AFFORDANCES OF PLANTS AND ANIMALS IN GARDENS FOR CHILDREN’S PERFORMANCES

Ismail Bin Said, Mohd Suhaizan Bin Shamsuddin

1Associate Professor, Department of Landscape Architecture, Faculty of Built Environment, Universiti Teknologi Malaysia
81310, Skudai, Johor
b-ismail@utm.my

2Post-graduate student, Department of Landscape Architecture, Faculty of Built Environment, Universiti Teknologi Malaysia,
81310, Skudai, Johor
msbsraw@yahoo.com

ABSTRACT

This study investigated the performances of children playing with plant and animals in home and neighborhood gardens. Physical and social performances of middle childhood children in outdoor environments influenced their sensorial and motoric developments. Sensorial and motoric actions involved scanning and manipulating plant and animals in their own imaginative and creativity ways. Ecological perceptual responses of 120 children, aged 6-12, were elicited using a survey questionnaire and an interview in urban and rural outdoor environments. The purpose of the survey and interview was to measure children’s physical, cognitive and social performances with the plant and animals that lead to the amount and level of affordances of the outdoor elements experienced by the children. The data was analyzed using SPSS version 15, and it was found that the urban and rural children played actively in the outdoor. Spatially, rural children played in five areas: front yard, side yard, back yard, barn area and bushed area. On the other hand, urban children played in playground, street, abandoned spaces and nearby forest. The rural children perceived trees as element to perform symbolic and constructive plays utilizing branches, stick and twigs, fruits and seeds to construct play tools such as slingshot and tops. Slightly different, their urban counterparts performed less constructive play but equally understood the natural links between plant and animal and between animal and other animal. Inasmuch, the study found that rural outdoors afforded more functional significances for children to physically and socially engage with the elements of plant and animals.

Keywords: Middle childhood children, affordances, plant and animals, functioning, gardens

INTRODUCTION

Studies on children’s environment found that children play with structure equipments afford less physical and emotional development. Moreover, the studies have revealed that children are found to feel bored after a few visits to playgrounds with play equipments (Ismail, 2008, Christensen and O’Brien, 2006, Louv et al., 2008). In contrast, children perceived green spaces as a playscape affording a variety of functional properties, examples include rumbling and tumbling, running, sitting on grass, observing animals in field, and collecting ornamental grass flowers. Therefore, play in outdoor environment enables children to roam far distant places. The places can be abandoned spaces, vacant lands, and wild spaces that afford fascinating activities and independent movement.
which playground could not provide. In other word, these places offered private activities and out of parent or adults supervision and surveillance. Therefore, elements in nature afford attention stimuli toward children cognition (Wilson, 1995; Ulrich, 1993) and declarative knowledge (Kaplan, 1991).

Plants and animals are the most recognizable natural elements when children play in the outdoors. Children found plants and animal afford fascinating interactive and imaginative activities (Hart, 1992). Plants and animals also afford multi-functional affordances in constructive, functional, and symbolic play (Fjortoft, 2004). Studies by Chawla (2002) and Percy-Smith (2002) revealed that children are the best manipulator of outdoor element as well as users of local environments; playgrounds, parks, gardens and natural open spaces. The children perceived the natural environment as a place for them to socialize and physically active with peers, siblings or accompanied by parent or adults occasionally (Ladd and Coleman, 1993; Ladd, 1999).

**HOME AND NEIGHBORHOOD GARDENS**

This study examined children’s functioning in home and neighborhood gardens in a terraced house community and a village. A home garden of rural house is referred as legal proximity territory of spaces demarcated by plant including fruit trees. The outdoor spaces are front yard, side yard, back yard, barn yard, and bush area (Figure 1). These spaces are connected to neighboring houses which are generally houses of relatives. The spaces and the trees afforded a variety of functional properties to children for outdoor experience. On the other hand, a home garden of urban house is a fenced or walled space in front of building. Its shape is similar to one another in a neighborhood that is having a standardized design as shown in Figure 2. Its typical spaces are car porch area, side yard and back yard. Like the rural outdoor spaces, they provide space for children to play. However, its functional properties are less varied than the rural ones due to its monotony in form and layout.

