Ergonomic Design of Children's Play Spaces in the Urban Environment

Przemysław Nowakowski and Jerzy Charytonowicz

Wroclaw University of Technology, Department of Architecture
Prusa 53/55, 50-317 Wroclaw, Poland
{Przemyslaw Nowakowski, przemyslaw.nowakowski}@pwr.wroc.pl,
{Jerzy Charytonowicz, jerzy.charytonowicz}@pwr.wroc.pl

Abstract. Any space available to children can be used as a playground. Such places are getting more and more diminished and isolated from the nearby surroundings. Creating spatial enclaves, apart from undeniable measurable advantages (e.g. safety), causes various negative social and organizational consequences (age discrimination, monotony, uniformization, loosened and deteriorated interpersonal relationships). However, the arranged playgrounds may become a means of an effective psychophysical and social development and rehabilitation of the handicapped children. The paper discusses the following issues: evolution of housing needs of children of all ages, with special concern for spatial requirements connected with children's increased mobility; role of a dwelling, the importance of a child's room and the importance of conditions of acquiring independence and autonomy; the importance of the play environment in the open urban space and the role it plays in the family life and in the life of individual children, and problems of its evolution in the circumstances of the progressing urbanization.

Keywords: designing for children, playgrounds, home and urban environment.

1 Introduction

The human rest environment is comprised by flats and their surrounding areas used mutually by their occupants. The environment is supposed to enable realization of changing needs of groups of people varied by age and psychophysical abilities.

The model of flat with rooms allocated individual people and generations became established in the nineteenth century. At that time, it was becoming more and more common to allocate separate rooms to children. Through the whole 19th century, attempts were being made to disseminate that division between children's and adults' activities. Children's intensive motor activity or noisiness they produce are elements of family life usually unwelcome by adults, especially in a more representative part of a flat. In such circumstances, children's living needs can be satisfied only in "children's rooms", which most often belong to the smallest rooms of a flat. It generally leads to a rigid division between the adult and children's world, intergenerational isolation and narrowing down the living space within a flat [2].

C. Stephanidis (Ed.): Universal Access in HCI, Part II, HCII 2007, LNCS 4555, pp. 517–526, 2007.
© Springer-Verlag Berlin Heidelberg 2007

Also, the contemporary building regulations legitimize the established model of a flat divided into rooms for children and for adults.

Urbanization processes, particularly the development of motorization cause the external areas intended for rest and play continually get diminished. Children's and adults' kinetic activities are more and more uncontrollably superimposing on areas performing functions which basically preclude the possibility of relaxation.

In Europe, the first public municipal "gardens of entertainment and kinetic plays for children" emerged at the end of the 19th century in Poland, thanks to the initiative of the Polish socially engaged doctor Henryk Jordan. They were patterned then on American solutions. Playgrounds adjacent to homes became more widespread in the interwar period. However, it was not until World War II that every housing estate was to be completed by that kind of facility [3]. More complex play units began to emerge in the western countries, especially from the beginning of the 70. The normative records valid at that time, conditioning the number, size and manner of equipping the play sites on the number of flats within a housing estate, assured children a sufficient access to free space.

The "quality" evolution of flats and urbanized spaces unfortunately progresses in parallel with deterioration of the "quantity" features. In flats, children are still being allocated small rooms, and on housing estates the free spaces are more and more being adopted for other purposes, mainly parking lots.

Still, the functional programmes of majority of playgrounds do not include the equipment that kinetically stimulate physically handicapped children. Those playgrounds and their attractions are thus accessible to them to a limited degree.

The contemporary challenge is making much more space accessible to children at different ages and in different psychophysical form, and some dispersion of the play equipment. First of all, it pertains to hitherto allotted grounds in bigger green areas (in parks) or big yards. Furthermore, play areas should be attractive not only to small children, but also to school children and adults. Mobility and convertibility of selected elements in a play ground, serving its users' imagination and skills, may, however, help avoid weariness.

At present, it can be noticed that children are more often treated as equal partners of adults, and a better identification of children's needs and recognition of the influence upbringing has on their subsequent, adult lives are conducive to the evolution of contact between successive generations. Thus, a change in the relation of adults and children should be reflected in both the living and urbanized spaces.

