DESIGNING LEARNING ENVIRONMENTS FOR CHILDREN:

AN AFFORDANCE-BASED APPROACH TO PROVIDING DEVELOPMENTALLY APPROPRIATE SETTINGS

by
Janet Loebach

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ABSTRACT

This thesis explores the potential of a developmental-affordance framework for designing learning environments for children that are more congruent with their environmental perception and behaviour, and which can more effectively support learning and development. Specifically this paper focuses on the design of school settings which facilitate developmentally-significant play experiences for children.

A developmental-affordance framework recognizes children's functional interpretation of their environments as well as the influence of development on children's environmental needs and behaviour. This approach uses the distinctive patterns of children's environmental perception and behaviour to suggest functional opportunities that can be embedded within the physical environment to support their unique interests. The potential of this framework is explored by determining the affordances for play experiences conducive to the development of a healthy self-concept. A developmental-affordance model is found to be a viable framework for the design of environments that are more supportive of children's learning and developmental needs.

ACKNOWLEDGEMENTS

To

my family
for their love, encouragement and frequent care packages

Mike, Melanie, Allegra, Jen, Samantha and Juliana
my Halifax cheerleaders and coffee buddies

the Fireball Club
for constant laughs and inspiration

Joan, Patricia, Christine and Sarah
for guidance and perspective

Introduction

This thesis will focus on a framework for designing physical settings for play and other child-initiated activities within school environments. Play environments for the purposes of this paper will include all spaces in the school where children may have opportunities to choose and direct their own activities, including classrooms, libraries, quiet rooms and other indoor and outdoor gathering or recreational spaces. *Specifically, this thesis will explore the suitability of a Developmental-Affordance model for providing physical environments which support the self-directed, developmentally-significant play activities of children within the context of their school facilities.*

Chapter 1 will establish the importance of supportive educational facilities for children, and the role of physical environment in meeting this objective. It will also explore the value of providing environments for rich play experiences as a mechanism for learning and development.

To establish a theoretical basis for an effective design framework, Chapter 2 considers theories from various disciplines which have examined the child-environment relationship, and works to synthesize these contributions to better reflect children's environmental perception and use. Behavioural research suggests that children attend to features in their physical environments that suggest functional opportunities, or affordances, that support their intentions. Subsequently, this section explores the potential of an affordance-based model for the foundation of a new framework in order to acknowledge this unique interpretation.

Though recent studies have reinforced the notion that children's environmental perspective is fundamentally functional in nature, little research to date has acknowledged that their interests, and therefore environmental needs, change as they develop. This developmental component must be included in any design framework if it is to effectively support the behaviour of all children. Chapter 3 therefore considers the role of development in both motivating and influencing children's interactions and outlines the play activities of interest during each developmental stage of childhood.

A review of the 'special places' that children create for their play and restorative activities also suggests that they will actively seek out play opportunities that help them reach their developmental goals. This pattern indicates that there are specific environmental features and conditions that children will perceive as being supportive of particular play or restorative activities. The Developmental-Affordance framework is summarized as an approach to understand and provide physical environments that children consider to be supportive of their shifting learning and development needs.

Chapter 4 outlines the lessons about supportive physical environments that we can learn from children's 'special places' and other favourite settings and activities. This section explores the value of less structured, affordance-rich environments as a way of providing diverse play experiences and increasing the flexibility of settings for children. Facilities designed by two prominent architects will illustrate how it is possible to incorporate 'incentives' into the built environment that suggest rich opportunities for imaginative and developmentally stimulating play.

Chapter 5 will provide an example of how a Developmental-Affordance framework may be used to program and design school environments that support valuable play experiences. This approach will be employed to suggest physical features or conditions that afford the experiences that are conducive to a specific childhood goal, the development of a healthy self-concept. Developmental and environment-behaviour research will help to define the activities that support this development. Patterns of environmental use and preference will be used to suggest the associated affordances that can facilitate these interactions for children at different developmental levels. Examples from contemporary schools will illustrate how these opportunities can be incorporated into the physical form of the facility to create more supportive learning environments for children.

1 Children and the Physical Environment

He bent down and vigorously swung the tire back and forth many times, as a baseball pitcher winds up before he throws the ball. Then, with a final energetic swing, he released the tire.

He watched it intently as it rolled almost to the other end of the hall. When it stopped against the baseboard, he ran unevenly after it. He scooped it up and with the same motion rolled it back toward the north end of the corridor.

He began running after it as soon as the tire left his hand. He headed to the north end of the hall just as the tire gave its last turn and flopped on its side. Without a pause and panting heavily, he swooped down and picked it up. He swung his arm far back and with a wide, smooth, deliberate movement threw the tire.

Standing motionless, Raymond watched the tire roll down the corridor in a perfectly straight line and bounce against the south door. Then he turned to me with a look on his face at once proud and expectant.

"That's the best yet," I remarked.

Raymond smiled contentedly but said nothing.

~ Excerpt from "One Boy's Day"
Barker & Wright, 1951, 76

At first glance, this account of a young boy playing a game of his own invention may be taken as a charming yet unremarkable event. Most adults can likely remember similar experiences in their own childhoods, where found objects or places inspired numerous games and adventures. However, this brief story, particularly because it *is* typical, provides remarkable insight into the needs and behaviour of children, and the role of the physical environment in accommodating them. It tells of a child who perceives and takes advantage of a simple yet powerful opportunity in his environment to advance his own knowledge and capabilities through the medium of play. The practice and eventual mastery of this playful interaction instills a sense of pride and accomplishment, strengthening his sense of self worth. In this case, the physical environment is instrumental in both suggesting and supporting a rich learning experience.

There is little doubt that childhood is the stage of life during which humans make the largest and most significant advances in both learning and development. Several disciplines are dedicated to understanding how children acquire skills and knowledge during this time, and develop into healthy, competent individuals. However, much less is known about how children perceive their environments, and utilize them to meet their unique goals. Research has focused to some degree of the influence of the social environment on children's behaviour, but the investigation of their interdependent relationship with the physical environment is still in its infancy. Understanding this latter interaction has tremendous value; caretakers and designers would be able to fashion more meaningful and appropriate physical settings for children, which could support and even facilitate essential childhood activities and experiences. The physical environment of children's homes, schools and playgrounds has the potential to be wielded as an instrument for learning and development. However, in order to move towards this goal, we must improve our understanding of children's perception and use of their physical settings, and how these environments influence their behaviour and development.

1.1 Influence of the Physical Environment

There has been increasing recognition during the last half century that children's environments play a considerable role in their development and well-being. Psychologists Bloom and Deutsch contend that a child's intelligence and development can be "dramatically affected by the child's experience and his environment, especially in early ages" (Sanoff, Sanoff & Hensley, 1972, 2). Not only are they prone to being influenced by their experiences and interactions, children's behaviour may in fact be strongly influenced by their surroundings. Clare Cooper Marcus, who has been studying children's settings for several decades, suggests "children are more deeply affected by the environment than any other age group", and stresses that they could be subject to physiological or psychological harm if they continually encounter barriers to engaging in play activities or exploring their environments (1986, 109). Recent theories have also emphasized that environmental influence is not strictly social in nature. Proponents of 'place identity' theory, for example, stipulate that children are as shaped by their

physical environments as they are by their social settings; both types of interactions can contribute to their growing sense of self (Maxwell, 2003).

Researchers from several disciplines have worked to ascertain the exact nature of environmental influence on the behaviour and well being of adults and children. A growing body of research validates the notion that the physical environment has a powerful effect on all human beings. It has become clear that settings are capable of communicating information regarding context and desirable behaviour to their potential users (Wolff, 2002). "Space allocation, design and the availability of materials convey messages of acceptance or rejection of individual interests and values, strengths and capabilities, ethnicity, gender and lifestyle" (Feinberg, Kutchner & Feldman, 1998, 30). Both adults and children are subject to these signals, though the messages communicated to children are not necessarily the same ones received by more mature persons. Several researchers have asserted that "children perceive physical space differently than adults do" (Ahrentzen & Evans, 1984, 459; Maxwell, 2000). If their environmental perception is unlike that of their parents or teachers, it is likely that children experience and respond differently to environmental conditions as well.

Children are, in fact, well aware of their environments, and express preferences for settings that are often very distinct from those valued by adolescents or adults (Maxwell, 2003). Children as young as 4 or 5 years have been able to distinguish and select among environmental characteristics (Cohen & Trostle, 1990). Lackney states, "preference for an environment leads to motivation to interact with the environment, which leads to learning" (2000, 1). Therefore, recognizing that children's perception of, and partiality for, physical settings can vary considerably from adults is crucial to providing environments that will attract and engage them in learning and developmental activities. Children's susceptibility to environmental influence also suggests that they would be among those who would benefit the most from physical settings that are designed to support their needs and behaviour.

However, to provide appropriate settings for children, we must understand more than just the manner in which children interpret their physical surroundings. We must also

appreciate the nature and purpose of their environmental interactions, and its variation by developmental level. For example, there is considerable evidence that children at the various stages of childhood perceive their physical and social environments differently, and will use them to serve current developmental objectives (Becker, 1976; Wohlwill & Heft, 1987). Therefore, in order to design environments that are congruent with their specific needs and intentions, we must be cognizant of children's changing relationship with their environments throughout the course of childhood.

1.2 Designing Supportive Physical Environments for Children

Effective environmental design relies on a high degree of compatibility between the characteristics of the setting and the behaviour of the users (Wohlwill & Heft, 1987). This concept, known as 'environmental fit', is the state where the environmental conditions are well suited to the intentions or actions of the inhabitant. Stine suggests that humans can usually pinpoint when there is a lack of congruency between an environment and their desired behaviour. People may experience physical discomfort or may feel they are not able to maneuver easily through their activities or through the physical space itself (1997). These sensations, whether registered consciously or unconsciously, indicate a lack of support from the immediate environment for activities or interactions. In the case of children, achieving 'fit' is of even greater concern due to the potential behavioural influence of environmental factors, as well as the relationship between environmental experiences and development. Children are also living, playing and learning in a fundamentally adult world. They often have little choice in choosing or manipulating their settings, which were likely set up for the comfort and functionality of adults (Proshansky & Wolfe, 1974). For these reasons, a critical aim in the design of children's environments is to maximize the degree to which the setting suits the environmental behaviour, preferences and goals of children.

To achieve this objective, any framework for the design of children's environments must incorporate three vital components:

i. Children's perception and interpretation of their physical environments
ii. The influence of the physical environment on children's behaviour
iii. The motivations behind children's environmental interactions

This task may be even more difficult than it sounds. Though research has revealed some of patterns of children's preferences for various types of places, less is known about the "specific physical characteristics of these places, and what these characteristics mean to them" (Maxwell, 2003, 2). This thesis is therefore in part an attempt to clarify the meaningful way in which children view and utilize their physical environments, and highlight the features and conditions that can facilitate engagement in valuable learning and developmental activities. These environmental needs and preferences can then be made integral to both the design framework and the physical form of children's settings themselves, thereby creating more appropriate and supportive physical environments for their use.

The environments that warrant the most attention are those in which children spend the majority of their time, namely their homes, learning settings and play areas. This thesis will focus on the design of more effective educational facilities for children, in part because of the vital role they play in fostering learning and overall development. Schools and other learning institutions are also of special concern due to the considerable amount of time spent in these settings during the course of childhood, and the degree to which they influence children's ability to learn and develop effectively (Sanoff, 1994). Gump and Sanoff agree that the quantity is "so significant that it is important to recognize that much of this time is devoted to living as well as learning. The quality of this living, therefore, is an important matter" (Sanoff, 1994, 1; Gump, 1987). As a result, besides the role of the educational facility in supporting formal learning goals, these environments must also be able to nurture the development of the whole child – physically, socially, intellectually and emotionally.

This objective suggests that in addition to building proficiency in math, reading or geography, schools must also foster critical childhood developments such as the formation of social ties with peers and the evolution of a healthy self-concept. These

developments can be advanced through formal curricular activities but also during the unstructured, freely chosen play experiences of children which complement more structured lessons. However, each type of activity may require particular kinds of environmental support. Providing accommodating physical environments for both curricular and play activities allows learning and development opportunities to be extended into all of a child's daily school experiences, and increases the facility's overall level of congruency with the diverse needs and intentions of all its students.

Unfortunately, the physical settings of many contemporary learning facilities are primarily designed according to administrative and economical guidelines; they may exhibit a high degree of 'fit' from an adult perspective, but frequently conflict with the learning behaviour and developmental goals of its young users (Lackney, 2000; Sanoff, 2000). As well, Roger Hart claims that much of the research, up to the 1970s and 80s, that sought insight into children's play and learning behavior actually paid little heed to the places and settings used by the children during their activities. He also suggests that the majority of the work that has in fact studied children's built environments has focused on the degree to which these settings supported the institution's goals rather than those of the children (in Lackney, 2000).

These observations suggest that there is a need for a new, more informed approach to conceptualizing and design learning environments for children - one which reflects the ways in which children interpret and use their physical environments, and the unique learning and developmental goals that motivate many of their environmental interactions. It is the intention of this thesis to develop and explore the potential of a new design framework aimed at providing physical settings that are more congruent with the diverse needs and interests of children at various levels of development.

As mentioned earlier, there are two main activity categories within the context of learning environments – those that are directed by teachers within a structured curricular program, and the informal activities that children undertake of their own initiative primarily in the form of play. Both types have the potential to foster developments in physical, cognitive, social and emotional areas, and would therefore

benefit from effective environmental support. The educational philosophy of the school substantially influences the degree to which the child is engaged in each type of activity, and the freedom they have to choose and shape their own experiences. However, there are many educational models in use in contemporary schools, which can exhibit enormous differences in teaching style, classroom and facility use, and the degree of child-directed activities. Though physical settings can be designed to bolster curricular objectives, these environmental supports must be considered in conjunction with the particular educational approach. An investigation of this type would be extremely valuable but also considerable in magnitude.

However, children in almost all learning institutions have opportunities during the course of their school day to engage in play and restorative activities of their own choosing. Though there are substantial variations from one model to the next in the amount of time allotted for these activities, and the settings and materials available during such unstructured periods, these child-directed play experiences can be considered somewhat independently from the educational program of the school. Exploring children's play needs within these settings is therefore a more suitable investigation for this paper. Play activities are also valuable to consider as they are freely chosen by children and may provide a more accurate picture of their interests and behaviour, and how these change as children develop. Supportive play settings can substantially increase the ability of school environments to nurture the learning and development of their young students.

1.3 Learning Environments for Children

Our attempts to design child-rearing spaces have, for the most part, been too narrow and timid. We think about climbing structures and child-sized furniture, but we do not think about the total child-rearing environment and its ultimate purpose.

~ Prescott, E., in Stine, 1997, 6

In order to design more supportive learning and play environments, we must understand the experiences by which children accumulate knowledge, capabilities, and

awareness, as well as the role of the physical setting of the school in these developments. Many disciplines have made important contributions to this objective. Developmental and child psychology, early childhood education research, and environment-behaviour disciplines have all come to recognize the role of children's environments in supporting learning and development. Studies in the last few decades reflect an increasing focus on learning settings; a growing body of interdisciplinary research is working to determine the components and opportunities necessary for a supportive educational environment. Studies to establish patterns of student behaviour, environmental preferences, and the impact of the physical setting on behaviour, are all aiming to improve educational facilities through design and policy changes.

Studies find that the overall quality of school facilities is strongly associated with the health and performance of students, a notion still not fully recognized by parents, school administrators and even some designers. Sanoff notes that "widespread misconceptions reinforce the view that the quality of the school buildings has no impact on academic performance" (2000, 2). However, studies suggest that children in higher quality centers showed "more advanced communications skills and verbal intelligence, and more positive social behaviour and task orientation" (Sanoff, 1994, 7). This research suggests that the caliber of the learning facility influences both academic and social activities.

There has also been increasing focus on the effects of specific components of the environment on the learning behaviour of children. Several studies conclude that the level of ambient noise and other background conditions in a classroom setting impedes learning for some students, and impacts their development in a broader sense if exposed to excessive auditory stimulation over a long period of time (Wohlwill & Heft, 1987). Research by Sommer and his colleagues regarding the impact of "soft classrooms" on student behaviour suggests that features such as comfortable seating and foliage are associated with better student attendance and participation, as well as more positive attitudes towards the class, the instructor and classmates (Sommer & Becker, 1974; Sanoff, Sanoff & Hensley, 1972; Sanoff, 1994).

These studies illustrate that even minor changes to the design of a learning facility contribute to changes in the behaviour of students, including the degree of interaction with learning materials and peers (G.T. Moore et al, 1986; Sanoff, 1994). This sample of research also suggests that the environmental conditions of the learning setting impact both the behaviour and development of its student users. Not only is it critical to understand these behavioural effects in order to minimize negative reactions, but to recognize that an informed understanding of the relationship between children's learning needs and the physical environment could lead to the design of more effective educational facilities.

1.3.1 Children's Learning Behaviour

The recognition of children's needs and learning processes is a pre-requisite to the formulation of goals for a child development program.

~ Sanoff, Sanoff & Hensley, 1972, 2

In designing effective environments that support children's learning and development, it is not enough to strictly consider the features of the setting that support specific activities or affect concentration and performance. Getzels emphasizes that "the [learning environments] we envision for our children represent not only conceptions of spaces for learning, but also our conceptions of the learner" (1974, 11). Schools and other learning institutions must also reflect an informed understanding of how children learn and develop, and the role of the physical setting in facilitating these processes.

During the 20th century there were substantial changes in the conception of the young learner (Brown & Campione, 1996; Bransford, Brown & Cocking, 2000). Learning was once considered a "primarily passive activity" and learners themselves were perceived to be "empty organisms, responding more or less randomly to stimulation" (Brown & Campione, 1996, 289; Getzels, 1974, 4). This perception falls under a deterministic model, which suggests that a specific response, or learning objective, is produced by introducing specific stimuli into the learner's perceptual environment. However, the intentions of the individual are not considered as a factor in this interaction. If this model were accurate one would expect all children to learn the same concepts through

the same methods, regardless of the needs or capabilities of the specific child (Bransford, Brown & Cocking, 2000). Advances in the perception of both the learner and the learning process advise that this is not the case.

This early theory of learning fueled the dominant belief of most early 20th century psychologists and educators in the "tabula rasa", the notion that people are born with minds like 'blank slates' that are filled in when exposed to information or stimuli (Bransford, Brown & Cocking, 2000, 79). Piaget was one of the prominent theorists in childhood development who shepherded the move away from this concept, demonstrating that children are active participants in their own learning (1972). Subsequent studies by child psychologists indicate that even infants perceive and, in fact, seek out stimuli in their environment that promote intellectual development (Bransford, Brown & Cocking, 2000). Gradually, a vision of children as proactive agents in their own learning processes emerged. The prominent belief is now that childhood is a time of "active and continuous learning", a great deal of which is initiated and directed by the child, often during play, and which can be affected by numerous environmental factors (White, 1959, cited in Parke, 1978; Bransford, Brown & Cocking, 2000).

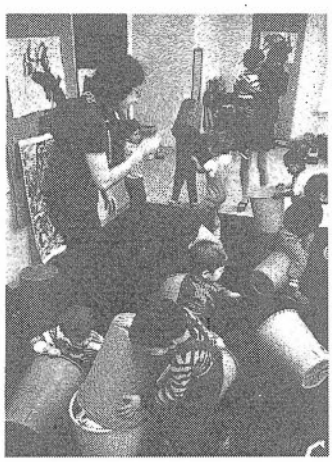
1.3.1.1 Play as a Learning Tool

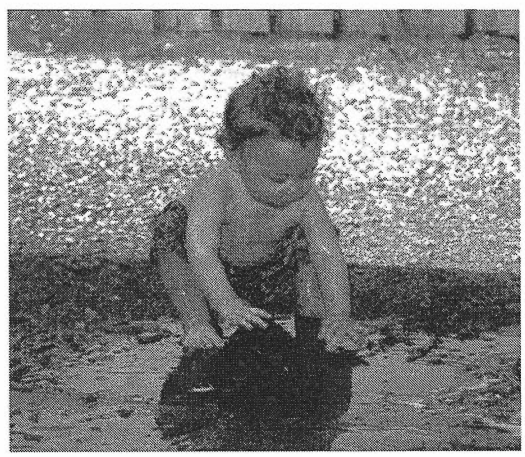
Child specialists now acknowledge the crucial contribution of play activities to children's development, and its role as a principal facilitator of the learning process (Kielhofner, 1995; R. Moore, 1986; Cooper Marcus, 1986; Wohlwill & Heft, 1987). Children engage in a range of play activities, from those that promote primarily motor skills, to more complex modes of pretend play which also stimulate cognitive and social development. Particular types of play activities are often characteristic of certain periods of childhood and are considered to facilitate different developments. Children choose occupations and interactions that correspond to their current level of capabilities, but which also drive the development of more challenging skills (R. Moore, 1986; G.T. Moore, 1987; Loebach, 2002). Over the course of childhood, a single child will undertake an assortment of activities to foster shifting developmental goals, which will likely be different from those chosen by their younger or older peers. Studies of children and their play activities reinforce these notions, and suggest that a diverse set of play

activities and settings is required in order to meet the needs of individual children and of differing age groups (G.T. Moore, 1987; Sanoff, 1994).

The study of play activities also sheds light on children's intrinsic motivations and patterns of behaviour. Observations reveal that children are inherently curious, and will explore their world without being prompted by adults (Barth, cited in Getzels, 1974; Bransford, Brown & cocking, 2000). Tan asserts that if adults let children play freely, they will "organize games, invent stories, imitate adult behaviour, and so in these ways broaden their world" (1978, 12). These studies have helped to confirm the perception that children innately play an active role in their own growth, and aren't entirely dependent on physical or social stimulation to initiate developmentally supportive activities.

Although children seek out stimulating encounters of their own accord, the conditions for an effective or rich learning experience will not necessarily be available to them. DeVries & Kohlberg emphasize that an interactive component is essential for learning, claiming, "children acquire knowledge best by construction rather than instruction" (1990, cited in Staley, 1998, 20). Children come to grasp and understand concepts regarding their environments and themselves by manipulating objects and experimenting with situations, and in an incredibly proactive fashion (See Figs. 1.1 and 1.2) (Staley, 1998). "Children learn with their whole body... Anything that can be moved, turned, poked or manipulated will be" (Feinberg, Kutchner & Feldman, 1998, 32). Unlike many adults, children actively explore using a number of their senses, and come to understand a concept or feature by testing





Figs. 1.1 and 1.2: Hands-On Learning

it in a variety of ways (Piaget, 1972; G.T. Moore et al, 1979). An interactive learning experience also requires feedback on the consequences of one's manipulative actions; comprehension is facilitated when children can monitor and assess the outcome of their experiences (Bransford, Brown & Cocking, 2000). Caretakers, educators and designers must therefore recognize a child's need to interact with, manipulate, and absorb a wide range of settings in an experiential manner. Though hands-on environmental play has substantial educational value, this mode of learning is not always available to children within the context of their curricular activities, making rich, interactive play experiences during the school day that much more valuable.

1.3.1.2 Limitations on Play

Play is an incredibly valuable learning and development tool for children, but both the physical and social environment can affect the degree to which they have the opportunity to carry out these developmentally-supportive activities, in any of their primary settings. "Play lies at the heart of childhood, limited in its boundaries only by the opportunities afforded by physical settings and by the attitudes and commitment of those whose business it is to manage them" (R. Moore, 1990, 18). Parents and educators may unintentionally place obstacles in the developmental path of children by limiting their access to varied settings or placing restrictions on the type or location of their play activities. Restrictions are often a result of a perceived risk of harm; children may be prohibited from playing in a 'dangerous' abandoned lot, or from climbing to the top of a large tree (Pyle, 2002; Kytta, 2002). Caretakers may also restrict what they consider to be inappropriate conduct, such as preventing a child from splashing around in a mud puddle because it may soil clothes, or from engaging in boisterous play in a public setting.

The rigid schedule and behavioural expectations of an educational institution may also place limits on the type or timing of play activities. Curricular activities within learning environments are often very structured, and directed by a teacher in pursuit of specific academic objectives. Many programs do not give children the opportunity or resources to engage in freely chosen or play activities except during off-curriculum times, such as lunch breaks or the periods before and after school. Even during times when

unstructured play is encouraged, children may still have little choice and variety with respect to their play settings and resources. As a result, such restrictions may severely limit the richness of children's environmental encounters, and their ability to learn about the world and themselves through playful exploration and experimentation.

1.3.2 Educational Models and the Physical Environment

These changes in our understanding of the experiences and processes by which children learn and grow have implications for the design of learning environments. Both the physical setting and the educational approach of the institution should reflect an understanding of the activities and conditions by which children most effectively gain knowledge and capabilities, including the value of play, and should work in concert with each other. Though there have been a number of prominent educational models during the last century, they exhibit substantial differences in the degree to which each considers and utilizes the physical environment as a complement to learning and development objectives. A review of prominent 20th and 21st century models illustrates the extent to which the educational philosophy incorporates interactive and varied learning experiences, and the degree to which the physical environment supports the educational approach or the needs and behaviour of children.

1.3.2.1 Traditional and 'Open' Schools

In the early 1900s, most educational approaches were analogous to the reigning industrial principle of mass production. Children were considered the raw materials to be processed through the educational system, by the technical workers known as teachers, in order to produce a valuable end 'product' (Bransford, Brown & Cocking, 2000; Edwards, Gandini & Forman, 1993). Such 'traditional' schools and classrooms were configured to reflect this concept; children sat in strict rows within enclosed classrooms which flanked long corridors. Students were assembled in fairly large groups by age and

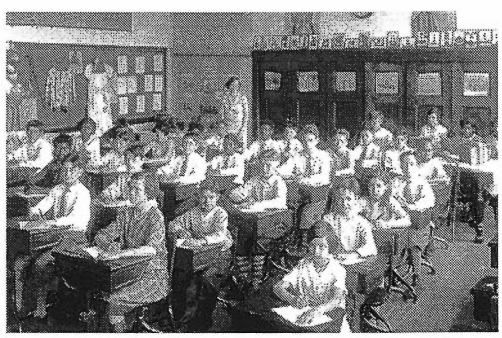


Fig. 1.3: Early Traditional Classroom

instructed by a single teacher normally situated at the front of the classroom (See Fig. 1.3). The curriculum was carried out within a rigid schedule aimed at passing on a specific knowledge and skill set to all students of a particular age, who learned in large part by rote. The primary measure of quality and effectiveness of the program was often the performance of the students on standardized tests (Bransford, Brown & Cocking, 2000).

This 'production' model does not support active, experiential learning within its curricular program, nor does it accommodate the fact that children learn and develop at different rates, and by different methods. Both the regimented setting and the educational approach fail to acknowledge that diverse, interactive opportunities such as exploring, experimenting and constructing are essential ingredients for childhood learning and development. Many traditional approaches have undergone substantial changes in the last 50 years to accommodate developments in learning theory, however school settings and classroom configurations did not necessarily follow suit. In fact, this traditional pattern remained a dominant model of school design during most of the 20th century (Sanoff, 1994).

The 'open school concept' was introduced in the 1970s and 1980s as an alternative to traditional approaches, reflecting changes in notions of teaching methods and learning styles. The model was conceived as a way of providing greater flexibility in teaching and use of space, improved supervision and even reduced construction costs (Rivlin & Rothenberg, 1976; Sanoff, 1994). Part of the concept involved removing the walls and corridors within the school in order to maximize the volume of space available for learning activities; low dividers and open shelving are often used to partition spaces while providing access to educational materials (See Fig. 1.4) (Sanoff, 1994). In most cases, the shift in the physical arrangement of the school was accompanied by modified educational

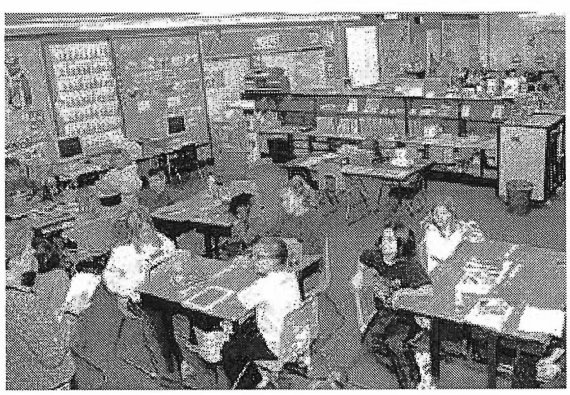


Fig. 1.4: Open Concept Classroom

approaches that attempted to incorporate the interests of the children, increase collaboration among students and teachers, and promote flexible use of learning spaces (Rivlin & Rothenberg, 1976). Open schools also provided opportunities for team teaching and for variation in the size and composition of student groups, and in most cases incorporated more interactive and child-directed activities within the curricular program.

The open school movement was intended to increase the choices available to both teachers and students, and was fairly successful in promoting a flexible and collaborative approach to education (Rivlin & Rothenberg, 1976). However, the open-concept school also met with criticism over the years. Despite being more congruent with emerging notions of learning, studies demonstrated that the connected open space classroom reduced task involvement on the part of the students. The increase in noise and visual stimulation that accompanied this arrangement proved to have a distracting affect on many students (Sanoff, 1994; Ahrentzen & Evans, 1984). Privacy, which was an issue in traditional schools, was even harder to achieve in the open classroom (Sanoff, 1994).

Some studies also indicated that many teachers in open schools gradually reverted to more traditional practices, spending the majority of their time at the front of the classroom, utilizing a primarily instruction-based approach and shifting the room back to traditional arrangements (Rivlin & Rothenberg, 1976; Proshansky & Wolfe, 1974).

Both the traditional and open school approaches are still employed in many contemporary school facilities. Despite substantial efforts to address health and safety issues, changes in learning theory, and the integration of technology into the school and curriculum, both of these educational facility models still demonstrate shortcomings in their capacity to provide an effective learning environment (G.T. Moore, 1987; Sanoff, 1994). Addressing issues of safety and academic performance are priorities for all schools, but Sanoff argues that these guidelines alone are not enough to produce "responsive schools" (1994, 43). Kennedy feels that part of problem is the continuing failure of many learning facilities to adequately consider the critical learning and developmental goals of its students, and how these needs can be supported by

environmental interactions, conditions and settings (2001). This includes teaching methods and learning experiences that are congruent with the needs and behaviour of students, as well as settings that are appropriate, comfortable and stimulating.

1.3.2.2 'Alternative' Schools

The objective of education is to increase possibilities for the child to invent and discover.

~ Malaguzzi, in Edwards, Gandini & Forman, 1993, 77

There have been many attempts to break away from traditional strategies in order to address the perceived gaps in these models. Various educational approaches have emerged that are concerned with accommodating the natural ways by which children develop skills and knowledge, and the experiences and environments that facilitate this learning for different children. Several of these 'alternative' philosophies, such as the Montessori, Reggio Emilia and Steiner schools, have become well-established programs promoting an interactive approach to learning, and attempting to nurture the development of the whole child. As part of this effort, children are often given a considerable amount of freedom and input regarding their curricular activities, and are encouraged to use the variety of resources and environments available to them. As a result, the philosophy and setting of these programs may provide useful heuristics for the design of other school facilities and the integration of an insightful educational philosophy with the physical environment.

The Reggio Emilia School, pioneered by Loris Malaguzzi in Italy after World War II, serves as a useful example of a more responsive program. The cornerstone of this approach is the perception of children as "capable, competent, curious and creative" beings, and believes in letting the interests of the children guide both the content and the pace of the curriculum (Rinaldi, 1993, cited in Staley, 1998, 20). The philosophy also recognizes the value of stimulating the development of the intellectual, emotional, social and moral capacities of each child, and to this end, employs a variety of teaching methods and materials (Edwards, Gandini, & Forman, 1993). The school actively promotes exploration of topics of interest to the students, through a variety of hands-on activities including fine arts, role-playing, construction and experimentation. By letting

children shape their own activities and environments, this approach provides more effective and individualized learning and development experiences.

The image of the early 'factory' school stands in stark contrast to the settings developed for the Reggio Emilia schools in Italy. "A great deal of attention is paid to details of light, beauty, and harmony. A transparent connection between the indoors and outdoors is provided by large windows, the absence of clutter, inside gardens or atriums, and many plants" (Stine, 1997, 94). The school recognizes the value of a pleasing physical environment, as well as its potential to serve as a mechanism for learning. Children are encouraged to actively explore the variety of phenomena available in both their indoor and outdoor settings; a variety of work and play areas, surfaces, and media can be chosen by children for a given hands-on activity. There is a conscious effort to use the physical features of the school to support the interactive educational philosophy (See Figs. 1.5 and 1.6).

Figs. 1.5 and 1.6:
A Reggio Emilia Classroom

The Reggio Emilia schools illustrate how the physical environment of the school can be used to support the educational philosophy and the learning styles of children. They "describe a fit between the built environment, the educational vision, and the users' activities" (Stine, 1997, 94). The schools strive to provide a variety of engaging settings and the opportunity for the children to explore and play with them in their own way, as a means of achieving their educational objectives. These alternative schools may experience problems similar to those in open-concept schools depending on their arrangement and use, but these facilities come much closer to providing a

setting which is highly congruent with the behaviour of the users and the philosophy of the institution. The Reggio Emilia model suggests the potential for providing physical settings in school environments that effectively support the learning and play activities of children.

1.3.3 Contemporary Learning Facilities

The tremendous changes in learning theory and educational models during the last century have generally been attempts to better understand and accommodate children's learning needs. Despite these advances, the design of many school facilities continues to be driven primarily by motives other than those that aim to provide environments that facilitate rich learning and development experiences for children, including unstructured and exploratory play activities. Sanoff suggests that, more often than not, decisions regarding school designs are based on "budgets and buses rather than an understanding of the physical, intellectual, psychological, and social needs" of children (1994, 42). This may in part be due to the infancy of the systematic study of the relationship between school environments and student behaviour (Ahrentzen & Evans, 1984). Although there has been an increasing focus on areas such as the technical performance of school buildings, "the social and behavioural elements of performance that focus on the extent to which educational goals link activities to the physical environment have received little attention" (Sanoff, 2000, 7).

However, there are some examples of contemporary facilities that are recognizing the potential value of the physical environment as a facilitator of learning and development. A few recent school designs attempt, for example, to capitalize on the benefits of informal learning by encouraging the use of non-classroom spaces, such as corridors, eating areas, lounges and outdoor settings. The gathering and socializing that typically takes place in these areas is believed by some to lead to more creative, collaborative work and peer development among the students (Wolff, 2002; Sanoff, 1994). However, this encouragement may be sporadic and not integrated with the educational approach or curriculum, which detracts from the effectiveness of these environments for learning. Alternatively, these areas may not provide the conditions appropriate to the needs of the particular group using the space. Schools which are effectively matching the physical

environment to the behaviour and intentions of its young users are few and far between.

In truth, a substantial number of schools built in the last several decades, and which continue to be built, are not being conceptualized or designed in a manner that leads to a high degree of fit between the physical form, the educational approach and the needs or behaviour of the students (Sanoff, 1994; Gump, 1987; Bransford, Brown & Cocking, 2000). Facilities may not only be missing a chance to provide a supportive environment, they may in fact be creating obstacles to effective learning and healthy development. This is in large part due to a failure to recognize the role of the physical environment in influencing children's behaviour and in supporting their goals throughout the course of childhood. There is also a profound gap in our understanding of the specific features and conditions that are meaningful to children and which are conducive to rich learning and development experiences, and a lack of clear, informed guidelines for effectively integrating these environmental properties with an educational approach.

It is time for a paradigm shift in both the aims of and approach to educational facility design. We need a programming and design framework that conceptualizes the school as an instrument for learning and development, rather than a passive setting or an administrative institution. We require new guidelines that consider how children perceive and utilize the physical environment for their goal-driven activities, and ways to incorporate appropriate opportunities into the form of the school itself. We need to work to provide features and spaces that accommodate an insightful educational program as well as children's diverse learning behaviour and developmental goals. This thesis is intended to begin outlining an effective approach to educational facility design that can successfully realize these aims. However, this approach much be based on an understanding of the criteria necessary to make an environment truly effective at supporting the learning and developmental needs of children.

