

Considering the Effect of Gender on women's Understanding of Architectural Spaces

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Abstract

Considering the importance of active presence and role of women in various social fields, especially in the profession of architecture and interior design, either as employer and user of space or as designer, which is increasingly progressing nowadays, access to a scientific recognition of women's understanding in architectural spaces and their perspective on factors affecting visual quality of space is important. The aim of the present study is to investigate women's understanding of architectural environment and space given the factor of gender with an emphasis on visual elements creating the space. In this study, existing theoretical basics regarding gender-related psychological characteristics and understanding of women were considered in a descriptive-analytical way, and based on existing theoretical fundamentals, the quality of environmental understanding was formulated according to the four components of a) mental imagination, three-dimensional understanding of space, b) understanding visual elements of space, c) auditory imagination, and d) understanding of social space in the form of a questionnaire and it was assessed among a group of women in Tabriz, who were selected via simple random sampling, with the results thereof implying a significant relationship between gender and the degree of understanding various visual spatial elements.

Keywords: perception, gender, woman, architectural space

Introduction

For behaviors to be consistent with the environment, essential tips have to be considered, one of them being biological capabilities of different people. These capabilities are different between children, adults, and in different genders. Women and men have different personality structure. Differences between women and men's susceptibilities are biological and are existent since the time of birth (Love and Stosny, 2010: 20). Over the history, obvious difference is seen in most cultures between activities of women and men. This difference is more obviously seen in such cultures as in the Saudi Arabia where women wear hijab. If gender roles change, interior design of houses, opening forms, and the relationship between house, street and outdoor design will subsequently change. Although houses with a yard are still climatically acceptable in many parts of the world, they are now turning into other forms. One of the reasons for this change is that complete segregation of women's and men's activities is not the way it used to be. Many design decisions including giving centrality to kitchen have been due to participation of women in activities other than housework. Lifestyle can be understood from people's roles and their behavioral establishments (Lang, 2011: 139). Women and men are certain people and have been made with unique combinations that make them distinguished and form their perspective on the world. Gender remains as the coordinating basis of modern life theory and practically in each culture, gender differences are pivotal ways in which, humans know themselves as individuals, organizing social relations, and represent a symbol of natural and social events and procedures (Harding, 1986, Safiri & Imanian, 2009). Due to some differences both in sexual topics and in gender, women and men have different

needs. Through concepts related to human rights, development and progress in which gender-based differences are confirmed, these different needs have to be addressed in a way that complete participation of women and men in social and political gender life is fulfilled (Mertous, 2003; Khani, 2006). Gender refers to psychological, social, and cultural aspects of masculinity and femininity (Kessler and McKenna, 1978). Put it another way, gender is a symbol of men and women's characteristics on encountering social and cultural life via socialization. To define gender following Ridgeway and Levine (1999), gender is viewed as a system of social habits. This system creates gender segregation, maintains it and organizes unequal relationships based on these differences. In this regard, gender is the result of differences and inequalities (Safiri and Imanian, 2009). Gender differences are the most powerful founders of human talents and behaviors. Individual orientation becomes more obvious by imagining two types of perspectives that are positioned in this framework. The first perspective views gender as a collection of characteristics, potentials, or behavioral conduct, and addresses the recognition of differences of women and men in these areas. The second set of approaches focuses on social procedures that generate gender and tries to discover how women and men become gender entities (Safiri and Imanian, 2009). In psychology, the topic of gender differences is defined in two sections: the first part includes gender differences with biological roots originated from biological differences. The second part is called gender differences and refers, in fact, to dissimilarities with cultural and social roots. In other words, they have formed under the influence of cultural social factors, but there have essentially been no reasons for their existence (Mazaheri, 2004). As a matter of fact, if we look at the issue from a psychological point of view, some kind of fear of research regarding gender differences has appeared under the influence of powerful feminine flows on the world, as Cloninger clearly points out, "Our fear of doing these studies is that we might reach a point where we find the origin of differences in biological issues and this means that if gender differences have cultural and social roots, they might vary as cultures change and thus gender similarity might occur, whereas if it is proved that gender differences between men and women are biologically rooted, view at this topic will change. Therefore, the goal is to deny all gender differences (apart from physical and apparent differences of women and men which are undeniable) and consider their roots in sociocultural and driven by historical trainings. For example, in psychology, we face fundamental differences under the topic of introversion and extroversion and find women to be more extrovert than men. Thus, based on a theory, we find that extroversive individuals make more use of behavioral environments and make closer contacts with the outer environment (Lang, 2011).

