Representations of architecture in children's drawings: a study of children's art in Jordan

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ABSTRACT: Beginning with the birth environment, adults create and control the physical conditions in which children live and experience the world. This fact lays a great deal of responsibility upon planners and designers, to whom the authority of making decisions, on behalf of children, is considered to be a difficult task. In this research, children's drawings are seen as a primary source of knowledge, upon which the investigation of the child's power of thinking is based. The objective is to investigate some aspects of the relationship between children and their architectural environments, through analyzing their graphic representations. The aim is to reach some understanding of the typology of thinking that might help the designers understand how children experience, appreciate, and assess their environments.

Data was collected by means of survey questionnaires supplemented by interviews. The subjects of study were chosen from the same neighbourhood, totalling (47). The children were all 7-12 years old. Each child provided seven drawings of seven different architectural settings. The investigation was conducted using two methods. The first method used statistical analysis, of a set of defined variables, to identify broad patterns in the data. These include two main categories: typology analysis; and gender analysis. The second method, supported by available literature, qualitatively examines the statistical results to understand why the broad patterns emerged.

Analysis of the different settings, displayed a wide range of representations; from the most centralized and orderly (the room and the house) to the most disperses and non-hierarchical assembly of elements (the city). It became evident that this range verifies the child's knowledge of the drawn setting. The child's understanding of these settings becomes more limited with the increase of physical scale. The study also concluded that the typology of objects, within a space, represents the most recognizable features to the child. Different objects present themselves in different ways according to the kind of experience the child has with them.

Conference theme: Human context: social, cultural, and economic studies
Keywords: children, design, perception, cognition, graphic representation

INTRODUCTION

Making places for children must be a participatory process. It is a process where children, parents, planners, and designers must all work toward a shared vision of the future; a common image of what makes a good place. The core challenge lies in how to get children involved in this process and how to elicit the necessary information that best manifests their thinking and assessment of their built environments.

For this purpose, it is essential to maintain a view of the child as a conscious, active person who is actively trying to understand its social and physical reality. The child does not merely react as a passive object to the environment; it ignores some of its aspects and selects others to suit its personal responses and creative power (Newman and Newman 1978, Morcos 1991).

Children's graphic representation provides an important tool for examining the child's power of observation and analysis, its capacity for synthesis thinking and judgment. Its content may provide insight into their feelings and thoughts about the world. It represent an important tool of communication, through which children can indirectly participate in the design and planning of their settings, which should inspire the creation of more engaging, exciting, and meaningful places for them.

This research takes as its main focus of interest, the use of a language of art in the investigation of categories of thinking about the visual world. Children's drawings serve as a primary source of knowledge, upon which the investigation of the child's power of thinking is based. The aim is to investigate some aspects of the relationship between children and their architectural environments, looking at which aspects of these environments held particular meaning for them, hopping to reach some understanding of how children experience, appreciate, and assess their environments.

1. BACKGROUND

Perception, cognition and representation usually form a triangle that is hard to disentangle. This triangle serves as a framework, which can be utilized to examine mental images of the environment, translation of the environment into graphic forms, and interpretation of graphics.

1.1. Perception

According to Jean Piaget and Barbel Inhelder, perception can be defined as:

> A system of relationships organized in an immediate whole. But the equilibrium of this whole depends not only upon real relations (i.e., actually perceived), but also, like a mechanical equilibrium, upon virtual relations which refer to earlier or contingent perception (Piaget and Inhelder 1956: 14).

Perception is much more than sensation, for it includes both a conception of the object and also an immediate conviction of the object's present existence (Boring 1970). The problem of how children perceive the visual world can be divided into two aspects, the perception of the substantial or spatial world and the perception of the world of useful and significant things. The visual stimulus is thus, neither an object nor an experience of that object, but something which stands in between (Gibson and Carmichael 1977).

The study of the psychology of vision indicates that seeing is selective from the start (Gombrich 1984). Vision deals with the raw material of experience by creating to corresponding pattern of general forms. It became evident that overall structural features are the primary data of perception (Arnheim 1974). Piaget and Inhelder explained that every perceptual field is organized in accordance with the same types of structure. This organization is supposed to be of a geometrical character right from the start (piaget and Inhelder 1956). It is thus important to understand that the idea of space develops under the influence of motor and perceptual mechanisms. Moreover, the study of how children estimate size or measure objects is particularly interesting because operations involved in measurement are so concrete that they have their roots in perceptual activity and at the same time so complex that they are not fully elaborated until some time between the age of 8 and 11 (Piaget *et al.* 1960).