1.4 Defining a Supportive Learning Environment

It is the enhancement of the developmental processes that are the most appropriate concept of educational goals.

~ Sanoff, Sanoff & Hensley, 1972, 2

The first step in defining a supportive educational setting is to acknowledge that learning environments are not exclusively school facilities. Learning is a continuous process taking place in all aspects of life, and therefore in almost any setting (Wolff, 2002). A broader definition includes any setting or program that supports and encourages the process of learning in a stimulating and interactive fashion. Museums, libraries, playgrounds, theatres, summer camps, and various play settings are all captured under the umbrella term of 'learning environments'. This thesis concentrates specifically on school settings, in which case the term 'learning environment' includes the physical facility, the patterns by which the school operates, and the philosophy of both the institution at large and its administrative and instructional staff.

It may also be helpful to understand Sommer and Becker's distinction between the characteristics of a 'learning environment' and those of a 'teaching environment'. Their concept of a teaching environment refers to settings like traditional classrooms with "fixed time-space coordinates with implicit, as well as explicit, behavioral norms" (1974, 75). Learning environments, on the other hand, are conceptualized as dynamic, multi-sensory environments that encourage children to learn by handling and experimenting with both materials and ideas (Sommer & Becker, 1974). This definition expands the notion of a learning environment to include both formal and informal activities and settings, and recognizes the role of the physical environment in the learning processes of children (Sommer & Becker, 1974). However, Getzels warns that the aforementioned settings have the potential to remain in the 'teaching environment' category if the setting or the philosophy continues to discourage children's active participation and exploration (1974).

Working under this broader definition of learning environments, and acknowledging that effective learning can take place through both curricular and play activities, we can

begin to define the components necessary for an *supportive* learning environment that will nurture and accommodate the needs and inclinations of children.

i. A supportive learning environment needs to address and support the intrinsic learning behaviour of children

Most theorists and educators have now adopted the perception of learners as "active constructors rather than passive recipients" of knowledge, who play a considerable role in fostering their own learning (Brown & Campione, 1996, 289). Children demonstrate a penchant for seeking out novel and challenging situations or settings of their own initiative. Their natural inclination to explore and experiment illustrates that children fundamentally learn best by 'doing'. They will seek out experiences that allow them to discover their world and their own capabilities, which in turn furthers their development. An effective educational environment is one where both the philosophy and the setting of the institution work to encourage children to experience the enormous possibilities for learning inherent in their environment. This includes providing access to stimulating, hands-on interactions both inside and outside the formal classroom setting, and spaces or features that are designed in such a way that children have the opportunity to shape their own learning experiences. A supportive learning environment accommodates the natural and diverse learning behaviour of children.

ii. A supportive learning environment must recognize that learning is related to developmental stages and goals, which are different for every child

The function of a learning environment is not strictly related to scholastic goals. Sanoff has been a strong advocate for learning environments that address the development of the whole child. He feels that schools cannot be concerned with academic performance alone, but should work on "instilling enthusiasm for learning and encouraging positive social relationships" (1994, 1). Sanoff and his colleagues suggest that the essential goals of the primary environments of children, such as the home and educational setting, include:

1. [facilitating] competence in the physical-motor, social-emotional and intellectual skills
2. encouraging creative expression and invention
3. nurturing individuality in ways that contribute to feelings of worth and self identity

These guidelines suggest that the role of a learning setting is to encourage the entire range of developmental goals (1972, 2). However, it is not appropriate to apply these criteria like a blanket to the entire stage of childhood. Children of different ages and temperaments demonstrate diverse capabilities, intentions and tolerances, and may respond very differently to various learning methods or settings. As an example, Rivlin and Rothenberg note that an environment that is stimulating to one child might be overwhelming or disturbing to another (1976, 489). Children of differing ages are also working on mastering very different sets of skills; their learning goals will reflect their level of development (Sanoff, Sanoff, & Hensley, 1972, 2). A supportive environment for a child is one that is compatible with their current tasks and goals (Stone, 2001). Therefore, a learning environment must provide both a program and a setting that can accommodate the range of developmental needs of its child users.

iii. A supportive learning environment should provide a variety of rich experiences and interactions.

Accommodating a diverse range of learning and development goals can be a difficult task for an educational institution. A critical factor in the effectiveness of such an environment is its ability to respond to the various demands of its users. Children exhibit a natural tendency to actively pursue stimulating experiences; however, the learning environment must be able to support these activities by providing access to a variety of appropriate settings and interactions.

A varied environment first serves to expand the number and diversity of opportunities for rewarding exchanges. Sanoff claims "students appreciate an environment that provides a variety of spaces to allow different learning experiences to take place" (1994, 42). Exposure to an extensive array of materials, contexts, and phenomena promotes broader understanding. Gallagher notes that for this reason humans in general are constantly seeking experiences that provide different kinds and degrees of stimulation

(1993). Proponents of the Reggio Emilia approach claim that "the wider the range of possibilities we offer children, the more intense will be their motivations and the richer their experiences" (Edwards, Gandini & Forman, 1993, 73). By providing a number of resource-rich settings and opportunities for stimulating interactions, a learning environment maximizes its ability to support a range of critical developmental experiences. This diversity will also allow the facility to support activities that are appropriate for a large group of children of various ages.

A learning environment that provides a variety of spaces or experiences also increases its degree of flexibility. Kennedy claims it is "critical for new and renovated educational facilities to have the flexibility to enhance student learning and adapt to unforeseen changes" (2001, 1). Educational approaches and resources are constantly changing to accommodate advances in our knowledge base and the changing needs of learners. Research from various fields has also demonstrated that "different environments are valued [and considered appropriate] for different reasons" (Eubank Owens, cited in Clark & Uzzell, 2002, 97). That is, specific spaces and features will support particular experiences; a variety of settings can support diverse modes of learning. Considering that children also have learning style preferences, they may not all learn effectively through the same approaches, using the same materials, or within the same settings. A flexible setting is essential to meet the myriad needs of a diverse group of inhabitants, as well as to grow with changes in educational approaches. A supportive learning environment provides a variety of stimulating experiences, settings and interactions which in turn increases its ability to be congruent with the goals of the institution as a whole as well as with the individual needs of its users.

iv. A supportive learning environment embeds learning and development opportunities into both the educational program and the physical form itself

Sanoff argues that "achieving more effective educational facilities relies upon an approach rooted in the recognition of the differences in needs, values and preferences of the building's users" (Sanoff, 1994, 2). The culmination of this review of literature and theory suggests that these needs must not only be reflected in the programming and operation of school facilities, but should be made integral to the physical form itself.

The building must be able to be effectively interpreted by all users, and therefore be capable of taking on different roles as the needs of the users change. This may include opportunities for a range of social interactions, such as the option to either explore on one's own or play with a group of children. Stone suggests that this implies the physical environment should vary between open and private settings in order to support a variety of tasks and interactions (2001). Opportunities to actively engage and experience a variety of phenomena should also be inherent within the physical environment. When these options are embedded within an accessible environment, the learning setting can simultaneously provide both choice and variety to children. Hertzberger refers to this phenomenon as "reciprocity of form and program" and suggests that this relationship is only possible if "the different meanings are contained with the essence of the form, so that they are an implicit provocation rather than an explicit suggestion" (1992, 149). So finally, a supportive learning environment integrates a variety of appropriate and stimulating opportunities into the educational approach and the physical form of the facility.

1.5 Designing Supportive Play Settings in Learning Environments

The environment is an active and pervasive influence on the lives of children and teachers throughout the school day. It provides the setting for learning and at the same time acts as a participant in teaching and learning.

~ Stine, 1997, 90

The guidelines outlined above suggest components that are critical to designing effective learning environments that are congruent with the needs, goals and behaviour of children. They are also valid for both formal curricular goals and more unstructured play experiences. This paper will focus specifically on increasing the ability of the physical setting to facilitate the freely chosen play activities of children during the course of their day within the school environment. These activities, which reflect children's inclinations and interests, are critical mechanisms for learning and development. As such, appropriate environmental support for play activities should be a primary aim of design programs for school settings. The following chapter will begin to frame a new approach to designing school facilities which more effectively reflects children's natural perception and use of the physical environment for their learning and play activities.

2 Building a Supportive Design Framework

Most people who care about child development know nothing about design, and most people who design know nothing about child development.

~ Hart, 1979, 8

The previous chapter emphasized the importance of providing high-quality environments that support the diverse needs of children, and outlined components necessary to provide supportive learning and play environments within school facilities. To establish a foundation for a design framework that effectively meets these criteria, it is essential to gain a better appreciation for the nature of the relationship between children's behaviour and the physical environment, including the ways that they perceive, interpret and use environmental opportunities. As a first step, it may be valuable to look to research areas that have studied this critical interaction, most notably the fields of developmental, ecological and environmental psychology. This chapter will review the theoretical models of these disciplines and suggest a framework which synthesizes the essential contributions of each in a manner that tries to capture the full picture of children's dynamic relationship with their environment. Subsequently, we will explore the potential of affordance theory for meeting the criteria of this theoretical framework and for understanding children's perception and use of their physical environments.

2.1 The Child-Environment Relationship: Theoretical Frameworks

Developmental psychology and ecological psychology both emerged during the 1940s and 1950s, although they grew from very different research traditions. Both fields study the influence of the environment on the behaviour of children, but exhibit fundamental differences in philosophy, including their definitions of 'environment' and the perception of its role in child development and behaviour. Environmental psychology, with roots in ecological psychology, followed in the 1970s as a branch of research specifically interested in environment-behaviour relations. These three disciplines exhibit several key differences in both philosophy and approach, but each research area provides

perspectives that are valuable to a design framework aimed at creating effective settings for children.

2.1.1 Contributions from Developmental Psychology

Developmental psychology seems like an obvious choice when looking to psychological literature for a theoretical framework to inform the design of children's environments. This field has actively laboured to understand the developmental processes that characterize the lifespan of human beings, and has compiled a large body of knowledge regarding the behaviour and development of children. Prominent theorists, such as Jean Piaget, have defined a series of stages through which children progress physically, cognitively and emotionally, and describe the experiences that influence these developments. The patterns of development uncovered by this body of research are invaluable in clarifying the needs and understanding the behaviour of children. However, the following review demonstrates that there are also critical factors largely missing from the developmental psychology approach that limit its ability to provide a suitable design framework.

Initially, developmental research did not recognize the reciprocal nature of the relationship between people and their environments. In fact, until the last few decades, most psychological theory did not appreciate that human beings are constantly engaged in dynamic interplay with their social and physical settings (Bjorklid, 1982). It was during the last half of the 20th century that a new model of human development emerged and steadily gained in both popularity and credence. Researchers and theorists in many branches of psychology have now adopted the concept of the human-environment relationship as being one of *interaction*, although there remains some debate regarding the exact nature of this relation (Bjorklid, 1982; R. Moore, 1986).

Some of the earliest theories to incorporate this notion viewed the environment, and even the person, as passive elements in the exchange. It was this belief that spawned the developmental theory of the *tabula rasa*, which suggested people learned and developed through the passive absorption of knowledge (Bjorklid, 1982). Eventually other models started to consider the individual, and later the environment, as active

agents in a dynamic relationship with one another (Heft, 2001; Bjorklid, 1982). Despite widespread adoption of an interactive perspective, Moore claims that the domain of many of these disciplines remained limited due to their "restricted conceptualization of the 'environment'" (1986, 205). For example, psychological research, while demonstrating support for an interactive theory, focused for the most part on the role and properties of the individual and paid only minor attention to the environmental context (Bronfenbrenner, 1979; Bjorklid, 1982; R. Moore, 1986). As well, even when the environment was taken into consideration, studies usually took only social and cultural factors into account.

Developmental psychology, although acknowledging fairly early on that the environment was an important factor in child development, was one of the disciplines that primarily defined the environment in "interpersonal and sociocultural terms" (Wohlwill & Heft, 1987, 282). This field has come to recognize that social interactions are essential components of child development, but research continues to largely ignore the role of physical attributes in influencing or supporting their advancement (Maxwell, 2003). Bronfenbrenner argued that this gap in developmental research rendered it 'ecologically invalid', claiming it failed to consider the natural and holistic context of children's behaviour (1979; Bjorklid, 1982). This criticism may be well-founded, considering a substantial portion of developmental research with children until that time took place outside of their familiar everyday settings, and as such would be unable to provide a complete understanding of the child's natural interaction with his environments. Even for those studies carried out in the actual living, playing and learning settings, the focus was specifically on the development of the child, rather than on the reciprocal nature of the relationship between the child and his or her surroundings (Bjorklid, 1982).

Although this field can provide key insights into the developmental needs and processes of children, its general lack of consideration of the child's interaction with the physical environment renders a developmental psychology framework unsuitable for informing the design of built environments for children on its own.

2.1.2 Contributions from Ecological Psychology

The field of ecological psychology may hold more promise for providing a theoretical basis for an appropriate design framework. This discipline also emerged in the 1950s, but set out on a parallel path to developmental psychology; both research areas were addressing issues of child behaviour, yet they remained largely detached from one another (Bjorklid, 1982; G.T. Moore, 1986). Early ecological psychology theory was driven primarily by the work of Roger Barker and Herbert Wright, who attempted to develop the first ecological framework for analyzing human behaviour (Bjorklid, 1982). The ecological perspective emphasizes that the behaviour of people and their immediate environments are dependent on one another. "To understand any behaviour in its ecological context it is necessary to understand the effects of both social and physical environmental factors, and the interaction between the two" (G.T. Moore, 1986, 228). Barker and Wright believed both the setting and the situation were essential factors affecting behaviour, and emphasized that acquiring a true picture of person-environment interaction required observation in 'real' settings, not in laboratories or other contexts created for experimental purposes (Bjorklid, 1982). Their research led to the concept of the 'behaviour setting', which became a basic environmental unit in ecological psychology (Wohlwill & Heft, 1987; Bjorklid, 1982).

According to Barker and Wright's theory, "behaviour settings occur naturally as a function of the collective action of a group of individuals" (Heft, 2001, 253). The social and physical components of 'behaviour settings' were considered to work together to frame a pattern of behaviour generated and maintained by the occupants (Heft, 2001). Public places, such as churches, schools or playgrounds could therefore serve as 'behaviour settings', as could specific events or activities like football games or piano lessons (Bjorklid, 1982). The characteristics of each setting imply a set of appropriate activities and a pattern of expected and acceptable behaviour (Heft, 2001). Barker and Wright reasoned that, in accordance with ecological theory, the 'behaviour setting' was a more suitable milieu in which to observe the natural behaviour of people, including children (Bjorklid, 1982).

The 'behaviour setting' theory came to be recognized as a potentially valuable framework for the study of children in their typical settings, such as schools and playgrounds (Wohlwill & Heft, 1987). However, the approach has also been criticized for its lack of consideration of the intentions or behaviour of *individuals* within a given environment. Stokols suggests that this framework pays "insufficient attention to behaviour on a micro-level, focusing instead on the manner in which the average person responds to a setting" (1977). Barker and Wright's concept defines a general behavioural situation that exists independently of any one individual, where one occupant can be replaced by almost any other individual (Heft, 2001; Bjorklid, 1982). For example, the setting of a baseball game frames a set of rules and patterns of behaviour for a group of players. However, the situation is not substantially affected if one player is substituted for another. In other words, the 'behaviour setting' lumps all the occupants together, and does not consider the influence of an individual's particular motivations or needs in the environmental interaction.

Despite Barker's call to regard the 'total environment' when analyzing behaviour, his own work focused on social and behavioural phenomena, giving only minor consideration to the physical features of the settings (G.T. Moore, 1986). He does address the physical characteristics of a setting to some extent in his notion of 'behaviour-milieu synomorphy', which is akin to the idea of 'environmental fit'. This concept refers to "the presence of congruence between topographical and designed features of a setting, on the one hand, and the activities that take place in the setting on the other" (Heft, 2001, 286). Here Barker alludes to the need to achieve a degree of 'fit' between the physical environment and intentional behaviour; however his reference only extends as far as the role of environmental features in helping to define the setting and support particular group activities. His research rarely considered the role of the physical features themselves in influencing, or being influenced by, the behaviour of the setting's individual occupants (G.T. Moore, 1986; Heft, 2001).

Barker and Wright were not the only theorists endorsing an ecological approach to examining the behaviour of children. Bronfenbrenner proposed an ecological theory of development, which emphasized "the ongoing process of interrelationships between the

individual, other individuals, and the physical and temporal contexts of a child's life" (Maxwell, 2003, 1; Bronfenbrenner, 1979). He describes human environments as a series of systems, ranging from a global level, incorporating social, political and economic systems, down to a micro-system that includes our immediate environments of home, school, and work (R. Moore, 1986; Bjorklid, 1982). This ecological model of "nested systems" encompasses a variety of social and cultural influences and recognizes the importance of local-global connections (Maxwell, 2003, 1). The model also addresses a gap in other ecological approaches by explicitly recognizing the role of the individual in environmental behaviour. However, like Barker, Bronfenbrenner himself neglects to give sufficient consideration to physical environmental factors, which is surprising given his similar assertion that one must consider the individual's "total situation and interaction with his environment" (Bjorklid, 1982, 41; R. Moore, 1986; Wohlwill & Heft, 1987; Maxwell, 2003).

There is tremendous value in the various models developed within the field of ecological psychology, particularly their endorsement of a holistic approach to studying the interaction between people and their physical, social and cultural environments. However, the ecological psychology framework as it stands still exhibits critical limitations as an approach for informing the design of children's built environments. The theoretical body of research is not consistent in its consideration of environmental factors from the perspective of the individual. The 'behaviour setting' model uses the setting as the unit of reference, rather than the occupant, and is therefore restricted in its ability to address any individual needs that are beyond those of the group of users (G.T. Moore, 1986). This is particularly problematic when considering the settings of children, given the diverse nature of their individual needs and behaviour.

2.1.3 Contributions from Environmental Psychology

Despite different approaches to studying children's behavior, some researchers felt that neither developmental nor ecological psychology place sufficient emphasis on the impact of the physical environment on the critical activities of children. Environmental psychology was a branch of the discipline developed by Proshansky, Rivlin and Ittelson at the City University of New York as a partial response to the perceived failure of

psychological research to adequately consider the environmental context of behaviour, and the physical environment in particular (Bjorklid, 1982). This interdisciplinary field concerns itself with specific research interests, such as studying the processes of cognition, perception and social learning in relation to both environment and behaviour. Although the discipline was influenced by the ecological principles, environmental psychology stands out in its advocacy for the adaptation of a physical environment to better suit the needs and preferences of its inhabitants. Moore suggests that the reintegration of the physical environment as a critical element in understanding behaviour is one of the most valuable contributions of this discipline (1986).

Environmental psychology, in contrast to ecological psychology, explicitly emphasizes the importance of considering an environment from the perspective of a specific inhabitant. Environmental behaviour researchers argue that the conduct of a person within a setting, and his or her experience of the environment, can not be separated from the needs, capabilities and intentions of that unique person (Wohlwill & Heft, 1987; R. Moore, 1986). Further, Ittelson claims that a study of the relationship between an environment and the behaviour of an inhabitant has no meaning unless one considers the significance of the setting for that individual (Bjorklid, 1982).

The meaning ascribed to an environment may be related to the degree to which a person perceives a congruency between a setting's characteristics and his or her goal-driven behaviour. Stokols suggests that most environment-behaviour research works under the assumption that humans are constantly seeking "optimal environments", or settings that support their goals to the highest degree possible (Bjorklid, 1982, 47; Stokols, 1977). That is, "people orient to the environment in terms of existing information, goals and expectations; they operate on the environment in an effort to achieve their goals and maintain desired levels of satisfaction; they are directly affected by environmental forces (e.g. situational supports, constraints); and they evaluate the quality of the environment as a context for future activity and goal attainment" (Stokols, 1978, 259). Moore emphasizes that this interaction not only influences the individual, but also that the "environment itself develops, and can be modified, changed and moulded by the individual" (R. Moore, 1986, 10). Bjorklid suggests that not only do we

seek out and adapt environments that suit our individual needs and intentions, but that we have an innate desire to achieve environmental congruency (1982). In this respect, the environmental philosophy is compatible with our understanding of children's proactive environmental behaviour.

The field of environmental psychology has contributed a great deal of literature, particularly during the 1970s and 1980s, which illustrates how features in a built environment can be conducive to optimal behavioural functioning. Although some of the research specifically attempts to study the relationship between children and their physical environments, the work demonstrates little convergence with child psychology (Wohlwill & Heft, 1987). As a result, with the exception of a few researchers, such as Smith & Connolly, Gump, Wohlwill and Heft, this body of work has not considered the relationship between children and their critical environments from a developmental perspective (G.T. Moore, 1986; Wohlwill & Heft, 1987). The research has yielded crucial insights into the influence of various elements of an environment on the behaviour of children, which will be considered later in this investigation. However, the research framework itself, like that of ecological psychology, does not specifically recognize the different environmental needs of children at various developmental stages, and therefore provides an incomplete model of the child-environment relationship.

2.1.4 Weaving a Theoretical Framework

There is an acknowledged need for new approaches to both studying and designing environments for children. However, any design framework must be built upon a theoretical foundation that exhibits a full understanding of the nature of children's environmental interactions and its role in development. All three disciplines reviewed have contributed theory and research that are useful in understanding the developmental needs and natural environmental behaviour of children. However, there are gaps in the models of each that suggest serious limitations in their ability to provide a comprehensive framework for the design of children's environments. An effective model must weave elements from all three fields in order to provide a complete picture of the nature and significance of the child-environment relationship.

Fortunately, these fields of psychology stand on some common ground. A critical notion that is now generally accepted by all three fields is the interactive and interdependent nature of the human-environment relationship. There is a dynamic reciprocity that exists between people and their environments; each works to influence and mould the other. Any approach to the design of built environments must recognize that one cannot remove human behaviour from its environmental context in order to be effective – they are inextricably linked. This is no less true for children, whose environments play a critical role in supporting learning and development. Building on these shared principles, we can define an approach that combines the essential elements contributed by each body of scholarship.

Research from ecological and environmental psychology provides a number of insights. The most important among these is the advocacy of a holistic, or ecological, conception of 'the environment' which includes social, cultural and physical factors, and emphasizes the need to study these influences in people's natural, everyday settings. In addition, each discipline reminds us that an effective environment is one which is congruent with people's goals, behaviour and preferences, and that this sense of 'fit' is defined differently for each unique person. We must consider the specific needs and intentions of individuals in order to provide more appropriate and supportive environments. Developmental psychology, while not adequately considering the influence of the physical environment, also recognizes the importance of considering individual differences in child behaviour and development. This field has also contributed a large body of research regarding the processes and milestones of child development, so that we can better accommodate the patterns and motivations of their environment interactions.

Creating more effective environments for children requires a framework which reflects the unique nature of their environmental perception and use, and which appreciates how this behaviour can vary substantially from one child to another. As well, it must reflect the reciprocal nature of the relationship between development and children's interactions with their physical and social environments. The following section proposes

an approach which encompasses these fundamental principles and facilitates a high degree of 'fit' between children and their physical environments.

2.2 Defining an Affordance-Based Framework

The preceding review demonstrates the need for a new framework that is congruent with the natural behaviour of children and more reflective of their dynamic relationship with their environments. This thesis proposes that an affordance-based framework is most suitable for describing this relationship and demonstrates considerable compatibility with both the unique environmental behaviour of children and the fundamental criteria for effective learning environments.

2.2.1 The Theory of Affordances

Thus the relationship between the observer and the environment is reciprocal; perception guides action in the environment and this action provides information for perception.

~ E.J. Gibson, in Clark & Uzzell, 2002, 96

The theory of affordances was developed by James J. Gibson in the late 1970s, stemming from decades of research on human visual perception. Many contemporary theorists consider that our perceptual experience of the environment is "mere appearance and illusory", and suggest that our understanding of a given environment is mediated through our cognitive processes (Heft, 2001, 115). Gibson's view of perception, however, was that of a system which "picks up information that supports coordination of the agent's actions with the systems that the environment provides" (Greeno, 1994, 341). His theory implies that people do not intellectually 'construct' their perceptual worlds, but rather become attuned to the information available within their environments which are likely to support their intentions (Kytta, 2002, 109). In this respect, Gibson departed from existing theories regarding perception and suggested that functional meaning is *directly* perceived, rather than abstracted from an organization of sensory input (Heft, 1988; Heft, 2001). Another implication of his theory is that the immediate perception of an environment is functional in perspective; that is, people are innately attuned to the interaction opportunities embedded within an environment

Gibson coined the term 'affordance' to describe the properties of an object or an environment that suggest possibilities for interaction; individuals perceive an affordance because it holds functional significance for them (Wohlwill & Heft, 1987). For example, an object which is smaller than the hand span of a particular individual can be perceived as affording 'grasping'; depending on the weight, form and material of the object, it might also suggest the possibility of 'throwing' (Heft, 1988). A horizontal surface could be seen to afford 'sitting on', or 'stepping up on', depending on the location of the surface relative to an individual's leg length and whether it is perceived as being capable of supporting the person's weight (See Fig. 2.1) (Heft, 1988; Heft, 2001). In this sense, affordances are not mental representations of an environment; they are real phenomena that are defined by the functional possibilities they represent to the perceiver (Heft, 1988; Heft, 2001). Greeno describes affordances as "preconditions for activity...." ; they can be conceptualized as experiential opportunities suggested by the features or conditions of an environment that are perceived by an individual with a compatible intention (1994, 340). However, if the environment does not exhibit suitable properties, the object or setting will not be interpreted as affording the intended interaction.

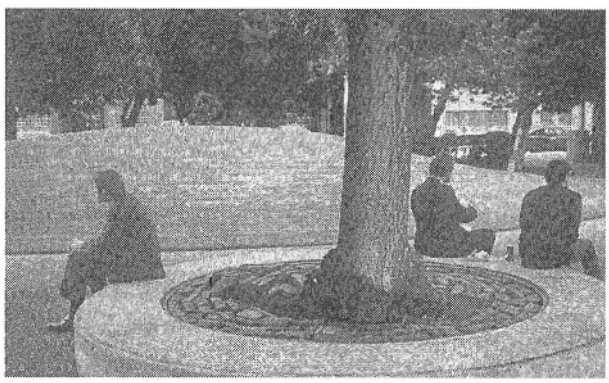


Fig. 2.1 An affordance for 'Sitting'

Although one can talk about actions such as 'grasping', 'throwing', and 'sitting' as "pure acts independent of their environment", Heft suggests that, in practice, these actions are inextricably dependent on the environmental context, relative to the actor (2001, 110). For example, the act of reaching toward and grasping an object is dependent on the biomechanical capabilities of the grasping individual, as well as on the physical properties of the object, such as its size, shape and texture (Heft, 2001). These variables can not be separated from the reality of the action. An affordance for action is

perceived precisely because it suggests compatibility with the needs of an individual; they are the perception of "a complimentarity between the [person] and environment" (Wohlwill & Heft, 1987, 285; Heft, 2001).

Gibson's theory of affordances reflects his advocacy for an interdependent, or ecological, perspective of the relationship between people and their environments. He considered this relationship to be one of reciprocity – the actions of an individual are fundamentally influenced by the environmental context, and the environment in turn becomes shaped and defined by the actions of the person (Heft, 2001). The definition of affordances therefore stipulates that affordances are "relationally specified"; that is, the possibilities for interaction are dependent upon properties of both the individual and the environment (Heft, 1988, 29; Greeno, 1994; Kytta, 2002). In Gibson's own words, an organism and the environment "make an inseparable pair. Each implies the other" (1979, 8). In this way, affordance theory is congruent with the interaction perspective, as it acknowledges the vital role of both the perceiver and the environment in facilitating the interaction.

Although compatible with other ecological theories, an affordance-based framework also succeeds where others fall short. Not only does the definition of affordances emphasize the fundamental role of the perceiver, it is capable of acknowledging the individuality of each perceiver, rather than simply the needs or intentions of a group. Although Barker's notion of 'behavior-milieu synomorphy' also describes a state where the features of the setting functionally support the actions of a group of people, his behaviour setting concept only considers the role of the environment in supporting collective actions (Heft, 2001). However, one cannot separate the affordances perceived from the perceiver; specific attributes may only be detected by an individual with a specific set of capabilities and intentions (Heft, 2001; Heft, 1988). For example, one person may perceive a surface with certain properties as affording 'sitting on', yet another person may not attend to this possibility precisely because of these specific properties. The surface may only suggest the opportunity of sitting to the second individual if the surface was, for example, higher, wider or made of sturdier material. Greeno stresses that an individual's motivations also influence their attention to affordances (1994). So

alternatively, the second person may not have actively perceived the possibility of 'sitting on' the surface because they had no intention to sit! The intentions of the individual drive the detection and engagement of supportive environmental features or conditions; each person chooses from a range of potential affordances, available to all persons in a given setting, in order to support their particular objective (Heft, 1988; Heft, 2001). As Kytta emphasizes, "affordances are always unique and different for each individual" (2002, 109). In this respect, the concept of affordances provides a critical component that is missing from Barker's concept and other ecological theories – the individual nature of the human-environment interaction.

However, this 'individualized' aspect of the theory may also be the cause of some confusion, as it seems to define affordances as having both objective and subjective properties. They are objective in the sense that the properties of an environment afford real possibilities for action. However, affordances are also subjectively perceived because they depend on the capabilities, physical properties, and intentions of a specific observer (Heft, 2001). As Gibson put it, an affordance "is equally a fact of the environment and a fact of behaviour. It is both physical and psychical, yet neither. An affordance points both ways, to the environment and to the observer" (1979, 129). Although many theories are based on a strict division between the objective and subject properties of an environment, it is this attribute of affordance theory that allows a single setting to meet the needs specified by a range of individuals, since it can be interpreted in any number of ways.

This review suggests that there are several important components of affordance theory that make it a suitable foundation for a more responsive design framework. First, it orients us towards a perspective that emphasizes the functional nature of people's environmental perception. Like other ecological theories, it also recognizes that the human-environment relationship is dynamic and reciprocal and reminds us to consider the influence of both elements in any interaction. However, an affordance approach is unique in its ability to incorporate the notion that each person has different capabilities and intentions that will dictate his or her ability and desire to engage a particular environmental opportunity. This last element is critical for any design framework that

attempts to provide more responsive environments for a group of unique human beings. These principles are particularly important in the design approach of children's environments, because of the difference in perspective from that of adults, and due to the variability in intentions and perceptions from child to child. Therefore, it is not enough to plan for any set of affordances in a given setting; just because an opportunity for interaction is present, and even detected, it is not a guarantee that the activity will take place (Greeno, 1994). An appropriate framework is one which recognizes that these embedded possibilities must be in tune with the motivations and capabilities of the users of that environment.

Gibson's theory of affordances has been used more and more in recent years to improve the understanding of the human-environment relationship. It has become valuable to researchers because it allows for the simultaneous examination of the "functional properties of the environment and the psychological/behavioural response to the environment" (Clark & Uzzell, 2002, 95). Using an affordance-based approach to defining and designing settings for children helps us to respond to their unique relationship with their environments. In the case of learning environments, a facility which is designed to reflect purely institutional or administrative goals will not likely provide a supportive environment for children. An approach grounded in the affordance requirements of children will be much more capable of providing a facility that supports the goals, behaviour, and preferences of its child users.

2.2.2 Children's Functional Perspective

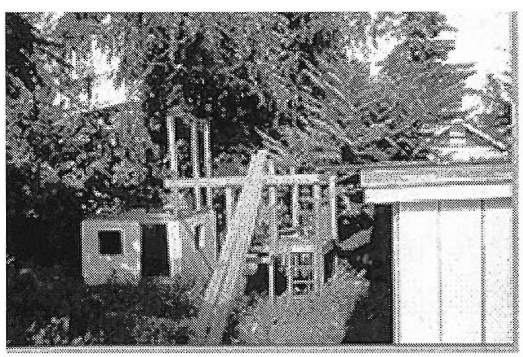
Noticing a small green board, about two by twenty inches, lying in the grass at the right of the walk, Raymond picked it up. Quick as a flash he tossed the board up into the air and over some telephone wires. His expression was animated and he showed some surprise at his success. He let the board lie where it fell.

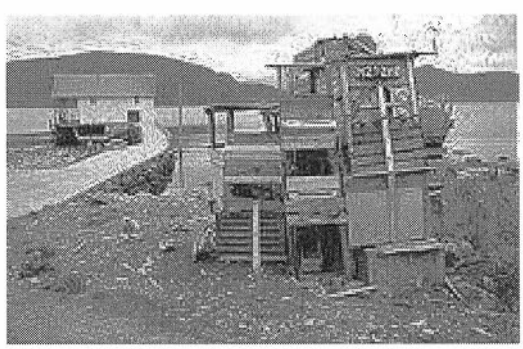
He then darted to some park benches near the bandstand. He pulled a small green bench out from several others and tipped it over so that the back was on the ground. He dashed back to the wall and returned, making a running jump as if to leap over the bench. Seeing that he couldn't quiet make it, he put his hands on the perpendicular seat and just vaulted over it with his hands helping him.

~ Excerpt from 'One Boy's Day'
Barker & Wright, 1951, 93

It has already been suggested that the affordances of objects or spaces will differ according to one's perspective and abilities. Therefore, in order to assess the functional possibilities of a particular environment or setting, there must be a particular individual or unique group of individuals in mind (Heft, 1988). To understand the affordances that are relevant to children, caretakers, educators and designers must consider the environment from children's unique perspective and recognize that they actually relate to the world in a very different manner than adults.

For one thing, children demonstrate very different abilities than adults, in part due to their diminutive size and their less well-developed capabilities. For young children especially, the affordances of a place are significantly influenced by the physical properties of the setting, such as scale, dimensions, and arrangement of openings, as well as the degree to which the child's motor and coordination skills have been developed (Feinberg, Kutchner & Feldman, 1998). Children often make decisions regarding their interactions primarily based on the opportunities for action or interaction present, and are more likely to be influenced by functional properties than are adults, whose perceptions are also mediated by the intended or typical use of an environmental feature or setting.





Robin Moore's classic study of children's play activities in outdoor environments in their neighbourhoods also emphasizes the fundamental difference between an adult's and a child's perception of a given setting. Many of the places that were important to children went unnoticed by adults or were considered "eyesores" (See Fig. 2.2 and 2.3) (R. Moore, 1986, 36). The areas in the neighbourhood that the adults considered to be wastelands were uniformly considered by

Fig. 2.2 and 2.3: "Eyesores"

the neighbourhood children as places of adventure and intrigue. They used these 'wasted spaces' for a diverse range of play activities, including "digging for buried treasure", having picnics and bonfires, and as a setting for elaborate fantasy games (R. Moore, 1986, 2). The children considered the setting according to the possibilities for play and interaction it afforded, rather than its aesthetic value. Adults have become socialized to consider their environments in part from an aesthetic perspective. Stine suggests that adults, for example, may lean toward making a children's slide "look good" by framing it with a brightly coloured cutout of a giant elephant; they assume that this equipment will make the slide more enticing to children (1997, 20). However, the decorative feature may make no difference to the child's attraction to or understanding of the purpose of the feature; they are drawn to it primarily because they see it as a place to experience sliding (Stine, 1997). By focusing their attention on the aesthetic properties of a setting, adults may neglect to provide the affordances that will attract and engage a child.

Children's unique, functionally-oriented perspective is further illustrated by their tendency to perceive a feature or setting according to its usual or stereotypical definitions of use (Feinberg, Kutchner & Feldman, 1998). Adults have learned to incorporate typical prescribed uses in their understanding of environments. Children on the other hand are still relying heavily on their innate perception, and are more likely to pick up on the suggestive qualities of a space rather than its prescribed function (See Fig. 2.4). Hart's research suggests that, as a result, children are more likely than adults to notice details in an environment, and assign meanings to them that suit their intentions (1978; Maxwell, 2003).

