



# Redefinition of the Participation Process of the Architecture and the Child Based on Children's Creative Thinking Abilities

Behnam Behnia<sup>1</sup>, Mehran Kheirollahi<sup>2</sup>, Mahdi Sahragard<sup>3</sup>, Atefeh Soltanifar<sup>4</sup>

1. Ph.D Candidate in Department of Architecture, Mashhad Branch, Islamic Azad University, Mashhad, Iran

2. 3. Assistant Professor, Department of Architecture, Mashhad Branch, Islamic Azad University, Mashhad, Iran.

4. Associate Professor, Department of Psychiatry, Mashhad University of Medical Sciences, Mashhad, Iran

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## ABSTRACT

**Statement of the Problem:** Architectural issues have various aspects, and creatively responding to such issues is an important criterion in evaluating the quality of architectural works, thus seeking effective factors on these aspects is of special importance for prompting the quality of responding to architectural issues. Nowadays, participatory architecture is a general approach which focuses on involving individuals and specialists in the process of designing. In this regard, observing children's civil rights aiming at obtaining a mutual understanding between the child and the designer is considered as the main focus of designers to children in the processes of participatory designing while frequently ignoring the abilities of children's thinking system in the areas of idea development and designing. Therefore, using the abilities of children's thinking system in creating architectural works and its conditions is the main issue in this regard.

**Research Question:** How are the theoretical foundations of the effectiveness of the architect-child participation explained in improving the quality of responding to architectural issues?

**Research Objectives:** The current study aims at introducing a new aspect of participation beyond the general perspective of research so far conducted in this area while considering fundamental concepts in the area of children thinking.

**Research Method:** This research applies a qualitative, fundamental, and descriptive- analysis based method in addition to seven-step meta-synthesis method by Sandelowski and Barrosos. The study results indicated that "architecture-child participatory thinking" can be introduced as a new "architect-child participation" method. In this new method, the product of participation is developed based on "architecture-child interactive thinking", and the role of children is upgraded from "respondent" to "the main thinker". During the design process, children make "creative comments" alongside the architect and the architect simply "standardizes" the end product.

**Keywords:** Child, Creating architectural works, Thinking system, Participation

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## 1. INTRODUCTION

Fisher (2007) defined "thinking" as any mental activity that facilitates problem-solving, decision-making or comprehension [1]. Dortaj et al. (2017) attached great importance to "creative thinking" because of its role in generating new ideas and defining it as the ability to quickly lateralize thoughts [2].

Bani Talebi Dehkordi (2018) introduced "creative thinking" as a factor in developing decision-making capacities [3]. Furthermore, Shabani (2018) considered it as a factor in creating new ideas [4]. Since the creative aspect of architectural work is assumed as a crucial criterion for its evaluation, the study of the factors that promote the creative aspects of the architectural work is of special importance. Children have a high ability to solve problems creatively.

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\*Corresponding Author:  
dr.MehranKheirollahi@gmail.com

According to Raouf (2009), children are instinctively meticulous and observe so-called small but real things [5]. Kashanijoo et al. (2012) believed that children are curious and imitative and can easily be guided to the desired path [6]. Najafi et al. (2017) demonstrated that children have a remarkable ability to shape the environment and devise new strategies for the problem when confronted with it [7]. Thornton and Bruner (2007) emphasized the ability of children to deduce. They believed that children utilize a series of different strategies in a short period of time, i.e., two or three or a maximum of five minutes. When faced with problems, they try to modify their previous successful strategies even if they have already responded. They can make wise inferences. When confronted with a seemingly silly question, they assume that the adults really asked a reasonable one. Thus, they attempt to act intelligently [8]. Thus, "self-logic" is just one of the problem-solving strategies challenged by children. Studies have shown that part of the human thinking ability would fade out in the transition from childhood to adulthood, which can be considered one of the barriers to creativity in adults and a contributing factor to their inability to see the environment through children's eyes. Comparisons between children and adults for thinking abilities yielded the question as to how the children's thinking system can fill the gap in the adult thinking system. In recent years, many designers have been concerned about architect-child participation. For example, Kamel Nia (2010) underlined the need to develop an architect-child conversation language [9]; Haghighi Boroujeni (2012) emphasized the need to improve the architect's skills in participating with children [10]; Ezzatian (2017) underscored increasing children's awareness of their opinions [11]; Driskell (2002) focused on the entrustment of project responsibility to children [12]; C Read (2014) stressed children's freedom of expression [13], and McNally (2017) accentuated the designer's use of parental assistance as a means of conveying his ideas to children [14]. Meanwhile, Chawla (2002) [15] and Ashford (2018) [16] defined "children's real participation in design" as the child's direct comment to the designer. Although not professional forces, children possess creative abilities and the ability to express their opinions. For example, Lawson (2014) argued that such opinions would be possible by