![Figure 1: Schematic layout of home garden in a rural setting](image)
A neighbourhood garden of urban setting is a composite of playgrounds, parks, paved open spaces, and abandoned open spaces affording more and larger spaces for children to discover, to explore and to socialize with peers in their play. The parks and playground are equipped with play structures and trees planted in organized layout. They afforded the children with regulated play and few manipulating opportunities. On the other hand, the abandoned spaces are wild place with treelets, tall shrubs and weeds affording the children to play loose and be manipulative. A neighborhood garden of rural setting are composed with varied spaces that include farm, orchard, nearby forest, and bushed area. These spaces afforded children to play freely to perform and explore intuitively on natural elements as their play tools.

METHODS

The study elicited 120 perceptual responses of middle childhood children, aged 6-12, who lived in urban terrace-house (n=60) and a rural village (n=60). It investigated on children preferences on gardens; home and neighborhood gardens. The interaction in both gardens involves with plant and animals in spaces; and the properties of affordances in garden by comparing with both residential setting; urban and rural setting. The children were interviewed on their experiences with the home and neighborhood garden. Both were social space for the children to play involving sensorial and motoric activities. The children were interviewed in the gardens or at their schools. They were randomly selected, and were interviewed either individually or in a group of five. In urban neighborhood gardens children were interviewed by the author while playing in the playground. In the school, the survey was conducted in the classrooms with the permission of the class teachers. The children were rewarded with knick-knacks after completed the questionnaires. The survey last for about one hour for each classroom and 10 to 15 minutes per individual or per group in the gardens.

MEASUREMENTS AND DATA ANALYSIS

The instruments to elicit the perceptual responses of the children were survey questionnaire and open-ended interview. The questions in the survey were divided into two settings according to children participation: (1) home garden, and (2) neighbourhood garden. The survey questionnaire and interview of urban and rural children was
conducted in school, playground of terrace house and home garden. The interview was conducted into two groups; individuals and groups of five. The survey elicited children range, properties categorization and affordances of the gardens for cognitive, physical and social functioning. The actual places for the children to play performing motoric and social activities in urban neighbourhood garden were categorized into four types: playground, green or abandoned spaces, nearby forest, and paved open spaces. On the other hand, the actual places in rural neighbourhood were composed into five types: farm, orchard, river and stream, home settings, and nearby forest. During the interview, the children were asked on their definitions of home and neighbourhood gardens, their interactions with plant and animals in their play, and the places that they regularly visited.

RESULTS

The results are divided into three categories: (1) actual places in the home and neighbourhood gardens, (2) categorization on plant and animals, and (3) categories of affordances including levels of affordances, taxonomy of affordances and types of affordances.

Places of Children Experienced in Home and Neighborhood Gardens

As can be seen in Figure 3, the urban children played in nine places whereas their rural counterparts experienced in six places. The result suggests that the former were exposed to more variety of spaces than the latter. It also indicates that home and neighborhood garden in both settings afforded an array of functional properties for the children to play and enjoy. As such, the rural children seem satisfied experiencing in the bushes and orchard areas whereas their urban counterparts preferred to play in nearby forest and home garden. It appears that natural places in residential areas are play spaces for the children.

![Figure 3: Places experienced by urban and rural children](image)

In aspects of function, territory, and context of play, rural children preferred to play in home garden (42%) and orchard (26%) whereas the rural ones selected green and abandoned spaces (36%), nearby forest (26%) and terraced home gardens (23%)—Figure 4. It suggests that the rural children felt safe and comfortable playing within accompanied by parents or adults and felt familiar spaces. Inasmuch, they felt the orchard setting offered more familiar attention because the vegetation are seem familiar for them as home garden such as trees of rambutan, durian, and guava. Moreover, the orchard setting offered them refuge for play with peers. In additional, it suggests that the urban children were attracted to play with natural elements that offered them fascination and being away from parent’s surveillances (Taylor and Kuo, 2006) rather than playing with structured equipments in playground. However, 23% of them were actively playing in the terraced home gardens due to many social factor that forced
them confined in terrace home garden such as parental concern of stranger in neighbourhood garden, an early year of middle childhood children, gender and many more (Walsh, 2006).