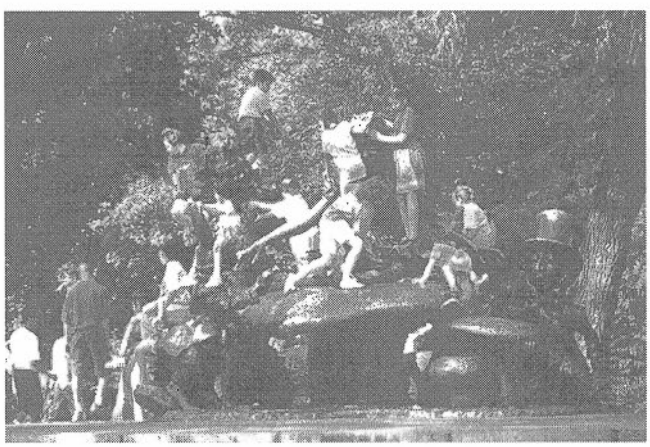


Fig. 2.4 A Statue or a Climbing Structure?

Moore claims that, "for children, objects derive significance from their use – [a tree can be climbed]" (1986, 10). As part of his study of children's environmental interactions, Moore asked children to draw pictures of some of their favourite places in their neighbourhood. The resulting drawings and comments illustrate children's unique perspective, their functional orientation. Each of the places was described in terms of the activities or experiences the particular place provided. A young boy named Brian describes his favourite setting: "I go here to watch the birds"; "This is where I collect blackberries and get conkers" (R. Moore, 1986, 34). Dawne notes that she likes to go to

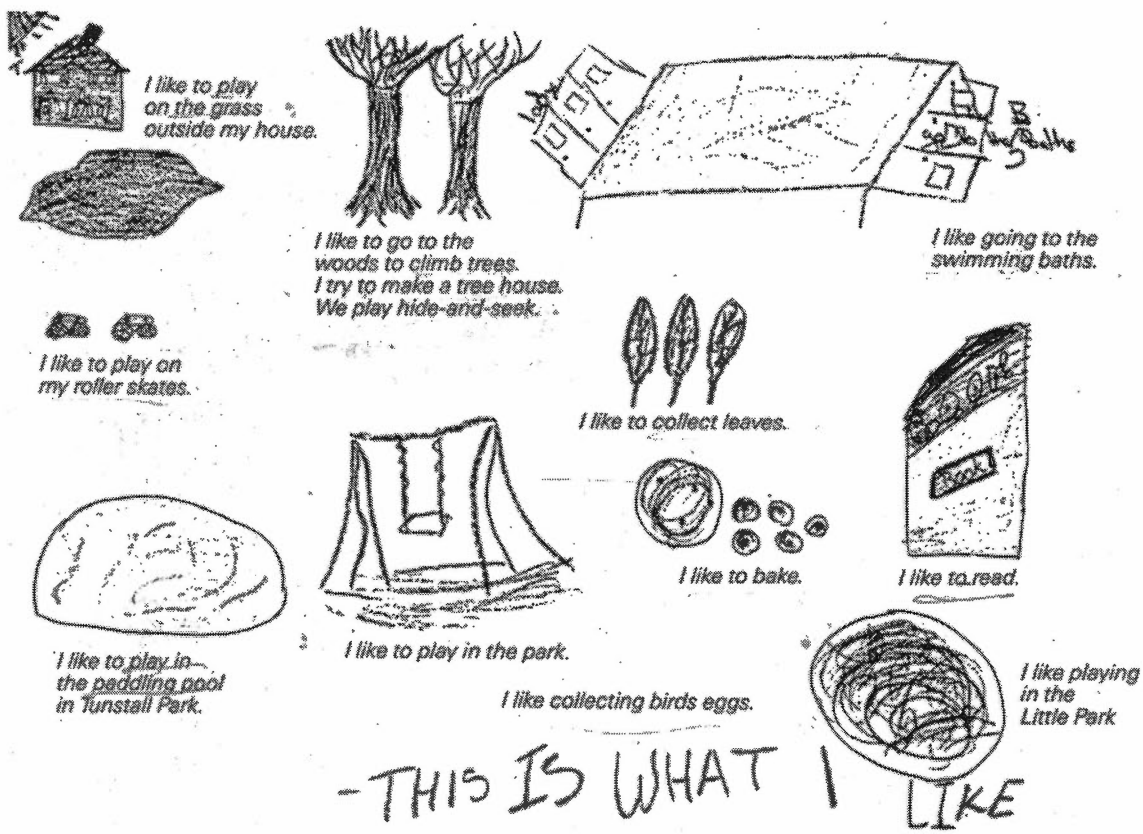


Fig. 2.5 A Functional Perspective

the woods "to climb trees": "I try to make a tree house. We play hide and seek"; "I like to collect leaves"; "I like collecting bird's eggs" (R. Moore, 1986, 38). (See Fig 2.4) Heft suggests that the notion of a primarily functional perspective is supported by evidence that children tend to name places or features in their environments with functional descriptions or terminology (1988, 35). Behavioural records reveal numerous examples

such as "the sliding hill", "the lookout-rock", "the big resting rock", "the place where the fair is", and "the house with the dog that bites" (See Fig. 2.6) (Heft, 1988, 35; Hart, 1979, 307). Adults do not seem to rely on functional assessments of environments to the same degree as they did when they were children. By the time one reaches adulthood, functional referencing has been replaced for the most part by more socially derived descriptions based on formal place or building names (Heft, 1988).

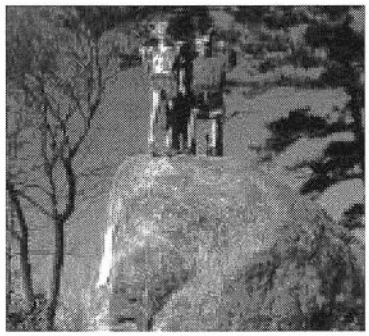
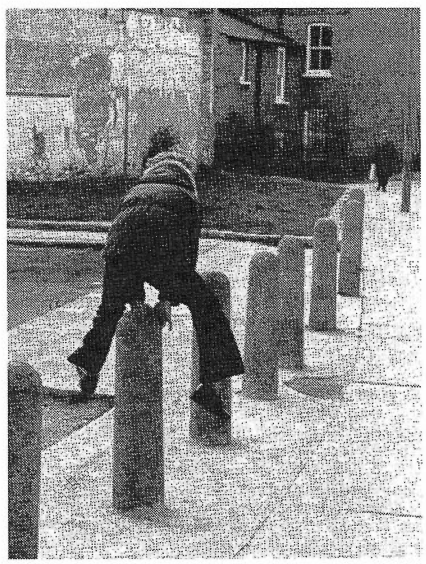
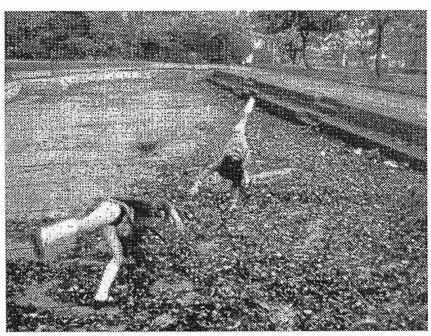
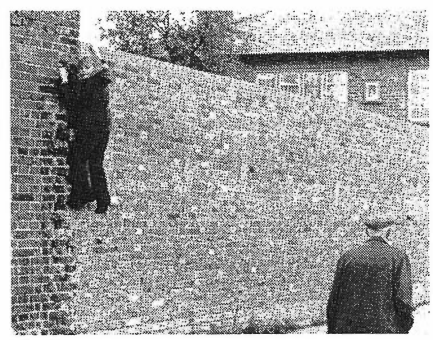


Fig. 2.6: The 'Lookout Rock'

Moore suggests that children are attuned to the "microfeatures" of their environments, especially those that let them test their bodies and skills (1986, 72). During his 'field trips' with various children around their neighbourhoods, he describes the frenetic pace of one young boy who was continually "darting ahead, leapfrogging over concrete bollards, hopping between paving slabs, balancing along the curbside" (See Fig. 2.7) (R. Moore, 1986, 72). He also observed a pair of girlfriends who roamed the neighbourhood, where they alternately "balanced on walls, hopped over cracks between paving slabs, climbed walls and trees, slid down and twirled around railings, leapfrogged dustbins, jumped over streams, did handstands and somersaults on every available patch of grass, and shuffled through leaves" (See Figs. 2.8







Figs. 2.7, 2.8 and 2.9 Responding to Environmental Opportunities

and 2.9) (R. Moore, 1986, 72). These observations demonstrated that children "used their bodies to respond to every perceived opportunity" in the environment. They "hopped, climbed, balanced, skipped, rolled, swiveled and squeezed through, on, over, around and inside their surroundings – using ledges, posts, walls, curbs, banks, bollards, doorways, steps and paving stones – their movement choreographed by the landscape" (R. Moore, 1986, 56). These descriptions illustrate the enormous range of opportunities for action that children perceive within their environment, regardless of conventional uses: steps will invite sitting and climbing; surfaces ask to be stretched out upon; appendages provide handholds for helping them to climb up and view the world from a new perspective; lower surfaces are used for resting books or toys (Feinberg, Kutchner & Feldman, 1998). Children's functional rather than form-based perspective allows them to increase the range of possibilities inherent in an environment so that they can experience it in a tactile, auditory, oral and olfactory sense. An adult may enjoy the view of a lush hillside; the child, however, sees it in terms of the opportunity to experience the free fall of tumbling down the hill, and to feel and smell the soft, wet grass (Stine, 1997). The passive visual experience does not feed the child's need to actively experience their world through a variety of sensory interactions (Stine, 1997). Children's functional perspective frees them from an intellectual assessment that would prevent them from experiencing the environment in the multi-sensory, exploratory manner that helps to drive their development.

The difference in environmental assessment between children and adults is primarily because the two groups are not looking to perform the same functions within a given setting. Children are looking for activities that will facilitate their learning and development; by the time one reaches adulthood, our occupational goals have changed, and therefore so have the functional significance of our environments. Werner discusses the difference in the adult versus child perspective in an analysis of the experience of a canal loading dock area by members of both groups. He suggests that, to the adult, the primary features of the place are the street, the path down to the dock, and the landing dock itself as these elements allow the person to move through and carry out their activities in this environment. The child, however, is not interested in these elements and turns attention to the wooden fence in the area and the slopes,

both of which suggest a multitude of exciting play opportunities (Werner, 1957, cited in Heft, 1988). Children may not perceive, or may ignore, features or opportunities in a setting on which the adult will likely focus because they are interested in very different interactions than those of their adult counterparts. Adults who are planning environments for children must remember that they will likely see the world through a very different set of eyes than the child for whom they are designing.

It is clear that any framework for the design of children's settings must consider the unique functional significance of the environment for a child. However, Heft stresses that the language typically used in environment-behaviour studies, not to mention in architectural design, is almost exclusively form-based (1988). This standard approach to conceptualizing places, which defines the actual objects or forms within a setting, is not necessarily the most appropriate. Instead, Heft proposes a new approach which defines environmental features "in terms of their functional significance" (Heft, 1988, 29). In essence, this approach attempts to describe a setting in terms of its affordances relative to a particular individual or group. In the case of children's environments, this paradigm would be more in keeping with the fundamental perspective of the child users.

A descriptive approach based on function rather than form is more in keeping with an affordance-based framework for a number of reasons. The description of a setting based on forms is not defined in relational terms; environmental features are considered independent of any inhabitant or perceiver of that setting (Heft, 1988). For example, one can describe a particular landscape in terms of its elemental forms such as trees, grassy plains, and water features like streams or ponds, without referring to any particular individual (Heft, 1988). However, it has previously been demonstrated that people, particularly children, perceive their environments in terms of their functional significance. The tree in the previous example then, using a function-based description, becomes a feature that alternately supports climbing up, swinging from, hiding behind, reading beneath, or lounging under in the shade (Heft, 1988). A function-based description attaches affordances to a given feature or setting, and allows the feature or setting to be defined according to the needs or intentions of an inhabitant of that environment.

Heft also suggests that using functional descriptions for environmental features allows for the possibility of multiple affordances (1988). A form-based description consigns a book to being seen strictly as a 'book'; it cannot also be a rock, a car, or a feather. Classifying the object into the form category of 'book' cloaks the variety of purposes for which the object can be used. From a functional perspective, one can use a book for reading, for weighing down papers, as a booster seat for a young child, or for propping open a window. As Gibson emphasizes, "You do not have to classify and label things in order to perceive what they afford" (1979, 34). Labeling may in fact limit the range of affordances that a person can ascribe to a particular item. A function-based description of an environment more accurately reflects human perception and use of features and settings within their environments.

A functional orientation is even more important to consider when the perceiver is a child. If children initially perceived an item as belonging to a certain form category of object, this labeling would interfere with the detection of the wide range of functions that it would afford, particularly given their more limited range of experience and knowledge. One study revealed that once the use of a toy was explained or demonstrated to children, they tended to use the object strictly in the demonstrated capacity (Stine, 1997). Labeling items, or in other ways restricting the exploratory use of an item, may limit the rich possibilities for interaction that children are likely to imagine.

Overall, affordance theory is congruent with children's functionally-oriented perception of the physical environment, which in turn governs their subsequent evaluation and use of a given feature or setting. An affordance-based model therefore shows enormous promise as a foundation for an approach to conceptualizing the child-environment relationship and designing effective settings for their use.

2.2.3 Applying Affordance Theory to Children's Environments

An effective environment for children is one that is compatible with their intended tasks or interactions

~ Stone, 2001, 180

During the last few decades there have been a few researchers who have attempted to further define the nature of affordances for children, and explore the possibilities of this model for improving our understanding of children's environmental preferences and behaviour. One of the primary intended outcomes of this field of study is to use this understanding to create richer, more meaningful settings for children. The following review traces this effort and establishes the conditions for using affordance theory as a foundation for a design framework.

Wohlwill and Heft have been strong voices supporting the notion that an affordance perspective may be more suitable as a theoretical basis for the design children's settings because it "stresses the action possibilities that environmental features and environmental settings encourage or permit" rather than the traditional design emphasis "on form in a geometric and abstract sense" (1987, 319). Since these functional possibilities are congruent with children's inherent environmental perception, an affordance-based framework is more capable of describing an environment that is psychologically meaningful for children (Wohlwill & Heft, 1987).

Even before Wohlwill and Heft's advocacy of an affordance-based approach, many researchers noted that, beyond the passive perception of opportunities for action within their environmental settings, children seem to experience a powerful attraction to suggestive environmental features. Barker referred to a study which suggested children perceive certain settings as almost demanding a particular behaviour (G.T. Moore, 1986; Heft, 1988). A level, obstacle-free area seemed to consistently stimulate "running and romping in unorganized, exuberant activity", leading Barker to remark that "open spaces seduce children". He concluded that the inherent characteristics of the setting create powerful "possibilities for action" (Heft, 1988, 32).

Despite increasing acknowledgement that children attend to functional opportunities in their settings, Harry Heft was the first researcher to undertake a comprehensive investigation of the affordances of children's environments in order to flush out patterns with respect to the specific physical or spatial features that facilitate children's engagement in activities. His study was also intended to support the notion of an innate functional orientation in children. To develop a catalog of affordances of children's outdoor spaces, he analyzed three of the most comprehensive records of children's behaviour in outdoor environments available at the time. The first resource, Barker and Wright's *One Boy's Day* (1951), provides an incredibly detailed account of the activities and interactions of a seven year old boy from a Midwest town during an entire day in April, 1949. *Childhood's Domain* (1986) by Robin Moore, Heft's second text, provides detailed observations of behaviour during a number of fields trips he took with various children to their 'favourite places' around their British neighbourhoods. The third record was Roger Hart's classic behavioural study of children's knowledge of, use, and feelings towards outdoor places, *Children's Experience of Place* (1979).

Although these studies for the most part concentrated on the behaviour of the children, Heft turned his attention to the specific environmental features that were mentioned as part of the children's various interactions. He chose to organize the child-environment transactions in terms of the types of activities that were documented in order highlight any associated patterns of environmental characteristics. One significant finding of his analysis of *One Boy's Day* was that every type of activity undertaken by the child required the support of particular physical features. He notes the following illustrative examples: "riding a bike requires a relatively smooth, flat surface; climbing requires an object or structure that has suitable hand and footholds relative to reach and stride as well as hand and foot size" (1988, 32). This observation provided confirmation of the interdependent relationship between a particular individual and the functional properties of an environment that is central to the theory of affordances (Heft, 1988).

Categorizing the young boy's activities in terms of environmental characteristics allowed Heft to cluster together the objects or structures that supported a particular interaction, such as 'sit-on-able' features, rather than grouping together all of the interactions with a

certain form, such as 'benches' (1988). As a result, there were a number of features that had the common functional property of supporting, for example, 'climbing-on': "the railing of the bandstand, the garage in the backyard, the second floor home railing, a bench, a crate, a fence, a tree, the doghouse in the yard" (Heft, 1988, 33). Heft's analysis also pointed out that there can be significant functional differences among features that are typically sorted together under the same form classification (Heft, 1988). For example, although the young boy was observed to have several encounters with various trees, he did not play with each tree in the same manner. Some trees he climbed up, others he used to swing from their branches, and still others he used to hide behind (Heft, 1988). Not only does the analysis of *One Boys Day* demonstrate the child's vast range of play activities during the course of a single day, it also suggests that some features and settings particularly captivated him.

Heft moved on to apply the same functional approach to the two remaining behavioural studies. The resulting analysis revealed similar patterns in children's use of a variety of affordances within their familiar outdoor settings. For example, Moore's record revealed that a water feature can afford "boating, fishing, playing in, riding through, and floating things on", while slopes provided the opportunity of "sliding down, dancing down, bicycling down, go-carting down, rolling down and rolling objects down" (Heft, 1988, 34). The study clearly demonstrates that children actively use suggestive features in their environments to support and even inspire a variety of activities. Although the affordances engaged in Moore's study showed different degrees of prominence than those in Barker and Wright's record, Heft found a considerable number of similarities in both the features with which children chose to interact, and the related activities they carried out with respect to these features (1988).

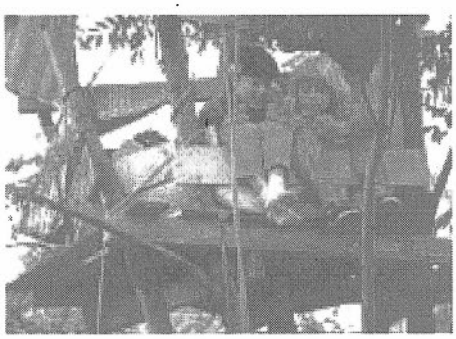
His analysis of Moore's study indicates that children may be attracted or ascribe meaning to certain places because the particular combination of various environmental features create *conditions* that are conducive to their activities – a phenomenon that Moore and Heft refer to respectively as a "micro-climate" or "micro-habitat" (Heft, 1988, 34). For example, a certain area may be chosen as a play space because the environmental elements combine to provide a setting that is both shielded from the

weather and out of the path of pedestrian or vehicle traffic, while at the same time suggesting a sense of privacy (Heft, 1988). This is an important aspect to understand: it may not be just a specific feature that entices the child, but the environmental conditions as a whole surrounding that particular feature.

An analysis of Hart's study also corroborated Heft's notion that a functional description reveals a more accurate picture of the significance and use of a given environment than is provided by a form-based analysis (Heft, 1988). This was particularly evident in the children's diverse use of trees (See Figs. 2.10, 2.11, 2.12 and 2.13).

Fig. 2.10: Affords Climbing

> There are trees that afford climbing, and among those types some climbing trees afford 'a lookout', whereas others do not. Further, some climbing trees are especially suitable for building tree houses, others for swinging on its branches, and still others are distinctive because they bear fruit. Further, trees with dense low hanging branches, as well as some types of bushes, are good shelters in and of themselves, and also some can be used for building forts. Finally, trees with areas of dirt at their base provide places for constructing roads and other like activities (Heft, 1988, 35).



Figs. 2.11, 2.12 and 2.13 Affords ... Building, Perching, Resting

Although Hart's observations spoke to the fact that trees are one of children's favourite environmental features, it is by distinguishing among the various trees according to their functional significance that helps to refine our understanding of child's attraction to this feature.

The final result of Heft's analysis of these three accounts of children's environmental behaviour was a preliminary functional taxonomy of children's environments. Ten categories of affordance features have been identified from the analyses, and each category has a corresponding group of activities that the feature was observed to support (See Appendix A; Table 1) (Heft, 1988). Heft acknowledges that this inventory is not comprehensive for a number of reasons. The diverse range of unique and imaginative uses of environmental features by children suggests that it would be impossible to provide a complete catalog of possible interactions. As well, there may be gaps in the taxonomy because it was developed from previously documented records of behaviour, and would therefore be limited to the interactions described in these studies. Heft also recognizes that each category within the taxonomy could be further divided with respect to the specific types of activities or experiences associated with each feature. For example, he suggests "climbable features that afford looking out" could be considered as a subset of the category "climbable features" (1988, 36). Regardless, Heft's taxonomy organizes environmental features in such a way that their potential meanings for children are revealed, and it provides "a much richer accounting of the psychological resources of the environment" (1988, 36). It also begins to define a functional language for describing environments which is congruent with the ecological approach called for by theorists such as Gibson and Barker (Heft, 1988).

Heft's affordance taxonomy was a good first step in starting to organize and document some of the specific physical or spatial characteristics that children perceive as affording particular activities. By his own admission, the list is not exhaustive, but there are omissions that need to be addressed in order to build on this preliminary framework. For one, the affordances that are cataloged by Heft are related primarily to activities such as 'jumping', 'climbing', or 'looking out'; the taxonomy does not reflect the notion that children may choose particular environments specifically because they afford social interactions, such as the opportunity to play with a small group of friends in a 'special' place, rather than strictly supporting a particular play activity. Heft's analysis also catalogs primarily active pursuits, and makes few references to quieter activities such as 'listening', 'looking' or 'resting'; this may be in part because the child may undertake

these activities in a private setting and are subsequently difficult to document. Kytta attempts to address some of the gaps in the taxonomy by enlarging it to include affordances for sociality, such as the possibility to play rule and role games, the opportunity to share with a friend, or the chance to play home or war (2002). Heft's work would have been limited in studying affordances for sociality in any case as he was relying on observations recorded by others, where children were rarely, and certainly not systematically, questioned about their use of places for social reasons. Kytta was better able to consider this component because the study included conducting interviews with the children involved, rather than relying solely on observation records. As such, she was able to solicit information regarding both the physical and social affordances provided by an environment (Kytta, 2002).

Although Kytta's study simply noted when the affordance for sociality was present, and did not distinguish between the various types or locations of these interactions, this work was an important step for the evolution of an affordance-based framework. It reminds us that there are many factors which influence the perception of affordances besides just the physical characteristics, including the presence or absence of others. Her study focused in particular on the relationship of both perceived and utilized affordances in children's outdoor community environments to the degree of urbanization in various locations in both Finland and Belarus. The comparison of the two countries, and of urban and rural communities, illustrates that not all environments are created equal; a wealth of affordance opportunities are not always available to children in their immediate environments. Although the study does not provide data regarding the specific nature of social interactions, the inclusion of the element of sociality broadens the taxonomy to reflect a more holistic picture of children's motivations for environmental engagements.

The work conducted by both Heft and Kytta serves as an excellent starting point for developing an affordance-based design framework. However, the taxonomy as it stands still exhibits a critical gap which must be bridged before it can function as such, namely the role of development in motivating and defining children's environmental perception and behaviour.

2.3 Introduction of a Developmental-Affordance Framework

As the individual's psychological and physical characteristics change developmentally, what action possibilities the environment affords changes in a reciprocal fashion.

~ Wohlwill & Heft, 1987, 285

Life is experienced as more satisfying and interesting, and is therefore more meaningful and conducive to growth when space invites us to do what we want to do.

~ Kritchevsky, S. & Prescott, E., in Stine, 1997, 5

Affordance theory has been shown to meet several of the aforementioned criteria for an effective theoretical framework, and has been enjoying increasing recognition among researchers and theorists as a viable approach to envisioning the human-environment relationship. An affordance model promotes the interactive nature of this connection, conceptualizes the environment in a holistic fashion, and defines affordances in relation to the needs and goals of individuals. However, there are still a number of elements missing that restrict its ability to inform the design of effective children's environments. The most significant gap is lack of consideration of the role of development in the perception and use of affordances. None of the studies reviewed to this point have set affordances within a developmental context, or attempted to address the motivation behind a child's perception of an affordance opportunity. This is problematic given that the increasing recognition among a number of disciplines that children's use of an environment is driven by developmental needs (Clark & Uzzell, 2002). Parke, as early as the late 1970s, suggested that children at different developmental levels will perceive their environments differently, partially because they are looking to the environment to support different intentions (1978). There is strong evidence that these intentions are specifically related to the developmental goals of a particular child at a given time. However, with the notable exception of Wohlwill & Heft, few researchers exploring children's settings from an affordance perspective have explicitly considered the role of development in both the perception of environmental opportunities and the motivation of environmental interactions.

This is not to say that an affordance framework is not capable of addressing a developmental influence. In fact, Heft himself acknowledged that the very definition of the concept emphasizes the relational nature of the perception of affordances; it stipulates that the affordance possibilities of an environmental feature or setting can only be considered with respect to a particular individual (1988). Since the capabilities and proportions of young children vary a great deal from those of older children, the affordances available to children of one age may not be accessible or desirable to children of either a younger or a more advanced age (Heft, 1988). As a result, Heft states that applying the concept of affordances "leads to the recognition that environments, when considered from a functional perspective, have a developmental dimension. Specifically, the functional possibilities of an environment change in relation to the developmental status of the individual (or group) of interest.... New affordances emerge throughout development as maturation and experience interact to expand the individual's behaviour repertoire" (1988, 37). An affordance approach, therefore, has an inherent developmental component, which actually increases its ability to serve as a foundation for a design framework.

Heft certainly recognized the connection between environmental behaviour and development, but the taxonomy, as he initially laid it out, does not account for this relationship. His categorization does not explicitly relate the perception or engagement of affordances to the specific needs, goals and preferences that characterize each developmental age. His work has been very valuable in illustrating the functional perspective of children and the physical features that afford various activities, but this initial analysis lumps the actions of all children into the same category, without considering the individual user's age or developmental level. Children's perception and use of affordances needs to be set within a developmental framework to acknowledge that children at various stages exhibit different physical and psychological capabilities, and are working towards mastering different skills.

This developmental perspective is important for a number of reasons. First, as articulated by Heft, the affordances available to a child in an environment change as the child grows physically and psychologically. The affordances of the object or setting

themselves do not change as the needs of the perceiver changes, rather their perception of the specific opportunities available changes because they have different needs and capabilities to support. As a result, they attend to different functional possibilities to support their current intentions (Clark & Uzzell, 2002). At an early age, a child may not have the motor skills or the cognitive capacity to interact with the environment in a sophisticated manner. Alternately, a child who has entered the more mature stages of childhood would have outgrown both the spaces and the activities sought out at a younger age. As a result, two children at different developmental ages, even when occupying the same setting, will attend to those features that are congruent with their differing goals and capabilities.

The second reason for considering affordances from a developmental perspective is related to our understanding that children take an active part in their learning and continuing development. If children in fact seek out activities or interactions that are appropriate for driving various developments throughout the course of childhood, we then have a significant clue to understanding the motivation behind their environmental interactions. Children may be attending to specific affordances that are compatible with the larger set of developmental tasks associated with their particular age of childhood. In this case, a child's utilization of a particular affordance opportunity may not be solely motivated by a desire to play a game with friends, or even by the more general desire for social contact. Their environmental interaction may in fact be driven, for example, by the higher order goal of developing a healthy self-identity. By understanding the motivation for their behaviour, namely specific yet shifting developmental goals, we can utilize their behaviour patterns to pinpoint the affordances that are likely to be attractive to children of various developmental levels.

Clark & Uzzell are among the only researchers to date who have attempted to identify affordances related to specific developmental needs, namely adolescents' need for places of social interaction and places for retreat, both of which are associated with the development of a healthy self-concept. Their study was based on earlier work by Lieberg that suggested that these intentions were among those which prompted adolescents to appropriate places (2002). Clark & Uzzell set out to investigate the

opportunities available to meet these needs in the various environmental contexts typically inhabited by adolescents aged 11 to 16 years: their home, school, neighbourhood and town centre. The study is valuable because it expands the notion of affordances even further to include more than just the opportunity for particular activities or social interactions; it suggests that the features or conditions of an environment can be perceived as facilitating psychological states. The study participants were questioned as to the places that afforded 'being active', 'being with close friends', or 'being alone', however they also addressed which places afforded a sense of 'being free to be yourself', 'being in control of the environment', 'feeling secure', and 'being in a place where I feel I belong' (2002). Although the study primarily analyzes which of the four types of environments provide for these various activities and states, it also makes a critical contribution to an affordance framework – the recognition that the affordances provided by an environment may be related to psychological experiences important for development, such as the ability of a retreat space to afford the experience of a sense of privacy or security. However, the study does not identify the specific environmental characteristics that underscored this perception.

In fact, very few researchers have made the explicit link between the actual physical or spatial features of a setting and the functional properties of that environment. One notable exception is a study conducted by Woolley and Johns that attempts to catalog the physical characteristics within urban spaces that British teenagers perceive as affording the appropriate conditions for skateboarding (2001). The study demonstrates that these adolescents chose spaces for skateboarding activities that were considered accessible and sociable, and which provided physical features suitable for practicing their tricks, such as stairs, benches or curbs (Woolley & Johns, 2001). Although these researchers relate specific environmental features to the desired affordances for skateboarding, they do not address whether the spaces chosen by the participants differed by age, or consider the importance of these physical and social activities within the context of their development. A review of the literature suggests that there are very few studies which consider the specific physical characteristics that support developmentally significant activities and experiences.

The only prominent exception is a recent, unpublished study by Maxwell of Cornell University. Maxwell suggests that the environmental behaviour literature has given us indications as to the types of places children prefer, but little about the physical characteristics of these places, and the meaning children ascribe to them (2003). Consequently she set out to investigate the connections between the physical features and spaces within children's homes, and the activities that relate to the development of self-concept, a significant goal of childhood (2003). As part of her analysis framework, Maxwell outlined a typology of spaces related to self-identity development. As is appropriate, the typology uses functional terminology, rather than form-based categories, to describe various spaces. These place categories include settings that support 'independence', 'privacy/self preservation', 'enjoyment' and 'social interaction' (2003). This typology reflects the more holistic definition of affordance opportunities utilized by Clark and Uzzell, which is more capable of providing a complete portrait of children's environmental perception. For the purposes of her study, Maxwell focused on two of the concepts related to self-identity: opportunities for social interaction and for self preservation. She concludes that family interaction and child's play are supported by clean, attractive areas, large enough to accommodate several family members at times, and particularly by expanses of clear floor space. Self-preservation and reflection, on the other hand, were seen to be afforded in places where children were able to control access to the space, such as a private bedroom or closet, and in places children perceive as 'belonging' to them, such as their desk or bed (Maxwell, 2003).

Maxwell's study constitutes another important step in the development of an effective affordance-based framework. She succeeds in drawing a connection between the three critical elements of a child's environmental interaction: first, the developmental goal, in this case healthy self-concept; second, the associated activities motivated by this goal, such as social interaction and reflective activities; and third, the supportive conditions or features in the environment. Although the study does not yield a great deal of data regarding the specific physical features that support these developmental activities, it outlines the relationships that must be emphasized in an effective design framework.

The one remaining element missing from Maxwell's study is recognition of the change in both the environmental perception and interaction as the child develops. Interviews were conducted with children of ages 8 through 13, but the analysis of the affordances of, for example, privacy in their home environments did not consider how the needs and experience of an 8 year old would differ from that of a 13 year old child. This aspect of the child-environment relationship must be considered in order to make an affordance-based framework truly effective.

This review of the application of affordance theory to children's environments has demonstrated that there have been concerted efforts to flush out a working taxonomy of affordance features in these settings as a step toward re-conceptualizing child-environment interactions. Clark & Uzzell and Maxwell also made important advances by considering the relationship between developmental goals and the child's perception and use of affordances. However, affordance theory stipulates that the intentions and capabilities of the individual cannot be separated from that person's environmental perception. For the case of children, this requires an understanding of the motivations behind children's behaviour, as well as acknowledgement of the impact of changes in their goals and capabilities as a result of development. To date, research has given little consideration to their motives and even less to their changing perception and behaviour.

So, we may aim to specify and embed a variety of affordances within children's settings, but if the functional possibilities are not congruent with their intentions or capabilities, these features may not be engaged or even perceived by the child users. As a result, we would miss a vital opportunity to provide children with an environment that effectively supports learning and growth. However, when set firmly within a developmental context, an affordance-based framework can be a powerful tool for informing environmental design. The following chapter will work to outline prominent patterns of child development and environmental behaviour, and to determine the features and conditions within children's learning environments that will afford the rich play experiences conducive to learning and development.

3 Developmental Behaviour and the Physical Environment

The essential idea is that the ways in which one perceives and experiences one's life vary qualitatively from stage to stage

~ Newman & Newman, 1991, 45

Childhood interests reflect the child's developmental process and expanding capabilities

~ Kielhofner, 1995, 141

Each stage of the human life course is marked by significant shifts and developments in our occupational activities. Childhood is "a period of tremendous growth and change in occupational behaviour" (Kielhofner, 1995, 140). During this period, children begin to explore their ability to make willful choices, and come to understand the consequences of their actions by way of their interactions with family, peers and the environment. The play activities in which children engage are vehicles for exploring their abilities and limitations, and discovering which activities and interactions hold value for them. These critical experiences require supportive environments, the nature and value of which change as a child develops. The previous chapter demonstrated that an affordance-based design approach is highly congruent with children's natural environmental perception and use. However, as discussed, in order to be effective such a framework must also reflect an understanding of the role of development in these interactions.

This chapter will review the development of children through the course of childhood, and outline the play activities and intentions characteristic to the various age groups. These interests substantially influence a child's environmental perspective and behaviour, and must therefore be reflected in any approach to the design of children's environments.

3.1 Theories of Child Development

Over the last century there have been a number of theories of human development, each trying to pinpoint the process by which human beings come to acquire knowledge and capabilities throughout the life course, as well as the environmental factors that influence development. Though there are many common elements amongst the various theories, each has been derived within, and therefore influenced by, specific historical and cultural contexts (Newman & Newman, 1991). As a result, each model can conceptualize the motivations and processes of development in very different terms. It is beyond the scope of this paper to provide a historical and critical review of these various theories. However, it is useful to utilize development theory as a framework for considering child behaviour.

Some of the most prominent models of human development are based on *stage theory,* which conceptualizes development as a sequence of "relatively discrete, hierarchical stages that can be identified psychologically, physiologically, and socially" (Rogers, 1982, 11). Though initially only applied to child development, stage theory has been more recently applied to the entire life span and suggests that there are distinct phases throughout the life course that have characteristic physical, psychological and sociological events (Rogers, 1982). Besides these developmental milestones, G.T. Moore suggests that each phase also involves new challenges and modes of behaviour that build on the abilities acquired during previous stages to develop more sophisticated skills (1979).

Within the category of stage theory there are several different conceptual models, which vary in the exact division of the life stages, as well as the definition of the characteristic developments of each phase. The most dominant of these theories was developed by Jean Piaget, who studied various elements of child development for over 50 years, particularly the areas of cognitive development and the role of play in the development process (Bjorklid, 1982). Piaget believed that all children developed according to "a genetically predetermined sequence of stages", each of which represented a specific set of tasks and advancements for the child (R. Moore, 1986, 12; Piaget, 1972). However, he also believed that the rate and the intensity by which a child passed through these

developmental levels could be influenced by the quality of their environmental interactions (Bjorklid, 1982; Bransford, Brown & Cocking, 2000).