relinquishing this role to non-specialists, i.e., children, and placing them in the architect's role and not merely exploiter [17]. Therefore, architects looking to produce unusual works should address the importance of children's influence on decision-making and design process. This is because participatory techniques help children come up with interesting and unimaginable ideas, according to Mazaherian and Ghasempour (2016) [18]. However, "participation" is often not addressed in conventional research regarding a child-designer consultation. Thus, the main point is that participation with children is not important just in terms of respecting their citizenship rights. Instead, beyond the perspective drawn by other researchers, a new perspective should be drawn on this category to facilitate the architect-child consultation and exploit children's thinking capabilities as an effective way to improve the quality of response to architectural problems.

## 2. Research Method

This study relies on a descriptive-analytical method based on secondary data extracted from desk research and primary data extracted from secondary data analysis. Secondary data encompasses the specific abilities of perception, thinking, and problem-solving in children, the concept of participation, and the researchers' view of this concept. The primary data includes the key points from the analysis of the information collected in the previous step. Due to the interdisciplinarity of the research, desk research was conducted in four areas: "Child Psychology", "Architecture", "Participation", and "Creative Thinking". Sandelowski & Barroso's seven-step meta-synthesis method was employed to systematize the aggregation, analysis, and synthesis of the collected data. In the first step, the research question was reviewed and scrutinized. In the second step, desk research was carried out on "child", "participation", "participatory design", "creativity", "creative thinking", "convergent and divergent thinking", and "specific features of children's thinking". In the third step, the collected resources were examined, and at the same time, note-taking of the resources was performed. The fourth step involved discussing the content of the notes. Then, the notes directly related to the formation of the response to the main research question were separated. In the fifth step, the

authors analyzed the content of the notes. The notes were then coded, and the codes were reviewed several times for scrutiny. Finally, the final codes affecting the development of an answer to the research question were extracted. The sixth step involved checking the validity of the codes using the Glynn tool. Introduced by Lindsay Glynn in 2006, this tool assesses the validity of qualitative research, especially used to assess the validity and reliability of findings in meta-synthesis methodology. The sources of the extracted codes were evaluated using the Glynn questionnaire. Codes that failed to obtain the required score were excluded. In the seventh step, the codes were categorized in MaxQDA 10. (This software is used in qualitative research. It helps the researcher take notes, encode notes, connect codes with a common theme, categorize codes, and compare the volume of important points of a code subset with other codes.) Then, effective concepts were developed to answer the research question. Utilizing these concepts, the general structure of problem-solving and creative thinking in children and adults was developed. Then, creativity inhibitors in adults were extracted by comparing the structures. The designers then outline the architect-child participation perspective to take advantage of the capabilities of the children's intellectual system, emphasizing the distinguishing features of the children's intellectual system in producing creative responses.

### 3. Background on children position in participation designing processes

Children's participation has been introduced as an area that children can present their comments about the surrounding area [11]. In other words, many adults consider children's participation merely as a good sense for children while having a low value for responding to their special issues [19]. Children are not specialized forces, but as previously mentioned, they have outré creative abilities and are capable of commenting by giving them (non-specialized children) a role to play, entering them into the negotiation process, and putting them in the role of an architecture rather than merely a beneficiary one [17] Thus the importance of children's effectiveness in decision making and designing processes should be considered by architectures who seek to create unusual works [10]. Participatory methods lead to the presentation of attractive and non-imaginable ideas by the children [18]. However, the authors' investigation and classification based on the literature review on children's role in the children-architecture participation process (2007-2019) show that most studies have been complied based on extracting children's interests aiming at respecting their comments and observing their civil rights in addition to providing valuable scientific results in this regard. To the best of our knowledge, none of these studies have addressed participation from the perspective of child-designer consultation (Table 1).