Although gender differences have a long background, in primary psychological studies this has been ignored. Wilhelm Wundt who is one of the founders of modern psychology, embarked upon studying the structure of mind and conception disregarding individual differences. He believed that mental activities are not affected by individual differences such as gender (Khosravi, 2003: 17). Based on studied carried out, first recorded experiments concerning dissimilarity between women and men, was conducted by Francis Galton in 1882 and it is maintained in the London Museum. He discovered that women use more words and they prefer to participate in individual works and issues (Piez, 2011: 65). Upon the domination of behaviorism, theorists who addressed gender differences were Freudian psychoanalysts. They stressed personality differences between men and women, which affected both psychology and sociology. Freud emphasized on the role of instinct and physiology on the formation of personality. He believed that instincts provide the main energy for personality growth. In his belief, a child's perception of anatomic dissimilarities between boys and girls is a pivotal event in formation their personality. On interpreting gender differences, instead of stressing genetic and hormone formulations, Freud stressed primary experiences of the child within family. In fact he wanted to show the interaction of physiology and experience in personality

formation. According to Freud, understanding anatomic difference between girls and boys is the basis of gender differences (Khosravi, 2003: 19-20). The differences between men and women in many environmental studies have also examined (Harrison et al, 1991; Lawton et al, 1996; Shrestha, 2000 Pain, 2001). For example, Laton et al (1996) examined gender differences in the building and at the same time, Matthews (1987) studied the ability of men and women in Mapping Contract and found that there were significant differences between the two genders (Amole, 2012).

Women and men look with different angles at the unit world. This is because women have detailed perception and men have general perception. Ladies see all the details. That is why perception is faster in women that is the individual notices the details of something quickly and accurately, and then focuses her attention to another step of understanding. Tests for these abilities are timely and the individual must compare two numbers or letters with each other in a given time interval and achieve desired responses. According to meta-analytic approaches, women's efficiency is more than men (Ra'eisi, 2011: 172). Women take bigger pictures from objects and show more attention to their details. For women, it is more important to find details than to perceive spatial form of a shape (Peze, 2011: 169). For girls it does not differ whether to close right or left eye because their brain uses both hemispheres for problem solving. That is why women rarely choose to work as mechanic, engineer, or pilot. Upon constructing a building from a two-dimensional plan, boys act more quickly than girls (ibid: 139). It could be stated that women have considerable superiority over men in distinguishing colors and perceiving distances. Today, there is no doubt that colorblindness is congenital and is one of the attributes associated with gender, as the number of color-blind men is sixteen times that of color-blind women. Even if we exclude colorblind people, women's superiority over men in terms of color perception is easily confirmed. For example, between pink and violet, women identify a wide range of colors including pink, magenta, magnolia, thistle, floral white, and eventually violet and better understand the very fine difference of colors, whereas this detailed color variety is not present in men (Ra'eisi, 2001: 172). Understanding spoken language dialogue (Debilow2011, 394). Also, the estrogen hormone renders a woman sensitive with respect to suitable color. She prefers a semi-dark space (Peze, 2011: 291).

Women and men have equal ability in drawing shapes, objects, and places that are considered from a two-dimensional angle. The problem many women have is reading maps and finding routes using maps. They need a three-dimensional shape to find their way (Peze, 2011: 140). Women have less activity than men. Therefore, compared to their husbands, married women have cognitive maps with less breadth but with more details and richness. Women's cognitive maps rely more on inner perception rather than being standard maps (Lang, 2011: 161). Unlike testosterone that increases the ability to perceive spatial and three-dimensional shapes, the feminine hormone of estrogen suppresses them. Thus, the more feminine the brain is, the less capable it becomes in perceiving spatial shapes (ibid: 295). Boys are relatively superior to girls in spatial imagination, mechanical talent, mathematical and logical reasoning. Girls' superiority is, in turn, confirmed according to reports in terms of aesthetics (shapes, colors, and images), verbal abilities (words definition), and hand skills (sewing buttons, threading, etc.) (Moazzeni et al, 2012: 28).

