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# Developmental-Affordances

## *An Approach to Designing Child-Friendly Environment*

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**Abstract:** A child-friendly environment is a place that provides children with opportunities for their activities, or from the ecological perspective, a rich-affordances environment. However, children’s environments are often designed by adults who may have an insufficient understanding of children’s needs, potentially causing a disconnect between affordances provided and those actualised by children. To address this issue, we posit developmental-affordances as an approach to designing a place for children, which integrates the theoretical perspectives of affordances and child development. Affordance theory indicates that an environment affords people with opportunities for action, and emphasises the relative functions of the environment according to the perceiver’s capabilities to respond to those opportunities. However, affordances can be more effective for designing a child-friendly place if it is informed by an understanding of the developmental stages. This knowledge will illuminate designers with ideas for environmental features and activities that naturally attract children as the configuration of affordances are actualised to support their development. Moreover, as child development takes place within a specific context, designers should also note the influence of social and physical properties of an environment that might support and thwart children’s motivation to actualise the potential affordances.

### INTRODUCTION

Acknowledging the global movement involving Child Friendly Cities Initiatives (CFCI), research on children within urban environments has increased since the 1990s (McGlone, 2016). The movement successfully triggered children’s participation to evaluate as well as design their city in various ways, include how they perceive public urban spaces. Most prominently, important results have been generated from the Growing Up In Cities (GUIC) and Environmental Child-Friendliness (ECF) frameworks, which provide us with indicators of child-friendly environments for assessing and designing effective places for children.

The Growing Up In Cities (GUIC) project, initiated by UNCESCO in 1996, successfully depicted environmental qualities of local environments perceived by children across different countries. Employing a participatory research design, GUIC generated children’s perception of negative and positive themes that define the social and physical quality of their local environment (table 1). The outcomes of GUIC also affirmed the findings by Nordström in 1990 (cited in Nordström, 2010) that the physical setting is connected to one’s social life; thus a quality assessment of an environment must not separate the two.

Table 1: Indicators of Children's Environmental Quality (source: Chawla, 2002).

	<b>Social Qualities</b>	<b>Physical Qualities</b>
<b>Positive</b>	<ul style="list-style-type: none"> <li>- Social integration</li> <li>- Freedom from social threats</li> <li>- Cohesive community identity</li> <li>- Secure tenure</li> <li>- Tradition of community self-help</li> </ul>	<ul style="list-style-type: none"> <li>- Green areas</li> <li>- Provision of basic services</li> <li>- Variety of activity settings</li> <li>- Freedom from physical dangers</li> <li>- Freedom of movement</li> <li>- Peer gathering places</li> </ul>
<b>Negative</b>	<ul style="list-style-type: none"> <li>- Sense of political powerlessness</li> <li>- Insecure tenure</li> <li>- Racial tensions</li> <li>- Fear of harassment and crime</li> <li>- Boredom</li> <li>- Social exclusion and stigma</li> </ul>	<ul style="list-style-type: none"> <li>- Lack of gathering places</li> <li>- Lack of activity settings</li> <li>- Lack of basic services</li> <li>- Heavy traffic</li> <li>- Trash/litter</li> <li>- Geographic isolation</li> </ul>

Another notable framework to identify essential properties of child-friendly environments is Environmental Child Friendliness (ECF) developed by Horelli according to her research in the Finnish-context. EFC comprises ten dimensions: housing and dwelling; basic services; participation; safety and

security; family, kin, peers and community; urban and environmental qualities; resources provision and distribution poverty; ecology; sense of belonging and continuity. The EFC also outlines “*young people’s life as a physical, psychosocial, cultural, economic and even political entity*” (Horelli, 2007, p.270). The ten dimensions can be regarded as normative aspects of an ideal child-friendly environment, but the form and details of this environment are shaped by the social-cultural context (Horelli, 2007).

From the mentioned frameworks, we can conclude that a child-friendly environment is indicated by opportunities that support children to implement their needs and goals (e.g. to move freely, to interact with others, to access services, to manage exciting activities, and to feel safe). To create this kind of place, a thorough understanding of children’s needs and their socio-cultural context is fundamental because it impacts children’s ability to access and make use of the opportunities within a setting.