Critics of Piagetian theory suggest that the proposed stages are too rigidly delineated, and that the sequences themselves may vary as a result of the type and quality of childhood experiences (Rogers, 1982). Piaget's definitions of the stages can also be seen to limit the developments of children to the events and milestones that are considered to characterize each level (Berk & Winsler, 1995). Vygotsky, another prominent developmental theorist, emphasized instead that the activities and social milieu of the child could succeed in driving the child's development beyond the capabilities associated with each Piagetian stage, a process he referred to as 'scaffolding' (Berk & Winsler, 1995; Bransford, Brown & Cocking, 2000). That is, cues and encouragement that a child receives from, for example, a caregiver, may help the child to advance some skills to a level that Piaget reserved for a more mature stage of childhood. Vygotsky proposed that development was actually a product of learning, and heavily influenced by social interactions, a factor that he felt was underemphasized in Piagetian models (Berk & Winsler, 1995).

Erikson, who was also a proponent of stage theory, developed a psychosocial model of human development. Like Piaget, Erikson believed that humans passed through a series of unique stages during which an individual will use previously developed skills to conquer new challenges and acquire more sophisticated capabilities (Newman & Newman, 1991). However, he saw development as the result of the combination of inherent ambitions and the desire to meet societal expectations (Newman & Newman, 1991). Though Erikson approached development from a different perspective than Piaget, both models advocate for the notion of a fixed sequence of development levels, each of which integrates the skills realized during earlier stages (Bjorklid, 1982; Newman & Newman, 1991).

Despite some fundamental differences in these conceptual models of development, there are some general commonalities amongst the theories. For example, both Piaget and Vygotsky believed development to be a result of a child's experience in the

environment, and that the rate of development of a particular child can be affected to some degree by social factors (Berk & Winsler, 1995). Not surprisingly, neither of these models gives much consideration to the influence of physical environmental factors in supporting or hindering a child's development. This supports earlier conclusions that the field of developmental psychology in general has neglected to consider the role of the physical environment, despite evidence that the child's developmental behaviour is inextricably linked to its environmental context, whether physical or social. For example, Vygotsky did not consider whether the physical environment was also capable of 'scaffolding' children's development.

Stage theories do exhibit some weaknesses, including disagreement regarding the age ranges and developmental milestones associated with the various stages, the degree to which the stages are pre-determined, and the role of physical and social factors. Some developmental theorists have suggested tracing the process of development of a single system through the life course as an alternate way of examining human development (Newman & Newman, 1991). However, such a model does not accurately illustrate the relational nature of cognitive, physical, social and psychological development. Regardless of which developmental model is utilized, children's physical, social, cognitive and emotional capabilities *do* move in a pattern of increasing complexity and sophistication as they progress through childhood (Rogers, 1982). Therefore, a stage model of development can provide a useful premise for looking at the changing abilities and behaviour of humans as they progress through life. For the purposes of this paper, this framework can help to highlight some of the skills and competencies that correspond to children at various points in the course of childhood, and shed light onto patterns of child behaviour.

3.2 The Developmental Stage of Childhood

Despite the differences exhibited by various human development theories, there is general agreement that the period of childhood is a critical developmental stage. Research shows conclusively that "the first five years of a child's life is the time of most active development, not only of intellectual growth, but also of the development of personality, social skills, and stable emotions" (G.T. Moore, 1979, 201-1). However,

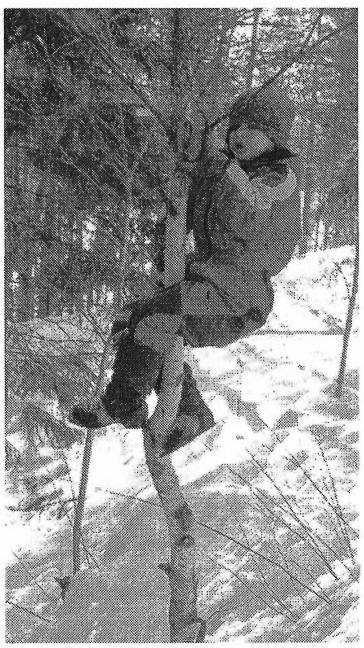
Moore emphasizes that development doesn't stop at the age of five years. Rather, as children gain capabilities that allow them increasing independence, they "continue to assert their urge to engage with the environment, to investigate and test its possibilities and to try things they haven't tried before" (R. Moore, 1986, 11). The entire period from birth through to the end of childhood is in fact marked by considerable and critical advances.

During the period between the age of 6 weeks and 6 years in particular, there is rapid development in a number of essential areas. Children of this age are involved in developing, for example, language skills, a sense of individuality and self image, large and fine motor skills, sensory acuity, as well as fundamental social functioning (G.T. Moore, 1979, 202-2). All of these tasks can be divided into three distinct, yet interdependent, categories of development: physical, cognitive-intellectual-perceptual, and socio-emotional (G.T. Moore, 1986). The various developmental tasks of childhood combine to promote advances in all three areas, which in turn prepare the child to tackle more advanced tasks and experiences. Taken all together, developmental tasks are responsible for promoting a set of skills and competencies that lead children to increased mastery over their environmental interactions (Newman & Newman, 1991).

The developmental tasks typically associated with each stage are accomplished through a combination of environmental activities and encounters. Moore highlights that some experiences foster more development in one area over another. For example, activities such as crawling, running and climbing are especially beneficial for physical development, while social development is advanced when talking with friends or playing house (G.T. Moore, 1986). However, other activities clearly promote development on several levels; Story-telling or the organizing of clubs affects both intellectual and social abilities, while playing ball games with friends develops both physical and social competence (G.T. Moore, 1986). The critical goal of childhood is to promote balanced development in all three areas. Achieving this aim relies substantially on the diversity, quality and compatibility of children's interactions with their various environments.

3.3 The Motivation for Environmental Interaction

Interactions with physical and social environments provide children with the fundamental tools for realizing critical developmental goals. But what prompts an interest in tackling challenging developmental tasks? Research with children suggests that this concern is innate; "The motivation for development and the motivation to interact with the environment exist in all children" (G.T Moore et al, 1979, 202-13). Bransford notes that children are driven to seek out challenges to conquer or problems to solve (2000). That is, the active role children take in tackling learning and development tasks is intrinsically motivated. Their interests at any given time during childhood centre on the experiences that stimulate the development of new capabilities; they are naturally attracted to activities that are compatible with their acquired skills but also provide a degree of difficulty that drives the development of new skills. For example, most children demonstrate a love of active pursuits like climbing and acrobatic activities. This type of play is more than just a recreational activity; the child is developing motor and coordination skills and testing their physical strength, while learning about their relationship with the physical environment (See Figs. 3.1 and 3.2) (Tan, 1978; Stine, 1997). Children are also drawn to activities where they can manipulate objects or environmental features, such as threading rings on a post or tightening screws and bolts with hand tools; these activities advance hand-eye coordination, perceptual skills, as well as conceptual knowledge (Sanoff, Sanoff & Hensley, 1972). Newly acquired abilities motivate children to interact with their environments at a more advanced level, thereby creating additional capabilities. "Skills motivate interaction. Interaction stimulates the learning of skills" (R. Moore, 1986, 15). In this sense, development takes place in a helical fashion; children gradually develop proficiencies



Figs. 3.1 and 3.2: Developing Physical Skills and Coordination

through environmental experiences that provide them with the skills needed to progress to the more mature stages of adolescence and adulthood. Though the motivation for environmental interactions can be influenced by both intrinsic goals and a desire to meet societal demands, as Erikson proposed, the overall ambition of a child is to fulfill the series of developmental challenges typically placed before them at each given stage.

This natural drive toward development prompts the child to actively seek out stimulating activities and settings of their own accord. Wohlwill & Heft suggest that, when left to their own devices, children will naturally set out to discover their environments, and in doing so, stimulate their own learning (1987). Piaget demonstrated that even infants were shown to seek out environmental stimuli that would foster intellectual development (Bransford, Brown & Cocking, 2000). Barth also mentions this active behaviour: "Children are innately curious and will explore without adult intervention" (Barth, cited in Getzels, 1974, 10). This initiative is compatible with the notion that children are intrinsically motivated to develop, and corroborated by the enormous degree of satisfaction they receive from accomplishing developmental tasks. Though they will naturally seek out opportunities that will challenge their current capabilities, children's environmental interactions also need to provide a suitable level of difficulty in order to remain motivating. The child will quickly lose interest in a situation that is considered too easy, however, a challenge which is too great may lead to frustration or self-doubt and cause the child to abandon the development opportunity. Children need, and are attracted to, opportunities that provide the right balance between familiarity and challenge.

3.4 The Role of Play in Development

Children's inherent need to undertake and learn from environmental experiences in order to meet developmental demands manifests itself primarily in the occupation of play. Playful activities are believed to be the major vehicle through which children confront and cope with the challenges of childhood (Korpela, 1992). First of all, various play activities assist in the development of specific competencies; play is a means for deriving motor skills and coordination, for developing intelligence, and for increasing the effectiveness of children's social abilities (Becker, 1976). Each new set of skills activates

their inherent potential to operate at a more advanced level (R. Moore, 1986). For this reason, the type and complexity of play activities shift as the child acquires new competencies and faces increasingly challenging tasks.

During the pursuit of play, children come to know themselves and their abilities, and understand their relationship with the rest of the world (Kielhofner, 1995; Hart, 1987). Becker suggests that playful interaction also instills the notion in children that they can be "effective change agents", capable of manipulating and mastering their environments to suit their behavioural tasks and physical, social and emotional needs (Becker, 1976, 545). A sense of environmental effectiveness increases the feelings of control and confidence that provide the foundation for tackling new tasks and skills, and is essential for continued development (Proshansky & Fabian, 1987; Wolfe, 1978). This feeling of agency comes in part when the child has the freedom to choose appropriate activities and settings for play; they learn how they can use places to support desired behaviours or experiences (See Fig. 3.3) (Sanoff, Sanoff & Hensley, 1972; Getzels, 1974; Korpela, 1992).

Fig. 3.3: Creating their 'own' play environment

Providing children with opportunities to learn about the world and themselves through freely-chosen activities contributes directly to their physical and psychological development (Wohlwill & Heft, 1987). However the quality and range of their interactions depend on the possibilities provided by their environments (G.T. Moore et al, 1979; Olds, 1979). All children require a range of play experiences in order to maximize their potential and meet critical developmental tasks, including a balance of active play and quiet activities (McArdle, 2001; Cooper Marcus, 1986). Children need a variety of environments and interactions to support this range of interests. However, as the child's developmental goals become more complex, their motivations and play activities shift accordingly; "Childhood interests reflect the child's developmental process and expanding capabilities" (Kielhofner, 1995,141). So both the play activities and

settings that children choose vary according to the mood and interests, but they also vary significantly by developmental age.

3.5 The Substages of Childhood

In order to be able to discuss the changing role of the physical environment in the development of children, we need to be able understand how the capabilities and interests of children changes as the age, and how this in turn affects their choice of play activities and settings. For the purposes of this paper, we will adopt the stages of childhood proposed by Erikson and others, which defines childhood as the period between the age of 2 years and 11 or 12 years old (Newman & Newman, 1991). Though the age ranges are only approximate, this childhood model is further divided into the sub-stages of Toddlerhood, from 2 to 4 years old, Early School Age, ranging from age 4 to 6, and Middle School Age, spanning from 6 to 12 years old (Newman & Newman, 1991). Though this model may vary from other stage models in the exact division of substages, the work of various developmental researchers will be utilized to identify the developmental processes and events that seem to be of primary learning value or of heightened significance during each approximate range. This particular division of stages however is especially useful for this investigation of learning environments as it corresponds to the ages at which children typically prepare for and enter formal schools programs. This development model will therefore we used as the framework for examining the behaviours and environmental preferences unique to the various ages of childhood.

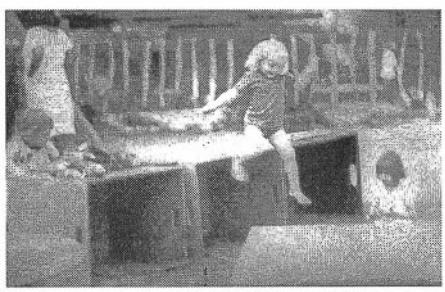
3.5.1 The *Infancy* Stage

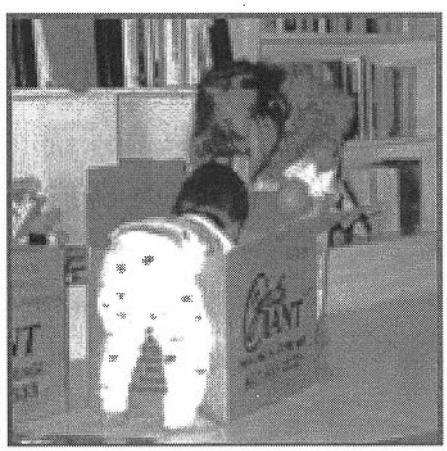
Though the stage of Infancy, here defined as the period from birth to the age of two years, is outside of the stage known as Childhood, it is useful to examine some of the major developments that likely take place during this time. These advances provide the foundation needed to tackle the upcoming developmental tasks of the childhood phase. Newman and Newman suggest that some of the primary goals of Infancy are to develop basic perceptual, sensory and motor functions, and to begin the process of social attachment between the baby and their primary caregivers (1991). Piaget refers to this time as the 'sensory-motor period', when the infant is primarily involved in exploring

their emerging abilities through repetitive behaviour and practice games; "The child attempts to grasp whatever he sees, to rock, shake, rub etc., simply for the sake of grasping, rocking, etc" (Bjorklid, 1982, 55). The goal at this stage is the activity itself, and the satisfaction of being able to control objects as well as their own responses. The period of Infancy is a time of substantial advances in skills and perceptions; infants are just beginning to understand that they are distinct beings, capable of independent thought and action. These developments are crucial for making the challenging leap to Childhood.

3.5.2 The *Toddlerhood* Stage

The stage of Toddlerhood, defined by Erikson's models as the period between the ages of 2 and 4 years and the first substage of Childhood, is a time of major advances in all three areas of development: physical, cognitive, and socio-emotional. According to Newman and Newman, "toddlerhood is a period of activity and mastery, self-regulation, and increasing awareness of dependence and independence" (1991, 238). Toddlers just entering the stage of childhood are steadily expanding their range of locomotive abilities, including large muscle movement and control, which manifests itself in an enormous surge of physical activity (See Fig. 3.4) (Newman & Newman, 1991). They become more confident with walking, and eventually move on to more adventurous physical activities like running and jumping. These advances in physical skills are accompanied by changes in cognitive capacities; Cooper Marcus suggests a toddler or young child's preoccupation with "[getting] into, out of, on top of, and under things", not only reflects their desire to master physical skills, but illustrates their expanding notions of spatial relations (See Fig. 3.5) (1986, 138). These advances mark the beginning of the cognitive stage Piaget termed the

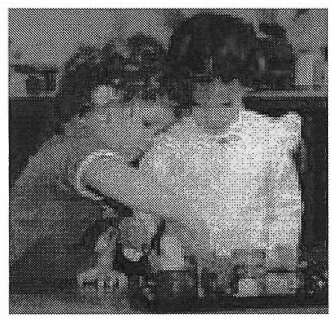




Figs. 3.4 and 3.5: Toddler Play 'Jumping off' and 'Getting Into'

"pre-operational period", during which children begin to comprehend and communicate with language, and become capable of internalized thoughts (G.T. Moore et al, 1979; Newman & Newman, 1991). Children as young as 2 years also develop the cognitive ability to represent things symbolically and to assign life-like characteristics to inanimate objects (Newman & Newman, 1991; Rogers, 1982). For example, a tree branch can become a sword, a box can turn into a castle, and a rock can become a frog prince. These new physical and cognitive abilities combine to allow the child to begin freely exploring and manipulating their environments, and spark involvement in fantasy play activities (G.T. Moore, 1987; Newman & Newman, 1991).

Several researchers have noted this emergence of pretend play at this stage of childhood, and it's association with social and cognitive development; the fantasy worlds that children invent during play stimulates creativity and problem solving skills, as well as an interest in including others in their play activities (See Fig. 3.6) (Cooper Marcus, 1986; Berk & Winsler, 1995; Newman & Newman, 1991). Though infants as young as



Figs. 3.6, 3.7 and 3.8: Pretend and Parallel Play

18 to 24 months begin to engage in parallel play with other children, it is usually in the later stage of toddlerhood that the play activities can be considered 'cooperative' (See Figs. 3.7 and 3.8) (Rogers, 1991; Cooper Marcus, 1986). The introduction of group play marks the beginning of a distinct shift away from the "egocentric" perspective of infants and younger toddlers (Rogers, 1982, 66; Newman & Newman, 1991). Through interaction with adults and peers, children between the ages of 2 and 4 years begin to understand that other people have different perspectives than their own, and move away from the notion that they are the centre of the world (Bjorklid, 1982). At the same time these young children are discovering their own individuality, the toddler also

begins to learn to balance their own desires with the needs of others (Newman & Newman, 1991; Bjorklid, 1982). While they continue to strengthen relationships with family members, they also begin to express a desire for autonomy, and start to test out their ability to be self reliant and make their own choices (Sobel, 1993; Rogers, 1982; Newman & Newman, 1991). Though careful not to venture too far away from their caretakers, toddlers will begin to seek out the experience of being alone, and begin expressing preferences when it comes to their play activities and settings (Cooper Marcus, 1986).

The fantasy play of toddlers becomes increasingly sophisticated as they develop, and they begin to create elaborate situations that allow them to practice and master newly acquired skills. These young children also start to respond to the behaviour of others and begin to "practice appropriate role behaviour and to imitate adults", often through dramatic role play; for example, they may play at being the parent in charge of young children, or pretend that they are a practicing dentist (G.T. Moore, 1987, 168; Bjorklid, 1982). Their rapidly growing abilities are further illustrated by the increasing complexity of play sequences; children, while playing 'firefighter', may alternate between pretending to be the fire truck, the hose, and the stranded victims, in addition to the firefighter itself (Newman & Newman, 1991).

As previously mentioned, children tend to seek out and gain tremendous satisfaction from activities that foster appropriate developmental skills. During the stage of Toddlerhood, a pre-occupation with activities such as fantasy play and behaviour imitation expand the motor, intellectual and social abilities of the young child. Their preferred activities also reflect the dawning understanding that they are capable of thinking and acting independently, and are on their way to becoming a fully autonomous person.

3.5.3 The *Early School Age* Stage

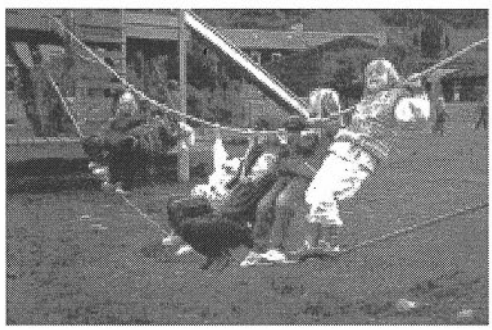
Though Erikson's model of development draws the line between the stages of Toddlerhood and Early School Age at the age of 4 years, many of the developments that take place in the latter stage are elaborations of skills that emerged during the earliest

level of childhood. The physical, social and cognitive foundation skills mastered in Infancy and Toddlerhood prepare them to contend with the new people and settings they begin to encounter. Newman & Newman suggest that when children emerge from toddlerhood with a strong sense of autonomy and individuality, they have the confidence to shift their focus of interest to their surrounding environments (1991). Though the younger children at this stage will still tend to remain closer to the security of home and family, all children between the ages of 4 and 6 or 7 years express an eagerness to explore and master the wider world around them (Sobel, 1993; Rogers, 1982). Erikson claims this active environmental investigation, or 'initiative', to be the major focus of the Early School Age child (Newman & Newman, 1991). These exploratory activities expand the child's capabilities by exposing them to diverse and challenging settings, as well as providing ample opportunities to hone their emerging skills.

As children reach this stage of development they begin to have access to an increasing number of physical and social environments, particularly if they are enrolled in a child care or school program. This increased environmental diversity activates a profound curiosity about "all facets of life" (Newman & Newman, 1991, 286). These new settings are exciting but still challenging, since they mean venturing beyond the security and comfort of their home and family realms, and into unfamiliar territory. "School brings external evaluation, new opportunities for success and failure, settings for peer group formation and social evaluation, and the initiation of a set of experiences that may lead to advancement of socioeconomic status in adulthood. At a more immediate level, school introduces a new source of influence on the child beyond the family" (Newman & Newman, 1991, 286). The increase in the type and complexity of environments at this age expose children to a wealth of opportunities for discovering and testing emerging abilities and ideas.

Early School Age children also begin to exhibit a strong desire to perform well, and will direct their attention to improving their level of competence through various games and interactions (Bjorklid, 1982). This desire for competence is related to critical developments in personality and self concept, in particular self confidence or esteem

(G.T. Moore et al, 1979). As children progress even further away from egocentrism, and exhibit increased understanding of the needs and perspective of others, they are capable of more complex social relationships (G.T Moore et al, 1979; Newman & Newman, 1991). Though they still engage in solitary activities and fantasy play, cognitive and social gains prompt an interest in more structured group games, such as 'Hide and Seek', or 'London Bridge' (Newman & Newman, 1991). The children become drawn to small groups of peers with whom they undertake group play; they then use these activities to test out their skills and roles, and appreciate the abilities of other children (See Fig. 3.9 and 3.10) (Cooper Marcus, 1986; Rogers, 1982). As they develop communication and cognitive skills, the nature of their symbolic play changes to be more reflective of reality and less distorted by fantasy (Bjorklid, 1982). Children gain confidence by performing well under these more realistic circumstances, as well as by comparing their abilities to those of their peers.

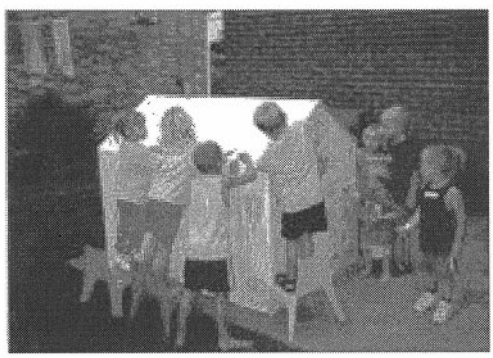


Figs. 3.9 and 3.10: Group Play

Beyond this increased engagement in the broader social milieu, the desire for environmental competence also activates an enormous interest in children of this age for investigating the larger physical world beyond their homes and backyards. A new school or care environment can provide exciting new possibilities, but between the ages of 4 and 6 years, children are also drawn to the natural and built settings in their surrounding community environment. These places often become the setting for many of their social and play activities. The Early School Age period is therefore predominantly a time of expanding environmental diversity and active exploration, which facilitate major advances in the capabilities of the young child.

3.5.4 The *Middle School Age* Stage

The enormous surge in environmental investigation characteristic of the Early School Age stage continues into the Middle School Age period, which commences around the age of 6 years and continues approximately to the age of 12. Despite this continuing interest in exploration, advances in various skill areas change the nature and focus of these activities during this final period of childhood. In terms of cognition, children at this stage begin thinking in a more systematic and logical manner; they begin to see order and logic in the physical and social worlds, as well as causal relationships between people and their environments (G.T Moore et al, 1979; Newman & Newman, 1991). Children also experience other social and emotional changes at this stage; they become more comfortable in the social environment, but peer relations and approval begin to take on increasing significance (Sobel, 1993; G.T Moore et al, 1979). Children start to develop strong friendship ties with other children, and begin to move beyond simple group play to more structured team games (See Figs 3.11 and 3.12). These rule-based games are more cognitively, physically and socially complex and require a solid foundation of basic skills developed during earlier stages (Bjorklid, 1982; Newman & Newman, 1991). Both team play and friendship relations can introduce elements of competition and evaluation that can affect a child's sense of confidence, either positively or negatively (Bjorklid, 1982; Newman & Newman, 1991). Successful experiences are related to an increase in self-efficacy, but failures and harsh criticisms can introduce powerful feelings of self-doubt that may impact the child's ability to respond to challenging tasks in the future (Newman & Newman, 1991).



Figs. 3.11 and 3.12: Structured Team Play

These characteristic developments during the course of the Middle School Age stage impact the nature of the child's interaction with his or her environments. New notions about the way the world works, and a growing desire for both competence and independence, can prompt more in-depth investigations of their settings and more rigorous testing of their own ability to affect them (Newman & Newman, 1991). Children between the ages of 5 and 12 years are extremely attracted to active environmental play, such as collecting bugs, digging tunnels in the sand or earth, or building bonfires (See Fig. 3.13) (Cooper Marcus, 1986). The desire to hone their skills may also prompt active pursuits like running, jumping, climbing, swimming, and skating, which help to improve motor and coordination proficiency (Cooper Marcus, 1986).

Figs. 3.13: Exploring and Collecting

Newman and Newman agree that children of this age are extremely motivated by the desire to improve their abilities and perform meaningful activities; they demonstrate a sense of perseverance in continuing to tackle demanding new tasks and mastering the skills that develop as a result (1991; Cooper Marcus, 1986). The older children at this stage begin to combine this interest with their more advanced physical and social skills, and undertake ambitious group building activities or establish group 'home bases' in areas located far from their homes and the view of adults (See Fig. 3.14) (Moore & Young, 1978). They actively work to expand their environmental range, and utilize a variety of rich, diverse environments for games and sociality, including their homes, schools and communities. These environments play an important role in helping children of the Middle School Age to organize

Fig. 3.14: Group 'Base' in the Wood

their experiences, and to understand their ability to impact and contribute to their own lives. Ultimately, they help to prepare the child for the upcoming social and occupational roles of adolescence and adulthood.

3.6 Implications of the Developmental Behaviour of Children

The preceding review of the changing goals and behaviour of children as they pass through the phase of childhood has helped to highlight some of the activities and encounters that take on increased significance at various points during this period. It has been established that children are inherently motivated to develop, and their interests revolve around certain patterns of environmental interactions that are compatible with their current developmental goals. The physical, social and cognitive advances that result from these activities further impact their environmental behaviour. It is therefore clear that both their motivations and interactions change as they progress through the substages of childhood.

The purpose of looking at the needs and behaviour of children from a developmental perspective was to understand how this factor affects children's perception and use of their environments so that we may provide them with more appropriate settings. The changing nature of a child's engagement with their physical and social environments over the course of childhood demonstrated that they value opportunities provided by their environments that are supportive of their current set of goals. Wohlwill & Heft suggest that "as the child's physical and psychological characteristics change developmentally, what action possibilities the environment affords changes in reciprocal fashion" (1987, 285). Both their changing capabilities and motivations impact the affordances that they perceive or desire; children will attend to or seek out the functional opportunities in an environment that support their developmentally motivated intentions.

This behavior can be effectively illustrated by examining the patterns of 'special places' that children find and create for themselves through the course of childhood. The pattern not only demonstrates how children choose activities and settings that suit their current set of skills and intentions, the 'special places' of childhood also highlight the

parallel changes in perception and use of their environments. The spatial and psychological qualities that are characteristic of these favourite places will also help to draw attention to the specific affordance features and conditions that children perceive as being congruent with their shifting needs.

3.6.1 The Pattern of 'Special Places'

Research from a number of different fields has revealed a consistent pattern of childhood play whereby children find or create places in their environments as secure settings for a variety of their activities, a phenomenon which Cooper Marcus refers to as "place making" (Cooper Marcus, 1995, 23; Moore & Young, 1978; Hart, 1977). The development of these spaces, defined by children as 'special' or 'favourite', is "almost universal in childhood, regardless of culture, social context or gender", and display remarkable similarities in both form and use (Cooper Marcus, 1995, 23). A review of the pattern of 'special places' illustrates how both the process of creating and claiming these spaces, and the characteristic qualities that these places exhibit, are inextricably related to children's development interests.

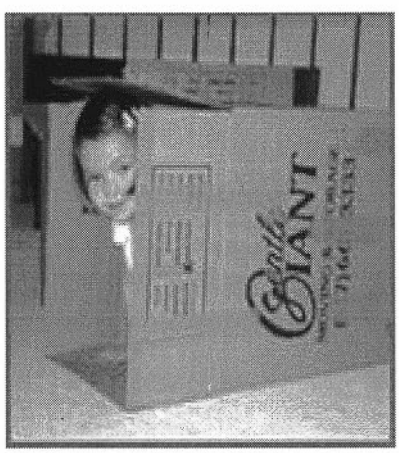
Observations of the play activities of children in various geographical and cultural settings around the world provide evidence that children consistently seek out or create 'special places' in their surrounding environments. The universality of this form is demonstrated by Sobel's comparison study of the play settings of school age children in Devon, England and on the island of Carriacou in the West Indies. Almost all of the children studied had a connection to an enclosed space, often found in an unstructured natural area (Sobel, 1995). Although the terminology varied, these "dens", "treeforts" and "playhouses" were consistently identified as the "favourite" place of the child in both cultures (See Fig. 3.15) (Sobel, 1993, 11). Tan's study of the play activities of the Chaga children in West Africa revealed a propensity for building "huts", which

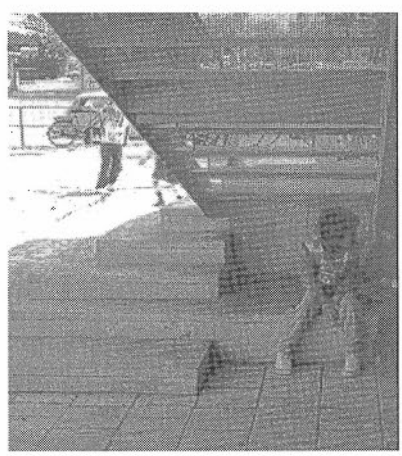
Fig. 3.15: A Boys 'Den'

served as the center of their imaginative play activities (1978). Observations of child behaviour by Alexander and his colleagues also suggested a preference for making and inhabiting "tiny, cave-like spaces" during the course of free play (Alexander, 1977, 927). Regardless of the social or cultural setting, these 'found' or built spaces often called to mind the elements of a home, exhibiting distinct walls, roofs, doors and even rooms, but scaled down to dimensions more suitable to a child (Tan, 1978; Sobel, 1995). These small, enclosed spaces seem to be chosen by children with considerable frequency; a study by Korpela noted that all of the children interviewed had such a 'favourite' place, which they visited on average four times a week and utilized for a variety of play activities (2002). These settings, however, are not chosen randomly or passively; children make deliberate choices regarding their play spaces based on the opportunities afforded by that environment. The 'special places' that children instinctively choose have specific qualities that are perceived to be supportive of their ongoing development.

3.6.2 The Developmental Nature of 'Special Places'

Despite the distinct pattern of attraction to such places, the specific nature and use of these 'special places' is not static through the entire course of childhood. In order to remain compatible with their current capabilities and pressing needs, both the complexity and the location of these spaces or structures shift with the age of the child. The 'favourite' places of younger children, up to the age of 5 or 6, tend to be 'found' places that provide a small degree of enclosure, and are usually located within the home (Hart, 1987; Moore & Young, 1978). Observations indicate that young children are consistently drawn to the spaces beneath chairs, in large discarded boxes, or under the stairs; these places become the setting for





Figs. 3.16 and 3.17: 'Found' Places

solitary activities or play with a small friend (See Figs. 3.16 and 3.17) (Hart, 1987; Cooper Marcus, 1986; Alexander, 1977).

The small, semi-enclosed spaces chosen by younger children illustrate their growing awareness of themselves as independent beings, and their need to regulate their environment (Weinstein, 1987; Sobel, 1993). By choosing to play in spaces under tables or in secluded corners, the Toddlerhood stage child begins to explore a sense of separateness, but does not yet feel comfortable enough on their own to venture outside of visual or acoustic range of their caregivers (Weinstein, 1987; Cooper Marcus, 1986). These young children do not as yet possess the physical and cognitive capabilities to build or modify substantial physical structures. However, they are becoming proficient at symbolic representation and so are capable of transforming suggestive features or settings into 'special places' with the power of their imagination (See Fig. 3.18) (Hart, 1987). The young child perceives and utilizes affordance opportunities in their environments that are appropriate for commencing the challenging separation process while allowing them to maintain a sense of security and control commensurate with their existing capabilities.

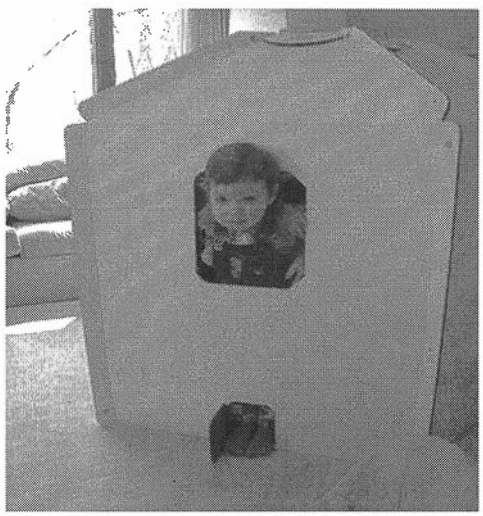
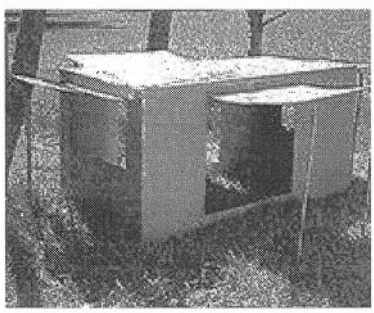


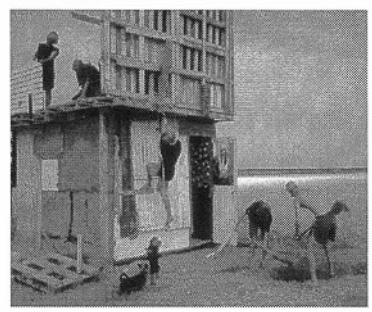
Fig. 3.18: A Semi-Enclosed Space

It was previously noted that the sense of autonomy which begins to emerge during the Toddlerhood stage becomes more pronounced during the Early and Middle School Age phases. This development is clearly reflected in children's choice of the type and location of their activities; after the age of 5 or 6, children become dissatisfied with simple 'found' spaces within the home and begin to explore the physical and social world outside this familiar realm (Sobel, 1993; Hart, 1987). This behaviour is related to the "intense desire to explore the world through creative play" that is characteristic of children of this age, and which manifests itself in an attraction to exploring and building

in wild or abandoned areas (Cooper Marcus, 1986, 138; Sobel, 1993; Moore & Young, 1978). Children's favourite places at this time shift towards a 'home away from home'; they begin to carve out and inhabit the space within a clump of bushes, a depression in a hillside, or in the gap between buildings (See Fig. 3.19) (Becker, 1976; R. Moore, 1986). Around the age of 8 or 9 years, children begin to utilize their developed capabilities to make serious attempts at building home-like structures (Sobel, 1993, 12; Hart, 1987). Loose or found materials such as discarded boxes, scrap wood and metal, and fallen tree branches provide the raw materials for the creation of substantial 'forts' and 'playhouses' (See Figs. 3.20, 3.21 and 3.22) (Cooper Marcus, 1986; Sobel, 1993). These structures, usually located in the midst of natural or undeveloped areas, often become the center for both the private and social activities of older children, including playing games, talking, eating, cooking, resting, reading, role playing, and decorating the structure (Cooper Marcus, 1986; Sobel, 1993).

Fig. 3.19: Carving out a 'Place' in the Bushes





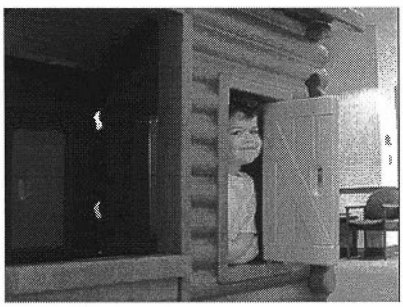
Figs. 3.20, 3.21 and 3.22: Building and Using Play 'Houses' and 'Forts'

Building 'dens' and 'hideouts' progressively further from the home environment, and the view of adults, gives children the opportunity to examine their independence and self-identity. The distant location challenges the child's sense of dependence, but the incorporation of home-like elements and distinct boundaries provides a sense of security that allows these places to serve as "outposts in the wilderness" while they experiment in the larger physical and social world (Sobel, 1993, 20). The knowledge that they have some control over this intermediary environment sharpens the child's sense of

competency and assists in the development of an independent self, both important advances during the Early and Middle School Age stages (Proshansky & Fabian, 1987).

