any aspect of your child's participation in this study, you may contact the University of Alberta's Research ethics board , for assistance (780) 492-1000.

Consent

Part 2 (to be completed by the parent/guardian)

Do you understand that you have been asked to be in a research study?	Yes	No
Have you read and received a copy of the attached Information Sheet	Yes	No
Do you understand the benefits and risks involved in taking part in this research study?	Yes	No
Have you had an opportunity to ask questions and discuss this study?	Yes	No
Do you understand that you are free to refuse to participate, or to withdraw from the study at any time, without consequence, and that your information will be withdrawn at your request?	Yes	No
Has the issue of confidentiality been explained to you? Do you understand who will have access to your information?	Yes	No

This study was explained to me by:

I agree on behalf of myself, my family, and my child to participate in this study:

Signature of Parent/Guardian	Date
Printed Name	Name of Child
Signature of Child Research Participant	Date of Birth

I believe that the person signing this form understands what is involved in the study and voluntarily agrees to participate.

Signature of Investigator or Designee	Date

Photo Consent

Throughout the research camp, your child will be taking photographs and I may be taking photographs of your child during his/her interaction with nature. I will also be videotaping the creation of the group mural in order to both participate in and observe the process. I ask that you consider whether this is appropriate for your child and sign the following:

_____ I hereby give my consent for photographs taken by my child to be used for the research purposes. Copies of photographs will be made, digital photographs will be taken of the children's drawings and sand tray. These photographs will be used us a memory and reflective aid for the researcher only.

_____ I hereby give my consent for Cara Linzmayer to taken photographs of my child interacting with nature for the sole purposes to be used as a memory and reflective aid in the research.

_____ I hereby give my consent for Cara Linzmayer to videorecord my child's participation in the group mural. I understand that this videorecording will be reviewed by Cara Linzmayer and her research assistant immediately following the mural process. Cara will be making notes of her observations and the videorecording will subsequently be erased.

Parent's Name: _____

Parent's Signature: _____

UNIVERSITY OF ALBERTA

Faculty of Physical Education and Recreation

E488 Van Vliet Centre
Edmonton, Alberta, Canada T6G 2H9

Child Assent Form

My name is _____. I agree to participate in the research study entitled "The Acorns from Which Great Oaks Grow: Uncovering the Affective, Cognitive, Behavioral and Sensate Experiences of Children in Nature". I understand that this research will be carried out by Cara Linzmayer, a PhD student from the University of Alberta**.**

I know that Cara will be observing me and interviewing me on my experiences in nature at a Botanic Garden.

I know that she will write about what she sees, learns, and wonders about from watching me and talking with me. I know that she and I will talk about my experiences in nature.

I know that when our conversations are typed that me and my parents will talk about them and will be given copies.

I also know that she will make copies of my photographs and take photographs of my drawings and sandtrays to help her remember what I made but that my drawings, photographs and sandtray pictures will not be published.

I know that I will be making a mural with Cara, her research assistant and the other four children that are participating in this research and that this mural may be shown to other people. Cara will check with me and everyone else making the mural after we are done to make sure it is still okay to show this mural to other people.

I am aware that she will write papers and go to local, national and international conferences to share what she is learning from our work together. I know that when she writes or talks about me, she will not tell my name.

Cara has talked with me about this research. She has answered my questions. I know that I can stop doing the research at any time and I will not get into trouble and anything I have said or given to her will be destroyed.

My mom and/or dad have said it is okay for me to answer questions on my experiences in nature and on the photographs, drawings and sandtray pictures I make about my experiences in nature. I know I don't have to answer any question I do not want to answer.

I understand what I am being asked to do to be in this study, and I agree to be in this study.

_____ _____

Signature Date

_____

Witness

For further information concerning the completion of this form, please contact Dr. Elizabeth Halpenny, Cara's supervisor, at the University of Alberta at Tel: 780-492-5702 or Elizabeth.halpenny@ualberta.ca.

The plan for this study has been reviewed for its adherence to ethical guidelines and approved by the Faculty of Physical Education & Recreation Research Ethics Board at the University of Alberta. For questions regarding participant rights and ethical conduct of research, contact the Chair of the Research Ethics Board at Phone: 780-492-1000.