1.2. Cognition

Cognition however, is extremely broad term that refers to any internal mental processes, including attention, perception, memory, language formation and development, reading and writing, thinking, problem solving, intelligence, creativity, imagination, expectation, intention, and belief (Dworetzky 1996). Cognitive theorists have contributed three important concepts to our understanding of childhood. First, they suggested that the child's strategies for organizing and interpreting the environment, are qualitatively different from strategies used by adults. Second, they emphasized the link between the structural properties of the sense receptors, the brain and the nervous systems, and the capacity to know the world. Third, the acquisition of knowledge is seen as an active, on going process. Cognitive development is the combined result of the maturation of the brain and nervous system and the experience that help individuals adapt to their environments (Piaget *et al.* 1960, Dworetzky 1996). Cross-cultural studies of perception and cognitive development find a significant degree of variability from one culture to another (Newman and Newman 1978). According to the social cognitive theory of Lev Vygotsky, a critic of Piaget, each person is born with a set of unlearned elemental cognitive functions, such as the ability to attend, perceive, and remember. Each culture then transforms these elemental abilities into higher cognitive functions, largely through social interaction, especially through the teaching and use of language (Dworetzky 1996). The language of vision operates in a broader field of social and linguistic values. In order for designers to take command of this broader field, they must begin to understand the relations between visual form and language, history, and culture (Lupton & Miller 1993). Based on Hall, language represents a major element in the formation of thought (Hall 1982) Words, spoken or written and images are components of the environment and sources of stimulation (Gibson and Carmichael 1977). Children and adults, are all influenced by the kind of images they see around them; on film and television, in the street, in shops and galleries, in books and magazine, etc. (Cooke *et al.* 1998, Hamdi 1981).

1.3. Representation

Representation is different from what is generally understood by the terms, perception and cognition. It is wider in scope, and may be considered to contain the previously described processes of perception and cognition. It involves the active production of visible signs for the purposes of human communication.

Through the process of child development, knowledge changes from a total dependence on experience to a gradual formation of rules and principles that are viewed as more reliable than experience itself (Newman and Newman 1978). Such experiences are represented in several symbolic systems: language, play, drawing, imitation, and mental imagery. The drawing, like the mental image, is not simply an extension of ordinary perception, but is rather the combination of the movements, anticipation, reconstruction, comparison, and experience (Piaget & Inhelder 1956). It is important to identify this graphic creation as a creative activity, which provides a home ground for visual thinking (Arnheim 1969, Abu-Dayeh 1994). Representational image making involves careful looking, critical thinking and decision making (Cooke et al. 1998, Freeman 1980).

1.4. Drawing as message

Drawing is a mean of expression and is fundamental to all visual communication. Its evolution is the expression of the development of the child's perceptual order (Eng

1954, Cooke *et al*. 1998). Children draw what they find important or beautiful to them, which appears to depend greatly on their cultures (Dworetzky 1996, Willats 1985, Cooke *et al*. 1998). Because of their relative subjectivity, drawings allow greater space for individual interpretation of the environment. They allow presentations to be controlled, as elements in a drawing may be explicitly included or omitted, emphasized, embellished, or distorted. Children's drawings are the result of considerable effort, solving many planning and performance problems. They provide a tangible evidence of careful planning and well defined intentions (Freeman 1980), and, therefore, are indicative of the child's power of observation and analysis, its capacity for synthesis, thinking and judgment (Eng 1954).

A study of the child's drawing, may, therefore, help to understand its individual character, its problems and special needs (Eng 1954). Understanding the content of children's drawings may provide insight into their feelings and thoughts about their world (Crook 1985)

1.5. Understanding children's drawings

Representational drawings can become part of a process of symbolization, in which the image created holds meanings beyond the form of the object depicted (Cooke et al. 1998, Arnheim 1974). It seemed that young children appear to be concerned with representing their knowledge about the object rather than their view of the object (Davis 1985). The young mind operates with elementary forms, which are easily distinguished from the complexity of the objects they depict (Arnheim 1969). Children's drawings are very economical in their style; few lines are deployed to capture the general scheme of scenes. Children often give rough approximations of the shapes and spatial relations they intend to depict (Crook, 1985, Arnheim 1969). Elements in the drawing are often related to one another according to specific principles, where every element is depicted with its own space, independent from the rest (Goodnow 1977).