However, despite this need, children’s environments are often designed by adults who don’t have sufficient knowledge about the developmental needs of children. Moreover, the process of designing and planning spaces usually excludes children which potentially causes a disconnection between opportunities designed into an environment and those actualised by children. In turn, the environment becomes an ineffective place for children’s development.

Yet, UNICEF (2009) stressed that healthy development is the indicator of a child-friendly environment. Therefore, this is a key area for further research and consideration. Specifically, this gap requires an approach that can lead to deeper understanding in two areas. First, the functionality of an environment depends in part on the perceiver’s capabilities, which can be examined by advocating affordances theory. Second, the utilisation of affordances can support child’s development, which can be better understood through human development theories. This paper will explain how the integration of two approaches will provide insight into a more effective way to identify child-friendliness of a setting as the basis for future design.

The nature of this research is a theoretical review which collects a number of studies and project reports of environmental design that utilise two theoretical perspectives, namely affordances theory and developmental psychology theories. This paper has two aims. First, to provide an

understanding of child-friendly environment indicators. Second, to propose a design approach that integrates the theory of affordances and child development to meet the indicators of the child-friendly environment.

## AFFORDANCES THEORY

First developed in 1979 by James Gibson, ‘affordances’ denotes a transactional relationship between perceiver and their environment, indicated by what an environment affords the perceiver:

*“The affordances of the environment are what it offers the animal, what it provides or furnishes, either for good or ill. The verb to afford is found in the dictionary, but the noun affordance is not. I have made it up. I mean by it something that refers to both the environment and the animal in a way that no existing term does. It implies the complementarity of the animal and the environment...”* (Gibson, 1979, p. 127)

In Gibson’s view, “*people and animals do not construct the world that they live in but are attuned to the invariants of information in the environment*” (Greeno, 1994, p.337). This means properties of the environment enable or afford the perceiver particular opportunities to interact with that environment.

Gibson argued that environments consist of affordances, defined as activity possibilities, as the primary objects of human’s perception. That is why individuals perceive the environment regarding what behaviour it affords (i.e. a tree affords climbing, a door affords opening, a chair affords sitting). Furthermore, the activities are guided by how a person detects or perceives information, often visual cues, that specifies what the environment affords that person. Gibson suggests that the environment or object offers what it does because it is what it is. An affordance is invariant and does not change even if the perceiver’s needs change (Gibson, 1986). However, an affordance exists relative to the action capabilities of the perceiver. In Gibson’s view as explained by Tudge, Shanahan, & Valsiner (1997), the perceiver also must pick up “self-information” (or assessment about his own capabilities) to respond to the information provided by the environment:

*“If perception of the environment is co-perception of the self, then information that specifies the environment also specifies the self, or the actor’s position in the environment. If the environment affords some*

*action for the perceiver, it is in relation to the perceiver's action capabilities.” (Tudge et al., 1997, p. 82).*

## **DEVELOPMENTAL NATURE OF AFFORDANCES**

Although affordance theory does not specifically examine human development, it is widely used by developmental psychologists to understand the process of learning the world through environmental interaction. For Gibson, the world contains invariant information that can be directly accessed by human perception systems that adapt to retrieve this information through direct perception, within exploration actions (Moore and Marans, 1997). Dynamic invariances are only revealed when humans move actively, capturing information in their environment. The exploration actions must be repeated to be able to detect new invariances that exist in the environment, so humans can achieve "real-life perception" about the world (Richardson, 2000).

As exploration is a continuous action across the lifespan, it leads to the development of an internal structure that enables the new affordances which previously have not been accessed, and in turn support the new exploratory ability. In the course of development, *“each bit of learning affords the next - there is a development of affordances because new systems for information production through integrated perception, cognition and action systems have developed”* (Richardson, 2000, p.107). Furthermore, perception informs what action can be done, and therefore all developmental action is based upon the adaptive utilisation of the environment.

Briefly, Heft (1988) posits that affordances have a developmental nature, in which one's developmental capability determines the function of an environment. As such, new affordances can emerge as an implication of the rise of one's developmental maturity and experience within the environment. For example, older children can perceive and actualise more affordances from streets in their neighbourhood than young children because of their well-developed independent mobility and diverse experience in that place. The older children can use streets in various ways, such as a place to hang out with friends, to access transportation, to observe the everyday occurrences in the city. On the other hand, the younger children may perceive streets as a less functional place because they spend

most of their time at home and limited independent mobility.