Another change in 'special places' related to developmental interests is the marked increase in the creation of spaces for use by a small group of peers, starting around 6 or 7 years of age (Sobel, 1993). This shift is reflective of the social and cognitive advances that prompt children of this age to take a more active interest in cooperative play (Cooper Marcus, 1986; Kielhofner, 1995). Having firmly established themselves as a separate and distinct person during the early phases of childhood, children now begin to explore the social roles that will further establish their personal identity and their understanding of social norms. The cooperative undertaking of more complex building projects common at this stage of childhood illustrates how the process of creating 'special places' itself supports children's emerging interests and capabilities.

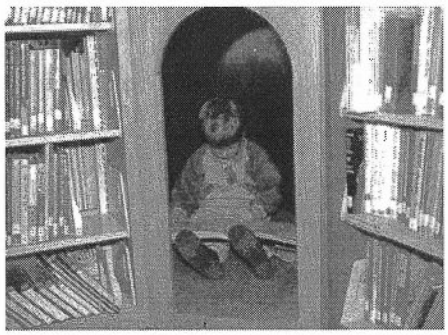
These patterns associated with 'special places' clearly demonstrate that the nature, location and use of play settings valued by children will change depending on the stage of childhood and its related interests. Sobel also emphasizes that a single child requires different types of spaces to support varying interests within a single stage of childhood. His research revealed that there are two distinct categories of 'special places', one or both of which a single child will utilize in the course of play activities. The first type is the individual, private spaces intended for use by only one child; the second category consists of spaces that are set up and shared by a small group of children (See Figs. 3.23 and 3.24) (Sobel, 1993). This revelation reminds us that children do not always want to be engaged in highly active or social play activities. Children, in fact, have a tremendous need for both physical and psychological privacy in order to undertake the occupations that foster the critical development of their sense of self (Cooper

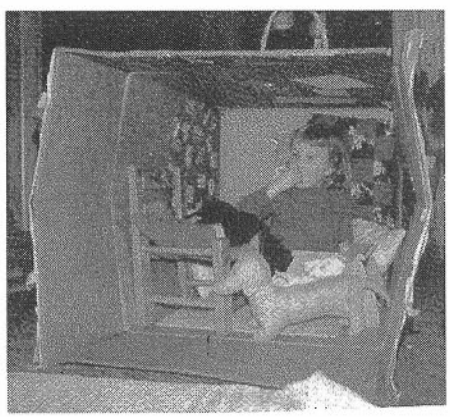


Figs. 3.23 and 3.24: Solitary and Group 'Special Places'

Marcus, 1993). Wolfe suggests that "the separation and individuation of the self requires that the child experiences aloneness in one form or another" and that "the quantity and form of possible privacy experiences... especially during childhood... have implications for the quality of life" (1978, 183; 1978, 180). However, living in an adult-oriented world, a child has little or no opportunity to experience privacy or to control their level of interaction with others (Cooper Marcus, 1986).

Children's 'special places' serve as an effective mechanism for achieving a sense of privacy. Several studies confirm that many children seek quiet, solitary places for activities like reading, thinking and tranquil play (Korpela, 1992, 250; Sobel, 1993).





Figs. 3.25 and 3.26:
'Special Places'
for Privacy and Rest

Many children in Sobel's study described their special place as one where "I go to be alone", where "I read and play by myself" or where "it's really quiet... and I can sit all by myself" (1993, 25, 42). Research by Korpela and his colleagues indicated that children aged 9 to 12 used their favourite places for many private, restorative activities, including relaxing, clearing their minds and discussing their problems with peers (See Figs. 3.25 and 3.26) (2002). The secluded and even covert location of many 'special places' helps to reinforce the conditions of privacy; many children used secret entrances and emergency exits to ward against intruders, and often take pains to ensure that they are not followed to or seen entering these private places (Sobel, 1993). This pattern illustrates that children need a balance between active and quiet, social and private, in order to tackle and cope with the various demands of childhood. Consequently, they require a variety of spaces and opportunities to support their diverse needs, and will seek out settings that suit a given mood or interest.

Overall, researchers who have studied the 'special' or 'favourite' places of children agree that they receive many developmental benefits from the process of creating and utilizing such spaces. Cooper Marcus theorizes that the 'special places' of children all have similar social and psychological purposes; they are places "in which separation from adults was sought, in which fantasies could be acted out, and in which the very environment itself could be molded and shaped to one's needs" (1995, 26). Sobel suggests that the construction and use of these places lets children "physically and symbolically prepare themselves for the transition to adolescence and later to adulthood" (1993, 47). Hart believes these environments provide the opportunity for the "learning of adult roles, the opportunity to deal with emotional conflict, discovery of physical processes and principles of spatial relationships, ordering the world as a means of establishing one's place in it, ... a sense of control over [the environment], and ...the development of a sense of environmental competence" (1987, 223). In general, the process of claiming a special environment for their own use exercises many of the critical physical, social and cognitive capacities that are necessary for the child's healthy development. However, the characteristics of the chosen spaces themselves change in order to provide children with a secure yet challenging environment in which to hone these skills, and explore their emerging identities as competent human beings.

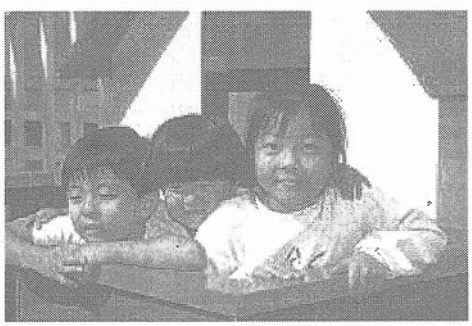
3.6.3 The Characteristic Affordances of 'Special Places'

Given what we know about the functional orientation and the developmentally motivated behavior of children, the presence of a consistent pattern of development of 'special places' by children reinforces the notion that these distinctive environments exhibit specific affordances that account for their universal attraction. A review of these affordance characteristics corroborates the fact that they are not strictly related to specific physical features or objects, but also to the overall conditions provided by a combination of factors, including the social and psychological qualities of the environment.

Overall, a good part of the attraction to a 'special place' seems to be related to the affordance of a manageable environment that these particular settings suggest. Although the demands of an environment can drive the development of critical skills, a

place that does not feel secure or familiar can also challenge a child's sense of effectiveness and competency (Weinstein, 1987). Despite the shifting nature of the type and setting of 'special places' through the course of childhood, each chosen environment still implied a balance of security and challenge commensurate with the child's current capabilities. This manageable environment is crucial for supporting a child's ability to carry out developmental tasks; however, the features or conditions that afford this balance changes in parallel with the child's development.

Two of the prominent affordance properties of 'special places' are its spatial proportions and the degree of enclosure provided by the environment. The child will pick up on the particular features or settings that suggest an appropriate degree of comfort and safety (Sobel, 1993; Hart, 1987). The young child, for example, with more limited skills and a greater need of security, attends to small scaled spaces with only a minimal sense of enclosure – the open space between the legs of a chair or the protective embrace provided by a corner of the room. As children age, and develop more confidence and autonomy, the spaces may become larger to accommodate their growth and interest in group play, but they seek out spaces that afford a higher degree of enclosure, often becoming closed off all together. In each case the child attends to or creates spaces with boundaries and a sense of territory; to the young child this opportunity is 'found' in a box or a bush, where they transform the environment into a personal space using



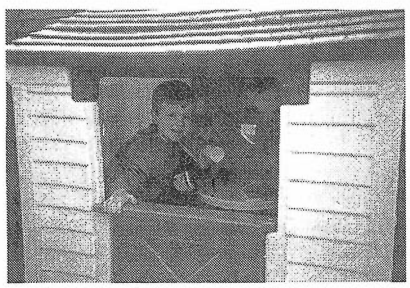
Figs. 3.27 and 3.28: Finding and Creating Defined Territories

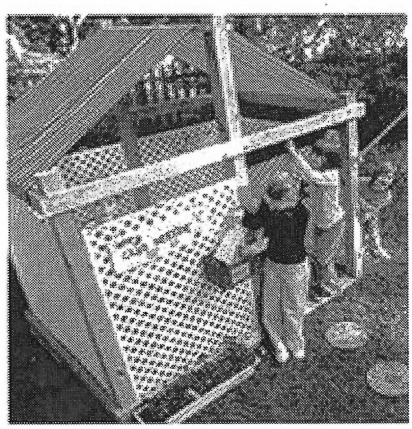
their imagination (See Fig. 3.27). The older child begins attending to settings that suggest a good place to build, where they can transform the space through more sophisticated, physical means – a clearing in the woods, a depression in side of a hill, or the crook of a sturdy tree (See Fig. 3.28). The physical characteristics of these spaces

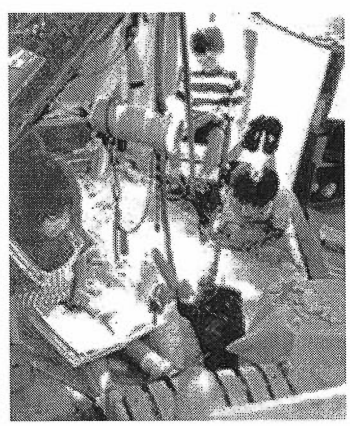
or features provide boundaries, small-scale dimensions and enclosure. The overall conditions afford both a sense of refuge and challenge.

Another key affordance of 'special places' is related to its location in the environment. The young child who is just beginning to experience the urge for independence will seek out a challenging space to explore their ability to deal with separation; however, since they want to be able to re-establish contact quickly, the special place will be located in close proximity to their caregivers. The older, more autonomous child will not consider these spaces as attractive as their younger peers; instead they will more likely attend to the suggestive qualities afforded by more remote settings, located far from the view of their authority figures. In fact, as they age, children begin to favour settings that provide the opportunity of creating a hidden or secret place.

The home-like forms that characterize these 'special places' of older children also serve to establish them as manageable environments. The familiar environmental elements and activities of home, along with the small scale, affords a critical sense of predictability and control that make them attractive settings for practicing adult roles and behaviour, such as playing 'house', cooking, and eating (See Figs. 3.29, 3.30 and 3.31) (Cooper Marcus, 1995; Hart, 1987). The home-like environment also prompts activities such as decorating and organizing of the structure; these acts of manipulation and personalization, along with the use of physical boundaries to denote a personal territory, mark the space as both belonging to, and being under the control of, the child.







Figs. 3.29, 3.30 and 3.31: Home-Like 'Places' and Activities

The exercise of territorial control and the ability to personalize are extremely important opportunities that are afforded by 'special places'. Korpela found that both of these elements were seen as key characteristics of the 'favourite' places of adolescents (2002). Ownership and control over an environment ensures that the place is accessible to the 'proprietor' when it is needed or desired, and it allows one to impose conditions of privacy by restricting access to, or managing interaction, with others. Wolfe suggests that it is not until people "have a place of their own... [that they can] experience control over access to their person or belongings or [exercise] the active choice of [imposing] the conditions of privacy" (1978, 189). The personally found or constructed place, with distinct territorial boundaries and "a view on the world", provides the child with feelings of control and privacy over the environment which can be instrumental in facilitating a sense of efficacy and independence (See Fig. 3.32) (Sobel, 1993, 72; Proshansky & Fabian, 1987).

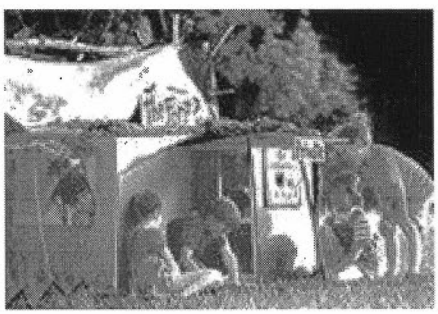


Fig. 3.32: A Personal, Controllable 'Place'

A good part of children's attraction to 'special places' is related to their need for environmental congruency; they are drawn to settings or features that support their developmental interests. However, the spaces typically available in their adult-oriented world may not provide the degree of interaction, comfort or predictability appropriate for their intentions and capabilities. The 'special places' of children harbour a number of affordance opportunities; a combination of physical, social and psychological characteristics provide balanced conditions for the activities of the developing child.

In general, this examination suggests that a setting that affords a sense of separateness through a combination of location and enclosure, a sense of security through scale and familiar form, and which provides the opportunity for personalization and control, will likely be perceived by a child as private, manageable, and therefore an attractive setting for their activities. The exact nature of these affordances will of course be dependent on the child's current developmental level.

3.7 Contributions to the Design Framework

It was proposed in Chapter 2 that an affordance-based framework has tremendous potential for informing the design of children's environments as it may more accurately capture children's environmental perception and use than a typical form-based approach. However, this framework must also acknowledge the role of development in influencing children's environmental interactions. The preceding section strives to clarify the critical developmental component to children's affordance perception that has been absent from previous research attempts, and which is essential in order for an affordance-based model to be truly effective.

Specifically, this chapter attempts to illustrate the unique intentions and capabilities of children, and how their skills and interests evolve as they progress through the developmental stage of childhood. It also outlines how the play experiences and settings that children seek out at various stages are both motivated by and reflective of their current developmental needs. This behaviour is particularly evident in their creation and use of 'special places' for play activities. These places tend to exhibit common physical and psychological properties that seem to provide secure and attractive settings for children's private or group play.

The review of the affordance characteristics of 'special places' also serves to emphasize children's function-based perspective. Their tendency to pick up on the suggestive qualities of a feature or setting, and to use them in creative ways regardless of their intended purpose, illustrates that children seem to attend to the functional possibilities in an environment that match their unique desires. However, it has also been made clear that the focus of this functional perception of the environment changes in accordance with their developmental abilities and interests.

This examination has also been useful for illustrating that patterns of behaviour and environmental preference may allow us to pinpoint some of the opportunities and activities that are especially attractive or beneficial to children at different stages of development, and the physical features or conditions which may support them. The following chapter will outline lessons we can learn from observations of children and

other favourite activities and settings; this valuable information could be used to help caretakers and designers create stimulating, affordance-rich environments for their use.

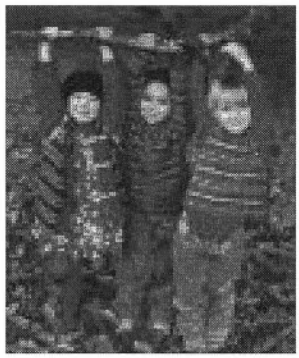
4 Affordance-Rich Play Environments

The 'Special Places' of children have many common environmental properties that may account for children's attraction to these places for play and restorative activities. Parents and designers can try to capitalize on this information to provide conditions in children's homes and neighbourhoods that would be conducive to the discovery or creation of such secure and stimulating places. However, there are important lessons from 'special places' and other settings and activities preferred by children that can also contribute to our framework for designing play settings in learning environments. Analyzing these patterns of environmental interactions can flush out clues regarding the affordances for play of specific physical features or conditions. Appropriate affordance-rich elements and spaces could then be embedded within the physical form of the school to better support vital play experiences for children, and make them more appealing settings for use. This chapter will outline lessons we can learn from behavioural observations that can help to provide developmentally-stimulating, affordance-rich play environments for children.

4.1 Value of 'Loose' Environments

Gustafson suggests that places prompt attachment or hold worth when they offer the inhabitants the chance to act in a meaningful way, or experience something desirable (2001). Children's 'special places' are enormously valuable for them in large part because the ability to shape the nature of their play activities, and the play settings themselves, helps them tackle challenging tasks and situations. As a result they derive enormous knowledge and satisfaction from the creation of these personal environments. A 'loose', undefined setting, a significant commonality among 'special places', is therefore seen as extremely appealing to children. The ambiguous and flexible nature of the refrigerator box, the space under the piano, or the hollow in the bushes, presents a wealth of opportunities; in these settings, children can use their function-based perspective to interpret and regulate environmental conditions in a manner that supports their needs.

It is likely an attraction to the vast possibilities inherent in open-ended environments that accounts for children's tremendous affinity for natural environments. In addition to



Figs. 4.1, 4.2 and 4.3: Opportunities for Play in Outdoor Environments

the observations regarding children's 'special places', numerous other studies have demonstrated their overwhelming preference for outdoor and natural environments (Moore & Young, 1978; R. Moore, 1986; Korpela, 1992). Moore and Young observed that children often mention rivers, lakes, frog ponds, woods, sand piles and quarries among their favourite play settings. They appear to universally like playing with the natural elements found in these settings, such as water, sand, rocks, dirt and mud; children also amuse themselves for hours outdoors looking for and gathering stones, bugs, worms and other 'treasures' (Tan, 1978; R. Moore, 1986; Stine, 1997). Other favourite activities include hanging or swinging from trees, scaling hills, and climbing up rocks and dirt piles (Tan, 1978; Moore & Young, 1978; R. Moore, 1986; Stine, 1997). (See Figs. 4.1, 4.2 and 4.3). There is definitely an attraction to play in such wild, undeveloped outdoor spaces; Cooper Marcus claims that "children will spend more time playing in such a setting than they would on even the best designed play sculpture" (1986, 131).

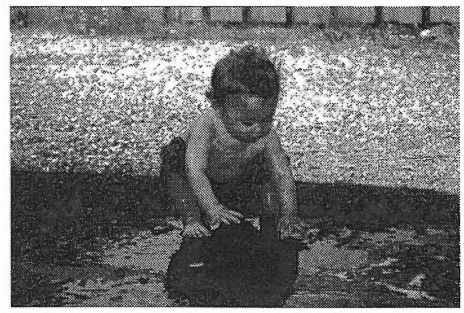
This research, combined with the patterns of 'special places', suggest that the most appealing environments, and perhaps most developmentally stimulating, are those which are 'loose' and unstructured by nature. Though the attraction to natural elements in particular shouldn't be dismissed, looking beyond the specific features or objects themselves reveals a number of more general affordance patterns characteristic to these settings which can help to inform the design of play environments for children.

4.1.1 Rich, Exploratory Play

One considerable benefit of open-ended environments is the degree to which they support discovery, exploration and experimentation (R. Moore, 1986; Lackney, 2000). Natural environments, and many of the settings for 'special places', are by nature less structured than formal play venues. Children experience fewer restrictions on their behaviour in these settings and so are free to use their imagination to its fullest; their play is less scripted and constrained than in many of their other environments (Wohlwill & Heft, 1987; Bransford, Brown & Cocking, 2000; Pyle, 2002). For one thing, parental regulations are typically more relaxed and subsequently permit more freedom of choice and exuberance in their activities; without having to worry about staining the carpet or breaking a vase, children are able to engage in very active and exploratory play. Wild, natural and abandoned spaces are also not usually made or owned by adults, allowing them to be more easily appropriated and shaped by children to suit their own interests (Moore & Young, 1978). The loose nature of these favourite settings frees children from imposed rules of play and conduct, and therefore become very conducive to rich, exploratory play.

The undefined features or objects themselves found in these environments are also supportive of discovery and experimentation, as is clearly evident in children's typical behaviour in natural settings. Elements such as water, mud, sand and trees invite a variety of activities, limited only by the child's imagination (Tan, 1978; R. Moore, 1986). Stine uses water as a prime example; children love to play in lakes, streams and even puddles because water features offer "endless possibilities to explore" (1997, 24). Even a single water feature provides the opportunity to sink stones, float leaves, and build twig bridges; children can scoop the water up with their hands and buckets, or divert it to make their own rivers and lakes; the still surface lets them trace the journey of a





Figs. 4.4, 4.5 and 4.6: Water Affords Numerous Play Opportunities

water bug or gaze at their own reflections (See Figs. 4.4, 4.5 and 4.6). Objects that can be picked up and manipulated also initiate a range of explorations and experiments. The children in Robin Moore's study discovered a virtual treasure trove of intriguing 'found' objects around their neighbourhoods; Moore noted that they were continually involved in collecting, examining, throwing and playing with items such as stones, twigs, eggs, and berries (1986) (See Figs. 4.7, 4.8 and 4.9). These "fragments" are rich in possibilities and prompt more open and imaginative styles of play (Moore & Young, 1978, 119).



Figs. 4.7, 4.8 and 4.9: Finding, Collecting and Examining

The various objects and features children discover in loose environments also provide an array of interesting shapes and textures. In natural settings smooth pebbles, squishy mud and crunchy leaves are sources of curiosity and wonder both for their own sake and for the delight the child takes in combining them to create 'volcanoes', 'castles' and 'casseroles' (Tan, 1978). Children crave such hands-on, multi-sensory experiences both for the sensations they afford and the understanding that comes from this active exploration (Staley, 1998).

Unstructured environments also simultaneously fulfill the child's need for both continuity and change. George Herbert Mead refers to this notion as "sufficient unpredictability"; though natural or wild settings continually provide new possibilities for exploration and skill testing, these exciting adventures are evened out by the familiar elements and predictable routines that come from habitual use (in Moore & Young, 1978, 93). This balance between security and challenge was also a characteristic condition of children's 'special places'. For example, it was noted that children like to get into or make small places; while the scale and enclosure afford a sense of security and shelter, these small, dark places are also appealing because they seem exciting and mysterious (Tan, 1978).

After repeated exposure to natural settings children become accustomed to the environment; however, new capabilities and interests will direct their attention to previously unnoticed or undesired possibilities. In this way, the same 'loose' environment can continue to provide attractive and stimulating opportunities even as a child develops.

Gary Moore and his colleagues claim that "much of the child's development occurs from unstructured activities – play where the child is learning and growing from his or her own initiative, exploration and discovery" (1979, 202-4). It was for this reason that Piaget advocated for providing children with opportunities to learn through their own self-initiated environmental interactions: "Children should be able to do their own experimenting and their own research. ... The essential thing is that in order to understand something, he must construct it himself, he must re-invent it" (1972, 27; Bjorklid, 1982). He believed they learned an enormous amount through the "actual stuff of the world" (cited in Sobel, 1993, 58; Berk & Winsler, 1995). Children's functional orientation and active imagination combine to turn almost any open-ended feature or environment into a rich, exploratory learning experience.

4.1.2 Multiple Affordances

Natural environments are also valued because they afford an inherent level of flexibility. The undefined nature allows for multiple affordances; each feature or setting in itself provides variety and complexity that can support sustained engagement by one child or the wide-ranging interests of many. By contrast, toys or equipment with fixed, specific uses can constrain valuable free or pretend play in children; objects with limited or known uses are less likely to be by children in imaginative ways (Stine, 1997; Bransford Brown & Cocking, 2000). When elements are less structured, children will be creative in their use of these features and recognize the many possibilities they provide. Loose, ambiguous environments have a high degree of flexibility and variety, and are capable of accommodating the developmentally driven activities of a number of children, even if their current capabilities and interests are quite diverse (Proshansky & Wolfe, 1974).

Moore's behavioural study, outlined in Chapter 2, aptly illustrates the multiple affordances ingrained in loose features or environments. His records document several different children utilizing the same environmental elements, but in their own preferred ways. For example, a particular tree was used by one child to hang a swing, while it supported another child's interest in playing 'Tarzan'; the same grassy patch let one child practice gymnastics, while others used it for chasing and playing football (1986). The rich possibilities embedded in an undefined feature are well demonstrated by the use of a monument base by two different groups of children. Two girlfriends were observed climbing the feature and using it in their game of 'Hide and Seek'; the base also prompted a game of 'Statues', and gave them the opportunity to watch the birds that would periodically use the base as a perch (See Fig. 4.10) (R. Moore, 1986). A group of young boys on the other hand used the same monument base to play war and 'Tarzan', along with including it in their own games of 'Hide and Seek' (R. Moore, 1986). These children picked up on the suggestive, rather than the intended, functions of the base to inspire and support their activities.

Fig. 4.10: Imaginative Environmental Usage

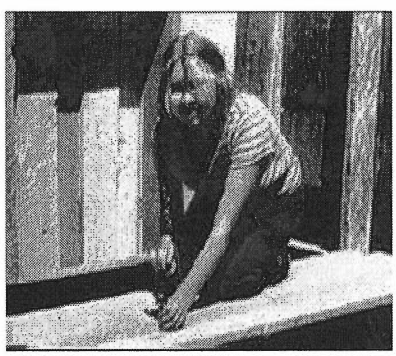
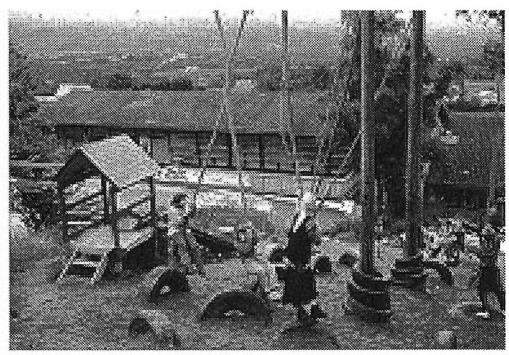
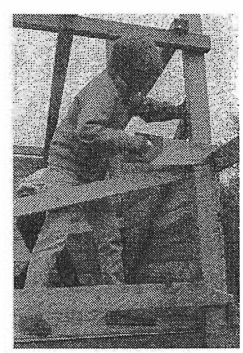
4.2 Adventure Playgrounds

It was the noted preference for 'making' and 'building' with loose objects, and an understanding of the value of play in unstructured environments, that prompted the development of the 'Adventure Playground' concept. The idea was first conceived in 1931 by C.T. Sorenson, a Danish landscape architect, when he realized how much enjoyment local children seemed to derive from playing with construction materials (Cooper, 1970). Having previously designed a number of traditional playgrounds, Sorenson considered creating an area where children could use tools and building materials to fashion their own spaces and structures. Though it took almost a decade to come to fruition, this first 'Adventure Playground' initiated a movement that would prompt many European and North American countries to attempt to establish similar

areas for their own children during the 1970s and 1980s (Cooper, 1970; R. Moore, 1986; Cooper Marcus, 1986; Costco & Moore, 1990).

'Adventure Playgrounds' were only ever sporadically developed in North America, and with varying degrees of support. However, many designers and researchers have actively promoted the development of unstructured play areas because of the clear connection with imaginative and developmentally stimulating play (Cooper, 1970; Becker, 1976; Cooper Marcus, 1986; Alexander, 1977; Wohlwill & Heft, 1987; Edwards, Gandini & Forman, 1993; Stoecklin, 2000). The rigid and sterile nature of conventional playgrounds, on the other hand, was seen to run counter to the essential play needs of children. Traditional equipment, like swings and slides, has limited uses and little inherent flexibility (Becker, 1976). According to Alexander et al, any such play place which "disturbs or reduces the role of imagination and makes the child more passive, more the recipient of someone else's imagination, may look nice, may be clean, may be safe, may be healthy – but just cannot satisfy the fundamental need which play is all about" (1977, 368). Adventure playgrounds, however, were lauded for providing an "ever-changing range of activities due entirely to the imagination and enterprise of the children themselves" (Alexander, 1977, 369).

The ideas behind the 'Adventure Playground' concept were well founded. The unconstrained nature of both of the setting is more in keeping with both children's function perspective and their desire to explore and shape their own environments. The variety of scrap materials, tools, and spaces available were loose enough to allow many children to create their own opportunities in concert with their developmental interests.

Figs. 4.11, 4.12 and 4.13: Adventure Playground Activities

(See Figs. 4.11, 4.12 and 4.13). Cooper's observations at an Adventure Playground in London showed that the same unstructured setting was capable of accommodating the diverse activities of children ranging in age from 5 to 17 years (1970). One 5 year old girl occupied herself by rolling a tire across the yard, while a boy of the same age busied himself filling a can with water from a puddle and dumping it over a log. Three boys approximately 8 years old competed to climb up a rope, while other children of similar age experienced the thrill of swinging from the rope end. A large group of their peers joined together to play softball in an open part of the space, while still others sat down nearby to watch (Cooper, 1970).

Many children also used the space and materials provided in the playground to build 'special places' for themselves; several boys were observed sawing up planks for the roof of their 'house'. A group of eight year old boys and girls, who had already completed a 'house' of their own, used their roof as a launch pad for 'jumping off', while another 3 boys of the same age perched on their roof, talking and discussing the activity taking place down below in the yard (Cooper, 1970).

In the unconstrained environment of the Adventure Playground, a child of any age can find a wide range of interesting things to do, all of which also foster physical, social and cognitive development. These unstructured play parks give children the chance to experiment and build with interesting loose materials in order to understand physical processes and spatial relationships, but also to learn about adult roles, increase their efficacy in social encounters, as well as develop a sense of control and environmental competence (Hart, 1987). Alexander eloquently sums up the numerous benefits of typical adventure play activities: "A castle, made of cartons, rocks and old branches, by a group of children for themselves, is worth a thousand perfectly detailed, exactly finished castles, made for them in a factory" (1977, 368).

This paper has emphasized that children's fundamental perception of the environment is functional in orientation, which leads them to pick up on the affordances in a setting that match their developmental interests. However, as the preceding review has suggested, when environmental settings and elements are less structured and defined,

the number and range of stimulating opportunities expands exponentially. Loose, open-ended environments are one of the richest sources of affordance possibilities and have the enormous potential to stimulate learning and development among a large group of children through rich, varied play activities.

4.3 Lessons for the Design of Built Environments

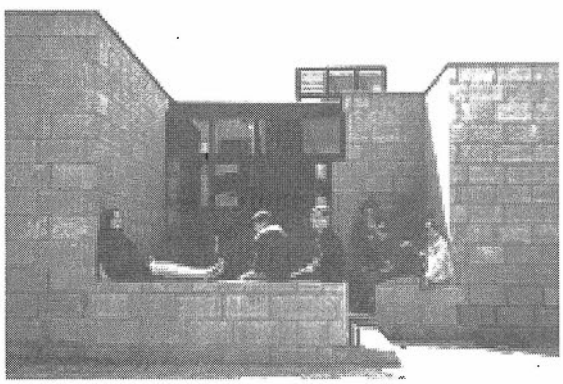
However, this 'looseness' and flexibility is not limited to either natural or outdoor settings in general, or playgrounds in particular. Herman Hertzberger, a 20th century Dutch architect, suggests that it is not only possible, but advantageous to incorporate rich possibilities for use into built environments, in order to facilitate a dynamic relationship with its users. He also believes, like the Adventure Playground advocates, in the value of allowing people to shape their own environments as a means of promoting a sense of ownership and attachment, and thereby providing a medium for their meaningful endeavors. "The more involved a person is with the form and content of his surroundings, the more those surroundings become appropriated by him, and just as he takes possession of his surroundings, so they will take possession of him" (1992, 170). It is, however, more difficult to achieve, or facilitate, a high degree of environment-behaviour congruency in built environments. A review of the work of both Hertzberger and Aldo van Eyck will illustrate how looser, more adaptable environments can be utilized to encourage engagement and attachment, a strategy Hertzberger refers to as "activating" the environment (1992, 186).

4.3.1 Activating the Built Environment

It is unclear whether Hertzberger was aware of Gibson's concept of affordances or not, but both the ideas endorsed in his writings, and his architectural projects themselves, are highly compatible with an affordance-based design framework. Hertzberger understood the value of 'looseness' and flexibility in increasing a facility's ability to accommodate various users. He believes that it is "impossible to tailor everyone's circumstances to fit exactly", but an interpretable environment can maximize the degree to which an environment can indulge the needs of a diverse user group (1992, 170). Beyond just providing arbitrary 'loose' features, spaces or materials, Hertzberger considers the provision of strategic opportunities for interpretation and manipulation by

the user a key ingredient in raising the potential for congruency – opportunities that should be provided by the very spaces and features of the environment itself (1992). Architectural features and settings, according to Hertzberger, should offer "incentive" to its users whenever possible; environments should be designed "to accommodate various solutions, and should moreover clamour to be [used or] completed... in other worlds that they induce the user to take such action" (1992, 164). Like the power of the clearing in the woods to suggest an attractive setting for a child's special place, Hertzberger suggests that built environments should also call to people to use them in a manner that suits their intentions, and provide the chance to influence them in such a way that these settings become their own.

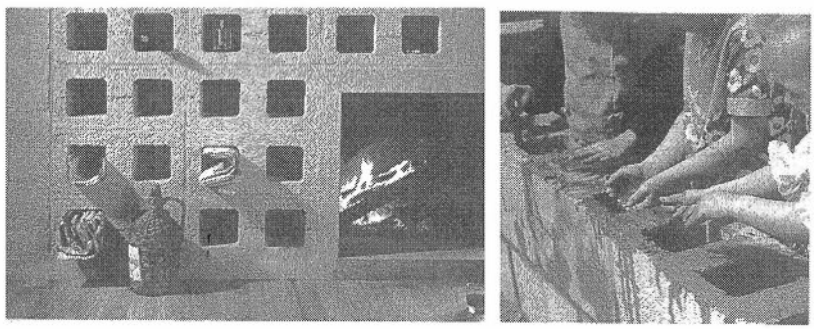
In order to offer such 'incentives', Hertzberger suggests that the basic forms of the design should be only partially defined, or suggest possibilities for change, in order to allow for interpretation and "colouring" by the users; the inhabitants determine the identity and function of the space over time through their adaptations and use (1992, 170). In other words, built environments should provide affordances that allow people "the freedom to decide for themselves how they want to use each part, each space" (1992, 170). There a number of examples in Hertzberger's work which illustrate this



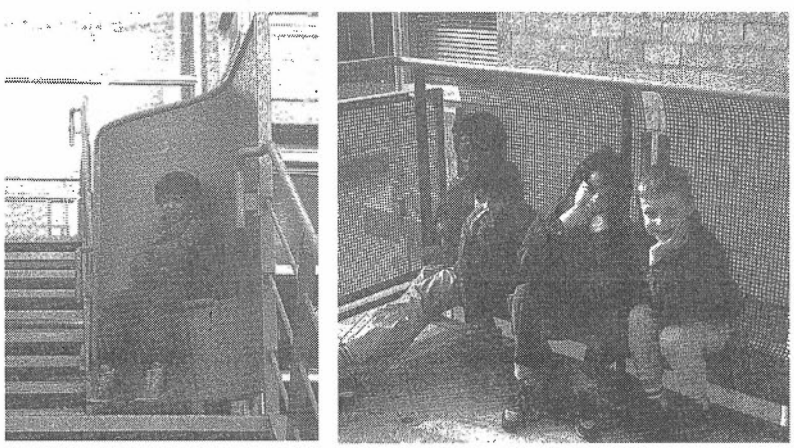
Figs. 4.14 and 4.15: Ledges Interpreted as Seating

principle. In several housing and school projects, he deepens and accentuates window sills and ledges, consequently providing space to place personal items such as plants and photographs, as well as casual seating. (See Figs. 4.14 and 4.15). Even his materials are chosen for the opportunities they afford; the strategic use of cinder

block offers receptacles for children's mud play, display space for meaningful personal items, and storage for newspapers (See Figs. 4.16 and 4.17). Essentially, Hertzberger is offering affordance-rich environments that can be appropriated by the user in any number of ways because no one space or feature is limited to a single prescribed use. By incorporating such flexible environmental elements, Hertzberger, by his own admission, is striving to "activate each [environmental] component whenever possible" (1992, 186). He attempts to make all features and spaces in his designs useful and inhabitable. Through simple yet deliberate gestures he raises the affordance potential of each corner, each stair, each divider; he is careful not to "leave any holes and corners behind which are lost and useless". In fact Hertzberger advocates that designers should seek to *add* 'places', particularly in those spaces that are typically disregarded. Several of his schools in the Netherlands clearly incorporate these 'inviting forms' and 'in-between spaces' (1992). The entry stairs to the De Evenaar School in Amsterdam provide both implicit and explicit suggestions of seating for the school children. (See Figs. 4.18 and 4.19). A small bench is incorporated into the exterior stair railing at the first landing which overtly invites children to sit in this protected space and observe the world of activity around them. However, Hertzberger also 'activated' the railing at the higher landing; the bottom of the perforated steel sheathing is curved at the bottom



Figs. 4.16 and 4.17:
Varied Use of Affordances Suggested by Material



Figs. 4.18 and 4.19:
Explicit and Implicit Affordances for Sitting

and suggests a special sitting place that children will quickly 'discover'.