It is also important to note that, the child draws by making use of mental pictures stored in the memory. It draws objects which it has mastered, and then makes modifications and arrangements using them. For example, it draws a house using already practiced rectangular shapes (Eng 1954).

When children draw, they are influenced by a set of perceptual and performance biases. Understanding these biases can help us understand and interpret their drawings:

Stereotypy: often, the child uses a limited number of graphic formulas "Stereotypy" from its graphic vocabulary, attempting to use them on many occasions (Allik and Laak 1985). Stereotypy does not imply that drawings always turn out to be identical. Often there is a great range of variability in certain aspects of a drawing, while maintaining a good deal of consistency in the organization of the core of the drawing (Freeman 1980). Stereotypy indicates that there are certain aspects of drawing that are stable enough, within individuals and across samples, which might give a point of departure for inquiring into issues relating to how children represent the world mentally, revealing their feelings and understandings of what they see (Meadows 1993).

Incorrect orientation and incorrect synthesis: is shown when parts of the drawing are arranged together in a manner not in accordance with reality (Eng 1954). Children often seem unable to put parts of a drawing together to make a whole; they cannot, when occupied with drawing the details, retain a grasp of the whole. The parts are drawn piece by piece without taking the total effect into account (Freeman 1980).

Proportion: The child emphasizes, in its drawings, what appears interesting and important to it, frequently by making it particularly large (Eng 1954). Exaggeration of certain aspects or parts of a given subject can emphasize certain importance (Hamdi 1981).

Color & ornament: It is not until the age of six that decorative drawing appears and children begin to carry out their drawings in color more frequently (Eng 1945). The use of color and ornamentation is a chief motive for the child's attempts to draw and it emphasizes what appears interesting and important to it (Eng 1954).

Perspective: Piaget and Inhelder, and based on their experiments on perspective drawing of children, concluded that it is not until the ages of 7 - 9 years old, the stage of visual realism, that perspective is applied systematically to drawing and a clear distinction is drawn between different points of view (Piaget and Inhelder 1956). Perspective representation requires a capacity for abstraction and complex naturalistic synthesis (Eng 1954). Nevertheless, the three-dimensional world depicted by the child, is a world of an undefined volume of space surrounding every object (Duthie 1985). The child finds it easier to depict separate objects as three dimensional than compound or complex objects.

Transparency: The child's tendency to look inside objects and draws them as if the external shell is made of glass (Gibreen 1981). Elements are often drawn transparent to reveal what is hidden.

Side-by-side arrangement: the child draws details which are in reality part of a whole, side by side and distributed over the paper.

Mixed views in a single scene*:* children draw using mixed views in a single scene.

2. METHODS OF INQUIRY

The objective of this research is to investigate some aspects of the relationship between children and their architectural environments, through analyzing graphic representations of seven architectural settings: the bedroom, the house, the neighbour's house, the playground, the neighbourhood shop, the neighbourhood and the city (Amman).

As a first stage, a pilot study was conducted, with the aim of testing research techniques and questionnaires. The pilot questionnaire was distributed among 20 children, randomly selected from different environments, backgrounds and with different age groups. Based on which, the final research techniques,

questionnaire design and sampling procedure, were defined.

2.1. Sampling procedure and data collection

Research participants were chosen from the same neighbourhood area located in west Amman, Jordan. The choice of a single neighbourhood aimed at keeping the social, educational, and economical backgrounds constant, in order to establish a common base of comparison. The sample's age group was defined between the ages of 7-12 years old. As it was established in the reviewed literature, the age between seven and nine, marks the stage of visual realism, where children start to realistically depict, perspective, proportion, colours, ornaments, measurements and distance. Based on this age group and the physical area of the neighbourhood, the final sample size was automatically defined to (47).