Hearing in women is better than that in men and women are excellent in identifying voices. If a child cries faraway, a woman can his/her voice and a man, with his spatial perception and positioning, can identify his/her spot (Peze, 2011: 41). Women often hear very bass voices weakly (if they ever do). They usually prefer hi-fi devices that offer tenor distorted tones (Mohye'oddin Bonab, 2000). That is, woman's ears are sensitive and require appropriate music (Peze, 2011). Individuals who live in the vicinity of railroads or airports or autobahns, will soon get used to traffic voices, but guests often stay awake all the night until their unconscious mind starts to ignore these voices (Mohye'oddin Bonab, 2000).

In the profession of architecture and especially in design mentality, it is necessary to formulate correct mentality of design in the process of architecture with a correct understanding of differences in perceptive matters of women and men, way of thinking, and environmental perception and embodiment. Also, other dimensions of introduction can be observed in social environment and design of spaces, and a kind of trade-off can be considered in this regard considering the nature of both genders. It is mutual understanding between family members and people of a community, opportune and realistic expectations, tapping legal freedom and evolving movement of the family to a higher destination that is acceptable for all humans (Husseinzadeh, 2012). For instance, Kershner and Ledger (1985) showed that women are always better than men in seven micro-scales of creativity: their verbal ability and better skills in social recognition, and capability in designing creative functional spaces and structures (Berbner, 2003). Given the descriptions presented and the importance of the issue, this paper has scrutinized the role of gender in capabilities of understanding architectural space in women. The lack of differences in performance between males and females during rehabilitation may be increased by the similarity in the functional and cognitive levels of acceptance between men and women (Dudkiewicz et al, 2011). Researchers, during their investigation have concluded that the issue of health is the major concern in women with disabilities (Kessler, Brown, Broman, 1981).

Materials and methods

Given the subject of study, studies were conducted using Pilot method (this enables researchers, after getting introduced to obstacles and shortcomings of the study and correcting and complementing it, to more closely observe the process of implementing the scheme in smaller dimensions and more preparedly conduct the main study in broad dimensions). Intended statistical population consisted 400 Tabriz women in autumn 2013 who were selected via regression method and given the fact that a sample is a part of the society that is being considered so that from this part, information regarding the whole population can be obtained, sampling was done by selecting subjects in different urban areas and from all sectors, different ages and with different education levels. In this regard, to consider the role of gender in spatial understanding, an architectural questionnaire was prepared that consisted in 20 questions with quadruple dimensions: a) mental imagination and 3D spatial understanding, b) spatial visual elements perception, c) auditory embodiment and perception, and d) social space understanding, which were selected in order and consecutively. The questionnaire was visually verified by a group of architectural and psychological students and professors in terms of validity and in terms of inner homogeneity of questions, total credibility of the questionnaire were verified by calculating Cronbach's alpha coefficient ($r=0.967$).

This questionnaire was evaluated among women in Tabriz, who were selected via simple random sampling. Next, using SPSS statistics analysis, significant implications were obtained. In terms of data analysis, the present study is post-causative. The aim of this study is to find presumable causes of a behavioral pattern. This method is often referred to as post-causative because it addresses items where cause occurred a priori and its study is currently done via the effect it applied on other variables. In behavioral sciences, this scheme is used for this reason that the researcher cannot control and manipulate many of the relations he/she is interested to study and observe.

Hypotheses of the study

Gender affects spatial visual elements perception.

Women do not perceive space-forming visual elements in one level and quality.

Amount of women's attention to space-forming visual elements is affected by age and education level.

Findings of the study

As stated already, to perform the study, a questionnaire was formulated which consisted of 20 questions in the framework of 4 axes: a) mental imagination and 3D spatial perception, b) space visual elements perception, c) auditory embodiment and perception, and d) social space perception, and was assessed among 400 women of the city of Tabriz. Then, the obtained results were analyzed in SPSS software, with the produced results being shown in the following diagrams. The first question of the questionnaire was regarding women's attention to visual elements of architectural space, with the results thereof showing that 72 % of women under investigation in a very high level, 55 % in a high level, 39 % in a medium level, 10 % in a low level, and 2 % in a very low level, have their attention drawn to visual features upon entering a space or setting (figure 1). This suggests that visual elements affecting spatial bodily structure are highly important to women. Among visual spatial elements, four elements of color, geometrical shapes and form/shape combinations, arrangement and furniture as well as lighting were questioned, with the results thereof showing that upon entering an architectural space or environment, 73 % of women to a very high level, 63 % to a high level, 30 % to a medium level, 5 % to a low level, and 7 % to a very low level, pay attention to color combinations (figure 2). Thus, it could be concluded that women's attention to the role color plays in forming architectural space is too high.