A number of researchers have examined the place-affordances sought by young people according to their developmental needs, or 'developmental affordances', include play (Maier, Fadel and Battisto, 2009), and independent mobility (Kyttä, 2003; Ramezani and Said, 2013). Previous studies also explored affordances through what an individual feels from doing an activity within a specific setting (Kyttä, 2003). For example, a room allows a child to have privacy (as a feeling) which supports the activity of emotional-regulation or as the implication of an activity (e.g. feel relaxed when visiting a park) (Oerter, 1998). Thus, it is possible to examine affordances through activities and experiences.

The perceiver's capabilities can be the starting point for examining affordances within an environment (Clark & Uzzell, 2006; Parke in Altman & Wohwil, 1978). From previous explanations, we can assume that the capabilities of the perceiver are an implication of their maturity level. Thus, capabilities are developmental-related attributes which are unique within each developmental stage (Newman and Newman, 2012). However, we still do not thoroughly understand how environmental interaction can support child development and what drives the children to use specific affordances. Therefore, we need further research to investigate the association between voluntary activities and the broader set of human developmental tasks.

## **DEVELOPMENTAL TASKS: THE MOTIVATION FOR ENVIRONMENTAL INTERACTION**

Each stage of development has its own developmental tasks which must be fulfilled as an indication of the readiness for the next period of life. To fulfil the developmental tasks, children as active agents are often encouraged to explore the physical properties of their environment (Loebach, 2004). Van Vliet (1983) suggests that children are naturally active in a continuous search of new interactions with the environment, coupled with their developing mobility. Gradually, the child begins his exploration activities with their current capabilities and is challenged to increase the difficulty level of the

activity in order to positively influence the acquisition of new skills. As Moore states, "*Skills motivate interaction* [with the environment], *interaction stimulates the learning of skills*" (Moore, 1986, p.15). Hence, the motivation for environmental interaction is naturally driven by developmental tasks and exists in all children of every developmental stage.

Self-directed exploration of an environment also leads children to naturally seek opportunities to continue to challenge their actual capabilities in order to achieve their potential capabilities. The scholars of sociocultural paradigm (e.g. Vygotsky) believe that these opportunities are provided in children's environments, and thus young people will be much more developed if they actively interact with their environment (Vygotsky, 1994; Mistry, Contreras and Dutta, 2012). Their psychological system or the ability to make meaning of experiences and take action will develop through these environmental interactions. By using their current stage of development, the child will strive to achieve their potential development with the support of the environment (Loebach, 2004). For this reason, the environment must provide children with an appropriate degree of familiarity as well as unfamiliarity, extending from the routine to exploratory, from known to the yet-be-discovered (Moore and Young in Altman and Wohlwill, 1978; Matthews, 1992)

Although the urge to interact with the environment is intrinsic, it is inevitable that environmental properties also invite a person to interact within that environment (Heft, 2013). From an ecological perspective, children and the environment simultaneously initiate the interaction. Children's environmental interaction is influenced by attributes of personal stimulus characteristic (Bronfenbrenner, 1993), such as personal characteristics, interest in world-exploration, and directive belief about their relationship with the world. Simultaneously, the environment has physical and social features that initiate the transactions with the child. The nature of the environmental properties can either promote or thwart a child's motivation for environmental interaction (Tudge, Shanahan and Valsiner, 1997).

## DESIGNING ENVIRONMENTS TO PROVIDE DEVELOPMENTAL AFFORDANCES

As discussed in previous sections, we understand that the relationship between the perceiver and the environment can be measured through the actions and experiences of using the affordances which are naturally motivated by the perceivers' developmental tasks. This section will explore the implications of developmental stages on environmental design to provide developmental affordances.

We posit three key aspects of designing an environment that provides developmental affordances: developmental tasks, developmental related activities/experiences, and supportive environmental conditions/features within which the activities/experiences can occur. Figure 1 depicts the relationship between the key design aspects.