2 Spaces Intended for Play and Their Significance for the Structure of a Dwelling, a City, Family Life, Rehabilitation and Integration

A child gets to know her/his environment as s/he becomes independent kinetically. The urbanized space can be divided into the following areas: a flat (including child's own room, annexes for playing in other rooms), semi – open spaces (e.g. staircase), and areas encircling a house (the entrance area, the yard), the interior of a housing estate, quarters of a building (with playgrounds, parks, and nearby shops), a district with a school and recreational buildings). Children look closely at the material and

social surroundings and search in it some ways of understanding their environment, satisfying their needs, and thus shaping an appropriate behaviour. All those things, in turn, contribute to identification with place and people.

In child's imagination almost every surrounding space may serve playing. It can be a flat as well as free green areas, but also farm buildings, streets, squares, parking lots, or even wastelands, building gaps and ruins. Adults, for various reasons, perceive playing sites for children in a limited way. The function of such places more and more frequently is performed by enclosed and marked spaces, supplied with special equipment. Two types of playing space can by distinguished – not only from the architectural, but also educational point of view – „playground" as an artificially allotted one – functional acreage and "playing space" as a multifunctional space, enabling children a considerable motor freedom and invention when playing.

Territorial divisions made by adults and limitations of motor freedom connected with them are generally not respected by children, and every near patch of land can be a stimulus to varied kinetic activities.

It should be mentioned that a specific lifestyle of parents and prestigious character of a flat may negatively influence a child's proper, unfettered psychophysical development. Also, it should be remembered that – considering a progressing limitation of freedom in the area of further use of an urbanized environment - as the child is growing older, a role of the living environment with the surrounding area is becoming more and more significant. There are other factors shaping that influence such as: the development of motorization, prevention of criminogenic situations, and raising standards of general public safety. Unfortunately, the world of children's motor activity with yards, squares, streets, gardens, and parks is becoming more and more confined to allotted and enclosed play grounds designed rather according to adults' than childrens' view of environment (e.g. aspects of safety).

Adapting a dwelling to children's needs should be a well – thought – out action, which all members of family – as well as children – judge and take part in. Surprisingly, even relatively young children are capable of expressing their preferences and participating in the decision – making process concerning interior design [5]. A quality of living together can be affected by the following factors: psychological attitude towards a child's presence and activity, accepting the fact that the whole flat is a place of gaining experience, a learning and playing field, expression of clear rules of coexistence, explanation of bans, avoiding a division between adults and children, and a selection of equipment meeting raised durability and safety requirements.

Designing space for children should be based upon recognizing their needs and identifying activities they may perform. Typical functions will include: satisfying basic existential needs (e.g. changing a baby, toilet, sleep, feeding and maintenance) and spiritual needs (e.g. learning, static and motor plays).

Childrens' proper psychophysical development and their motor activity related to it requires support from an urbanized environment and therefore it should be included into the "playing space". Adopting such a solution should find acceptance not only among urban designers, but also estate owners, co – tenants , teachers as well as parents. They can focus on such activities as: removing limitations and sometimes bans on playing in yards and nearby green areas, removing fences around

neighbouring multifamily houses and green areas, adapting undeveloped areas (building gaps, wastelands, ruins, etc.), converting the existing open spaces into areas attractive to both children and adult users, and finally traffic calming and regulation.

In the industrialized countries, there is a well developed infrastructure for children's play. The infrastructure expresses a concern of city and a housing estate management for satisfying motor needs of children and their parents. Those tendencies, however, can be usually deemed as a peculiar "alibi" for adults who – wishing to maintain peace and quiet – brush aside lively and noisy children and close them in enclaves. Additionally, such actions reinforce loosened interpersonal relationships between members of different generations (children – adults) and between neighbours (families and their neighbours). Atomisation of families and an atrophy of social relationships between co-tenants can become soothed in a universal "playing space" facilitating the establishment and development of interpersonal contacts in relations children – children, children – adults, and adults – adults. The nearness of playing site to home (as a meeting place) can favour making spontaneous and lasting acquaintances or even friends. Such meetings do not require special preparations from adults and children. Children's contacts may turn into lasting friendships between whole neighbouring families. A nearby playground, often popularly called a yard, may then become a multifunctional space, conducive to the development of widely – understood interpersonal relations, later shifted to homes.

Additional equipment enabling the use of space for play by handicapped children may have practical implications not only for the parties concerned with it, but also for the whole society. Yet, it stimulates the psychomotor activity (being a supplement to motor rehabilitation exercise) and mixing with other children helps develop and strengthen interpersonal contacts and bonds. The proximity of a playing space may have a considerable therapeutic, educational, and integrating significance to children in an impaired psychophysical condition. In a sociological sense, both healthy and handicapped children playing jointly permit to accustom the phenomenon of disability from the youngest age, and at the same time give their carers a chance to participate in a social life.