Data was collected by means of survey questionnaires supplemented by interviews. Distributing the questionnaire was done through children's parents, to whom the aim and the importance of the study were explained. It was made clear that children should have the freedom to choose any drawing media they please and also to be given all the time they need to complete the seven drawings. The collected data was elementary examined, photographed, and classified. Based on this examination, five Participant's questionnaires were excluded. The final sample size was set to 42 valid questionnaires: (19 males, 23 females).

2.2. Questionnaire design

The final design of the questionnaire consisted of two sections. The first section contains questions related to the child name, age, sex, type of residence, and a brief introduction on the importance, aims and procedures of the study. In the second section, children were asked to draw seven architectural settings related to their direct environment. These include: I draw my room; I draw my house; I draw my playground; I draw the neighbour's house; I draw the neighbourhood shop; I draw my neighbourhood; and I draw my city. For each drawing, a white square paper (size 300mm * 300mm) was provided. Square shaped paper was chosen in order to avoid the bias of orientation, which was obvious in the pilot study.

To help reach appropriate understanding and interpretation of children's drawings, non-structural interviews, with the children and their parents, were conducted. The collected verbal data was used to understand the depicted representation as compared to the actual setting.

2.3. Documenting the physical settings

To establish a base of comparison, the area of research and the different targeted architectural settings were documented using photographs, areal photos, sketches, and maps.

3. ANALYSES AND OUTCOMES

Analyses of drawings were conducted using two methods:

1. Statistical analyses were used to identify broad patterns in the data. These analyses were based on the number of occurrences in each examined issue of research. Two main categories were investigated: typology and gender related issues. Typology analyses were focused on defining patterns of representation, which might illustrate a common way of thinking and also looking for diversity and uniqueness of representation, which might illustrate creative impulses of the child's way of thinking. Typology analyses investigated biases related to stereotypy, transparency, drawing arrangement, point of view, orientation, synthesis, proportion, colour, ornament and perspective. Gender analyses focused on examining gender differences within the typology analyses.
2. Qualitative analyses examined the statistical results in order to understand why the broad patterns or uniqueness emerged. These analyses were supported by available literature and by comparing children's representations to the actual settings.

3.1. Analyses of bedroom's drawings

These analyses were divided into two main components. 1. Analysis of the architectural setting, which included: boundaries, areas and spaces, walls and ceiling and colours. 2. Analysis of furniture and other household items, which included: furniture objects, furniture arrangements, colour and detail and method of representation.

3.1.1. Outcomes

- %96 of children drew their rooms' spaces in terms of arrangements of separate objects, forming the overall space (Fig. 1). For most children, identifying space as a three dimensional volume, was a challenging task, instead they could more easily identify separate objects and areas.
- For the child, in its process of learning and discovery, various objects of furnishings present a variety of types of experiences: wardrobes standup and conceal; chests of drawers contain and induce classifications; beds provide the unlimited tactile experience; doors define boundaries and stimulate inquiry about mechanisms of movements; keyholes and windows provide an opportunity for voyeurism, both from inside-out as well as from outside-in (Fig. 3). A substantially higher percentage of the male children included windows and doors in their drawings (70.58%), than females (43.40%).
- Accessories and tactile objects were among the most represented and emphasized elements (94.80%). They were drawn with all their details; shapes, colors, textures, sizes, and ornaments. Accessories were represented as points of control and instruments of change. Such items, therefore, should be designed carefully in terms of their shape, color, size, and location. The ease with which a switch or a handle can be reached, relative to the age, size, or physical ability of a child, creates an experience of success or failure.

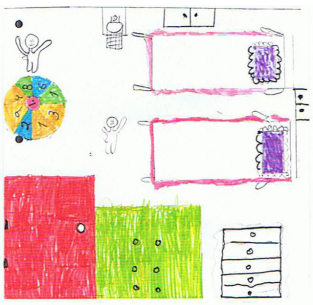

Figure 1: Interior drawing of the bedroom by Raed, age 9; representation of various objects and accessories.

3.2. Analyses of house's drawings

These analyses included drawings of the child's own house and the neighbour's house. The discussion was built according to the methods of representation presented by children, which basically fall under two main headlines. 1. Mapping the interior, which included; plans, and furniture arrangements. 2. The outside image, which included; two dimensional views (elevations, sections), and three dimensional views.