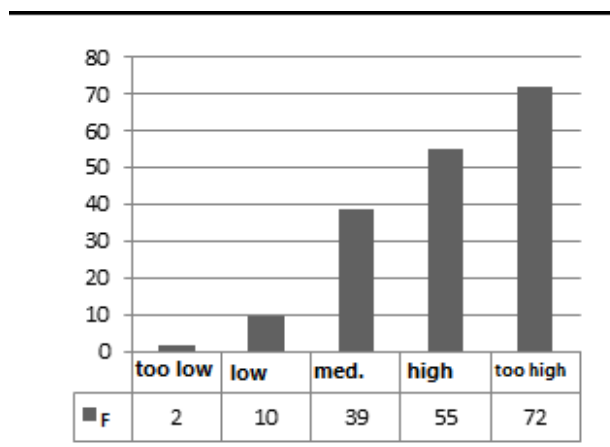


Figure 1. Attention to visual features upon entering a space or setting (source: authors)

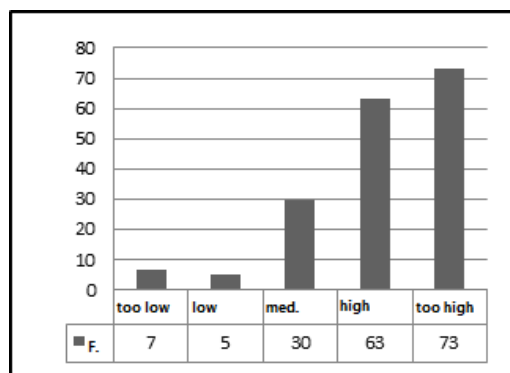


Figure 2. Attention of women to color and color combinations upon entering a space or setting (source: authors)

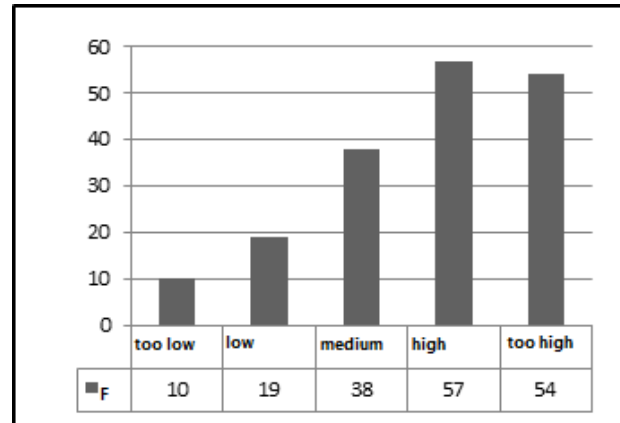


Figure 3. Perception of geometrical shapes, form and shapes combinations (source: authors)

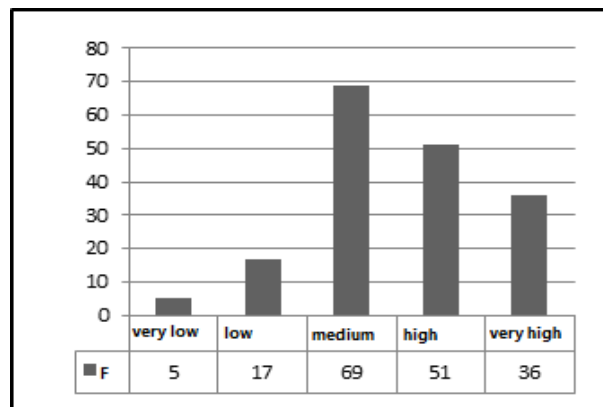


Figure 4. Perception of arrangement and furniture of architectural space (source: authors)

Among other visual elements are geometrical shapes, forms and shapes combination that 54 % of women to a very high level, 57 % to a high level, 38 % to a medium level, 19 % to a low level, and 10 % to a very low level pay attention to upon entering an architectural setting and space (figure 3). Amount of attention to architectural arrangement and furniture shows that 36 % of women to a very high level, 51 % to a high level, 69 % to a medium level, 17 % to a low extent and 5 % to a very low extent notice these criteria (figure 4).