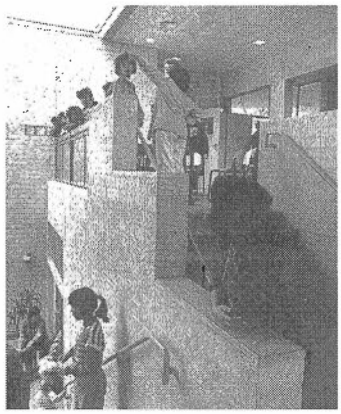
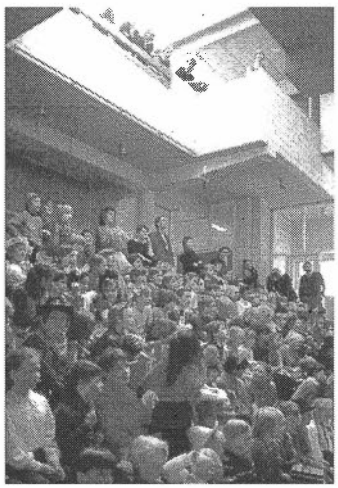


Fig. 4.20:
'Activated' Stairway

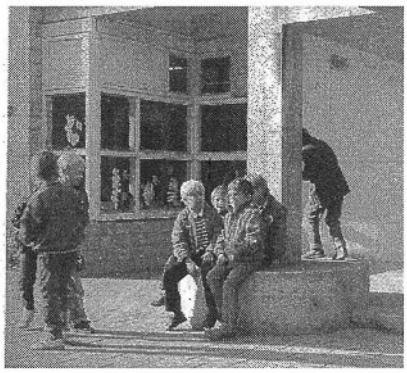
The interior stairs of the school are no exception. Rather than detailing the parapet bordering the stairs to follow the direction of the handrail as per usual, Hertzberger installs a series of horizontal ledges down the course of the stair. In effect, he has again added 'places'; the wide, flat surfaces suggest an opportunity to pause, lean one's elbows on the ledge, and observe the activity below (See Fig. 4.20). The ledges also run the length of several stairs, allowing people of different heights to find the perfect spot for leaning. The stairs in the main hall of the De Evenaar School, as well as the Apollo Schools, also have many implicit possibilities for use. In addition to serving as the bridge from one floor level to another, Hertzberger designed the stair width and height to provide comfortably scaled seating for the children as well; the fact that the stairs extend across the entire transitional space allows this area to function as a gathering space that can accommodate the entire student body. (See Fig. 4.21). However, the dimensions and surface of the stairs also suggest a comfortable work space for the functionally-oriented student (See Fig. 4.22).

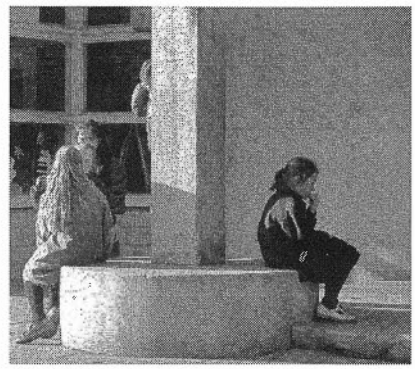


Figs. 4.21 and 4.22:
Multiple Affordances Provide Flexible Spaces

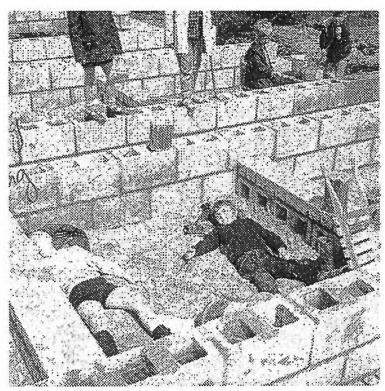
Even structural elements become targets for 'activation' in Hertzberger's facilities. At the Apollo Schools, also in Amsterdam, the bottom of an outdoor support column is intentionally widened in order to increase its accommodating capacity. (See Figs. 4.23

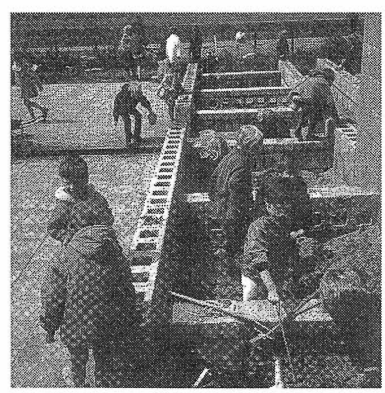
and 4.24) The children use this space for sitting together, for storing their lunch bags during recess, and as a 'home base' during games such as 'Hide and Seek' (Hertzberger, 1992). With minor, yet thoughtful, design gestures, Hertzberger creates a loose yet definable 'place' that affords many play and interaction opportunities for children. In addition to sensitivity to users needs in general, Hertzberger shows enormous insight regarding the behaviour and preferences of children in his design work. He clearly understands the value of spaces that are of an appropriate scale for a child, as well as the role of manageable spaces in facilitating engagement in activities and social interaction. As a general principle, Hertzberger endorses the articulation of space in such a way as to create definable spaces. Articulation creates nooks and alcoves that provide alternative spaces with smaller dimensions, suitable for smaller groups and more intimate encounters. However, in the case of children, he also explicitly recognizes that young children prefer to congregate in smaller clusters, and deliberately set out to define spaces more suitable to smaller numbers. Perhaps the best example of this spatial articulation is the sandpit designed for the Montessori School at Delft. Rather than providing one large open area for sand play, Hertzberger divided the space into a series





Figs. 4.23 and 4.24:
Activating the Structure to Create Affordances





of small territories bounded by short walls of concrete block – "just right for sandcastles" (1992, 193). He hypothesized that the smaller compartments would allow for more concentration and intimacy during play, and therefore be more appropriate for the group of young school children. The popularity of the sandpits, and the incredible range of activities that take place in these bounded areas, are testimony to Hertzberger's instincts. (See Figs. 4.25, 4.26., 4.27).

Aldo Van Eyck, another prominent Dutch architect, demonstrated similar insight in his design for the orphanage on the Ijsbaanpad in Amsterdam. Assisted by the empathetic and detailed programme provided by Frans van Meurs, the director of the orphanage, van Eyck attempted to design a facility that would be sensitive to the needs of the 120 inhabitants, who ranged in age from newborn to 18 years old (Strauven, 1996). In many respects, he was highly successful in his efforts; the building reflects an understanding of the attributes of space that will provide appropriate affordance features and conditions for all the inhabitants.

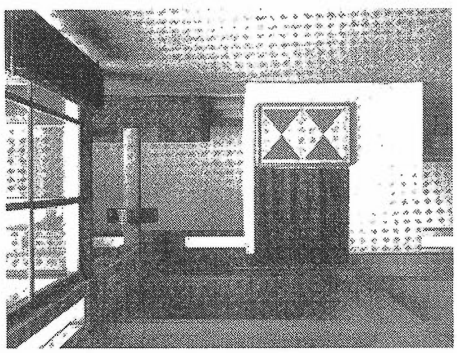


Fig. 4.28: Boys Play Area

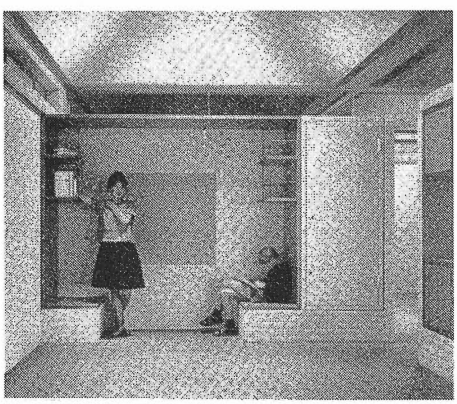
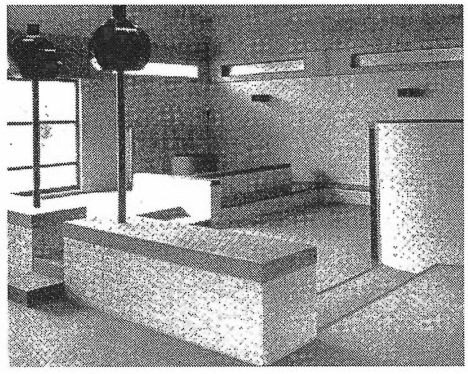
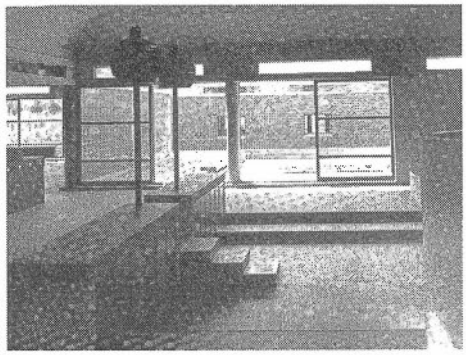


Fig. 4.29: Girls Nook

One striking example of this environmental congruency is van Eyck's design of unique residential units to reflect the needs of each age grouping; these areas were conceived of as "dwellings, attuned to the characteristic lifestyle of each group... [each with] its own atmosphere and organization...." (Strauven, 1996, 5). The careful consideration van Eyck gave to the needs of the various groups of children manifested itself in spaces and features created explicitly for their use, each one reflecting a concern for flexibility, scale and preferential endeavors. A play space designed for the 6-10 year old boys was carved out of the main circulation space and affords a variety of activities and interactions appropriate for their age level (See Fig 4.28). The raised platform, steps

and well-proportioned seating invite the boys to use their imaginations in transforming the space for their pursuits. The raised platform also effectively marks off a distinct territory separate from the main space, and could function, for example, as a stage for plays, a surface for building, or an arena for wrestling. The steps and benches, on the other hand, provide opportunities for sitting, talking, reading or quiet play (Strauven, 1996). There are noticeable differences in the spaces designated for girls aged 14 to 18 years. Van Eyck carved out cozy nooks suitable for reading or having conversations with a few close friends; the lowered ceiling, built in benches and shelves, and the warm materials lining the alcove portray an intimate space comfortable for either the solitary or small group activities of older girls (See Fig. 4.29). In both of these examples, we see how van Eyck 'activated the environment' to provide features and conditions that reflect the changing social and environmental preferences of various age groups, without restricting the spaces to specific uses. Essentially he has created play and restorative settings with affordance properties likely to be supportive of the needs of its primary inhabitants.





Figs. 4.30 and 4.31: Articulating Spaces Provides Multiple Play Opportunities

These examples also illustrate how Van Eyck used the articulation of space to divide the larger facility into a number of smaller, more inviting spaces. Throughout the facility, he manipulated floor and ceiling levels, as well as partitions, openings, materials and light, to provide spaces which vary in function as well as degree of intimacy. Some of the common spaces he designed afford a variety of these experiences; a prime example is the entrance halls to the residential units which were designed to accommodate large assemblies and group activities. However, van Eyck also raised the 'potential' of the environment by separating the common space into smaller, well defined areas through the use of partitions, storage cabinets and changes in both material and floor levels (See

Figs. 4.30 and 4.31). These spaces simultaneously provide multiple activities for many children, and the physical features also create a number of enticing environments that call out to be investigated. The sunken spaces, raised platforms, walled enclosures, and the 'playhouse' all facilitate exploration and provide privacy opportunities. The steps, parapets and handrails that serve to define the space also afford climbing-on, sitting-on, jumping-off, and so on. Van Eyck also manipulates the light in these spaces to create interest and variety. The round skylights in the domed roof of one common area throw circles of light on the floor that move with the sun, creating a 'new' space and atmosphere every hour. In addition to providing an instant spotlight for a budding actor or prompting shadow play, the changing light patterns also bring attention to natural phenomena (See Fig 4.32). The overall environment then becomes highly capable of accommodating numerous patterns of preference and use, as well as providing a range of learning opportunities (Hertzberger, 1992).

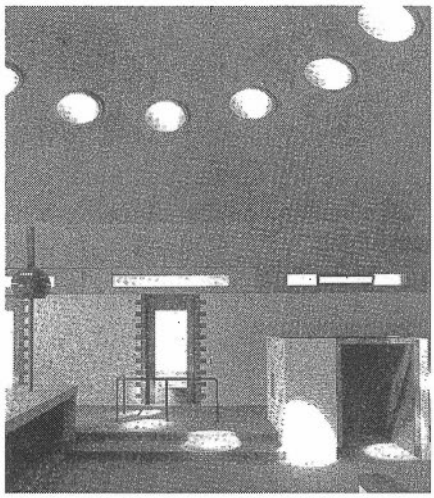


Fig. 4.32: Light Creates Interest and Variety

Van Eyck's work, like that of Hertzberger, suggests an insightful understanding of the environmental elements that will stimulate the interest and engagement of children, and worked to embed them into the design of the facility. Two final examples from the orphanage illustrate the 'incentives' for interaction that can be provided by a physical environment at the hands of a sensitive designer. In one area of the facility, van Eyck carved out an otherwise unusable space at the bottom of a structural column in order to create a paddling pool for younger children (See Fig. 4.33). Here a 'leftover' space is elevated to the status of a 'place' that affords a number of cognitive, social and sensory experiences.

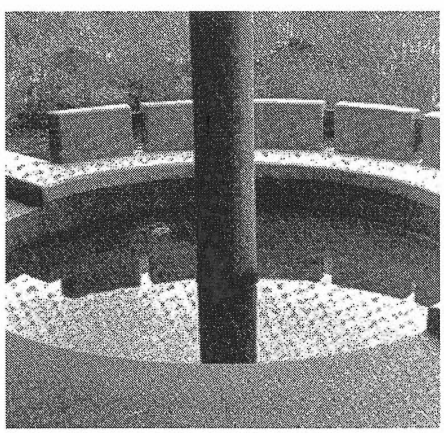


Fig. 4.33: Carving out Affordances

The last example from van Eyck's orphanage, and perhaps the most delightful, is his design for the sand play area on the grounds of the facility. He provided a raised concrete bed with a large round area in the middle filled with sand. However, around the edge of the sandpit, platform circles were impressed into each corner; children use these depressions as special seats, as individual sandboxes, and as the location for particularly special sand sculptures. The incredible potential inherent in this feature is most evident after a rainfall; the circles become filled with water and provide the unexpected and exciting opportunity for water play, such as turning sand to mud, floating and sinking objects, or using the pool as a mirror (See Fig. 4.34). Just as the random water puddle in a natural setting can occupy a child for long periods of time, van Eyck has embedded a similar opportunity into a built environment. The loose but thoughtful nature of the sandpit provides an ever-changing variety of stimulating play experiences; children can simultaneously learn to manipulate materials, engage in pretend play and observe a number of natural systems at work.

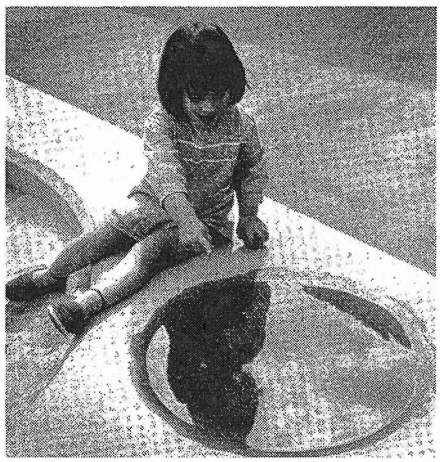


Fig. 4.34:
A Surprise Play Opportunity

The work of both Hertzberger and van Eyck demonstrates a sensitive awareness to the ways in which people, and particularly children, learn, play and interact with their environments. The conscious and successful incorporation of affordances into their designs perfectly demonstrate Hertzberger's principle of "reciprocity of form and user" (1992, 169). The 'inviting forms' and conditions present in the reviewed facilities support congruency between the environment and the behaviour of its many users. In the case of the settings for children, the designs are in keeping with their functional orientation and allow the children incredible freedom to manipulate and 'colour' in their environments according to their own intentions. Their designs offer many of the same benefits attributed earlier to natural environments, such as the provision of multiple affordances, and therefore serve as excellent preliminary examples of ways to 'activate' a built environment to support the diverse needs of child users.

4.3.2 Designing 'Less' ?

The interactions and environments reviewed in this chapter suggest that providing affordance-rich settings for children's play may involve designing 'less' rather than 'more'. Many of the playful interactions described were inspired by open-ended, interpretable physical objects and settings rather than those with specific, defined uses. Although there are differences in the types of interactions desired or valued by children, particularly those at different developmental stages, they are often drawn to environments that they can 'discover' on their own and manipulate in imaginative ways. Play settings should offer a wide variety of 'incentives' for stimulating, hands-on experiences appropriate to the development of all its young users. A loose, manipulable environment provides a wealth of such affordances that can be interpreted in numerous ways by children of different ages. An affordance-rich setting increases the flexibility of a facility and its ability to meet the play needs of a range of children. Examples from facilities designed for children by both Hertzberger and van Eyck illustrate that there are ways that such 'incentives' can be integrated into the physical form of an environment.

In the work of Hertzberger and van Eyck there is also evidence of the recognition that children of different ages may need and prefer distinct environmental conditions or arrangements. Both designers worked to embed a degree of flexibility into the physical design of their children's facilities in order to better accommodate these differences. There is, however, a danger in designing with flexibility in mind. Considering the need to address the different requirements of a variety of students and teachers, it is clear that there is no single or ideal environment that will be appropriate for everyone. Sanoff, who has been a pioneer in advocating for 'responsive' schools, points out that there is a troubling misconception that coping with differences involves designing for no one in particular (1994). Hertzberger agrees that while a building designed within rigid specifications will quickly become obsolete, a facility designed to yield the most neutral solution to specific problems, "will never [yield] the best, the most appropriate [solution]" (1991, 146). Both of these designers then suggest that an appropriately flexible design is one which can be put to many different uses without having to undergo significant changes itself.

This principle again reinforces the value of loose, unstructured features and environments as a mechanism for accommodating the diverse play needs of children but underscores the need to employ sensitive and strategic affordances that facilitate the desirable experiences characteristic to each level of development. Hertzberger suggests, "form directed towards a given purpose functions as an apparatus, and where form and programme are mutually evocative the apparatus itself becomes an instrument" (1992, 170). When the physical environment of a school reflects children's natural play behaviour and stimulates their engagement in appropriate activities, the school itself can become an instrument for learning and development. This is a fundamental aim of a Developmental-Affordance design framework.

The final chapter is intended to illustrate how we can look to patterns of behaviour and environmental preference in order to determine affordances that may facilitate play activities associated with critical childhood developments. As well, it will suggest how these opportunities could be embedded within the physical environment of school facilities to create affordance-rich play environments for children.

5 A Developmental-Affordance Approach to the Design of Play Settings in Learning Environments

... a sensitivity to the physical and psychological attributes of children at different periods of development can act as a guide in the creation of functionally appropriate environmental features

~ Wohlwill & Heft, 1987, 319

So far, the thesis has laid the groundwork for a new design framework for children's environments by addressing the three essential issues identified at the beginning of this investigation: how children perceive and interpret their physical environments, the influence these settings have on their behaviour, and their particular motivations for interacting with their environments in the first place. This thesis has suggested that children are unique in their perception of functional opportunities in their surroundings for developmentally-stimulating play activities, and that their interpretation and use of the environment is related to both their developmental goals and current level of capability. The patterns of behaviour outlined so far suggest that there are specific affordance features and conditions that children prefer or seek out in support of their play activities at a given time. Many of these objects or settings are 'looser', or less defined, in nature and allow children the freedom to interpret the environment in a manner that suits their interests.

The Developmental-Affordance approach recognizes the distinctive patterns of environmental behaviour and preference exhibited by children and catalogs the physical elements and settings that seem to best support their desired activities at various developmental levels. These affordances can then be incorporated into the built or planned environment in order to facilitate the developmentally-significant experiences of children. This framework could help to generate guidelines to assist designers, caretakers and educators in providing primary environments that support the essential learning and development experiences of children.

Chapter 5 will illustrate how this model can help to clarify the features and conditions that will likely be effective at supporting the pursuit of a particular developmental goal relevant throughout the course of childhood – the evolution of a healthy self-concept. Existing behavioural research will be used to identify the play activities that are conducive to self-concept development, and subsequently the environmental affordances which might support this behaviour. As many of these studies have been carried out with particular age groups, we can also begin to determine the important differences in the perception, interactions and preferences of children at various developmental levels, and tailor their environments to suit. Examples from existing contemporary schools will be used to illustrate the types of physical environments that can afford the specific play experiences related to the development of self-concept throughout the stage of childhood.

5.1 Fostering the Development of Self-Concept

A child needs "[experiences] that allow for the growth of autonomy, the development of a sense of competence and mastery and supportive relationships with others"

~ Wolfe, 1978, 183

The effectiveness of interactions and competence developed during childhood contribute to the child's ability to adapt to the occupational forms and roles of adolescence and adulthood

~ Kielhofner, 1995, 142

One of the most important goals of childhood, and one which spans the entire course of this life phase, is the development of a sense of self-identity, or self-concept. From the earliest stages of life, children show signs of exploring their identity as a separate and unique individual; this sense of autonomy is critical for undertaking the developmental tasks they will face during all subsequent life stages (Wolfe, 1978; Korpela, Kytta & Hartig, 2002). A recent review of environmental psychology literature by Spencer and Woolley reveals an increasing emphasis of "the importance of the child's early and continuing transactions with places in contributing to their developing personal identity"; however, the relationship between the physical environment and development is still

given little consideration in developmental, education, and architectural research (2000, 187; Maxwell, 2003).

'Place identity' theory contends that children are influenced as much by their physical environments as they are by their social interactions, and that their encounters with places significantly contribute to their development of self-identity (Maxwell, 2003). As children develop, they accumulate experience and knowledge through contact with various settings, and in turn come to understand themselves and their abilities relative to these environments (Wolfe, 1978; Sanoff, 1994; Cooper Marcus, 1995; Lackney, 2000; Maxwell, 2003). The conditions present in these places impacts the child's ability to carry out the activities that foster feelings of independence and competence. Proshansky & Fabian suggest that "autonomy and self-identity are defined by the knowledge that one has some control over one's physical environment" (1987, 28). For example, the ability to define a space of their own, fill it with their personal items, and use it as a place of refuge, will instill a sense that this place 'belongs' to them; the choice and control inherent in this personal environment sets the stage for other experiences that further develop self-concept (Proshansky & Fabian, 1987; Wolfe, 1978). These conditions were prominent characteristics of 'special places' and Adventure Playgrounds; the creation of a place of their own provides a controlled setting for exploring behaviour roles, regulating emotions and interactions, as well as support for both active, free play and quiet, reflective play. These activities all help children to come to know themselves and their abilities. The physical environment therefore plays a large role in setting the stage for self-concept development.

Considering the importance of fostering a healthy self-identity during childhood, it stands to reason that school facilities should provide the physical and experiential support necessary for its development. The shifting nature of the needs and behaviour related to the ongoing development of self-identity throughout childhood makes it an excellent example for illustrating a Developmental-Affordance approach to the design of the school environment.

However, the concept of self-identity is still a large and complex issue; there are a number of critical experiences that fall under this larger developmental goal. Maxwell, in her preliminary study of affordances in the home related to self-concept, identified a number of subcategories of self-concept including social interaction, reflection/self preservation, independence, enjoyment, restoration/rejuvenation, and skill development (2003). Similar to Maxwell's study, this chapter will focus on a few essential sub-concepts - the manner in which the built environment supports the development of children's sense of *environmental competence* and their ability to *regulate environmental interactions*. First, the experiences and activities which can help to foster these specific abilities will be outlined, followed by the environmental features and conditions that can afford these interactions throughout the stages of childhood.

5.2 The Development of Environmental Competence

A significant factor in a child's identity development is the recognition that he or she is capable of interacting with the environment in an effective manner, often referred to as a sense of *environmental competence*. Hart defines this as the understanding that one has the "knowledge, skill and confidence to use the environment to carry out ones' own goals and to enrich one's experiences" (1987, 225). Just as they require a comprehensible environment in order to carry out their goal-directed activity, children also need to understand that they have the ability to handle or effect change in their environments to meet their needs and further their own development (G.T. Moore, 1987). This sense of competency is necessary as a springboard for tackling the challenging activities and experiences that they will face during the course of childhood and beyond. Kielhofner stresses that the development of a sense of capability in childhood is essential in order to prepare for the even more complex roles and demands of subsequent life stages (1995). Researchers agree that a child's sense of mastery and ability within an environment is an important step in the development of an identity "as a unique and competent person" (Sanoff, Sanoff & Hensley, 1972, 3; Proshansky & Fabian, 1987).

Built environments can play a significant role in the development of environmental competence in children. As demonstrated by the use of 'special places' and 'Adventure Playgrounds', children come to know their ability to act on, change, and cope with their environments, as well as understand processes and relationships, through interactions with physical features and settings. In order to be able to support this development within learning environments we first need to appreciate the specific experiences or conditions that can instill environmental competence.

5.2.1 Experiences Conducive to Competence Development

Children develop a sense of mastery and control primarily through playful engagement with their physical and social environments over time, and the gradual assimilation of these experiences (R. Moore, 1986). They use play and rest time to face as well as cope with the demands of development, and gain confidence in their ability to do so; incremental advances in their sense of competence leads to a willingness to tackle new challenges, and thereby advance their skills (Korpela, 2000). Effective interaction, however, requires that children be fully engaged and focused during their play activities; random behaviour or incomplete interactions will detract from the child's ability to take full advantage of a learning opportunity. Persistence in play is therefore required in order for competency and mastery to emerge (Wohlwill & Heft, 1987; G.T. Moore, 1986; Getzels, 1974). The caliber and degree of engagement is often affected by the type and quality of opportunities available in the child's environment (Lackney, 2000).

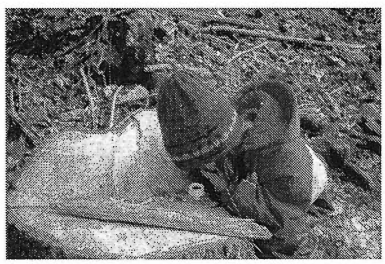
The development of competence is best supported by environments that encourage exploration and experimentation. Children first begin to distinguish themselves and understand their capabilities by investigating the physical objects and spaces around them (Proshansky & Fabian, 1987). The continuing discovery and manipulation of environmental elements serves two critical functions; "it leads to identification of distinctive object properties, that is, its affordances, and it develops an individual's skills in interacting with the environment" (Wohlwill & Heft, 1987, 292; Moore & Young, 1978). This is particularly true of elements that provide feedback regarding their abilities and which are commensurate with the child's current level of development (Tan, 1978; Wohlwill & Heft, 1987).

Also critical to the development of environmental competence in children is the opportunity to reflect upon and assimilate their experiences and their emerging skills. This requires a chance to withdraw from demanding situations from time to time. Children may choose to find a private, cozy place to rest or play quietly, or may engage in seemingly purposeless activities, such as wandering, fiddling with blocks or stones, or haphazardly scratching in the sand (Korpela, 2000). In these cases the child is taking time to digest and perhaps practice emerging competencies, free from the pressures of more challenging tasks or situations (Korpela, 2000). This suggests a connection between developing competency and regulating interactions; children require private or quiet time in order to come to terms with their developing sense of self.

5.2.2 Environmental Support for Competence Development

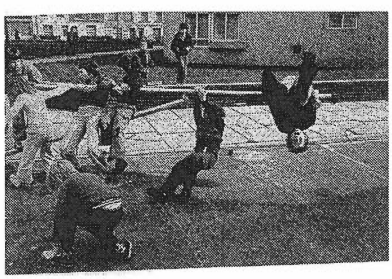
There are a number of ways that an environment can provide rich opportunities for the development of a child's sense of competence. The first supportive characteristic is accessibility. Stine emphasizes that "if a child cannot see the possibilities for play activities or reach an area... he or she cannot explore the learning opportunity available there" (1997, 25). Children operating in an adult-oriented world are often barred from potential environmental interactions because of their smaller size and more limited capabilities; children cannot effectively explore that which they cannot see, reach or touch (Stine, 1997). Access to play or work areas in a non-distracting environment is also important for effective exploratory activity (Proshansky & Wolfe, 1974). Built environments therefore support engagement when materials and workspaces are clearly visible, and when children have the freedom to access these elements for examination and use without too much disturbance (Proshansky & Wolfe, 1974; Lackney, 2000). The concept of accessibility was one of major premises motivating a change to open plan layouts in many school environments. Although the intention was valid, the open-concept layout did little to minimize distractions, which detract from the child's ability to maintain focus and engagement (Rivlin & Rothenberg, 1976; Sanoff, 1994).

The provision of both novelty and variety within the environment are other strategies which support the development of environmental competence. An intriguing and diverse setting will be more likely to pique and maintain children's curiosity, and subsequently draw them into prolonged periods of play and exploration (See Figs. 5.1, 5.2 and 5.3) (Moore & Young, 1978; Wohlwill & Heft, 1987). First of all, the environment should arouse a range of senses; an assortment of textures, forms, colours, and sounds will provide a wealth of stimulations. Novel, multi-sensory, and



Figs. 5.1, 5.2 and 5.3: Hands-On Exploration

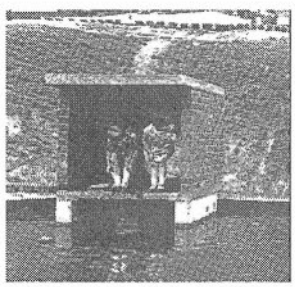
hands-on experiences will facilitate the initial exploration and manipulation, but will also help to maintain a child's interest in order to eventually lead to understanding and mastery (Staley, 1998; Stine, 1997; Heft, 1988). Children's settings should also exhibit variety in the types and complexity of actions which they can support. Children need the opportunity to engage in a wide range of activities, from boisterous group play through to quieter, introspective events; variety in terms of the complexity of environmental elements prompts children to work at more advanced physical and cognitive levels or practice those skills already instilled (See Figs. 5.4 and 5.5).



Figs. 5.4, 5.5 and 5.6: Wide Range of Play Activities

Environmental competence is also facilitated by the presence of both open-ended

elements, which support exploration and manipulation, and those which provide concrete feedback and a sense of achievement (See Fig. 5.6) (Stine, 1997).



Figs. 5.7 and 5.8: Balance of Security and Challenge

Although environmental diversity prompts the variety of playful interactions that lead to a sense of competence, a child's motivation to explore and learn is also dependent on the degree of stability the environment provides (Pollowy, 1977; G.T. Moore et al, 1979; Bransford, Brown & Cocking, 2000). Demanding tasks and interactions certainly promote skill development, but a predictable environment and the opportunity to practice emerging skills are required in order to achieve mastery (Stine, 1997). Children therefore require a balance of challenge and security, of new and familiar, to support the iterative and ongoing process of competence development (See Figs. 5.7 and 5.8). As outlined earlier in this paper, a manageable environment is characterized by qualities of familiarity and security, as well as spaces and activities which are scaled to the child and his or her current level of development.

Finally, a child's ability to develop a healthy sense of environmental competence is related to the opportunity to make their own choices regarding the type, location and duration of their environmental interactions. When children are able to choose their play activities, and are given the freedom to select the environment in which these are carried out, the engagement is both richer and more congruent with their developmental goals (Korpela, 1992; Wolff, 2002). This choice and autonomy were characteristics which made the creation of 'special places' so enticing to children; the sense of control that accompanied their 'own' setting allowed them to pick the activities and conditions that best suited their needs, with few restrictions on time, type or intensity of play. Meanwhile, the notion was instilled that they were capable of successfully dealing with the environment. As Edith Cobb suggests, making their own places allows children to "become authors of their own experience", and gain confidence in their ability to do so (cited in Sobel, 1993, 83). Hertzberger summarizes the connection between freedom of

choice, environmental competence, and ultimately self-concept: "[when] the user gains the freedom to choose for himself which pattern suits him best, to select his own menu as it were, he can be truer to himself [and] his identity is increased" (1992, 171)

5.2.3 Changes in Competence-Related Needs

Not surprisingly, the experiences and environments that help to foster a sense of competence shift with the child's capabilities and interests as they develop. These changing needs are primarily related to the degree of environmental stability, intensity and complexity.

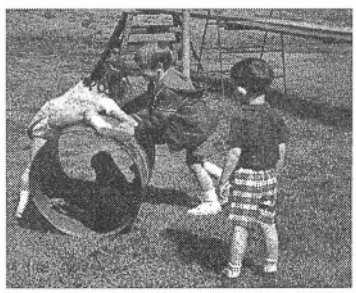


Fig. 5.9:
'Conquering' a Barrel

Fig. 5.10:
Manageable Environment

Children as young as 2 and 3 years begin to develop a personal identity through interaction with others and with their physical environments; this development is strongly related to the realization that they are learning to handle these exchanges with proficiency (G.T. Moore, 1987). During Toddlerhood, young children are concentrating on the development of basic physical and cognitive skills, and are likely to attend to simpler features and tasks which let them practice and master these abilities (See Fig. 5.9). Younger children are also more prone to overstimulation and overwhelm, and are most in need of a manageable environment. However, having a secure base will help to encourage young children to venture further into unknown territory (Pollowy, 1977). For young children, this secure base is usually associated with their caregiver (Grossman, Grossman & Zimmermann, 1999). As a consequence, they prefer child-scaled places that allow them to play in a non-distracting environment within a comfortable range of their caretakers (See Fig. 5.10).

Young children also show a growing interest in opportunities to play and pretend with other children; observations suggest that they most prefer to play in groups of 2 to 5

children, and will feel more comfortable in spaces scaled to accommodate this small group (Wohlwill & Heft, 1987; Hertzberger, 1992). Exploration and pretend play, whether alone or with peers, become important mechanisms for toddlers and Early School Age children to learn and practice skills. Although rich textures, colours and forms will stimulate engagement, in general the child's active imagination and more limited capabilities mean that props and spaces may be more modest than those required for older children. Several researchers have also suggested that the younger child's curiosity and ambition to master new skills is stimulated by the opportunity to observe and imitate older peers (Bransford, Brown & Cocking, 2000).

To continue stimulating competence development as children move through the Early and Middle School Age phases, features and experiences should become both more diverse and more complex in order to match their growing skills. Older children benefit from conditions that allow them the opportunity to compare and test their abilities against their peers; through these events they gain confidence in themselves as well as learn from children with more advanced abilities. (See Fig. 5.11) Children in these later stages are also at the height of a fascination with exploring and manipulating, and benefit from increasingly challenging and intricate environmental features and settings to investigate. This shift is reflected in the expansion of the territorial range of older children as they seek out more demanding and complex experiences further away from the view of caretakers, as well as their interest in more elaborate, rule-based games (See Fig. 5.12). Children approaching adolescence have grown fairly confident in their abilities and are less overwhelmed by environmental challenges. They do not usually require the same degree of stability as their younger counterparts, yet still benefit from places that seem manageable for them and their peers.

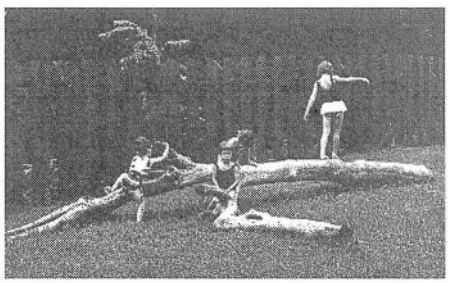
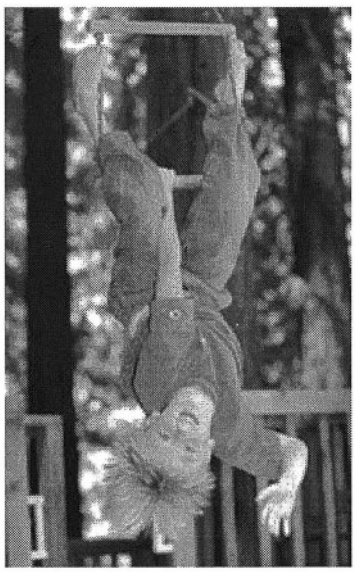


Fig. 5.11: Practicing with Peers

Fig. 5.12:
Expanding Territorial Range

5.2.4 Affordances for the Development of Environmental Competence

The value of loose, open-ended elements in increasing an environment's potential to support children's diverse play needs was established in the last chapter. However, our interest here is in the specific environmental features and conditions that are supportive of the play activities related to the evolution of a sense of competence in children.