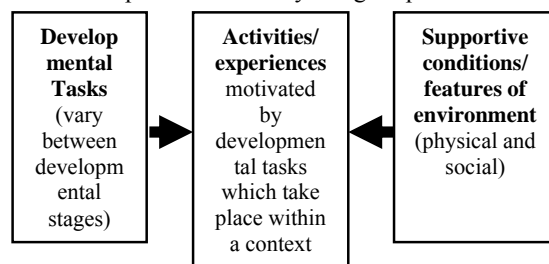


Figure 1: Three key aspects of designing an environment that supports developmental affordances (proposed by authors)

To support our proposition, we provide an example of developmental tasks and the supporting environmental features for each developmental stage during early and middle childhood (table 2). However, an environment can be defined on a small or large scale. Hence, this paper provides an example of properties of a play space in the context of public space. Public space is often assumed to be the representation of a place that provides free access for all ages and affords a variety of developmental activities (Elsley, 2004; Francis *et al.*, 2012; Pacilli *et al.*, 2013).

Many approaches are discussed in the literature in order to understand children's behaviour related to their development. However, in this paper, we use developmental theory related to psychosocial by Erikson because this approach has several advantages (Newman and Newman, 2012; Ray, 2016). First, psychosocial theory acknowledges the influence of capabilities during the earlier stages on

later development. Second, this theory focuses on clear developmental themes and the context for each developmental stage, and the implications for failures and successes that lead to achieving the developmental tasks. Third, the psychosocial approach recognises the bidirectional influence of individuals and their environment on development, which can be described as transactionalism as it is adopted in affordance theory.

From table 2, we understand that each developmental stage has different as well as similar preferences of environmental features to support activities. Different developmental stages may also have similar choices of environmental features, but

the use of them can be flexible to accommodate different intentions (Shackell *et al.*, 2008). For example, a ladder within early childhood can be used to support their gross motor skills, while for middle childhood it can be used to cater to their risk-taking interests by enabling them to jump from different heights. The common use of affordances may also appear across the developmental stages because basically development is not a result, but a process (Bronfenbrenner, 1993; Richardson, 2000). Children will always be advancing their capabilities, starting from what is familiar to them and exploring the unfamiliar, as the conditions needed to challenge and develop their new skills.

Table 2: Childhood developmental stages and the supportive environmental features (adapted from Moore, 1974; Loebach, 2004; Newman and Newman, 2012; Masiulianis and Cummins, 2017)

Developmental Stage	Developmental Tasks	Activity/ Experiences	Supportive Environmental Features
Early childhood (3-6 years)  Psychosocial crisis: Initiative vs guilt	<ul style="list-style-type: none"> <li>- Gender identification</li> <li>- Early moral development</li> <li>- Peer play</li> </ul>	<ul style="list-style-type: none"> <li>- Climbs with confidence</li> <li>- Increased speed of run</li> <li>- Solitary activities</li> <li>- Physical balance activity (e.g. rides a tricycle)</li> <li>- Recognising the spatial concept (behind, under, in front of)</li> </ul>	<ul style="list-style-type: none"> <li>- Flexible elements (e.g. rocks, logs, branches)</li> <li>- Loose objects including leaves and twigs that support diverse play</li> <li>- Supporting facility for climbing (e.g. ladders)</li> <li>- More structured solitary games that invite interaction (e.g. hide and seek, castle with window)</li> <li>- Facility for gathering and interaction (low seat and desk) with same age children</li> </ul>
Middle childhood (6-12 years)  Psychosocial crisis: Industry vs inferiority	<ul style="list-style-type: none"> <li>- Friendship</li> <li>- Concrete operations</li> <li>- Skill learning</li> <li>- Self-evaluation</li> </ul>	<ul style="list-style-type: none"> <li>- Purposive social interaction</li> <li>- Team play</li> <li>- Educational activity</li> <li>- Risk-taking physical activity</li> <li>- Restorative experience for emotion regulation</li> </ul>	<ul style="list-style-type: none"> <li>- Adventure play properties (both loose and fixed)</li> <li>- Safe place and equipment</li> <li>- Sufficient places and facilities for group activities (e.g. soccer, handball)</li> <li>- Clear rules of place use and spatial organisation</li> <li>- Educational related tools (e.g. reading material, counting tools)</li> <li>- Adult's support to gain new cultural knowledge</li> <li>- Restorative qualities of place, such as privacy, relaxing atmosphere</li> </ul>

## CONCLUSIONS

This paper posits that developmental-affordances is a practical approach to designing and planning child-friendly environment. This approach will guide designers and planners to be aware of children's developmental needs that drive them to engage with specific activities within a place. Therefore, designers and planners can create a meaningful place that supports the positive outcomes of children's development, as it is the ultimate indicator of the child-friendly environment.

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