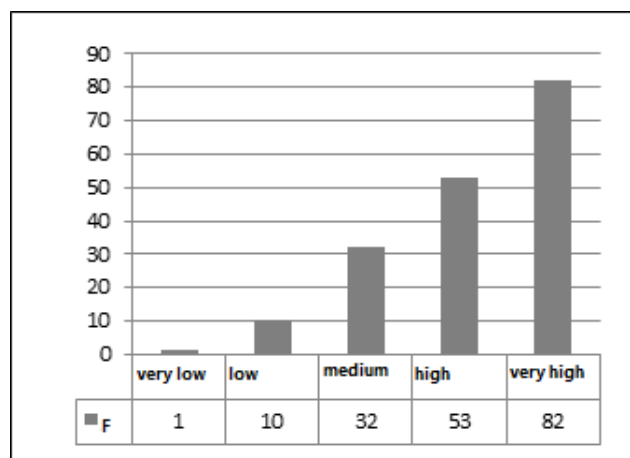


Figure 5. Lighting perception (source: authors)

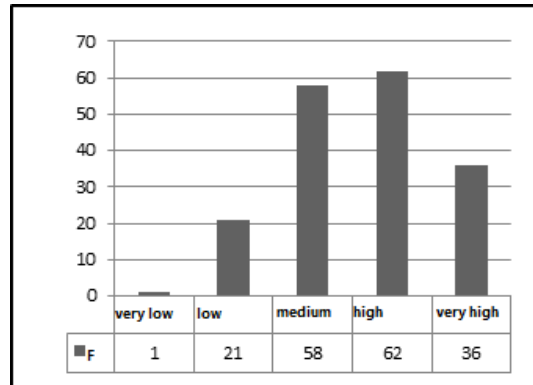


Figure 6. Perception and attention to details

Lighting is one of the other important components of visual elements of architectural spaces asked from subjects. Results showed that 82 % of women to a very high extent, 53 % to a high extent, 32 % to a medium extent, and 10 % to a low extent, notice lighting (figure 5). Next question concerned women’s perception of the details of architectural environments and spaces and the goal was to determine how much women notice these measures upon entering an architectural environment or space. Results showed that 36 % of them to a very high extent, 62 % to a high extent, 58 % to a medium extent, and 21 % to a low extent notice the architectural space details and remember them (figure 6).

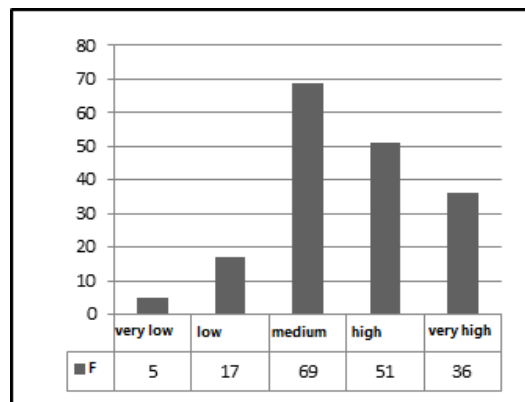


Figure 7. Attention to faults of architectural space design and decoration (source: authors)

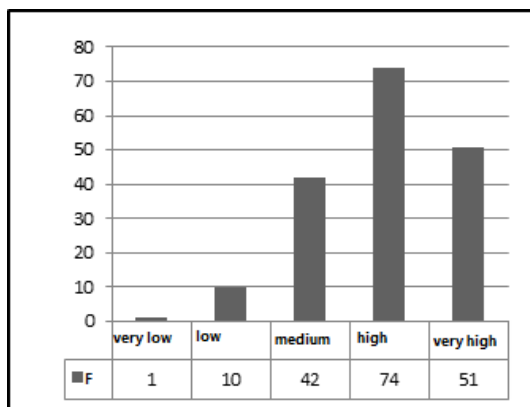


Figure 8. Consideration of the effect of architectural setting and space on women’s behavior (source: authors)

Considering women's perception of faults in architectural space design and decoration was another choice for the study to which the subjects responded. Results showed that 36 % in a very high level, 51 % in a high level, 69 % in a medium level, 17 % in a low level, and 5 % in a very low level have the ability to perceive design faults (figure 7). Among other components of the study was 3D imagination and perception which included several sub-choices. One of the questions was dedicated to the consideration of the effect of architectural setting and space on women's behavior. According to the findings of the study, 51 % of women in a very high level, 74 % in a high level, 42 % in a medium level, and 10 % in a low level, thus averaging 35.6, stated that visual elements present in space or environment affect their behavior (figure 8).