3 Children in the House Environment

In the industrialized countries, dwellings with a number of rooms equal to a number of household members are commonly accepted. That means that children usually have their own rooms. Also, the rooms usually belong to the smallest parts of a dwelling. Additionally, every child does not always have a separate room. In families of limited means and with many children each room is occupied by more than one person. In those circumstances, satisfying such needs as a natural seclusion from the environment, intimacy, freedom of play (especially the loud one) and the need for concentration during studying are difficult, and sometimes even impossible.

Granting a child a separate room is a significant parental decision. A child's room performs various functions, which in the case of adults are carried out within the

whole space of a dwelling – in different rooms (a living room, a study, a dining room, a bedroom, etc.). A child, however, is supposed to fulfil most of his/her living needs in his/her own room. That room is one of the rooms exploited most in a house. Once a child reaches a schooling age, the time of using of such a room extends during the day. Then, to traditional children's plays its new forms should be added, such as plays with a computer, and new obligations: studying and doing homework. The size of child's room should also provide an opportunity for an unfettered kinetic activity and a mutual play of a child with his/her peers or adults. If it is not possible, and additional area for play should be determined and separated in other part of a dwelling. Making other parts of a flat accessible to children (in particular those smallest ones) is recommended especially in respect of a necessary visual and audial contact and supervision by an adult – a parent or a carer.

To children furniture has not only a utilitarian role, but also symbolic; it can serve as a landing field for planes, a fortress, an observational tower, etc. Thus, it can be a means (a pretext) of individual creation of ideas and images and an inspiration to arrangement of one's own room interior. Arrangements and forms of furniture should be free and flexible – easy to adjust to changing children's needs, so that the furnishings would "grow" with their users (Fig. 1). Important elements supplementing elementary furniture (a bed, a table, a chair, a wardrobe, a bookcase, etc.) can be special furnishings for plays, particularly kinetic: exercise equipment, a ladder at a wall, a slide, and a swing, etc. That equipment enables children's kinetic activity at home, especially during the rainy weather.

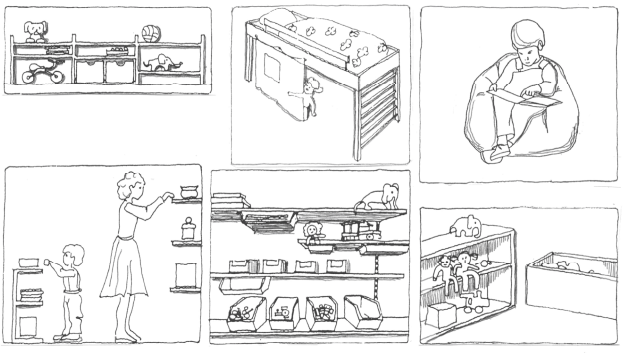

Fig. 1. Examples of furniture in children's rooms [3]

Furnishing of a child's room with furniture for adults is undoubtedly not a recommended solution, in particular with the heavy one and with a more prestigious design. They are difficult to adapt to children's kinetic needs and the size of their bodies. Such furnishings do not favour creating a specific and individual atmosphere in the room.

4 Creating Playing Spaces in the External Environment

Already in the 70. of the 20th century in the industrialized countries playing spaces were much more considerably varied. A great significance in that process had also family initiatives. They focused not only on creating new playgrounds or modernizing the existing ones, but also on creating alternative programme solutions. From this current, thematic infrastructures are derived, e.g. adventure, architectural, educational and prointegrating. However, additional infrastructure that will help children in an impaired psychophysical condition use the playing space is still lacking.

Although many ideas are relatively old and repeatedly imitated, they still seem to be interesting to a majority of users so far devoid of similar facilities at all. Generally, standard solutions are applied, with equipment mostly prefabricated, sold on the market in large quantities. They are universal and independent of the environment. A mass duplication of the same conceptions often make playgrounds monotonous, and thereby less appealing to children.

At present, a selection of playing equipment varied as regards their programmes and aesthetics matching an individually shaped surrounding is one of the most interesting tendencies. Moreover, such equipment inspires its users' creativity and imagination when playing. The "prointegrating equipment" does not have to be more costly than the standard one, but at the same time it can be an interesting alternative to typical solutions.