**Table 1.** Domestic and External Research Contents in the Area of Children-Designer Participation (Source: Authors)

Contents of Discussion and Conclusion	Researchers
Evaluating the present situation from the perspective of observing children's civil rights	(Haghighi Boroujeni & Feizi, 2012; Mansouri & Qare Beiglou, 2012; Galan, 2015; Wagner & Bratteteig, 2018) <sup>10,45,48,58</sup>
Providing empirical strategies for children's participation	(Golestani, Kamali, & Roushan, 2016; Kleine, Pearson, & Poveda, 2016; Van Mechelen, Vandenberghe, & Derboven, 2018; Molina, Tanner, & Seballos, 2018) <sup>49,50,56,53</sup>
Investigating the existing obstacles for children's participation	(Shahabzadeh, 2016; Najafi, Daviran, & Noor Ali shahi, 2018; Ezzatian, 2017; Van Mechelen, Zaman, & Horton, 2014) <sup>49,7,11,57</sup>
Emphasizing or complying the communication language of the designer and children for improving the quality of participation processes	(C Read, Fitton, & Horton, 2014; McNally, Mauriello, Guha, & Druin, 2017; Sang & Kun-Pyo, 2018) <sup>13,14,54</sup>

## 4. Theoretical research foundations

### 4.1. Defining a child

In the UN convention, children are attributed to all individuals under 18 years old [20]. In this

span, their thinking structures and decision making strategies are different [21], which is because the structure of decision making in under 8-year-old children is of non-compensatory or

low-level processing type, and >15 years old children, based on various trainings during their education, have a criterion-based thinking system, which is one of environment obstacles for creativity [22]. Accordingly, the evaluated children in this research are in the age range of 8-15 years old. Children in this age range are responsible and creative [23], then they have the ability to provide creative responses to the posed issues while having high levels of capacity to process issues regardless of the dictated rules to their thinking system.

#### **4.2. Ability to understand the environment in children**

The lack of success in architects in simulating the children's understanding process merely leads to the creation of inefficient areas for this group of users [10]. On the other hand, feedbacks and effects, which the child receives from the environment, affect his/her growth [24]. Therefore, discovering the manner of children's understanding from a sophisticated environment greatly paves the way for improving the quality of environments that the children are dealt with in their lives [25]. Piaget suggests that effective structures in understanding the physical area, including topological structures (i.e., adjacency, distance, interference,, and) and graphical structures and the metric system (i.e., measurement, displacement, and two/three - dimensional simultaneous and parallel coordinates), are formed in children from the childhood period [26] although children's understanding of the world is entirely different from that of adults [27], and children differently perceive the world compared to adults [28]. They enjoy some kinds of perspicuity in perceiving the world which has been interpreted as mental realism and is replaced by visual realism by increasing age [29]. The child's method of action for representing the external fact is not visual similar to that of the adults, instead, it is a mental method. In other words, if adults show one aspect of the external facts of a subject when drawing it while considering logic, the child can succeed in demonstrating all invisible but imaginable dimensions by his/her simplicity. Accordingly, the way of understanding and evaluation of external phenomena in adults entirely differs from children's understanding [30].

#### **4.3. Physiognomic perception**

Children imagine the subjects full of life. A noisy truck may seem angry and a piece of cloud is imagined single and sad. Werner interpreted this subject as physiognomic perception [31], which differs from geometrical-technical perception and is a more realistic interpretation and is close to the orientations of researchers and technicians. Adults believe that physiognomic perception is proper only when stimuli are alive. In other words, attributing some affections to rocks, woods, cups, and other inanimate subjects is naïve. However, the situation varies for children since they perceive the generality of world full of life and affections because of the lack of accurate borders between themselves and the environment. When the child sees a cup lying down on its side, he/she may utter that it is tired. In addition, seeing a stick split into two halves creates a sense in the child to think that the wood is damaged, or the child may perceive number 5 as a kind of face and may indicate that this number is angry. Werner believed that physiognomic perception is impeded by some kinds of geometrical-technical attitudes. Nonetheless, we have never lost our ability for physiognomic perception and this ability grows in our sole but it is slower compared to the geometrical-technical perception. The development rate of artists' physiognomic sensitivities has been represented by an artist called Kandinsky. He mentions that even geometrical shapes have their own internal sounds and special smells. The comparison of the child with an adult is similar to that of an artist and a researcher from many aspects. A child, like an artist, perceives the world physiognomically and lively with his/her inner sense and in the form of an image [32]. Werner also suggests that physiognomic perception in adults is less dominant in comparison with children although it remains in our sole and plays a role in our artistic and literary viewpoints [31].

