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Affordances of Nearby Forest and Orchard on Children’s Performances

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Abstract

This research investigated the performances of children and adolescents with the properties of nearby forest and orchard in Malaysia. It measured the affordances of the natural settings including topography, water bodies, vegetation and animals as experienced by them. Their performances were observed by participating with them in a two-day hiking and camping program in both settings. Utilized affordances dominated the actions of the children and adolescents twice more than the combination of perceived and shaped affordances. The result suggested that the nearby forest and orchard are suitable playscapes for them to express their physical as well as socialization competences.

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1. Introduction

A plethora of theories and empirical studies suggest that children's contact with natural environment is crucial to their physical, social and cognitive development (Chawla and Heft, 2002). To children, natural environment provides place to play (Fjortoft, 2004), transact with peers (Kytta, 2002), set boundaries to play within own sense of control (Olds, 1989), and understand the outer world (Faber Taylor et al., 1998;
Sebba, 1991). Experiencing nature permits children to attain fascination because they gain peace and quiet, tranquility, and moments of privacy.

Children experiencing in outdoor environments such as forest allows active living, dexterity and mobility. Forest affords young children to play a variety of sensorial and motoric activities including climbing rocks and trees, running and tumbling and sliding slopes (Fjortoft, 2004). Studies on children in outdoor environment suggest that children are attracted not to the forms and shapes of the outdoor features but to their functions (Fjortoft, 2004; Heft, 1988) that is their affordances (Gibson, 1979). Function is the interaction of children with the spatial elements in the ecosystem (Christensen, 2003). Heft (1999) explains how children perceive the function of environment and utilize them for play: if a tree is climbable it affords climbing; if a stone fits the hand it is grasp-able or throw-able and thus affords grasping and throwing. In other words, the functional meanings of the elements trigger children to interact with them. Inasmuch, Said (2008) found that middle childhood children perceive boulders at river as climbable features that afford scaling, sitting, looking-out from and hiding. Playing in nature means children’s freedom to explore and interact with the natural elements with little or no restriction or supervision. Interaction with the natural world is direct and spontaneous (Chawla, 1994; Kellert, 2002). In sum, direct experience of outdoor environments such as forest stimulates children’s cognitive, physical and social functioning.

In Malaysia, 32% of the population (8.2 million) is children, and majority of them whom are living in cities and towns are disconnected with the outdoor environment for play and socialization. Inasmuch, the children spend their time indoors and experience a sedentary lifestyle. As such, their understanding on functional properties of forest such as sloping ground, boulders, trees and fruits, insects and birds, and effects of wind and rain is very limited to the knowledge that they learned from books in school. This vicarious method is a cognitive mode of learning that limits physical and social interactions (Kellert, 2002). It means that the children lack of hands-on experience and know little on how to manipulate plant elements into play tools such as making a slingshot from a Y-shaped tree branch. They knew neither the names of plants and birds nor they recognized that not all spiders are poisonous. In other words, their dexterity is low, and consequently, their cognitive performances are minimal.

2. Literature Review

2.1. Properties of forest park for performances

Exposing the children to forest-liked environment such as nearby forest and orchard affords them to discover things themselves, in their own space and their own time. Direct experience with the natural environment permits various performatory activities through curiosity and discovery. For example, hiking on a forest trail can offer the children to discover that ants move in a long line and bump their heads when they meet. The experience involves motoric and sensorial performances (Kytta, 2003); the former is bodily movement and the latter is visual scanning and audio stimulation. The performances afford the children to establish affection to the forest environment they participated, and later attached to the place (Chawla and Heft, 2002). Furthermore, nature helps children acquire powers of observation and creativity and instills a sense of peace (Crain, 2001). Children learn best when they are able to discover things themselves, in their own space and their own time.

Apart from vegetation and animals, topography may offer children engagement in sensorial and motoric activities. Fjortoft (2004) found that young children recognized slope and roughness of topography as play habitat. The children utilized slopes for sliding, cliffs for climbing, and snowy hills for skiing. These are performatory as well as exploratory performances that develop children’s motor skills including balance and coordination. Topography is integrated with stream configuration and its elements
such as boulders and sand, overarching trees, aquatic animals and velocity of flow. An empirical study by Said (2008) suggests that stream environment affords 87 functional properties. For instance, graspable objects such as sand, pebbles and boulders permit the children to build sand mound, throw sand on peer’s back, throw flat pebbles of water surface and collect small boulders to build dam. In summary, topography and stream of a forest landscape provides a variety of performances; performatory, discovery, production (Chawla and Heft, 2002). According to Kytta (2003), these performances are the result of integration of sensorial and motoric actions of children experiencing an environment. The experience may allow children to establish affection and attachment to the forest park environment (Kellert, 2002).