3.2.1. Outcomes

- Almost %70 of children represented their houses as a vertical independent being, located at the centre of the page. It was presented with its frontal facade and its basic geometric shapes (Fig. 2). This facade was represented as a clean background surface housing all the elements of importance.
- Some patterns of representation were found: 1. Simplicity in shape and design. 2. Clarity of using the basic geometrical forms. 3. Attention to details. 4. The importance of typology in forming the child's vocabulary of elements, upon which the image of the house is formed in the child's mind. 5. The ease with which the child read an elevation is linked with its ability of perceiving the different geometrical shapes connected to the main background plain.
- Doors, and windows, were one of the most depicted exterior features. These elements open the way into the inside (Fig. 3).
- Privacy, territoriality and ownership were among the very important issues that strongly influenced the child's image of his house plan. These issues are mainly controlled by patterns of social interaction, which is controlled by culture and religion. By comparing the represented maps to the actual house plans distributions, 92.30% of children separated the public zone (main entrance and guest areas) from private zones (family areas and bedrooms).
- Apartments were mainly represented by the interior setting, rather than the exterior (Fig. 4). This might be due to issues related to territoriality and ownership.

3.3. Analyses of playground's drawings

These analyses investigated some basic issues related to children's play environments. These issues include:

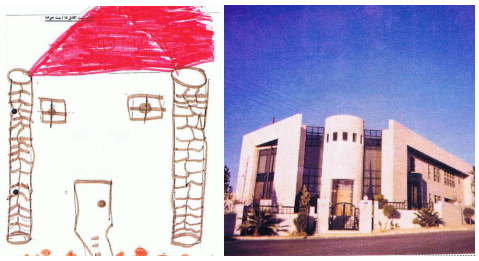

Figure 2: Left: drawing of the child's house by Diana, age 10; Right: an image of Diana's house; representation of basic geometric shapes

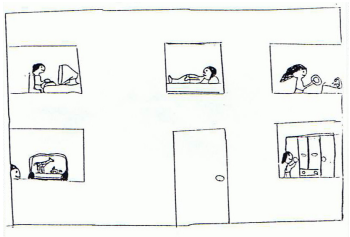

Figure 3: Drawing of the child's house by Zaid, age 9; windows into the inside.

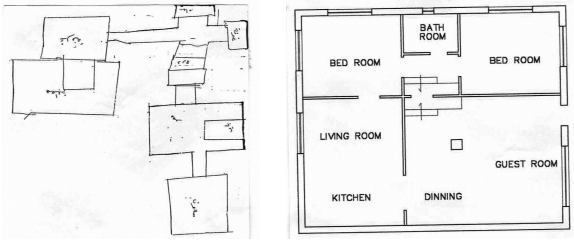

Figure 4: Left: drawing of the child's house by Abdula, age 7; interior representation. Right: the Actual plan of Abdula's apartment

1. Active and passive. 2. Hard and soft, natural and people built. 3. Open and closed. 4. Private and public. 5. Colour and detail. 6. Space shape and size.

3.3.1. Outcomes

- For children, the power of roles is not as important outside the immediate context of home and school. Away from home children have the chance to direct their behaviour and to observe the consequences. Accordingly all drawings neglected any connection with any part of the house. Most of the represented play grounds where drawn in complete isolation.
- While most female children (%78.7) drew boundaries to define their playgrounds, 70.59% of male children drew their playgrounds with no edges at all. Research experiments strongly link privacy and territoriality as socio-environmental phenomena (Bowers 1979). The male child seeks rich, sensory stimulation of large-muscle activities which only open spaces can provide, he often looks for opportunities to manipulate or mess about in the setting, unlike the female child who usually can be

more tidy, content, and less active. Moreover, girls are far more likely to have their movements restricted due to social boundaries in the Jordanian society (Bisharat 1996).

- Four main different shapes of playgrounds were drawn by children: the rectangular shape (%62.5), the circular shape (%5.0), the linear shape (%20.0), and the irregular shape (%12.5).
- Football games were the most popular play activities among male children, and were represented often in their drawings. Unfortunately dangerous spaces were, often, depicted as legitimate play spaces. For example, when boys temporarily lay stone goal posts across a street to play football (Fig. 5). Designers and planners need to structure the physical environment to help avoid sex-stereotyped representation. It is important to provide a world, in which boys and girls can choose from the greatest possible range of roles and behaviours.