#### **4.4. Thinking and creative problem-solving**

Thinking is a current in which a person attempts to identify a problem he/she has encountered and proceeds to solve it using his/her previous experiences [33]. Torrance and Guilford believes that creative thinking includes elements such as fluency, flexibility, originality, and elaboration [34]. Fluency is the talent to produce frequent responses and flexibility indicates the talent for generating ideas with various methods of problem solving. Furthermore, innovation is the ability to

think in an unconventional way and provide unusual responses. Finally, elaboration means the ability to attend to details during performing an activity [35]. Creative thinking is formed in a way that leads to new results [36] and is the factor for developing decision-making capacities, [3] and paves the way for creating new ideas [4]. Creative thinking has been identified as the ability to rapidly rotate thoughts [2]. Torrance refers to creative thinking as a kind of problem solving [37] and Gardner suggests that the person is considered to be creative when he/she creates or solves a problem [38]. Additionally, Amabile suggests that knowledge affects the creativity circle as a facilitator or prohibitor factor [39]. Researchers have found that creative individuals have common characteristics including playing with thoughts. Werner further believed that most creative thinkers do not restrict themselves to advanced and logical analyses [32]. Fisher considers characteristics such as divergence to be special to creative thinking [33] since there is no deterministic response in divergent thinking and many responses may exist, and thus it can be considered as creative thinking [40]. From Guilford's viewpoint, creativity is the same as mental divergence [41]. Conversely, convergent thinking is conservative and based on a special rule and thus no new thoughts can simply enter into it [42]. In addition, although this type of thinking cannot produce new ideas by itself, it can integrate new thoughts with old ones, monitor the performance, remove unsuitable things, and select the best ones [40] because it relies on data integration and reaches only one true response based on logical methods [43], and acts as an inhibitor of creativity in adults. For solving the problem of the new world, convergent thinking is not considered an appropriate method while problem solving with divergent thinking leads to providing proper strategies and fundamental new ideas [44].

#### **4.5. Children's techniques for dealing with problems**

Researchers and trainers such as James, Santayana, and Stern believe that children have creative intelligence [30]; they innately see well and attend to tiny, but real things [5]. The child is curious and an imitator and can be put in an intended direction [6]. Children have considerable abilities in shaping the environment [7].

Oppenheimer, a famous American physician, once mentioned that children playing in alley could solve one of his physics problems because they had some kinds of perception that he has long lost [30]. Children would like to repeatedly regulate things which belong to them [17], implying that regulation is a redefined norm in children's thinking system. Strategies for decision making in children is different depending on their age range so that it is of non-compulsory or low-level processing type in little children. However, older children use a compensatory strategy which is considered to be of a high-level processing type, and are similar to adults in this regard [21]. A child, is slaved by sudden excitement and has no hesitation in initiating a relationship and organizing various issues [45]. Children can truly enjoy solving a problem and innovate new strategies when encountering a problem. Moreover, they have the ability to conclude and Children use different strategies in a short period of time (i.e., two, three, or at last 5 minutes). They even change previously successful strategies if finding a new response [46].

#### **4.6. Belief bias in adults**

Adults involve in belief bias. These biases can be considered as the result of training and the socialization process [47], thus adults prefer to conclude about the real world based on their previous knowledge and it is hard for them to overlook this knowledge while children can conclude extremely wisely. Children, who encounter an apparently stupid question, suppose that adults have asked them a reasonable question, thus attempt to act smartly. Therefore, it is only one of the methods of processing a problem per se [46] and children have challenged it.

### **5. Findings**

5.1. Perception and evaluation of external phenomena are different in children and adults. However, adults do not generally consider such phenomena since the structure of environment perception and children's thinking is ambiguous for adults while this structure is full of partiality and creativity. Children acts smartly when faced with a problem. Research findings represent that children have quadratic characteristics of creative thinking (Table 2) and can change responding strategies to problems with a multifaceted view.