Designing an interesting playground for children requires fulfilling many conditions, e.g. "participatory design" (with children's participation and taking into consideration their expectations and varied psychomotor abilities), treating a playground as a supplement to a richer offer and not as a mere substitute, location close to a place of living (which is particularly important in the case of the handicapped children), openness to other spaces and accessibility to all users (seperating only from the dangerous areas), lack of age and physical ability discrimination (a special offer and its accessibility to the elderly and the handicapped), and finally communication and functional connection with other play spaces (hardened communication pathways).

Fig. 2. Application of natural, low processed building materials

Fig. 3. Use of water for playing

The programme of furnishing a playground with playing equipment and facilities should provide for the need for creating various options of play, not imposing the one and only solution (Fig. 2, 3). This can be assured by: the usage of natural building materials (trunks, boulders, rock, sand, etc.), the usage of flowing waters (ditches, gutters, fountains, cascades, etc.) and still waters (ponds), creating the open wings and auditoria (in the form of faults and resistance walls, platforms, arenas and viewpoints), the use of multifunctional, mobile and convertible equipment, the use of free materials (pieces of wood, chests, cases, car tyres, cardboard boxes, old pans and other safe scrap materials).

As far as the aesthetic qualities are concerned, the following features should be taken into consideration: individualized programme of equipment for every playing complex, facilities individual and unique by nature, supplementing the equipment with elements appealing to senses (smelling and colorful plants, green tunnels, etc.), diversification of land level (avoiding flat surfaces) through the use of reclaimed pits and building heaps (financial savings), the division of larger acreage into functional annexes (e.g. sandpits in quiet areas, equipment for kinetic plays in "loud" areas, large and small size equipment).

The design of greenery should provide for: varied selection of plants (trees, bushes, grass, flowers), functional issues (isloation from noise and excessive insolation, providing fruit trees and bushes, avoiding poisonous and prickly trees and bushes).

Considering issues related to the safety of usage one should remember about the elimination of a potential threat of an accident (injuries, slips, falls, stumbles), protection against poisoning by harmful plants or preparations (paints and varnish), isolation from the traffic, and a convenient connection with pedestrians' pathways, easiness of evacuation and escape (elimination of barriers, divisions, and partitions on communication pathways), keeping clean, neat and tidy (sand sifting and change, removal of broken glass and pieces of metal, etc.), regular security check, and social control thanks to houses in a near neighbourhood [1, 4, 5].

The above mentioned requirements also have a considerable significance to the handicapped children. What is important for them is not only an opportunity to spend free time on active playing, but also prophylactic, remedial, educational and social considerations. An easy access to a playing space has a special significance for prophylaxis and rehabilitation – both physical and mental. Properly designed

playgrounds may therefore stimulate kinetically the disabled children, and a varied selection of materials and textures may influence the development of their sensory sensitivity. Moreover, a play, especially with other children, apart from its integrating qualities and mobilizing to an increased effort, helps get away from daily worries and inefficiencies (Fig. 4, 5).

What presents a considerable challenge to playing space designers is finding a unique *genius loci*. An individual and unique character of the place, responding also to users' functional and aesthetic needs, creates a sense of place and the place identity. A sense of place favourably influences users' behaviour, affects their imagination, and releases the feeling of identity with a particular place. Unique features of a place can be obtained through: the use of unique features of a particular space and its surrounding physical context (spatial relations, the character of the nearby buildings, a slope, directions and communication pathways, the existing greenery, orientation towards the sun and the wind.)

Fig. 4. Educational facility in open space

Fig. 5. A child sitting in a wheelchair playing with sand

5 Psychological Aspects

With time a small child learns to attach not only to the household members, but also to material objects and places, where she/he is staying. Child's growing independence can be realized and expressed through taking possession of those objects and places.

Both children and parents can make use of that ability to develop a child's individual character. The control over some elements of the surrounding helps a child better understand mutual interaction between the social world and the material environment. A bit older children develop their own associations with objects, places, and spaces. Some of the feelings are positive, negative or neutral, and some are a combination of those reactions. As a child is becoming more and more mobile, his/her activity, at the beginning in a flat, and later outside, will exhibit intentions and motives of action, reflecting the development of identity with place. Even a small child not only knows which objects are his possessions, but s/he can better and better determine where they should belong to, how they should be used and when they can be used by others. This ability is also completed by expectations related to the material surroundings, which become expressed directly, especially when they are not fulfilled [3, 4].