2.2. Definition of concepts

In this study, the orchard is comprised of young and matured fruit trees of durios (durain), garcinias (mangosteen), parkia (petai), nepheliums (rambutan and pulasan), pakia (petai) and lansium (langsat). These are seasonal tropical trees are cultivated for their fruits that generally occurred in the months of April to May. The topography of the fruit farm is undulating from gentle slope (10 to 15%) to steep slope (20 to 30%) with little undergrowth that permits the children to walk on its trails. It is located on an elevation of more than 650m above sea level in a village, Kampong Cheh in Cemor in the state of Perak, Malaysia.

The nearby forest is a secondary forest which generated after its matured tree stands were harvested about 35 years ago. It is located at the periphery of the orchard and thus on higher elevations and steeper slopes that the orchard. Its undergrowth is dense with vines, gingers, licualas, rattans and plenty of tree saplings. Its canopy is mainly composed of low to medium height dipterocarpus trees with a few emergent trees such as Kompassia excelsa (Tualang) and Vatica indica (Resak). The dense vegetation and steep slopes are the main challenges that the children have to endure during the hiking. There is a stream that originated from the forest and run through the orchard and to the village landscapes.

Affordance of an environment is defined by the individual’s qualities, such as children’s physical skills or bodily proportions (Kytta, 2003). As such, Heft (1999) posits an object that smaller than the hand-span of a child, for example, a twig, is perceived by the child to be graspable, which is it affords grasping. The twig also affords the child to throw it away, to scratch the ground, to dig dirt, and so on. Thus the twig, as an environmental feature, has multiple functional significances understood by the child through experiencing the environment. Therefore, the concept of affordance is well suited for describing the psychologically essential qualities of children’s environment (Kytta, 2002). According to Heft (1999), the affordances of natural environment for children activities can be categorized into a taxonomy consisting of 10 categories of environmental quality: flat, relatively smooth surfaces, relatively rough slopes, greenery and wildlife, graspable /detached objects, attached objects, non-rigid attached objects, climbable features, aperture, microclimate, moldable material, and water. A study on children’s outdoor environments by Kytta (2002) improves the taxonomy by adding a category affordance for sociality and play, and subtracting category of aperture.

3. Aim, Objectives and Scope of Study

This research, therefore, investigated on the affordances of nearby forest and orchard on young children and adolescents experiences with the natural elements. It measured the functional properties of the forest topography, water bodies, vegetation and animals as experienced by the children, both in sensual and motoric modes. The unit of analysis was children and adolescents, aged 5-17, who are interacting with the forest elements in at least three types of activities: performatory, exploratory and productive (Chawla and Heft, 2002). The dependent variable was the children’s performance, measured
in form of physical and social actions or activities. The independent variables were: (1) landscape elements including topography, water bodies, vegetation and animals that afforded them physical and social plays, and (2) the way they used those elements for play.

4. Methodology

4.1. Data collection

Physical and social activities of 18 children and adolescents were observed during a two-day participatory hiking and camping program in a nearby forest and orchard setting at a village, Kampong Cheh in Cemor district, Perak, Malaysia. The participants were boys from an orphanage, An Nur Maisarah which housed 31 orphans from varied backgrounds and income levels. Generally, most of them were from villages whom parents or caretakers died or whom could no longer able to support the children livelihood. The researcher with his assistant hiked with the children which begun from a camping site in the orchard located beside a stream. The children’s actions were documented in digital camera as well as in a field journal. Three tape recorders were given to three children, aged 5, 11 and 16, to elicit their words on the hiking experience. The group was led by a guide that knew the trails in the natural settings. From the camping site, the journey crossed a footbridge over the stream that attracted the children to stop and observed a landscape of weathered sandstone boulders which have been shaped by the running water of the stream. The guide was briefed by the researcher on the purpose of the participatory study, and thus hiking along the trails should be according to the children pace and demand. In the orchard, the group stopped at several points in the following order: under a cluster of durian trees bearing young fruits, under a 50m tall Tualang tree, and on top of a hill near a hut (a vantage point) to taste the leaves of garcinias and to view the surrounding greenery. As the group approached the nearby forest, the guide informed them that they will encounter steep and slippery slopes, thorny rattans, thick undergrowth, and attack from leeches. As such, the children made a few stops at a stream and waterfall, on top of a slope, and on large boulders. The experience in the forest was shorter than in the orchard because of the difficult conditions. Adolescents have to carry a few 5 to 6 years old peers on their back. Once the group reached a ridge, they decided to turn back to the camping site in the orchard. The journey lasted for more than 3 hours. Upon reaching the camping site, all of them took bath and played in the stream near to their camps.