![Figure 4: Categorization of places experienced by urban and rural children](image)

**Categorization of Plants and Animals as Play Tools**

As can be seen in Figure 5, the children played with plants as play tools in the gardens and the analysis categorized the tools into five categories: (1) branches, sticks and twigs, (2) fruits and seeds, (3) trees, (4) leaves, and (4) flowers and buds. Children preferred to play with branches, sticks and twigs (37%), followed by fruits and seeds (28%), trees (19%), leaves (11%), and flowers and buds (5%). It suggests that the children see the tree and bamboo parts—branches, sticks and twigs—as manipulables. For example, bamboo pole afforded them nine affordances including self- made of gasoline lamp, cannon, musical instruments, fishing rods, kite frame, shooter stick, raft, bird trap, and bird cage. Thus, it means that direct contact with the plant elements branches enabled the children to perform constructive and symbolic plays. As such, in symbolic play, sticks and twigs were turned into self-made sword for pretend play (Figure 6).

![Figure 5: Plant categorization in gardens](image)

![Figure 6: Stick is symbolically represented a sword in pretend play](image)
The study also suggests that the children were familiarized with garden fruits and seeds such as rambutan and betel nuts by eating them and turning them into play accessories, respectively. In the rural setting, children make spinning tops from betel nuts (Figure 7). The process of making a top begins with searching and collecting the betel-nut fruits under a palm tree. The husk of the fruit is peeled using secateurs to get the nut. Then the children cut a small piece of bamboo and punch it into the nut, and the top is ready for play. In summary, the children perceived the nut as top-make-able-to. Thus, the process of the top making involves at least six affordances: search-nut-able-to, collect-nut-able-to, cut-husk-able-to, cut-bamboo-into-stick-able-to, punch-stick-into-nut-able-to, and spin-top-able-to. This suggests that natural elements in the home and neighborhood gardens afford plenty of functions for children learning development (Kellert, 2002).

Figure 7: A betel nut is a material used by children to make manipulable such as a top

The children perceived trees as a property affording them with physical competency to play with peers. The activities were climbing, clinging, moving from branches to branches, viewing from top, and shaking or bending that led to exciting and fascinating play (Figure 8). Therefore, children viewed trees as primary affordances that offered them physical and emotional rewards. They found tree properties such as leaves, flowers and buds, fruits and seeds, and branches, sticks and twigs as complementary materials for mutual activities. They favorite trees were fruiting species including water apple (Syzygium aqueum), mangosteen (Garcinia mangostana), rambutan (Naphelium lappeceum), Langsat (Langsium domesticum), guava (Psidium acutangulum), sentol (Sandoricum koetjape).

Figure 8: Trees afforded physical challenges during socialization

In the home and neighborhood gardens, children played with four categories of animals: birds, insects, spiders, and small animals. As can be seen in Figure 9, children preferred to play with insects (42%), followed by birds (35%), small animals (15%) and spider (8%) suggesting that insects such as ants and birds were plentiful in the garden and attracted their attention.
The children encountered with birds in abandoned spaces, vacant land, and nearby forest. This is because these places where secondary forest tree species grew that provided seeds and flowers for food and place for shelter. The result suggests that the children recognized birds such as bulbuls nested in the trees or kingfisher burrowed at stream bank. They also caught small animals such as squirrels and tortoises as pet. Most of these animals are found in the nearby forest and stream. In addition, relative to urban children, the rural ones were knowledgeable to search and to catch these animals.

Finally, both rural and urban children loved to play with jumping spiders and recognized the habitat the animal that is in Pandanus and a few flowering shrubs. Through play with the creature, they were able to differentiate the species of spider by the spider’s size and color. It means that experiencing the garden environment afforded the children to recognize and actively interact with the animals.