**Table 2.** Comparative Comparison of Problem-solving Characteristics in Children Having Creative Thinking Characteristics (Source: Authors)

Problem-solving Characteristics Based on Research Results	Characteristics of Creative Thinking Based on Theories of Torrance and Guilford
Producing a chain of different strategies	Fluency
Changing previous successful strategies	Flexibility
Producing new strategies	Innovation
Attending to all surrounding details	Elaboration

5.2. Children’s thinking system is capable of becoming insignificant by transition from childhood to adulthood and leads to a difference in the child and the adult in understanding the

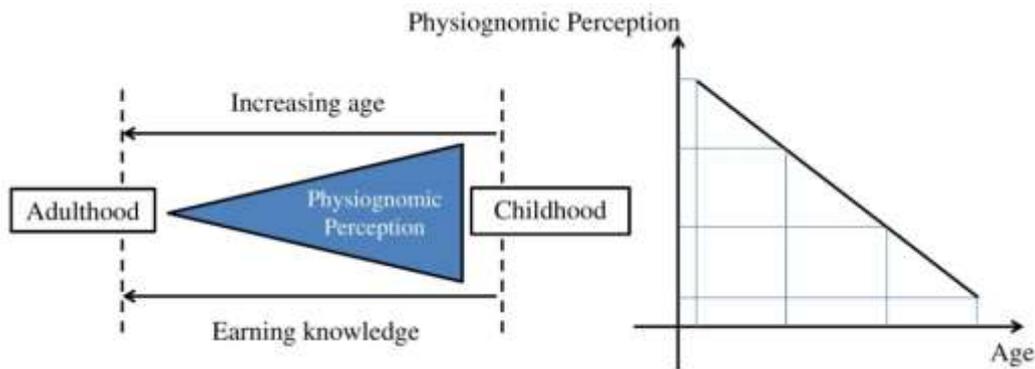
environment and disability of adults in viewing the environment from point of view of children’s viewpoints (Figure 1).



**Figure 1.** Special Abilities of the Child’s Thinking System (Source: Authors)

5.3. An effective parameter of “physiognomic perception”, which plays a role in aesthetic viewpoints of artists and designers, becomes

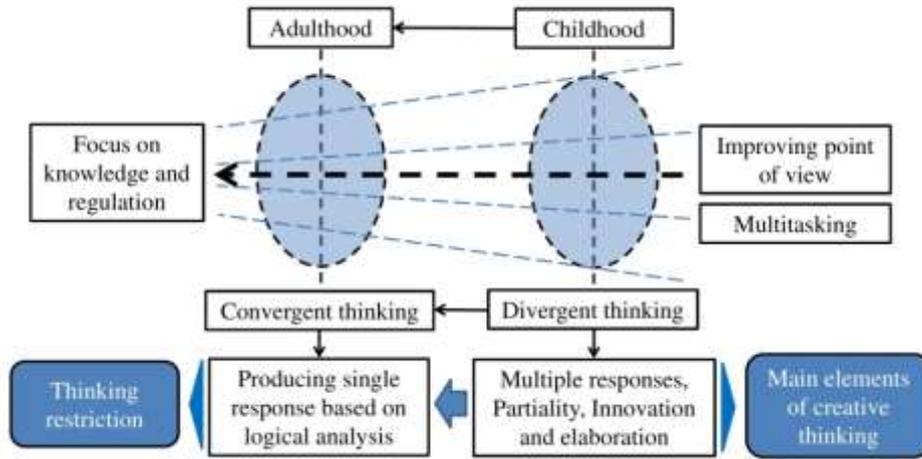
insignificant in transition from childhood to adulthood based on the geometrical-technical view (Figure 2).



**Figure 2.** Insignificance of the Physiognomic Perception with Increasing Age (Source: Authors based on Werner’s theory)

5.4. Adults’ mental system encounters with belief bias, which restricts their conclusion ability in limit of knowledge and regulation while children

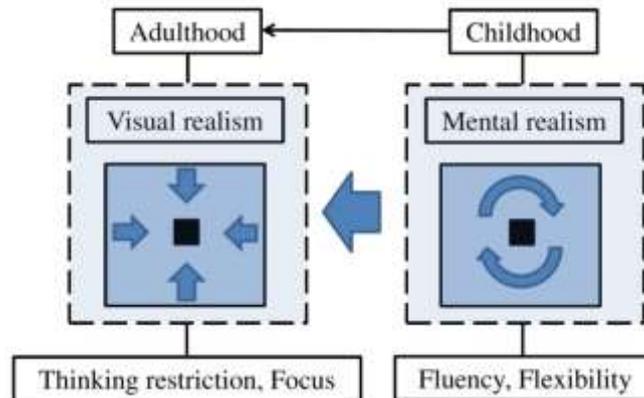
perceive problems abstractly and produce various responses regardless of this inhibitor factor (Figure 3).