A slow metamorphosis of a totally dependent child into a separate individual, different from others, is supported and continually confirmed by acquiring the ability of coexistence with the nearest surroundings, especially when it includes objects, places and spaces "belonging" to the child. It can be stated that a child's room with all its objects and the ability of making it a place beyond parents' control is a place having a considerable significance to the child's development, the development of his/her place identity, and also his/her own identity. When children are able to discriminate between themselves and others and the surrounding space, home and its surroundings indeed become their world. Apart from creating their personal world, children learn also that spaces and places are shared, and that the surroundings is not static, but it is continually changing, because it is being changed by the presence of other people. Being a child carries many spatial limitations, which are slowly but steadily removed as a child displays her/his own responsibility and dexterity in the surrounding world. Already very young children can gradually discover who controls particular areas and learn to respect the spatial autonomy and privileges, especially of the older household members. For example, they may first learn that the access to the bathroom is not possible, because it is occupied, or that they cannot enter their parents' bedroom, because its door is locked. However, as children grow up, their ability to coexist and interact with the surroundings evolves, and they acquire both the ability to control their actions and autonomy in particular places at home. The spatial autonomy essentially influences the development of psychological independence. A certain degree of control over the material environment (at least within the boundaries of a child's own room) is indispensable for a healthy psychophysical development.

What bears an immense significance to child's development is the part of his/her room, performing the role of a deep hiding place. A peculiar niche or hideout, understood literally and figuratively, is supposed to enable him/her effective isolation from the surrounding space and his/her relatives, and satisfy the child's need for privacy. A place like this allows the child to struggle with his/her own problems and a bad mood, maintain secrets, and concentrate during studying. The intimacy sphere appears to be equally important to both younger and older children. Own room has a particular role in a teenager's life, whose experience of opposition and rebel against the surrounding world is inherent in their existence. On the other hand, the above mentioned places may become a means of initiating interesting (also group) games and plays of dramatic nature, involving dressing up (disguising, identity changing, impersonating other characters) and arranging little puppet theatres.

6 Conclusion

Home comprises a fundamental environment in a child's life, because it is a place, in which most of the cognitive and learning processes take place. Many of those early personal observations and perceptions will last and survive to the adult life, so will a great part of the place identity moulded in childhood. Experiences gained in childhood to a large extent may determine particular behaviours in the future life environment, e.g. in own home.

Progressing urbanization cause the free space for children to diminish. Children's movement freedom is particularly limited by the development of motorization. Such monofunctional spaces as pavements, roadways, parking lots, market places and others should be adapted to safe and free presence of other people, including children. When designing playgrounds, it is essential to provide for the needs of all age groups, and also expectations of people with an impaired motor ability (e.g. the disabled children and the elderly). It is then possible to avoid age segregation and functional ascribing selected areas to particular generation groups (children, parents, grandparents) and ability discrimination (including those kinetically handicapped).

Typical dwellings, in which the role of a living room - a prestigious place for adults – is often overestimated, should be "open" to children's needs (kinetic in particular). The main part of a dwelling (e.g. the living room) does not need to be reserved for "show off" and used on special occasions only, and children's activity space does not need to be confined to only a child's room. Moreover, a change in a stereotypical lifestyle of the adult household members is recommended. It should happen through acceptance of children's visible presence, e.g. presentation of children's artefacts, changes in arrangement giving children an easy access to objects and materials for playing in different areas of home. Freedom of movement can also be assured by the arrangement of lights and other controls at the level easily accessible to children. In such a situation, the household members themselves and their home send visiting guests a symbolic message that children and their actions are valuable and significant to the family life.

External playing spaces located in the neighbourhood of houses can thus be a good supplement to space intended for children's motor activity inside buildings and in individual dwellings.

References

1. Burkhardt, Ch., Kuerner, P.: Kind und wohnen. Leske + Budrich, Opladen (1994)
2. Internet Encyklopedia. Panstwowe Wydawnictwo Naukowe, Warsaw (2006)
3. Oesterle-Schwerin, J.: Mit Kindern wohnen. Bauverlag GmbH, Wiesbaden (1976)
4. Rui Olds, A.: Child Care Design Guide. McGraw-Hill, New York (2001)
5. Weinstein, C.S., David, T.: Spaces for Children. Plenum Press, New York (1987)