As outlined earlier, one of the primary mechanisms for environmental competence is playful, varied and persistent interaction with the physical environment. One competence-building activity is the physical, boisterous play that allows children to challenge and practice their motor and cognitive skills; children are particularly drawn to activities such as swinging, hanging, climbing, balancing, jumping on and jumping over (R. Moore, 1986; Heft, 1988). Behavioural studies suggest that there are a number of natural and built features that afford these activities. Children will utilize elements such as trees with sturdy limbs, large rocks and various sized bushes as well as fences, monuments, walls, benches, railings, ladders, curbs, poles, columns and platforms (R. Moore, 1986; Barker & Wright, 1951; Heft, 1988) (See Figs. 5.13, 5.14 and 5.15). In general, these can be categorized as rigid and non-rigid attached items, extending surfaces or objects, structures with successive levels, and structures with numerous hand and foot holds. These elements, or those that support similar activities can be embedded in the physical form of a facility.

Figs. 5.13, 5.14 and 5.15:
Physical Play... Hanging, Climbing and Balancing

An excellent example of a feature that affords this type of active play is the exterior wall at Ravenstone primary school in London (See Fig. 5.16). A climbing wall is created with built-up columns and protruding bricks along the height of the wall; children of all ages can use these extensions as hand and foot holds to scramble their way as far up the wall as they can, or, as they get older, race their friends to the top. Hertzberger's De Koperwiek school yard also exhibits examples of unstructured elements that prompt such active play. A series of short, flat-topped concrete pillars are set in the ground at a distance from each other; younger children can practice climbing up to and jumping down from these concrete bases, while older children can try the challenge of jumping from pillar to pillar (See Fig. 5.17).

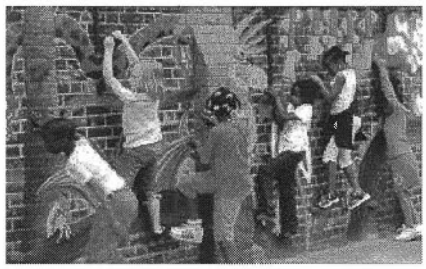


Fig. 5.16: Climbing Wall

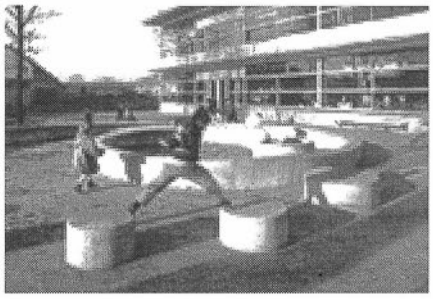


Fig. 5.17: Jumping Platforms

In addition to these features, natural elements or play structures with a variety of platforms, poles and perches, and other mechanisms providing climbing, swinging and balancing challenges, afford many types of active motor play for children of all ages. Younger children can swing from low poles and work to climb up to lower platforms, while older children can use their more advanced capabilities to climb ropes, poles and ladders and experience the unique perspective afford by higher points (See Fig. 5.18) (Korpela, 2002; Feinberg, Kutchner & Feldman, 1998; Stine, 1997).

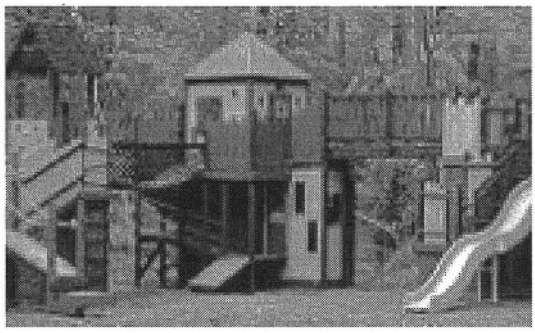
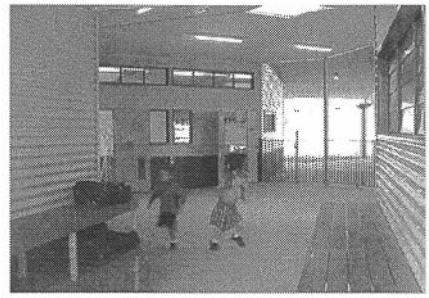


Fig. 5.18: Multi-Level Play Structure

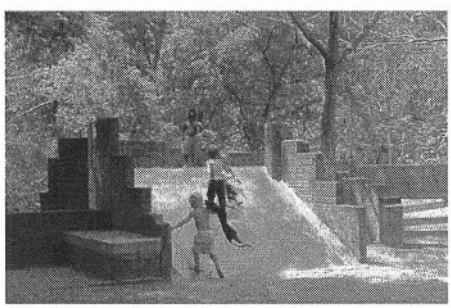
Activities such as running, chasing, biking, skipping, sliding, dancing, wrestling, cart-wheeling, and various ball games are also very attractive physical activities to children (Barker & Wright, 1951; R. Moore, 1986; Stine, 1997). This type of play requires hard surfaces or slopes, as well as a large unobstructed space, though children may prefer

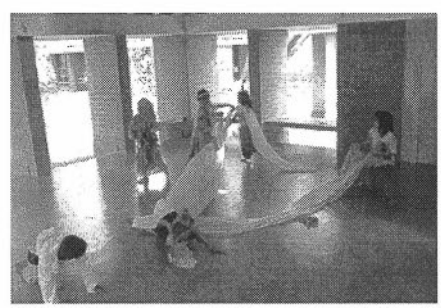
softer surfaces for gymnastic activities (Heft, 1988; Stine, 1997). Supportive outdoor surfaces include dirt, asphalt, and grass; indoor spaces include open expanses of hard, smooth flooring or short pile carpeting (R. Moore, 1986; Heft, 1988; Stine, 1997).



Figs. 5.19 and 5.20: Flat, Unobstructed Indoor Activity Space

School gyms and multi-purpose areas usually offer large, hard surface areas suitable for such games, though access and activity choice may be limited by school authorities (See Fig. 5.19). However, the Emmaus Primary school in Brisbane provides a covered open play area with concrete surfacing that is accessible to students during free time and extremely conducive to running, chasing and skipping (See Fig. 5.20). The Auroville School in India also provides supportive settings for these more boisterous activities. In the playground, children can compete to run up and slide down the slope provided at the edge of their outdoor play space, or up and down the adjacent stair platforms (See Fig. 5.21). Inside the school, there is a large activity space outside of the classrooms specifically for active free play; the expanse of smooth, open floor, as well as a variety of accessible props, support dancing, chasing and active role play (See Fig. 5.22).

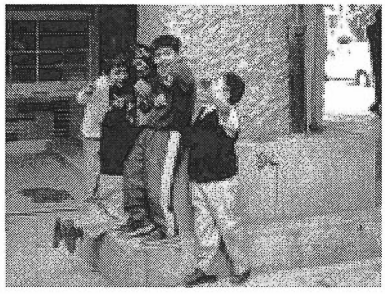
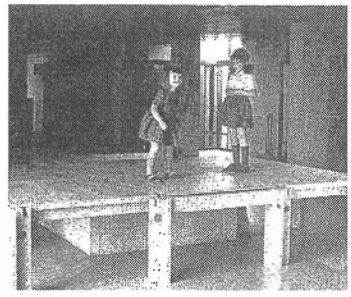
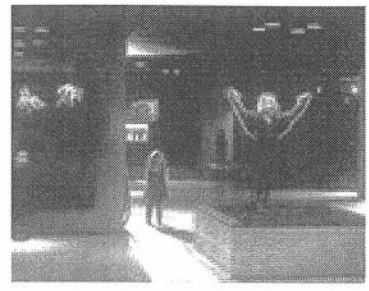




Figs. 5.21 and 5.22: Slopes, Steps and Open Floor Space

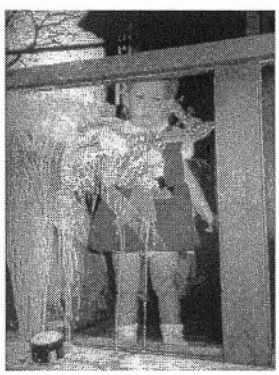
Children of all ages are likely to engage in active play, though it has been noted that the type and complexity varies by age, and in turn requires different environmental conditions. As a result, younger children likely consider smaller patches of flat or sloped surfaces located close to the facility or activity centers more attractive for motor play and simple games, while older children will likely gravitate to larger spaces further from the classroom or school building that support more structured group games.

Although an open area is required for these active behaviours, several records suggest that a strong landmark feature in the space is commonly used by children as a focus for these activities. Such a feature can serve to organize racing competitions or as a home

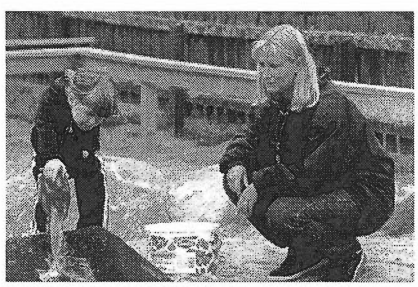




Figs. 5.23, 5.24 and 5.25: Inspiring Landmark Features

base for hiding and chasing games (See Fig. 5.23) (Stine, 1997; Hertzberger, 1992; R. Moore, 1986). The landmark can also provide a cue to orient children within the larger space (R. Moore, 1986; Stine, 1997). At the Delft school in the Netherlands, Hertzberger provided a central interior gathering and activity space for the students; this open area supports a variety of active games including running and chasing. However, a large, flat-topped brick podium in the centre of the space serves as a base for group games as well as an additional activity platform that attracts dancers and skippers (See Figs. 5.24 and 5.25). Similarly, young children at the Eastminster Sonshine Preschool in California race each other around a tree in the middle of a paved area (Stine, 1997).



Hands-on, exploratory play was also shown to be extremely supportive of competence development. Observations by researchers indicate that children are often engaged in activities such as wandering, examining, collecting, digging, moulding and building (Sanoff, Sanoff & Hensley, 1972; R. Moore, 1986; Heft, 1988; Stine, 1997). These activities are often prompted by materials which let them shape, scoop, mould and 'paint'; the availability of 'tools' like buckets, shovels, cups, funnels and brushes can increase the functional possibilities perceived by children (See Fig. 5.26) (R. Moore, 1986; Stine, 1997). Dirt, water, mud and



Figs. 5.26 and 5.27: Materials Inspire Activity

snow accessible in outdoor play areas will attract children and offer a wealth of experiences for testing, making and building; clay, sand, glue and paint in indoor activity spaces provide similar opportunities (See Fig. 5.27) (Becker, 1976; R. Moore, 1986; Heft, 1988; Staley, 1998; Sanoff, Sanoff & Hensley, 1972). These materials area also appealing to children for the intriguing textures and sensations they offer (Stine, 1997). Younger children will often gravitate toward simpler materials and tools available in their settings, such as blocks and buckets, while older children will be more likely to attend to possibilities for combining pliable materials with available 'loose' objects in order to make more complex creations (See Fig. 5.28) (Moore & Young, 1978). 'Found' objects and fragments that provide a variety of textures, shapes, colours, and even manipulable parts support rich and varied play experiences. The Roy Lee Walker school in Texas designed their outdoor play space as a natural 'water habitat'; the setting gives children a range of natural objects and phenomena to study and manipulate during play time, including the use of leaves, stones, sticks, dirt, water, and even bugs (See Fig. 5.29). McWillie Elementary in Jackson, Mississippi incorporated a 'learning garden' into the design of the facility which supports similar hands-on exploration of natural elements and materials (See Fig. 5.30). As observed in 'Adventure Playgrounds', scrap, craft or construction materials that can be 'found' in a setting will also be extremely attractive, particularly to older children, and can inspire building activities; these items

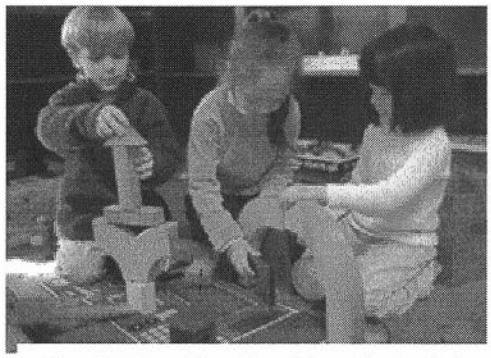


Fig. 5.28: Simpler Play Materials

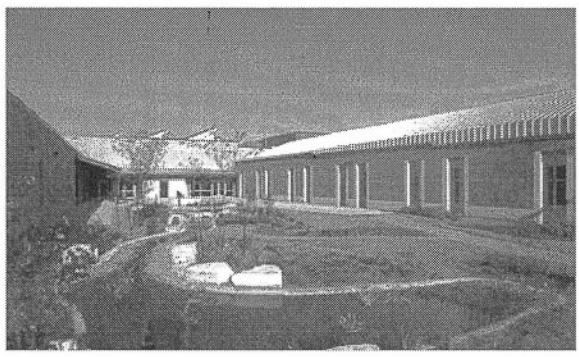


Fig. 5.29: Roy Lee Walker Playground Water Habitat

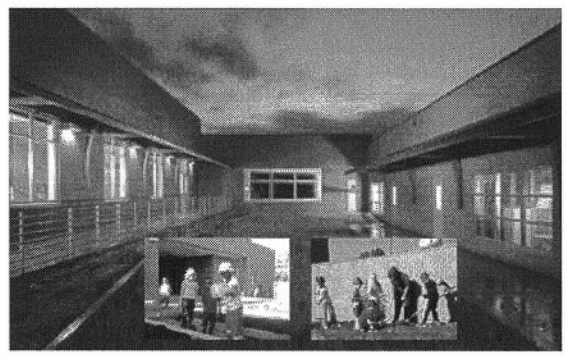
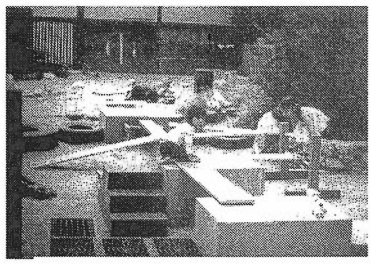
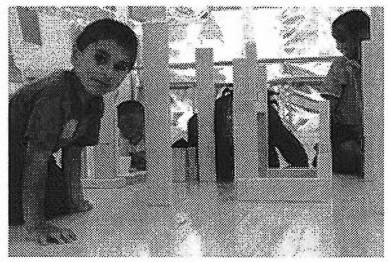
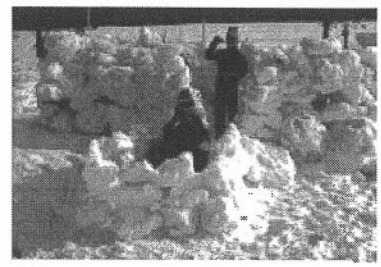


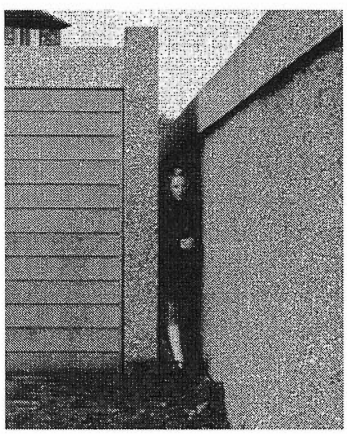
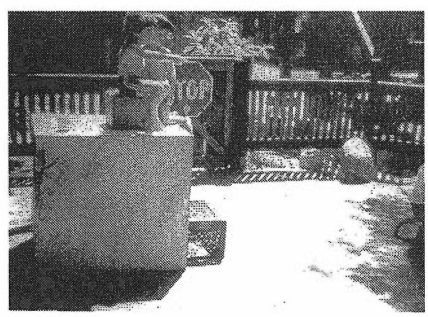
Fig. 5.30: McWillie Elementary Playground Learning Garden

can include boards, boxes, crates, cardboard and planks. In classrooms or indoor activity areas, appealing materials can include blocks, boxes and crates for younger children and more sophisticated building or craft materials for older peers. The provision of flat, solid work surfaces nearby, or hollows capable of being 'bridged', can help to prompt these shaping, making and building activities (See Figs. 5.31, 5.32 and 5.33).

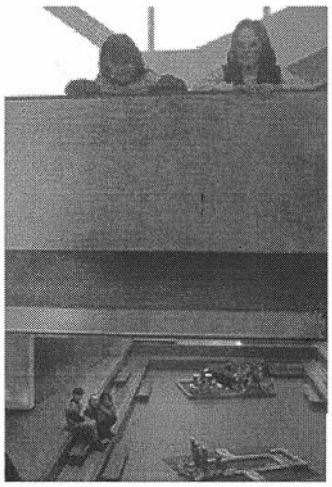
Figs. 5.31, 5.32 and 5.33: Loose Materials for Building and Creating

Besides materials or objects, the characteristics and conditions of school settings themselves can suggest exploration opportunities. There are a number of spatial qualities that can make a place seem intriguing or challenging to a child and which will often draw them in for closer investigation. Children are often compelled by articulated spaces which have a mysterious quality or which provide novel changes in perspective (Tan, 1978; Hertzberger, 1992; Stine, 1997). Darker nooks, alcoves or shelters are often perceived by children as affording adventure or prospect, while higher levels or platforms provide the privileged opportunity to look out or down upon the world below and gain a more global perspective (See Fig. 5.34 and 5.35) (Stine, 1997). Hertzberger incorporates a number of such intriguing observation spaces within various schools in the Netherlands. Lower railings along stairs and loft spaces allow children to peek over into the spaces below

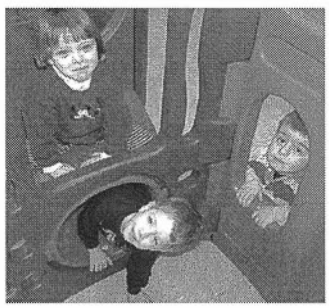
Figs. 5.34 and 5.35: Mysterious and Novel Places

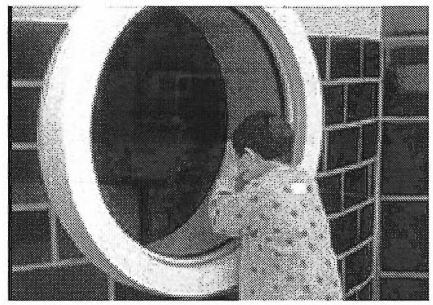
while 'leftovers' spaces like those under a set of stairs affords an place for unobtrusive observation (See Fig. 5.36 and 5.37).

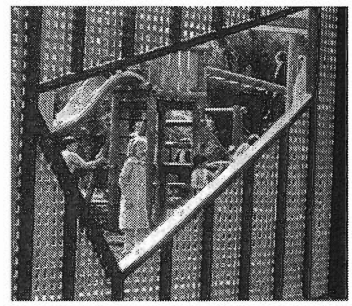


Figs. 5.36 and 5.37: Observation Places

Both younger and older children also seem compelled by spaces with small entrance apertures that are scaled to their smaller size, or 'portholes' which afford a glimpse into







Figs. 5.38, 5.39 and 5.40: Apertures and Portholes

a potentially intriguing world beyond (See Figs. 5.38 and 5.39) (Stine, 1997; Tan, 1978). Perhaps to facilitate such experiences, Sanoff includes latticework partitions around the playground of an elementary school which could provide an opportunity to furtively observe other play spaces or watch for 'Seekers' during a hiding game (See Fig. 5.40). Older children are particularly drawn to spaces into or through which they have to squeeze themselves, suggesting that the spaces are secret, forbidden and even a bit dangerous; the more distant the space, the more adventurous it will

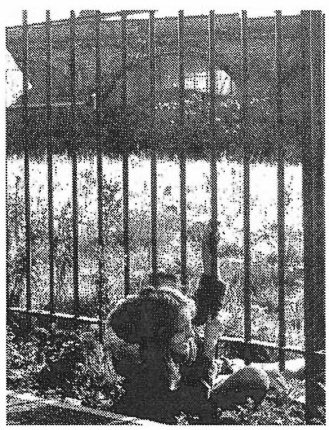
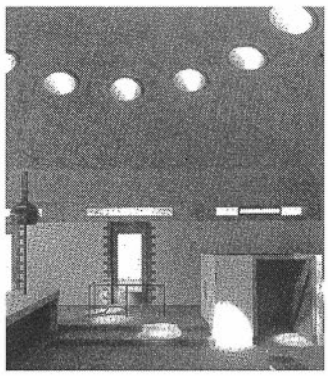


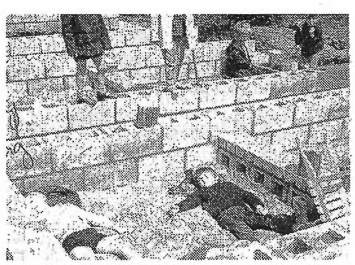
Fig. 5.41: Forbidden Places

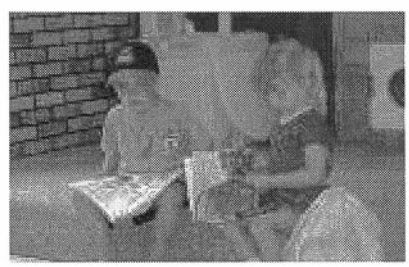


appear (See Fig. 5.41) (Feinberg, Kutchner & Feldman, 1998; R. Moore, 1986). The entry spaces of van Eyck's orphanage may suggest these conditions, particularly the small, dark child-sized enclosure in the corner of one activity area that could spell out challenge and intrigue for younger inhabitants (See Fig. 5.42).

Fig. 5.42: Intriguing Places

It was emphasized earlier that children often seek out quiet games and activities as well as part of their competence development to balance out active play. More subdued activities like reading, talking, lounging, picnicking, examining, making crafts, and doing puzzles require different features and conditions than more energetic activities. These less active behaviours may also require open ground surfaces, platforms or levels, but only if they are removed to some degree from noisier games or activities (G.T. Moore, 1987; Stine, 1997). These separate spaces, especially when covered in softer materials such as grass, sand or carpeting, afford lounging, socializing and reading (See Figs. 5.43 and 5.44) (R. Moore, 1986; Maxwell, 2003). The spatial definition provided by tiers, steps, or platforms can





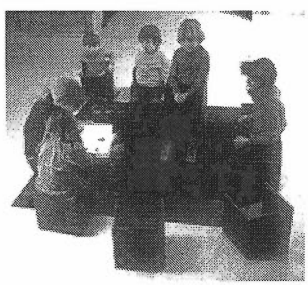
Figs. 5.43, 5.44, 5.45 and 5.46:
Opportunities for Quiet Lounging and Reading

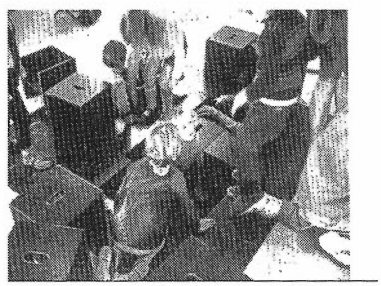
suggest a separate, quieter place for sitting, perching, talking, reading, viewing and puzzles or board games (See Fig. 5.45 and 5.46) (Stine, 1997; Hertzberger, 1992). A landmark feature in such a setting, like a tree, platform or post, can also serve as an anchor for quieter activities, providing children with a 'place' to gather (R. Moore, 1986).

The sense of enclosure provided by hollows, canopies, or corners can reinforce the suggestion of an 'away' place suitable for more subdued activities (See Fig. 5.47) (Stine, 1997; Hertzberger, 1992). For example, a shaded platform space at the Polygoon

Figs. 5.47 and 5.48: Hollows and Canopies Create 'Places'

School in the Netherlands makes an attractive place for young children looking for rest from the sun and physical activities (See Fig. 5.48). The space is large enough to accommodate a group of peers, and the dimensions and flat surface suggest the possibility of stretching out. A hollow in the gathering space at Hertzberger's Delft School is filled with light, removable blocks, which children use for play or as seating; the sunken area provides a defined place that supports quieter group activities for younger children (See Figs. 5.49 and 5.50). The children can also achieve a sense of competency and satisfaction by creating this special activity space themselves. Manipulable and versatile furnishings, like these blocks, provide variety and choice, and opportunities for experiencing control (Wolff, 2002).





Figs. 5.49 and 5.50: Manipulable Environments

Benches, ledges, curbs and railings at heights suitable for sitting will also encourage socializing and quiet play. The Wildwood School 'activated' the areas along corridors and railings by providing ledges at a height which affords sitting and socializing. Similarly Hertzberger created wide walls and platforms outside several of his school

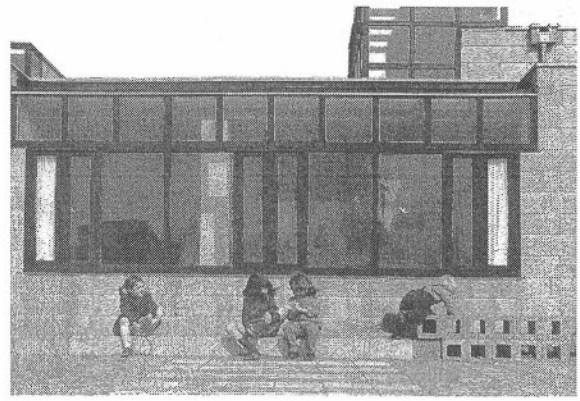
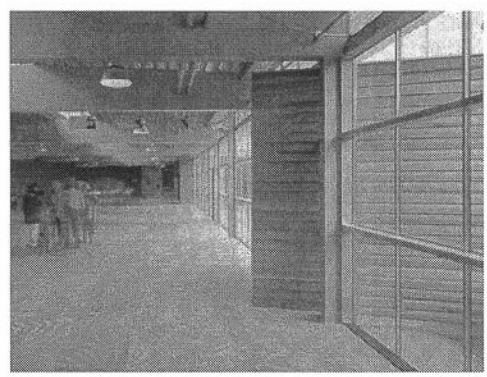


Fig. 5.51 and Figs. 5.52: Activating Environments for Socializing, Quiet Play

facilities to support lounging and conversation (See Figs. 5.51 and 5.52). I.V. Macklin Elementary school in Grand Prairie, Alberta, built ledges into a large, undulating planter in the crush space outside the auditorium; the benches along the crests and hollows draw children and adults into sitting and socializing (See Fig. 5.53). The Vensterschool, however, missed an opportunity to provide similar affordances in its main corridor space (See Fig. 5.54).



Figs. 5.53 and 5.54:
Including or Missing Opportunities for Gathering and Socializing

A larger, flat platform or level may also provide a place for sitting, as well as suggesting a stage for putting on a play or a game such as 'Statues' (Hertzberger, 1992; R. Moore, 1986; Stine, 1997). Here we can see the value of Hertzberger's loose, yet versatile, environmental features; the podium in the activity space of the Delft School also serves as a

Fig. 5.55: Platform Supports Multiple Activities

place for reading, quiet games and conversation (See Fig. 5.55). Low shelves, spaces, or cubbies for storing and displaying materials, games or props, which are easily accessible and within the vicinity of these spaces or tiers, can help to prompt these quieter activities (See Fig 5.56) (Stine, 1997; Wolff, 2002).

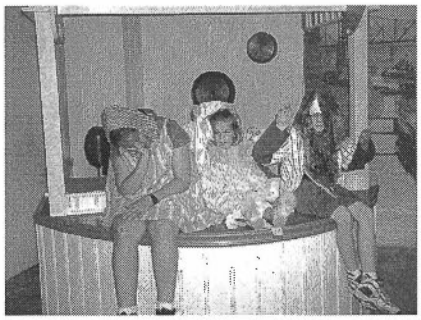
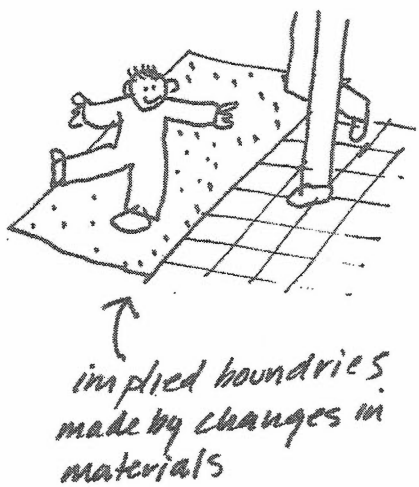
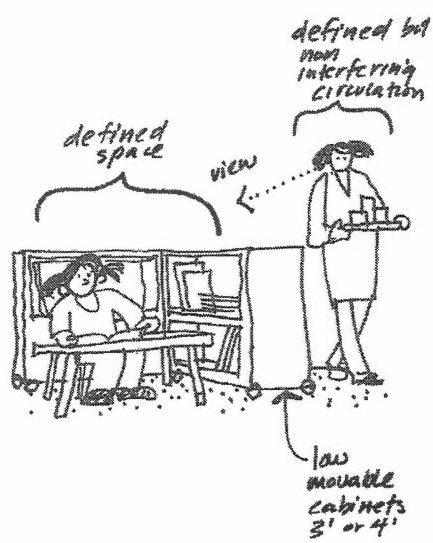


Fig. 5.56: Platform and Props Inspiring a Play

In addition to the specific features and spaces that support competence-building activities, an environment that seems manageable to a child is preferable for carrying out these developmental tasks. Children often need non- distracting environments in order to maintain focus and engagement in a particular activity or encounter. The scale, location and spatial boundaries of spaces within the school will impact the degree of security and focus that the child feels within its spaces. Features and conditions which help to separate spaces and control stimuli can assist in the provision of manageable settings.

Studies by G.T. Moore and his colleagues revealed that engagement and concentration is higher when children can work or play in well-defined settings with distinct spatial boundaries and at least partial visual and



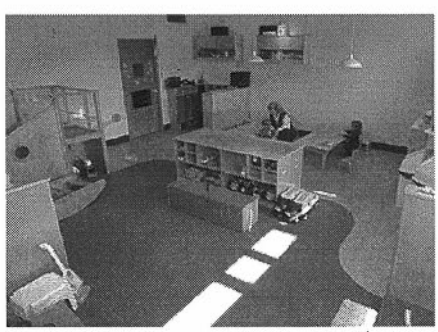


Figs. 5.57 and 5.58: Implied Boundaries and Spaces

acoustical separation (G.T. Moore et al, 1986; G.T. Moore, 1987). When a number of distinct areas are available to students, many focused activities can happen at once within the larger space; as a result, the congruency and accommodating capacity of the environment increases (G.T. Moore, 1987; Hertzberger, 1992). However, the desired degree of enclosure and size of the spaces change with the age of the child. Younger children will be more engaged in activity in a small, well-defined space, but they still require some visual and auditory contact with their caretakers. As a result, they will likely prefer those spaces that provide only partial enclosure or simply imply boundaries (G.T. Moore et al, 1986; G.T. Moore, 1987; Feinberg, Kutchner & Feldman, 1998). Low partitions or dividers such as cabinets, walls, bookshelves or screens will suggest the right degree of spatial definition to a young child (See Figs. 5.57 and 5.58). Even a truck tire can define a manageable play space for a group of young children (See Fig. 5.59).

Fig. 5.59: A Defined Space for Young Children

However, structural or spatial features that even merely suggest an articulated space, such as columns, curbs, raised edges or changes in ground surface, also seem to imply separation of space, particularly to younger children (G.T. Moore et al, 1986; G.T. Moore, 1987). In this case, defined patches of grass, paving, dirt or sand, or distinct contrasts between different flooring materials, will be interpreted by younger children as distinct 'spaces' (G.T. Moore, 1987; Stine, 1997). The combination of a low storage unit and a distinct change in floor covering helps to define smaller activity areas for young children at Akiba



Figs. 5.60 and 5.61: Spaces Defined by Dividers and Borders

Academy in Dallas. The brightly coloured concentric circles painted on the paved play surface at the Coombes Infant and Nursery School creates both a defined and novel activity space within the context of the larger play space (See Figs. 5.60 and 5.61).

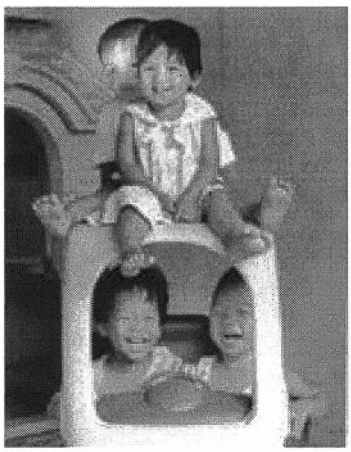
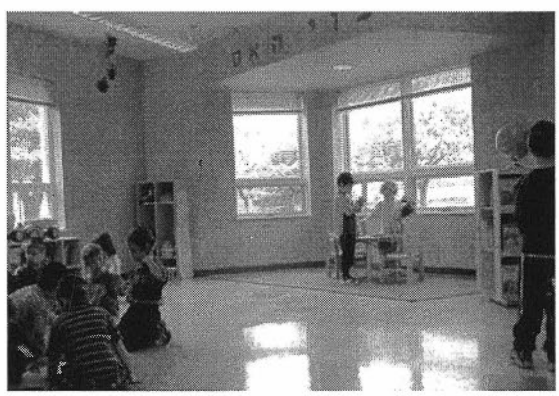
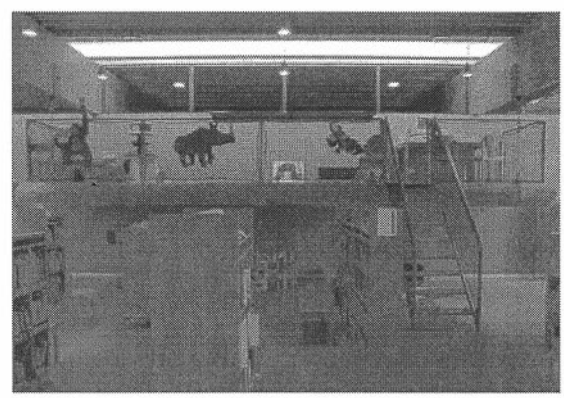


Fig. 5.62: Play Vehicle Frames a Defined Space

Distinct changes in floor and ceiling level can also be effective spatial mechanisms for suggesting a defined space. Younger children will prefer nooks, alcove or pits out of which they can see clearly; Stine suggests that a playhouse or large play vehicle with low ceilings and open windows will provide the right balance of exposure (See Fig. 5.62) (1997). At Yeshiva Elementary in Milwaukee, a small niche carved out of the exterior wall, with a lowered ceiling and change in flooring, may imply a well-defined, separate 'place' for kindergarteners (See Fig. 5.63). The library at the Vensterschool in the Netherlands includes a raised reading loft with transparent railings that creates a comfortable and child-scaled place for young readers; the raised platform also creates another cozy space underneath affording an opportunity for reading and quiet play (See Fig. 5.64).

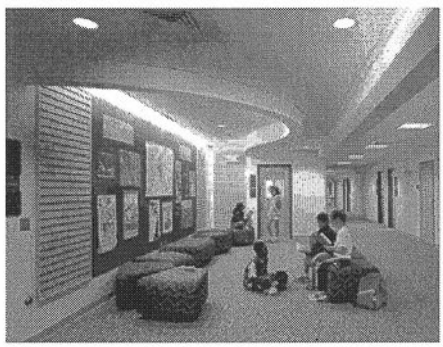


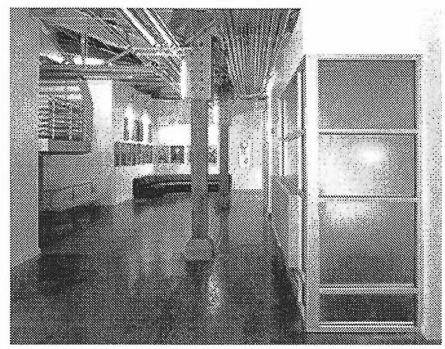


Figs. 5.63 and 5.64: Spaces Defined by Lowered Ceilings and Distinct Boundaries

Older children, who have different interests and abilities, require a different kind of spatial differentiation. This age group is generally more confident in their abilities and do not necessarily require enclosure for a space to feel manageable; however, they will still likely prefer a defined 'place' for their activities (G.T. Moore, 1987). Older children

are more likely attracted to spaces outside of the classroom area which they can use for 'private' social activities. The couches in a corner of a main corridor at Wildwood Secondary may be an attractive place to older children and their peers, as will the breakout space defined by a curved soffit and a number of cushioned stools (See Figs. 5.65 and 5.66). However, this age group is also often busy exploring their larger environments, and are likely attracted to more distant or novel locations. In this case, they may seek out an enclosed, defined 'place' to serve as a manageable outpost within these more challenging spaces. At Hertzberger's Apollo School a small landing bounded by solid walls can provide such a secure 'place' for an older child while perched high above the gathering space below (See Fig. 5.67).