4.2. Data analysis

Pictures from the camera were printed and then analyzed to elicit activities of the boys with the elements of nearby forest and orchard. The activities were tabulated and categorized into (1) level of affordances, (2) taxonomy of affordances, and (3) types of affordances (Kytta, 2003). Similarly, notes from the field journal were bracketed (Denzin, 2001) into the categories of affordance. Recorded words of the participants were transcribed and later bracketed into the affordance categories. The three sets of data, from camera, from field notes and from recorder, were triangulated and the results were discussed in the following section. Therefore, the analysis of the affordances is a descriptive statistic looking at the relationship of children physical and sensorial actions with the landscape elements of the nearby forest and orchard including topography, water bodies, vegetation and animals of the nearby forest. The validity and reliability of the data are depended on the rigor of participatory method that is direct experience of the researcher and his assistant with the children activities.
5. Results and Discussions

The affordances of forest on the performances of children are discussed in three categories: level of affordances, taxonomy of affordances and types of affordances.

5.1. Level of affordances

Performances of children were categorized into three levels of affordances: perceived, utilized and shaped (Kytta, 2003). The nearby forest and orchard offered 98 affordances to the children and adolescents, engaging them with 62 utilized activities, 30 perceived activities and only 6 shaped activities. The results suggest that the nearby forest and orchard afforded a variety of functional properties to engage their attention (Kytta, 2002) and to permit physical movement and competency (Kellert, 2002). It means that the rural setting is a natural environment affording a variety of elements allowing the children plenty of physical movements and social actions. The children traversed across various hill slopes and valleys in a partial dense landscape of fruits trees in the orchard and dense landscape of trees and undergrowth in the nearby forest.

Fig. 1. Hiking on trail in the orchard

Some of the utilized activities that they performed were hiking on trail (Figure 1), picking durian fruits, plucking leaves, climbing slippery slopes, holding treelets and rattan climbers climbing slopes, ducking under fallen log, picking pebbles from stream bed, throwing pebbles on water surface, throwing stones to tree trunk. The utilized activities were associated with perceived ones such as feeling cold while swimming in the stream, seeing bulbuls and magpie robins while swimming in the stream, watching peers searching for shrimps in the stream, and scanning and avoiding thorny rattan while climbing down the slopes. An example of utilized activity was picking young durian fruits under the trees in the orchard. An eight year old collected the fruits and held them from their stalks, three to five fruits in one hand. He said, “Look, nice and beautiful” to another five years old peer. “The spikes are soft, it is light” replied by the younger peer. It means that the fruit afforded a child to interact and exchange words with his peer, and
learned that young fruits were soft to touch and light to carry. This is a social affordance (Kytta, 2003) that generated acquaintanceship for the boys. It means that the boys were fascinated with the elements of the orchard through social interaction.

At the waterfall, the boys took a short rest for a meal which was brought by a few adolescents in their bags. Some sat on boulders and other on footbridge looking at the fast flowing water under their feet. An 8-year old boy plucked a leaf from a tree and formed it into a boat using a tiny branch. He let the boat flowed on the stream and later his action was followed by many of his peers. He demonstrated to them how to make the boat. This is a shaped affordance; building a play tool from the natural elements derived from the past knowledge.

At a steep and slippery slope in the nearby forest, the boys performed a cooperative task assisting each other to get to the ridge. They had to step carefully avoiding from the spikes of rattan climbers that were in abundance. They pulled and pushed each other to climb the slope with lots of laughter. This social interaction reflected from their cooperation living in one orphanage that is liked a large family. It means that experiencing the forest allowed the children and adolescents to demonstrate their bonds generated by the caretakers of the orphanage.

The results suggest that the nearby forest and orchard afforded a variety of functional properties to engage their attention (Kytta, 2003) and to permit physical movement and competency (Kellert, 2002). Notwithstanding, children only managed to manipulate four properties of the elements found in the nearby forest and orchard: making camp fire from fallen branches and logs, making a clothes-line by a bamboo pole to dry their clothes, and making a fishing rod by cutting a small branch of a tree and making toy boats from leaves. In short, children in nearby forest and orchard enjoyed many opportunities, freely demonstrated their physical competences, interacted with features, and gained social skills.

5.2. Taxonomy of affordances

In taxonomy of affordances, four properties that afforded the highest numbers of affordances were: water with 25 activities, vegetation with 22 activities, graspable/detached objects with 12 activities and environmental opportunities for sociality with 9 activities.