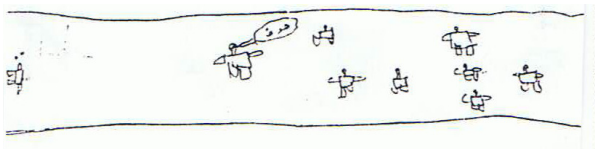

Figure 5: Drawing of playground by Abdula, age 7; the street as a playground.

3.4. Analyses of the neighbourhood's drawings

These Analyses included three main principal neighbourhood characteristics: Size and boundaries, identity and character and components and details.

3.4.1. Outcomes

- According to drawings, the child's definitions of its neighbourhood in terms of size, boundary, and identity were not represented clearly. No clear image was found of the neighbourhood character, the only way to present the uniqueness and identity of the neighbourhood was by singling out certain local landmarks which acted as types of point - reference. Landmarks were used as clues of identity. This was done to mark the distinction and singularity of the child's own neighbourhood's territory (Fig. 6).
- The boundaries of the neighbourhood, as represented by children, were not defined in terms of physical or visual definitions, but rather according to the child's social relation, and freedom of movements.
- The components of the neighbourhood's image were a combination of houses, paths, and landmarks. The image of the house dominated the neighbourhood structure. The neighbourhood was often represented as a group of iconic "Stereotypy" representation of houses (52.5%).

3.5. Analyses of neighbourhood shop's drawings

The discussion of this section was built according to the typology of drawings presented by children of their neighbourhood's shop. These analyses basically discussed representations of the internal image and the external image of the shop.

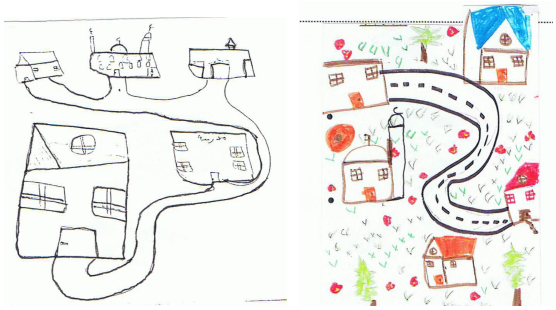

Figure 6: Left**:** drawing of the neighbourhood by Hadeel, age 7. Right: drawing of the neighbourhood by Diana, age 11; the mosque as a landmark.

3.5.1. Outcomes

- Based on children's representations, "order" represented the key characteristic in describing the inside space of the shop; objects were arranged on shelves or within wardrobes according to a systematic categorizations. Each group of items was grouped together according to its size, colour, shape, and function (Fig. 7). In order to classify a group of objects, a child must be able to coordinate two dimensions that make up the concept class. First, the child must single out the criteria that define the class; second, the child must select all those objects that fit the criteria (Newman and Newman 1978). Moreover, colours present children with a very important tool of classification (Fig. 7).
- The prominence of signs in children's representations provided an easy way for communicating the idea of the neighbourhood shop. Signing systems provided important features of the shop's external image. It was clear that children took pleasure in representing the colourful display of signs (Fig. 9). Transparency also represented an important quality of the outside shop's facade.

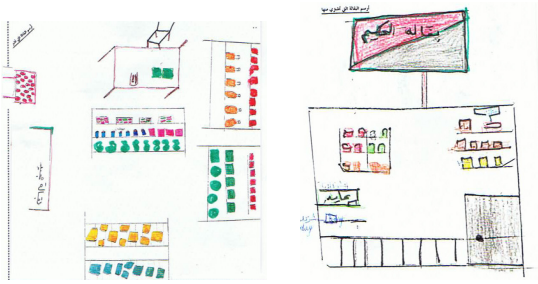

Figure 7: Left**:** drawing of the shop by Worood, age 12; classifications and colours. Right: drawing of the shop by Dana, age 11; transparency and signage.

3.6. Analyses of city's drawings

It is the aim of this section to understand how children, as one population group, perceive their city, and to

evaluate the components of perception, upon which the image of the city is built. It is increasingly clear that the city environment is perceived differently by different population groups. Variations in motivation, familiarity, cognitive skills, travel mode, and information sources, etc., all affect urban perception (Goodnow 1977).
These analyses were divided into two main categories: imageability analyses and city elements analyses. The Imageability analyses were based on understanding the component of imageability of the city, as recognized by Harrison and Haward (Harrison and Howard 1980): the physical components, which include location and appearance and the cultural components, which include meaning and association. The city elements analyses followed Lynch's classification of the city elements: paths, edges, districts, nodes, and landmarks, which, according to Lynch, form the basic components of building the mental image about the city (Lynch 1960).