**Taxonomy of Affordances**

The affordances of plants and animals in the home and neighborhood garden were categorized into taxonomy of affordances and levels of affordances. In the taxonomy, affordances were divided into positive and negative, and in the levels of affordances were classified as perceived, utilized or shaped (Kytta, 2002).

**A. Affordances of Home Gardens**

As can be seen in Figure 9, the rural home gardens offered more positive affordances than the urban ones. Likewise, positive affordances of both rural and urban home gardens were far exceeding the negative ones. The differences were in flat relatively smooth, non-rigid attached objects, graspable objects, climbable feature, vegetation, animals, microclimate, affordances for sociality and affordance for nature-link. It means the sensorial and motoric activities of rural children with the garden properties were more active than those of the urban ones. These activities were mostly performed and explored with peers and siblings. The activities were performatory and exploratory involving manipulation of plants and animals into play tools (Chawla and Heft, 2002). For example, the rural children searching for a betel sheath to make a sliding carriage, making a top from a betel nut, seeing weevil beetle at banana’s blossom, making a musical instrument from mid rib of banana leaf petiole, and making a boat from banana’s bracts. These children competences of activities in environment are paralleled with theory by Kytta (2003) that children perceived and recognized the functional properties of the environment through their active experiencing and discovering of materials.

Affordances for nature-link or cross-modal match and children cross-species interaction was a new finding of affordances that is expanded of taxonomy of affordances of urban and rural home garden. In other words, the children understood the links between a plant species to an animal. For example, in order to get a jumping spider, a child knew that he has to search for a pandanus shrub where the creature inhabited.
In summary, the rural home gardens afforded most positive affordances than the urban home gardens in the following categories: nature-link (n=18), non-rigid attached objects (n=13), flat relatively smooth (n=12) and animals (n=15). In perception of the children, the rural home gardens were more diverse in plants and animals species than the urban ones.

B. Affordances of Neighbourhood Gardens
The taxonomy of neighbourhood garden of urban and rural setting is analyzed through 12 taxonomies. The urban neighbourhood garden offered the children with 93 positive and 130 positive affordances of rural children. Meanwhile, the negative affordances in urban is n=9 and rural is n=12 affordances (Figure 11). It means that the neighbourhood gardens are offered the children 223 positive affordances and 21 negative affordances. Thus, the rural neighbourhood garden afforded 1.4 times more positive affordances to the urban neighbourhood garden. It means the rural children’s sensorial and motoric action activities were more active with the rural neighbourhood garden properties and attributes than those of the urban home garden. These activities were mostly performed and explored with peers that involved more performatory and exploratory materials of manipulation garden features as their play tools. In neighbourhood garden the urban and rural children found freely movement and independent mobility of decision making upon demonstrating their private and socially activities rather than in home garden. They were reported that play in place that considered private place is to avoiding from parent recognition. This finding is paralleled with study by Hill (2005) and Sobel (2002) that children occasionally need a private and special place that are consider as their refuge that are unrecognized by parent or adults.

The differences of the affordances between the urban and rural neighbourhood gardens were less than the home gardens (Figure 10). In general, rural neighborhood gardens offered more affordances than the urban ones particularly in properties pertaining to water, vegetations, animals and natural links. Similar to the home gardens, the negative affordances offered by the neighborhood garden were far fewer than positive ones. The results suggest that through performatory and exploratory performances in the neighborhood gardens afforded the children with a variety of positive sensorial, motoric and social activities.
categories of affordances

Figure 10: Affordances of the urban and rural neighborhood gardens

In summary, the neighbourhood gardens in rural and urban residential communities in Malaysia were functional affordances to engage middle childhood children in a variety of functional and perceptual as well as social activities. The outdoor engagement allowed the children to be independent and set their own boundaries to perform social play. Inasmuch, the children knew how to produce play tools from the natural elements, plants and animals.