**Figure 3.** Belief Bias via the Convergence of Thinking in Adults  
(Source: Authors based on the theories of Torren ton and Brunner)

5.5. Adults have a more superficial viewpoint about realities that relies on visual power and involves their criteria and knowledge while

children have no mental restriction and perceive all phenomena, subjects, and physical environments completely transparent (Figure 4).



**Figure 4.** Reducing Mental Fluency and Increasing Focus  
(Source: Authors)

**6. Discussion**

Findings indicate that children's thinking system has several pure capabilities that have been neglected in most participatory methods in the literature review. Thus, these findings could open a new perspective on child-architect participation. In this new perspective, contrary to the results of studies such as Haghghi (2012), Mansouri (2011), Galan (2015), etc., the main goal is not to strengthen children's citizenship rights by expanding their participation. This is while the research results have attached a high status to children's right to express their opinions. Instead, these findings can be used to provide new architecture-child participation strategies and thus

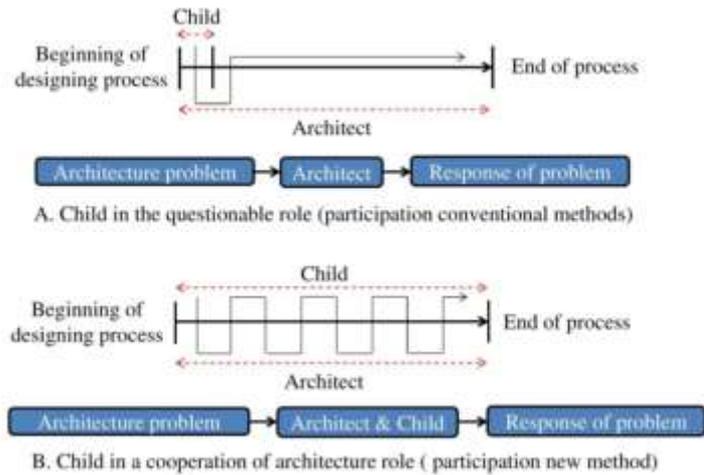
develop the results of studies such as Golestani et al. (2015) and Kleine et al. (2016), Van Mechelen et al. (2018), etc. Research results can also be utilized to emphasize researchers such as C Read et al. (2014), Mc Nally et al. (2017), and Sang (2018) and improve the quality of participatory processes by emphasizing the presence of children with the architect and architect-child interactive thinking. A comparison was made between the findings and the results of the research reviewed in the literature. The results showed that most of the architect-child participation researches face a great challenge. This is because the adult intellectual system, confined to knowledge and norm bounds, which has lost many of its

capabilities in the transition from childhood to adulthood, engages in problem-solving for a fluid and flexible thinking, based on all participatory processes based on children surveys. Such thinking certainly influences the child's wishes and criteria in accepting architectural spaces. In other words, an intellectual system that has lost many of its creative capabilities attempts to design an architecture for pure and creative thinking. Designers have employed participatory methods to address this challenge. Nevertheless, according to literature reviews, conventional participatory methods have failed to exploit all of the children's thinking capabilities in the architectural design process. These studies have ignored the issue of participation in terms of exploiting children's ideas and their creative abilities. At best, children are seen as exploiters surveyed by designers on the design theme at the beginning of the design process, unaware that children have pure abilities to inspire them. Therefore, using children's thinking for ideation and architectural design is considered a missing link of participatory architectural design processes. Neither participatory models nor studies in this area have ever addressed children as small architectural collaborators who can work with the architect throughout the design process. The findings suggest highly functional intellectual abilities of children's creativity that can be exploited by the architect for ideation and provide the architect with a wide range of different ideas about the architectural problem. Nonetheless, the architect should scrutinize and standardize these ideas as the process progresses. The architect-child consultation during the design process will definitely lead to the creation of architectural work. The children involved in this architectural work production will establish a much better emotional connection with it. Hence, architecture-child interactive thinking can improve the product quality of participatory processes and the status of participation with children in architectural design processes for children.