Water afforded the highest number of affordances in the nearby forest and orchard. Interestingly, in the stream, apart from swimming, children searched for shrimps and scooped crustaceans such as snails and crabs using plastic sieve, threw pebbles into water, scooped sand with both hands from stream bed, splashed water over peers, rested on boulders, felt cold after staying long in the water, cooled their bodies after hiking in the forest, and felt water moving around their body. This finding is partially paralleled with study by Said (2008) that forest stream affords 87 functional properties.

Affordances of vegetation were picking young durian fruits, plucking young garcinia leaves, hurdles over fallen logs, holding treelets to climb slippery slope, and touching moss with feet and hands. The result suggested that the nearby forest and orchard possessed a variety of elements for the children to play with. Not only children recognized different parts of the vegetation, they were also able to identify different types of branches of trees. Sixty percent of them recognized monopodial tree over sympodial ones (Figure 2). It appears that children were familiar with the sympodial trees found in their orphanage garden and thus able to differentiate the unfamiliar and uncommon one, the monopodial type.
The graspable or detached objects afforded picking and collecting pebbles, fruit stalks, sand and dried leaves. For example, the elements of the orchard afforded children watching peers throwing pebbles over water surface, scooping sand from stream bed (Figure 3), throwing stone to a tree trunk, and collecting branches for firewood and making fire. While hiking in the forest, children performed pulling garcinia leaves with stick, plucking wild guava fruits, picking yellow pods from the forest floor, cracking the pods to see red seeds, picking dried branches, grappling stalk of durian fruits, throwing dried leaves into river and watching the leaves drifting on the water. In other words, by scanning the natural elements, children were able to recognize loose parts of the elements and used them as playing tools. The results also suggest that nearby forests and orchards offer a plenty of loose parts to children to grasp and use in their playing activities.
Each affordance involved sensorial and motor actions, simultaneously. For example, sitting on boulder involved scanning and selecting a suitable boulder to sit; two sensorial actions. These actions triggered the child to climb and then sit on the boulder; two motor actions. In other words, through active detection of information and movement (Kytta, 2003), a boulder in a forest stream offered four properties to a child to experience.

The nearby forest and orchard afforded multi-affordances for children to play and manipulate. Those affordances were balancing on boulders, sitting on boulders to eat lunch, cutting bamboo poles, making a cloth line from bamboo pole, feeling irritated after cutting bamboo, standing on footbridge, observing huge tree and ducking under fallen logs. It means that children were familiar with that environment and its materials which perceptually generated attention and intention towards the affordances.

In summary, the nearby forest and orchard were viewed by the children and adolescents as suitable playscape. Perception and dexterity in the natural settings allowed them to exploit nature and learn about the utilitarian values of elements (Kellert, 2002). Additionally, the direct experience in nature permitted children to value the functional properties of naturalness of the forest and orchard; scanning, hearing, climbing, cutting, sitting, manipulating, standing, observing and ducking.

5.3. Types of affordances

The nearby forest and orchard offered 94 positive affordances but only four negative ones to the children. The positive affordances overwhelmed the negative ones suggesting that the functional properties of the nearby forest and orchard were effectively perceived and utilized by the boys. In other words, they perceived the orchard and the hill forest as places that afford a variety of functional properties for playing and learning about nature. The four negative affordances were fear of leeches, fear of thorny rattan, being tired to proceed hiking the forest hill and after climbing down the slope, and irritation on skin after cutting bamboo. However, the negative affordances were temporary attention stimuli (Sobel, 2002) because the positive ones overwhelmed children’s fear and anxiety. The vast difference between the number of positive and negative affordances suggests that children have recognized the forest and orchard as play spaces offering fascinating sensorial and motoric activities.

6. Conclusion

The natural environment of a tropical woodland area is a suitable playscape for children to express their physical competences as well as socialization ones. Familiar environment, comfortable environment, closeness, and variety of natural elements in forest settings afford multi-affordances for children to experience and play. Children’s playing activities in this setting involved high performatory and exploratory performances including climbing and sliding down the slippery slopes, picking fallen fruits, plucking leaves from trees, collecting pebbles from stream bed and throwing the pebbles of stream surface, and many more.

In sum, nearby forest and orchard are ecological systems comprising of a diversity of vegetation and animals as well as topographical and stream variations. They allow children to explore and discover the elements of nature through physical and social participations. They possess a variety of potentialities for children to play within their own perceptual, sensorial and motoric abilities. They afford limitless number of play modes that fascinate children. Inasmuch, it is a natural playscape for training of motor fitness in children as well as learning about the natural environment (Fjortoft and Sageie, 2000). And, finally, they afford children to understand worthiness of nature, the dependence of animals on plant, the opportunity to
explore and to discover, the manipulation of natural material into play tools, and the physical attraction and appeal of nature.

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