Levels of Affordances

The levels of affordances in home and neighbourhood gardens were categorized into three: perceived, utilized and shaped (Kytta, 2002). The differences of level of affordances between the rural and urban home gardens, and rural and urban neighbourhood gardens are shown in Figures 12 and Figure 13.

Figure 11: Levels of affordances of the urban and rural home gardens

As can be seen in Figure 11, home gardens provided the rural children with 58 utilized affordances, 39 perceived affordances and 22 shaped ones. On the other hand, far less affordances were experienced by the urban children. The result suggests that the properties of the rural home gardens offered the children more functions than the urban home gardens. For example, with bamboo poles, the rural children managed to made at least eleven play
tool, namely, gasoline lamp, bamboo cannon, musical instrument, fishing rod, kite frame, gun, raft, birds trap, and bird cage.

The result also suggests that interaction with the plants and animals afforded the children more benefits than adversities. The benefits were gained through physical movement and perception of the outdoor spaces in the home environment.

However, the neighbourhood gardens also afforded the rural and urban children almost equal number of utilized affordances that is 54 for urban and 60 for rural (Figure 12). It means that the neighbourhood gardens offered many functional properties such as fallen branches, fruits and insects to the children and to utilize them as play tools through sensorial and motoric actions.

![Figure 12: Levels of affordances of the urban and rural neighbourhood garden](image)

The utilized affordances were performatory and exploratory activities involving play performances. Thus, it means that children were actively performed motoric actions through sensorial actions. Examples of the performatory activities were involved with children climbing trees, clinging on flexibility branches, shaking and bending the flexibility branches, and moved into monopodial branches with peers. Meanwhile the exploratory activities were involved with searching ground ant burrow in the back yard, pulling out jumping legs of grasshopper as their fascinating play, tiding flying weevil beetle with thread as interactive activities, and searching jumping spiders at shrubs plant in home garden. It seems to confirm that children were responding actively and diligently with properties and attributes. Thus this finding are consistently accorded with literature on children experiencing outdoor spaces, that suggests that those middle childhood children contact with natural world, occupies an important place in a child’s emotional responsiveness and receptivity (Kellert, 2002 pp.126).

CONCLUSION

The results of this study suggested that middle childhood children in urban and rural settings preferred to play with plants and animals as their play tools rather than play equipments. The home and neighborhood gardens afforded different plants and animals for symbolic and constructive plays. Much of their physical interactions involved with plant and animals. To them, trees were seen as living elements that afforded to climb and cling on, to bend and cut branches, and to manipulate their parts into play tools such as bamboo was crafted into home-made gun. Interaction with the trees afforded social acquaintanceship, and in turn allowed children to assimilate and accommodate peers’ behaviors.
Apart from the commonalities of behaviors between the urban and rural children, there existed few differences. Noticeably, urban children preferred to play in the neighborhood gardens whereas their counterparts, the rural children, preferred to play in their home gardens. In other words, the urban children went further away from their home to play in the outdoor environment. This is because the terrace-housed neighborhood offered little variety of landscape elements for physical and social play. Therefore, the children extended their range of play further away from their home gardens. On the other hand, the rural children were much occupied by the diversity of plants (e.g. seeds and fruits, bamboo poles) and animals (e.g. spiders, worms, birds and insects), and topographical elements (streams and differences in elevation) in their home gardens. Apart from the diversity of biotic and abiotic elements, the home gardens in rural communities were large and thus affording many active activities such as running, swimming, and catching animals.

In summary, home garden and neighborhood gardens in urban and rural communities were places for children to perform their physical and social activities. These activities were triggered by cognitive (sensorial) performances, and in turn, generated more motoric and social actions. Outdoor experience afforded middle childhood children to understand the physical properties of plants, animals and topography, as well as ecological and functional links between plants and animals, and between play tools and plants or animals.

REFERENCES


Beck, A., Dr. and Barker, S., Dr., (2002), A Scientific Look at the Human-Animals Bond, Paper of PAWSitive InterAction, Atlanta.


DeRosa, B., (1987), Children’s Attitudes Towards Farm Animals: Children and Animals, University of Maryland.