3.6.1. Outcomes

- The representation of the city, as evidenced in the drawings, displayed a wide range, from the most centralized and orderly, to the most dispersed or non-hierarchical assembly of volumes or elements. In between, lay a percentage (17.5%) of representations that employed type of drawing using roads as datum. This latter type stands in-between the most orderly and centralized, and the least orderly and hierarchical assembly in the direction of a labyrinthine representation of the city.
- Based on the analyses, children represented their city in terms of separate entities, while struggling to connect these elements to each other or even to the actual reality. Because children are accustomed to travel in the city by automobiles, the circulation image seemed to be the dominant one (Fig. 8). Moreover, because children are not allowed to move freely within the city, but only within the boundaries of their neighbourhoods, the image of the neighbourhood dictates the main characteristics of the image of the city. As a result many children represented the city dominated by high-rise apartment buildings (Fig. 9).
- Nodes, baths and landmarks were the most represented elements in the city (Fig. 8).
- The cultural components of imageability seemed to be the dominant component which affects the child's image of its city.

Figure 8: Left: Drawing of the city by Mustafa, age 11. Right: Drawing of the city by Zaid, age 9; paths, landmarks and nodes dominated the city's image.

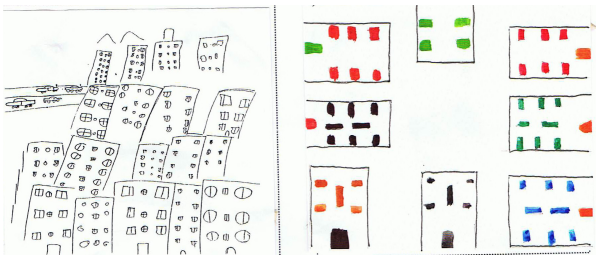

Figure 8: Left: Drawing of the city by Suliman, age 9. Right: Drawing of the city by Ruba, age 9; high rise apartment buildings.

CONCLUSION

The study concluded that the typology of objects, within a space, represents the most recognizable features to the child. Different objects present themselves in different ways according to the kind of experience the child has with it. These experiences represent the main contributor in building the child's image of different objects. The spatial dimensions, as we understand it, were represented as a byproduct of the positioning of objects. Indeed in this way it is the left over space between objects; exactly that which we as architects usually consider a drawback in any design. Thus in matters pertaining to interior furnishings for children, it would be advisable to place higher importance and significance on the design of the objects themselves rather than the customary attitude of integrating furniture with the space defining elements, such as the case of build-in furniture. Therefore, so-called integral or integrated furnishing (build-in furniture) would be undesirable because it eliminates the uniqueness of each object.
The study also concluded that male children were more realistic in their representations and more capable if representing the three-dimensional world, while female children were found to be more iconic in their overall graphic representations. This difference might be accepted as the natural product of the two different types of gender play; male children often seek rich sensory simulation of large-muscle activities, which can only be provided by large open spaces. This gender difference can also be linked to the child's patterns and freedom of movement. The more extensively children are permitted to roam and explore, the more accurately they can conceptualize the spatial relationships on their environment.
Once it is established that the cause of these gender differences is cultural and not inherent or natural, it becomes extremely crucial to underline that children of booth sexes would need the different sensory experiences provided indoor and outdoor play. The child, male or female, can never become fully developed without the exposure to the range of activities provided by the open world. Designers and planners therefore need to compensate for the lack of physical activities by creating play areas that provide visual simulation, and the equal chance to exercise open-field play activities. Further investigation of the

relationship between mobility and spatial visualization is recommended.
The analysis of the different settings, displayed a wide range of representation, from the most centralized and orderly (the room and the house) to the most disperses and non-hierarchical assembly of elements, in the direction of a more labyrinthine representation of the city. It became evident that this range of representation verifies the child's knowledge of the drawn setting. The child's understanding of these settings becomes more limited with the increase of physical scale.

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