Figs. 5.65 and 5.66: Defined Spaces for Older Children

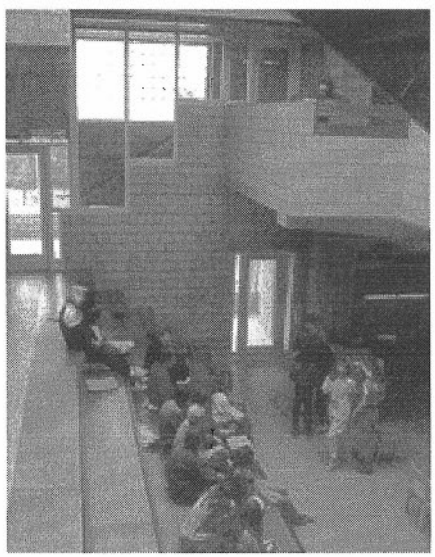
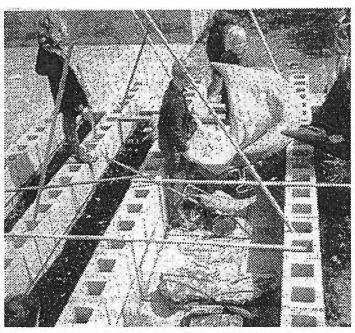
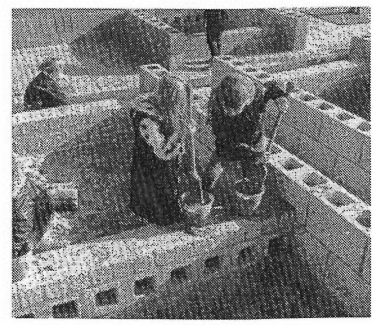


Fig. 5.67: A 'Secure' Lookout Place

Many of these school examples may also be able to meet many of the competence related needs of a range of children even within a single feature or space. Hertzberger's sand pits at the Apollo Schools in Amsterdam are a perfect example of a built environment supporting a diverse range of hands-on, exploratory play within an appropriate setting, particularly for younger children. Rather than provide one large sand play area, Hertzberger used masonry units to build strings of smaller sand pits around the edge of the grounds. The small pits with low walls are perfect for creating a well-defined space for a young child looking to play on his or her own, or with just a few

peers. The series of connected pits allows for a number of small groups to play simultaneously while maintaining manageable and focused activity centres (See Figs.





Figs. 5.68, 5.69 and 5.70: A 'Loose' Space Supports Multiple Affordances

Figs. 5.68, 5.69 and 5.70). The loose nature of both the space and materials supports an infinite variety of play activities; the sand, buckets and tools at the children's disposal, along with the sockets inherent in the wall material, provide opportunities for moulding, mixing, scooping, making and building. The combination of loose, open-ended materials and spaces provide an affordance-rich play setting for a range of children.

The outdoor play yard at the Vensterschool in the Netherlands also provides a setting that supports the competence building play activities for both younger and older students. For example, the playground sports a range of distinct play areas defined by changes in surfacing materials. Different sized patches of grass and paving stones, set at varying distances from the building, provide both the hard and soft surfaces necessary to support a variety of play types; younger children can have access to both types of spaces close to the school, while older children can venture further from the building for team games or group projects

Fig. 5.71: A Supportive Play Yard

(See Fig. 5.71). Small, grassy areas are also set into nooks created by articulation of the building. These defined, protected spaces are separate from busy circulation paths, and are small enough to create a special 'place', but large enough to accommodate a small group of children interested in lounging, talking or playing less active games. Trees, posts and small wooden shelters provide landmarks which anchor play activities; the shelters also provide small, manageable, get away spaces within the larger playground setting. As well, a play structure located near the building offers opportunities for climbing, swinging and sliding activities.

A final example of an affordance-rich play setting in a learning facility is the outdoor play yard for younger children at the Sam Goldwyn Center in Los Angeles provides the conditions to support competence related activities for a range of children, even within a fairly small space (See Fig. 5.72). The playground has a number of well-defined areas, distinguished by thresholds and changes in ground surfaces; the grass, boardwalk, concrete and sand are each conducive to a variety of activities. The defined patch of grass may suggest a place to practice gymnastics or a soft spot to sit and talk with friends. The boardwalk which runs the length of the circular space can be interpreted as a pathway between activity spaces, or provide a surface for running or using wheeled toys. The large tree set in a concrete planter in the middle of the boardwalk provides a distinct landmark which could help to organize games; the planter itself is taller on the sand side than the boardwalk side and so allows children of different ages to sit comfortably or climb up to the ledge. The ledge itself may suggest an opportunity to practice balancing or be perceived as a launch pad for jumping off. The sand area, in addition to supporting moulding, making and building, sports a large play structure with a series of poles and platforms for

Fig. 5.72: Multiple Play Opportunities in a Single Environment

climbing, apertures to peer from, and a suspended tire for swinging. A concrete walkway runs around the building and is covered by a mezzanine level; the darker, more removed space close to the school suggests a quieter place to withdraw, while the bridge platform above can provide a lookout for viewing the swirl of activity below. Within a single, small area, children of all ages have access to enormous spatial variety and can experience a diverse range of activities that will help to develop a strong sense of environmental competence.

There are a number of affordance features and conditions provided by the physical environment of the school which can support a variety of developmentally-significant play activities. When loosely defined but intriguing elements are provided, and children are given the freedom to choose their own activities and settings, their "innate inquisitiveness and fascination with the world they possess [will lead them to] learn for and by themselves.... A child [will choose his own learning activities and build confidence by doing so" (Sanoff, Sanoff, & Hensley, 1972, 4). This review has demonstrated that a sensitively designed school setting has the capability to inspire and support the diverse range of experiences and activities that will lead to the ongoing development of environmental competence throughout the course of childhood.

5.3 The Ability to Regulate Interaction

The ability to experience both privacy and social interaction, and to feel some manner of control over regulation of social and physical encounters, is an essential component in the development of a child's self-identity. Though developmental research has long considered interaction to be a significant contributor to child development, more recent research emphasizes the importance of the experience of privacy. Maxwell claims, "it may be equally as important for the development of self-identity and self esteem to have time and opportunity for reflection as it is to have time for interaction and collaboration" (2003, 13). It is the ability to experience and control the combination of privacy and encounter that facilitates a healthy sense of self.

Social interaction undoubtedly has a number of developmental benefits. Through their interactions with others children learn about social roles, values and norms, and receive

feedback as to how they are perceived by others, each of which contributes to their self-concept (R. Moore, 1986; Maxwell, 2003). Social relations help children to move away from an egocentric mentality and teach them effective communication skills such as negotiation and compromise (Rogers, 1991; Maxwell, 2003). Even indirect interaction is an effective learning tool; children develop their skills and esteem by observing, imitating and comparing themselves to peers and adults (Bransford et al, 2000). These interpersonal relations help children to develop a sense that they are separate and autonomous beings, yet are enriched by their connections to others (Wolfe, 1978).

Despite the advantages of extensive contact with other people, the opportunity to withdraw or experience a sense of privacy is also essential to the creation of a child's identity. A major goal of development is individuation; this separation of self requires the child to experience aloneness in some form (Wolfe, 1978). Children need to be able to reflect upon their emerging self and assimilate their many emotions and experiences, preferably in a non-distracting environment (Korpela, Kytta & Hartig, 2002; Maxwell, 2003). Private conditions also allow children to develop their own interests and practice challenging tasks away from the potential pressure that can result from the presence of others; in this sense privacy becomes closely allied with developing self esteem (Wolfe, 1978; Proshansky & Wolfe, 1978; Korpela, Kytta & Hartig, 2002).

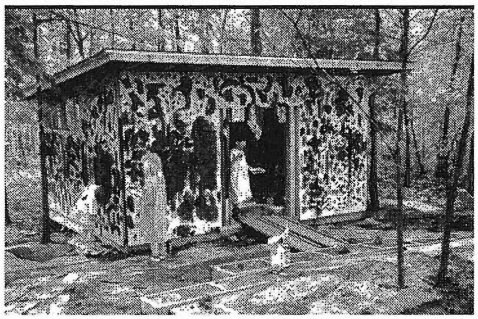
The experience of both high-quality social interactions and privacy are equally important in the life of the developing child, and should be available in all of their primary environments. A child's home tends be more comprehensible, and an easier environment in which to establish a sense of control. However, work by several researchers has demonstrated that children have very few opportunities for privacy within school and care settings (Ahrentzen & Evans, 1984; Rivlin & Rothenberg, 1976; Sanoff, 2000). During discussions with school age children Sanoff and his colleagues discovered that the students felt the only places within the school that afforded some privacy were the washrooms, and access to even these places was often regulated (Sanoff, 2000). In many schools both the physical facility and administrative policies limit chances to 'get away' from the demands and overstimulation to which children are often subjected. This constant exposure can also affect the children's performance or

behaviour both in and out of the classroom; students may end up spending an enormous amount of their mental resources trying to "behave as if in solitude when in actuality they are not" (Ahrentzen & Evans, 1984, 440). The inability to regulate their environmental interactions with their school environments will negatively affect the quality of children's relationships with others and ultimately their own self-identity. On the other hand, the opportunity to effectively balance interaction with privacy will lead to more effective and wholehearted engagement in learning, play and social relations (G.T. Moore, 1987). Clearly, opportunities for regulating interactions with others should be available and accessible within the child's school setting.

5.3.1 The Conditions for Interaction Regulation

In order to create interaction opportunities, we must first consider the experiences and conditions that children perceive as supporting both privacy and social interaction. Wolfe asked a group of children to describe situations or settings they considered to be 'private'. Many required that they be physically alone; however it was also frequently mentioned that they associated privacy with "quiet", with "controlling access to places", and with "no one bothering me" (1978, 193). These comments suggest that the presence of others didn't necessarily interfere with the establishment of a private situation, but that the ability to control social and sensory stimulation was important. This study also emphasizes that children don't necessarily have a single definition of privacy, and that it isn't necessarily defined by the conditions often required by adults.

Wolfe also noticed a strong correlation between a 'private' setting and feelings of belonging and ownership. This connection is corroborated by Spencer and Woolley, who noted that if a child felt a degree of ownership for a place, they were more likely to consider it private, and use it for the restorative activities such as rest and quiet play that are related to identity development (2000). Children's 'special places' patterns suggest that a feeling of belonging or ownership is supported when the child can choose their own setting, define it as a territory with distinct boundaries, and personalize the space in some way (See Fig. 5.73). These actions allow the child to consider the environment, and the activities that take place within, as being under their control. A space that is 'owned' provides the ability to regulate social access to the place, as well

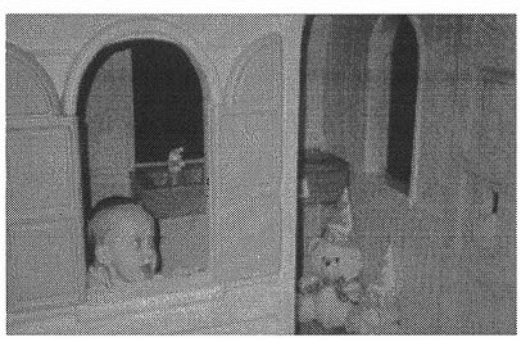


as sensory stimulation. Wolfe contends it is "not until [children] have a place of their own that they can experience... control over access to their person or belongings or the active choice of the conditions of privacy" (1978, 189).

Fig. 5.73: A Marked Territory

5.3.2 Changes in Interaction-Related Needs

It was made clear during the discussion of 'special places' that the environment plays a substantial role in the regulation of interaction and the perception of privacy. However, the conditions required to instill privacy, or which are considered most attractive for social gatherings, change as children age. Wolfe suggests that our notion of privacy and our reasons for seeking it out actually change throughout the life course (1978). Children around the Toddlerhood stage may look for a 'private' space as a respite from intense environmental stimulation and the demands of social interaction (Bjorklid, 1982). The small, intimate, semi-enclosed places to which young children gravitate serve as "stimulus shelters" rather than places to be completely alone (Wachs, 1978; Feinberg, Kutchner & Feldman, 1998; Wohlwill & Heft, 1987). The scale and boundaries of the space make it feel separate enough to be considered a retreat; the lack of complete enclosure does not interfere with the associated sense of privacy. In fact, to the young child, even private places need to be within range of their caretakers, and open enough to allow them to maintain visual and auditory contact (See Figs. 5.74 and 5.75) (Pollowy, 1977; G.T. Moore, 1987). Heft suggests that young children prefer places that provide both refuge and prospect; they like to be able to see out as a measure of security, but feel as



Figs. 5.74 and 5.75:
Intimate, Small Scale Shelters

though they themselves cannot be seen (1988). Research has demonstrated a positive correlation between the availability of this type of 'stimulus shelter' and several developmental measures for young children, including identity development (Wohlwill & Heft, 1987).

Fig. 5.76: A 'Private' Group Place

From the age of about 4 years onwards, children take an increasing interest in cooperative and structured group play, and even 'private places' can include the presence of other children. During these early School Age periods, these places vary between semi-enclosed and fully enclosed and are often sized to accommodate a group of children (Wolfe, 1978; Korpela, Kytta & Hartig, 2002). Though still likely to seek out places of complete solitude, several researchers have noted that children, particularly on the younger end of this age, prefer places that accommodate their small group of 2 to 5 peers (See Fig. 5.76) (Alexander, 1977; Wohlwill & Heft, 1987; Feinberg, Kutchner & Feldman, 1998). This pattern corresponds with the prominent interest in pretend play in Early School Age children, and research by Smith and Connolly which observed that smaller groups seem to be more conducive to this type of activity (1980). Hertzberger also observed that younger children were more absorbed in their activities and engaged with their playmates when they interacted in a smaller space. The scale and the defined territory help the child to manage the stimulation and demands from outside influences, which makes for more effective interaction (1992).

However, as children approach the Middle School Age period, the meaning of privacy becomes more closely related to the control of access. As a result, the 'private' setting becomes more distant from the territory of adults, increasingly closed off and much more strictly regulated. Private group places are often hidden in secret locations or protected behind closed doors, and are highly marked as the property of the members (See Fig. 5.77). Access is often limited to a privileged few, perhaps by employing

complicated passwords or 'knock' rules (Tan, 1978; Maxwell, 2003). Though these places are considered 'private' to the group, they are also settings for developing the strong peer ties that take on increasing importance at this age. Group interaction at this age is very important to identity development, however, children between the ages of 8 and 12 begin to associate privacy with places of their very own, where no one else enters or touches 'their stuff' (Wolfe, 1978; Korpela, Kytta & Hartig, 2002; Maxwell, 2003). As was noticed in the pattern of 'special places', older children seem to feel they are more capable of regulating interaction when they are in 'a place of their own' (Hart, 1987). This also helps to explain the fact that Sobel found two distinct types of 'special places' for older children, ones for groups as well as those for individuals. Older children can use doors, locks, increased personalization and separation of space to regulate their interactions; at home, older children may close themselves in their rooms or closet, or be fiercely possessive of a personal space, such as their desk (Maxwell, 2003). At this age, privacy often means total enclosure, however, sometimes it is just a matter of being 'away', left alone in a quiet personal space. Similar to younger children, invading stimulation, such as noise, can lessen the sensation of privacy.

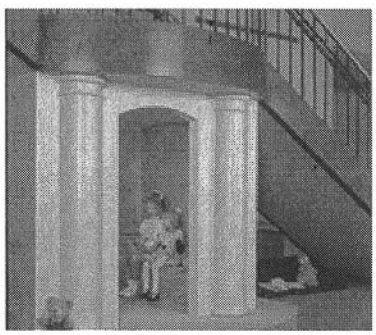
Fig. 5.77: "No Girls Allowed"

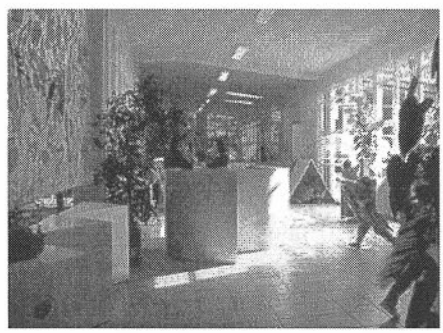
Through their experiences, children come to understand the conditions under which they can experience either interaction or privacy, and begin to seek out or create those circumstances as needed (Wolfe, 1978). Korpela suggests that children quickly learn to use the physical environment as a tool for "regulating emotions and maintaining one's self" (1992, 249). Understanding that they have the ability to regulate their social interactions through environmental means contributes to their identity as an autonomous and competent being. However, children need the opportunity to find and utilize places that afford these experiences.

5.3.3 Affordances for Regulating Interaction

There is a significant amount of overlap between the development of environmental competence and the regulation of interaction. Not surprisingly, many of the spaces conducive to competence development may also afford the opportunity to manage social interactions; for example, the well-defined settings that provide a manageable space for carrying out challenging new developmental tasks, also suggests an opportunity to control social access, or even for privacy.

The spatial differentiation, changes in floor or ceiling level, and sense of enclosure that may prompt quieter games with peers can also suggest an opportunity for more private activities such as resting, reflecting and observing (R. Moore, 1986; G.T. Moore, 1987; Feinberg, Kutchner & Feldman, 1998) However, there is another element which is not as crucial for defining a manageable space but is important for creating a private, 'away' place – the opportunity to escape excess noise and stimulation. Although nooks and alcoves are attractive centres for activity, children may seek out spaces with a higher degree of enclosure and separation from circulation or activity spaces that provide a quieter and more controlled environment (G.T. Moore, 1987; Stine, 1997). Younger children likely need a lesser degree of enclosure than older peers as they still need to maintain a sense of connection; research by G.T. Moore and his colleagues suggests that younger children perceive a small playhouse with windows, an enclosed nook, or an area encircled by low partitions, screens or wall hangings as a quiet, private space. It seems that even transparent barriers like windows or fish tanks will also provide a sense of privacy to a young child (G.T. Moore et al, 1979). An enclosed reading alcove under the stairs with a large entrance aperture suggests a non-distracting spot for a couple of young readers (See Fig. 5.78). At a Reggio Emilia school in Italy, a small tent like structure at the edge of a circulation space provides an intimate





Figs. 5.78 and 5.79: Partial Enclosure

space for resting and observing (See Fig. 5.79). At Hertzberger's Apollo school, a small desk space separated from others by windows and a structural column, and set apart from other classroom spaces, suggests a tranquil reading and work space for a couple of young friends (See Fig. 5.80).

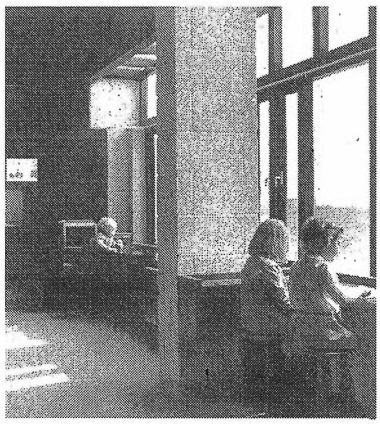


Fig. 5.80:
Separate Spaces

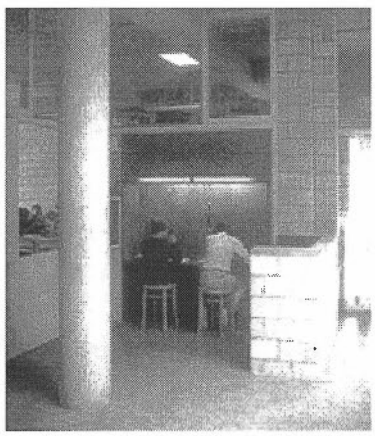
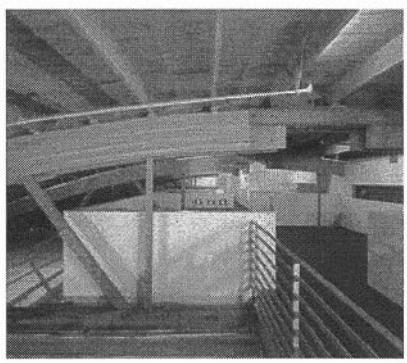
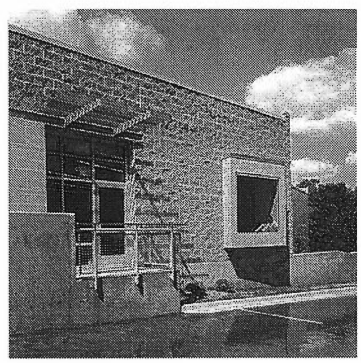
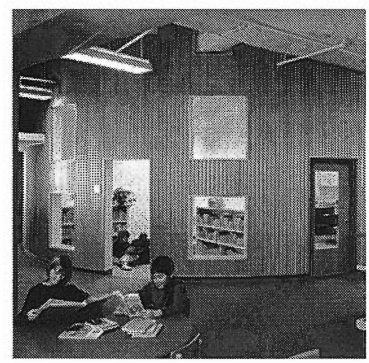


Fig. 5.81:
A Quiet, 'Away' Place

As children get older, private or non-distracting places are characterized by a higher degree of enclosure, spatial differentiation, as well as their location relative to activity or public spaces. An opportunity for privacy is afforded by enclosed structures, full partitions or highly nestled spaces that feel closed off or far from the view of adults and even other students (G.T. Moore, 1987; Heft, 1988; Maxwell, 2003). Deep alcoves outside of the main classrooms at the Apollo School which are defined by a lowered soffit and solid partitions are likely attractive to older children as a quiet, non-distracting work and reading space away from the rest of the students (See fig. 5.81). A sense of being 'away' is also provided by features or spaces that afford a change in perspective, such as high platforms or narrow apertures that afford looking out or over (Proshansky & Wolfe, 1974; Heft, 1988; Feinberg, Kutchner & Feldman, 1998). At the Wildwood Secondary school, a loft space accessible to older students which is



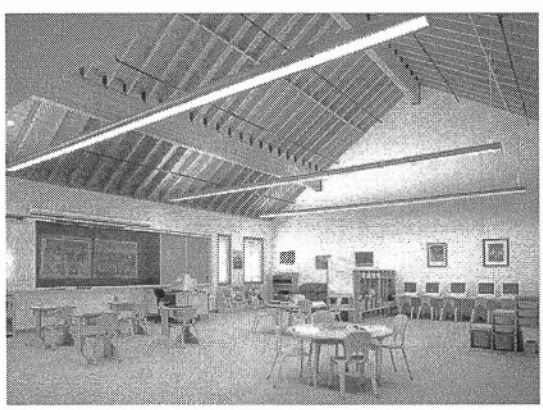




Figs. 5.82, 5.83 and 5.84: Places Affording 'Privacy' for Older Children

situated well above circulation or activity spaces and enclosed by half walls may be valued as a place for solitary or small group privacy (See Fig. 5.82). An older student at Oakland Hills may be attracted to the recessed library nook with a view out over an outdoor water feature as a quiet reading place (See Fig. 5.83). A media area at Gatewood Academy enclosed by full-height walls separating it from the larger circulation and activity areas, but featuring several openings for viewing, may be perceived as a suitably private reading and conversation space for older children (See Fig. 5.84).

These enclosed spaces are also valued because they allow children to regulate access by others. Control and ownership are both associated with interaction regulation, particularly for older children. The ability to completely close off a space, personalize it by displaying personal possessions, or manipulate the space itself all help to create the conditions conducive to regulating interaction (Wolff, 2002; Proshansky & Wolfe, 1974; Maxwell, 2003). Even modest spatial transformations can instill a sense of control and ownership in young children, such as the opportunity to remove the blocks to 'create' the hollow at the Delft School, as demonstrated earlier. Older children, however, prefer to be able to personalize or change a space in a more tangible and perceptible manner; they will likely be attracted to spaces with manipulable walls, dividers or furnishings that they can move to suit their interests, as well as tackable or display surfaces for displaying artwork or personal items (Proshansky & Wolfe, 1974; Hart, 1987; Hertzberger, 1992). A classroom at the Yocha-de-He school in California provides some spatial articulation with the use of a divider that also allows children to store personal items; however the high ceilings and sparse furnishings mean there are few



Figs. 5.85 and 5.86: Few versus Many Opportunities to Manipulate, Get 'Away'

opportunities to either manipulate the space or find an 'away' place (See Fig. 5.85). The main hub of the Heinavaara School in Finland however, is filled with movable chairs, tables and partitions that allow children to manipulate spaces and seating arrangements to suit their needs (See Fig. 5.86).

The Heinavaara School also demonstrates a number of other conditions related to interaction regulation. Although the 'house" spaces which serve as a base for each class exhibit flexible furnishings, these 'classrooms' open directly into the main activity space which services the whole school, and likely get substantial noise disturbance (See Fig. 5.87). The flexible furnishings and arrangements increase the ability of the space to accommodate a range of student needs, but the high ceilings and open structure do not help to provide the spatial differentiation that is characteristic of 'private' or 'away' places. Low partitions with open storage spaces provide some definition between spaces as well as access to books and activity materials, but the space could also benefit from changes in floor and ceiling level for example, which would help to further articulate the space, and increase the number of opportunities for regulating social interaction.

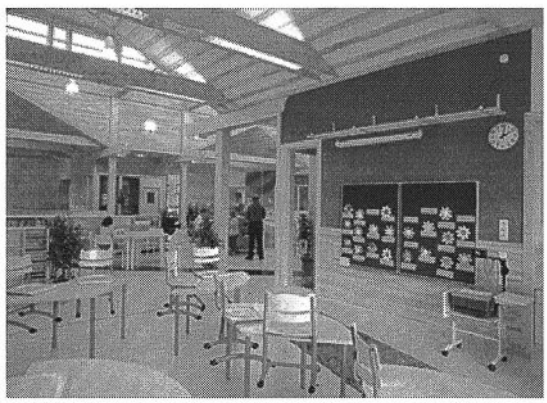


Fig. 5.87: Little Spatial Definition

The Bombeck Early Learning Centre in Dayton, Ohio demonstrates many affordances for both environmental competence and interaction regulation for its early school age children. One classroom for toddlers differentiates its spaces in a number of beneficial ways. First, a distinct change in flooring defines the open floor activity space from the area for making crafts or puzzles at low tables; low dividers with accessible shelving in the open space help to define smaller activity centres with materials and toys to facilitate engaged play (See Fig. 5.88). Another activity area at the back of the classroom feels separate due to the boundary implied by a lowered bulkhead and structural columns; the wide openings and low dividers would afford a sense of privacy

while maintaining visual and auditory connection with caretakers in the front end space. Finally, a structure built into one wall of the classroom is separated into two levels which form a small, defined loft space as well as a dark, cozy nook underneath. The scale and conditions of both spaces are suitable for the interests and capabilities of young children. The loft space provides a manageable space that also affords a novel perspective and cushions for lounging; the open railings help the child to feel a sense of enclosure and contact simultaneously. The low ceiling and wide apertures are perfect for a younger child needing a place to temporarily withdraw from stimulation and interaction; the partitions and support columns define large openings that let the child keep an eye on the activity in the larger space. Overall, this space exhibits a range of spaces, activities and conditions congruent with typical needs and intentions of younger children.

Fig. 5.88: Affordance-Rich Learning Environment for Young Children

This review has attempted to outline some of the features and conditions that children of varying development levels will likely be attracted to order to regulate their interactions with others. Whereas environmental competence development was fostered by features or materials which could accommodate a variety of physical activities, environmental support for the regulation of interaction was primarily about providing conditions; those that would be perceived as affording a state of 'privacy'. Many of the conditions were even common to both self-concept issues, demonstrating that the same environment can support a range of developmental tasks. For example, the opportunity to withdraw from stimulation or challenging activities into a secure, private environment also provides the balance and time for assimilation that facilitates a

sense of competence. An environment becomes especially accommodating when elements are loosely defined and flexible in nature; a single, varied setting is then capable of affording a range of possibilities to children users. However, experiences and environments will likely be valued differently by children with unique development-related intentions. Designers must be sensitive to these changing needs and work to include those affordances which are most congruent with the developmental tasks of all its children.

This exploration of the features and conditions in the physical environment which are likely to be supportive of the particular experience associated with the development of a sense of environmental competence, and the ability to regulate interactions with others, has suggested how environmental affordances could be effectively embedded within the facility of learning settings. The examples from contemporary schools illustrated specific ways to that appropriate possibilities for play could be made available both inside and outside of the classroom, extending development opportunities into non-curricular activities within the learning environment. Though it is impossible to speak to the overall quality and congruency of these facilities without understanding the environment and philosophy of the schools as a whole, the presence of developmentally-appropriate, affordance-rich features and conditions, even considered in isolation, raises the potential of each school to be supportive of children's unique needs and preferences.

6 Conclusions

The type, quality and diversity of the play setting we create for children directly affects the type, quality and diversity of children's play

~ Jones and Prescott, in Stine, 1997, 18

6.1 Efficacy of a Developmental-Affordance Framework

It was the intention of this thesis to develop and explore the potential of a new framework for designing children's environments that was more supportive of their perceptions, behaviour and interests. *In particular, this thesis sought to investigate the suitability of a Developmental-Affordance model for providing physical environments which support the self-directed, developmentally-significant play activities of children within the context of their school facilities.*

It was mentioned early on that any approach to the design of children's settings should address three critical issues: children's perception and interpretation of the physical environment, the influence of these settings on their behaviour, and their motivations for environmental interactions. The framework proposed in this paper was conceived in an attempt to understand and accommodate these criteria. The Developmental-Affordance model is meant to reflect the fact that children's fundamental perception of their physical environments is functional in orientation, and that they will perceive or seek out opportunities suggested by an environment that match their unique intentions at a given time. These intentions for interaction are often motivated by a desire to carry out activities that will further their learning and development, and the associated environmental needs will therefore change as children develop. Therefore, this framework is also designed to distinguish between the affordances that may support the activities of children at different developmental levels. Patterns of behaviour related to children's favourite activities and settings has helped to suggest the experiences that may be meaningful to children of different ages and the environmental features that can afford them. A Developmental-Affordance approach to design can successfully link the learning and development goals of children, and the experiences and interactions that

facilitate these objectives, to the features of the physical environments of the learning facility that are supportive of these activities. This framework then has successfully addressed the criteria for an effective approach to the design of children's environments.

Specifically with respect to the design of supportive environments for play within school settings, this exploration suggests that a Developmental-Affordance model has the potential to be able to describe rich and developmentally-appropriate environments for school children of all ages.

An environment rich in affordances can provide the functional opportunities that will support the intentions of a variety of children, and engage them in the hands-on, exploratory play that is so conducive to learning. When affordance features are also conceived within a developmental framework, these opportunities are tailored to the capabilities and goals characteristic of different levels of advancement. The approach also promotes the provision of the loose, open-ended affordances favoured by children, which allow them to interpret and shape their playful interactions to suit their needs. The physical environment of a school can then provide the diverse incentives that will maintain children's interest and support their unique, development-related goals even as these shift through the stages of childhood. According to Hertzberger, when the physical form of an environment is congruent with the needs of the users, that facility has the potential to function as an 'instrument'. This review suggests that a Developmental-Affordance design approach has the potential to transform the physical environment of play settings in the school into a highly effective instrument for learning and child development.

6.2 Where to Go From Here?

One of the primary motivations for this paper was to outline a framework that would provide an effective tool for the design of supportive play settings in learning environments for children. However, a framework can not be truly effective without the support of an institutional philosophy which understands the value of these self-directed play opportunities, and provides both the time and resources for pursuing these activities. Many innovative educational programs have been developed over the last

half-century which integrate these opportunities directly into their curricular framework, and take pains to set up an environment and a program which encourages child-directed activities. These institutions can serve as excellent guides for the effective integration of the needs of young users with an educational program and a supportive physical environment.

With an informed educational program that understands children's learning needs and behaviours, a developmental-affordance framework has the potential to provide environments for supporting formal curricular goals in addition to children's play activities. In fact, this model could be used to provide stimulating, affordance-rich settings in other learning environments for children, such as museums, libraries, and day care facilities.

However, a developmental-affordance approach should not only be considered for the design of new learning facilities. Essentially, this framework is endorsing a paradigm shift in our conceptualization of the physical environment of the school or any other learning institution. We need to consider the opportunities that are available to children in their various school settings, and whether these environments provide the appropriate support for both curricular and play activities. Children's environmental perception is such that even modest but informed alterations to an existing classroom or playground can substantially increase the type and variety of affordances available to students. Nor do these alterations need to be expensive. Low cost mobile dividers can be used to define smaller, more manageable spaces with the larger classroom for working on quieter activities; scrap materials can be provided in a corner of the school yard to promote group building activities; tiered platforms could be installed in either indoor or outdoor activity spaces to suggest places for sitting, reading, socializing, or climbing. In fact, many such affordances may already be available in the environment. For example, there may be a quiet, sheltered corner of the classroom that would be suitable for a child needing to temporarily withdraw from stimulation. However, it is often the case that the policies set out by the school or teacher may prevent the child from accessing this environment when it is needed most. Existing facilities could therefore be evaluated for the developmentally-significant affordances that are already available

or which could be easily added to increase its ability to support children's needs and interests.

There is a fairly rich body of research that was used for the purposes of this thesis to suggest what some of these meaningful affordances might be, and the types of interactions they could facilitate. However, the validity of this information is limited in some respects as it has been derived from existing behavioural studies of children that often have had very different objectives. Before this framework could be used successfully, additional research is required to document the environmental features or conditions that children perceive as affording particular activities, and to establish the effectiveness of theses affordances for facilitating appropriate learning and development experiences. With a solid research base to complement the theoretical framework, a Developmental-Affordance approach could help to create learning facilities for children that more effectively support the critical interactions necessary for ongoing learning and healthy development.

APPENDIX

TABLE 1

Heft's Preliminary Functional Taxonomy of Children's Outdoor Environments

1. **Flat, relatively smooth surface:**
   - affords walking, running
   - affords cycling, skating, skateboarding
2. **Relatively smooth slope:**
   - affords coasting down (e.g. on bike, wagon)
   - affords rolling, sliding, running down
   - affords rolling objects down
3. **Graspable/detached object:**
   - affords drawing, scratching
   - affords throwing
   - affords hammering, batting
   - affords spearing, skewering, digging, cutting
   - affords tearing, crumpling, squashing
   - affords building of structures (e.g. raw materials for forts)
4. **Attached object:**
   - affords sitting-on
   - affords jumping-on/over/down-from
5. **Non-rigid, attached object:**
   - affords swinging-on (e.g. tree branch)
6. **Climbable feature:**
   - affords exercise/mastery
   - affords looking out from
   - affords passage from one place to another (e.g. stairs, ladder)
7. **Aperture:**
   - affords locomoting from one place to another
   - affords looking and listening into adjacent place
8. **Shelter:**
   - affords microclimate
   - affords prospect/refuge
   - affords privacy
9. **Moldable material (e.g. dirt, sand):**
   - affords construction of objects (e.g. pottery)
   - affords pouring
   - affords modification of its surface features (e.g. sculpting)
10. **Water:**
    - affords splashing
    - affords pouring
    - affords floating objects
    - affords swimming, diving, boating, fishing
    - affords mixing with other materials to modify their consistency

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