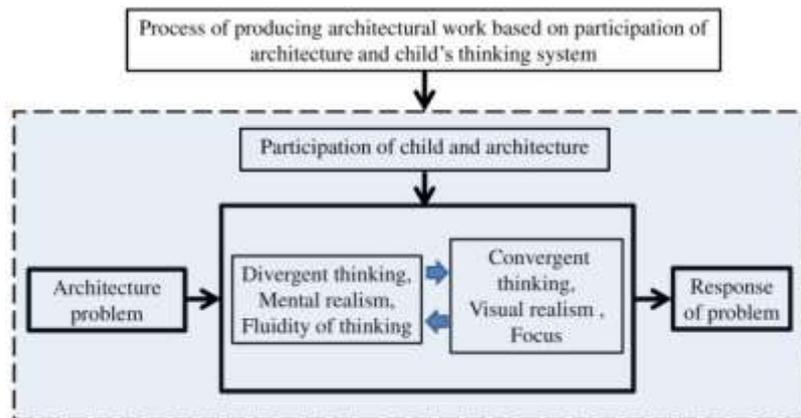
## 7. Conclusion

The background of children's position in participation designing process showed that conventional participation methods fail to use all

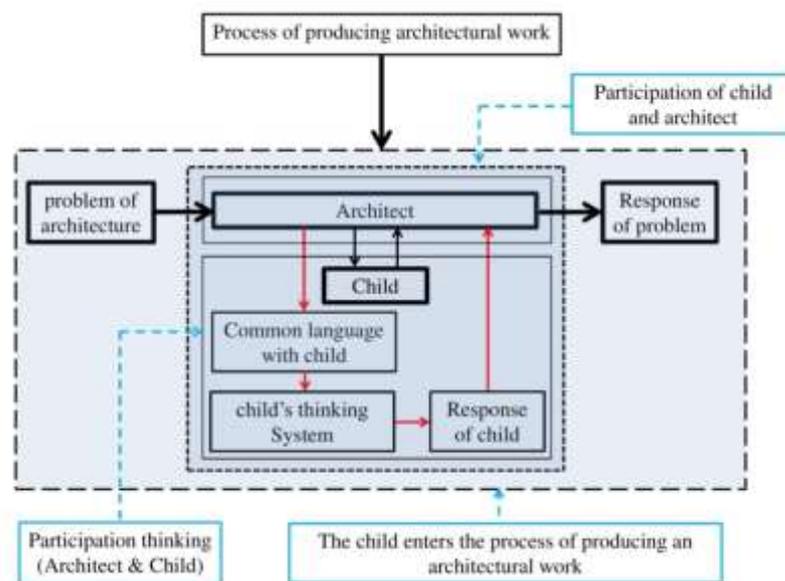
children's thinking abilities while inhibitor factors of creativity have not affected children. They enjoy pure capacities in problem solving, which is effective in removing or improving the obstacles of creativity in adults. The efficiency of the architectural area special for children requires the designer's perception of their environmental perspectives. Therefore, designers can view the problem from children's viewpoints using a model resulting from the interaction between the child-adult's thinking, and therefore children can help them in this regard with their creativities which are more, deeper, and more multi-dimensional, and more pure compared to those of adults. The authors, while respecting children's participation rights and commenting in decision makings related to beneficial projects open a new view to participation architecture in the form of the "child-architect participatory thinking". It impels introducing a new method regarding the process of participatory architectural designing in contrast to conventional methods in which children appear as a commenter in a restricted part of the process. In the presented model, children's thinking plays a key role in the process of designing (Figure 5). The "thinking systems of the designer and the child create a work in interaction with each other, then the designer precisely investigates the work based on his/her knowledge and by matching it with other effective factors in designing and enjoys the creative abilities of a child' mental system (Figure 6). Therefore, by entering children into the process of creating architectural works using the redefined method of the participation of the child and the architect, children can be regarded as a strategy and little cooperators, who create ideas during the process of designing, of the architect while encoding their wills and investigating problems from their viewpoints (Figure 7). A work that is designed based on children's ideas and by the children will be definitely more acceptable for children. Accordingly, in response to the posed research, it should be mentioned that efficient participation in architectural designing for children is obtained when they have a great presence as the main part of the thinking structure and idea creating process in all processes of creating architectural works.



**Figure 5.** The Role of the Child in Conventional Participation Processes (A) and the Proposed Process of This Research (B) (Source: Authors)



**Figure 6.** Process of Creating Architectural Works based on the Participation of the Child's and Architecture's Thinking System (Source: Authors)



**Figure 7.** Redefining the Participation Process of Creating the Architectural Work Based on Participation Thinking (Source: Authors)

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