Another question was dedicated to women's imagination and perception of performed modifications in the architectural space when they entered for the second time. In this part, according to the results obtained, 52 % in a very high level, 62 % in a high level, 45 % in a medium level, and 19 % in a low level had the ability to notice spatial modifications in the second visit (figure 9). Next questions concerned women's ability in reading and spotting a place on map, with the results thereof showing that 46 % of women participating in the study in very high level, 59 % in a high level, 46 % in a medium level, 19 % in a low level, and 8 % in a very low level were able to read and spot places using maps, where according to literature backgrounds, women have less capability due to biological structure (figure 10).

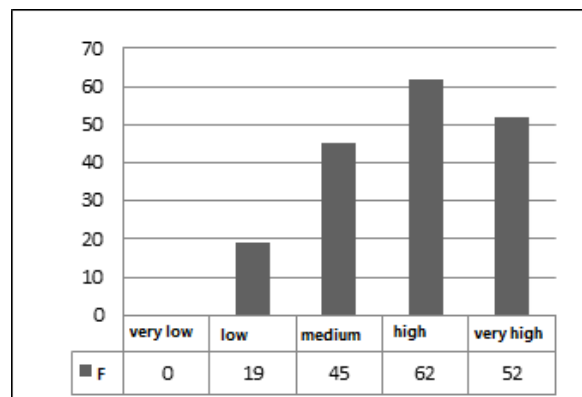


Figure 9. Perception of modifications in architectural environment and space in second visit (source: authors)

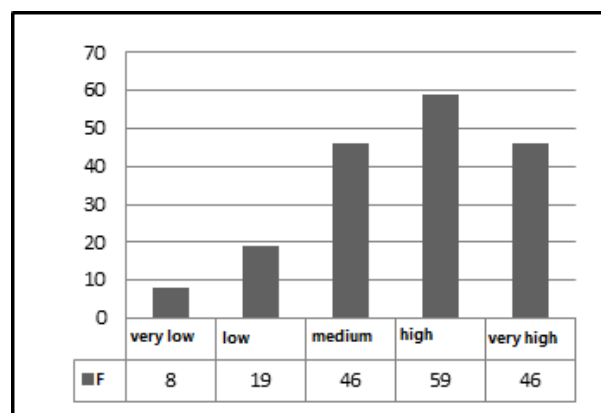


Figure 10. Women's ability to read and sport locations on maps (source: authors)

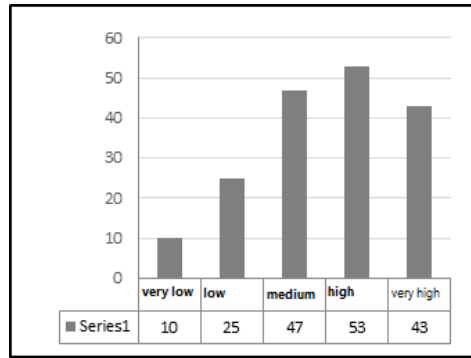


Figure 11. 3D space imagination using 2D map (source: authors)

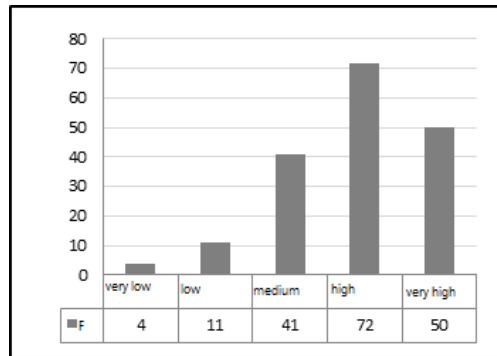


Figure 12. Women's imagination of architectural space using memory description (auditory perception) (source: authors)

In the question related to the investigation of women's 3D imagination of architectural space, results show that 43 % in a very high level, 47 % in a medium level, 25 % in a low level, and 10 % in a very low level, thus averaging 35.6 %, were capable of 3D imagination using 2D maps; this perception also has a less percentage in women, given background literature (figure 11). Among other components of this study is auditory perception. With respect to the question concerning women's imagination of architectural space via expressing or retelling memories, results showed that 50 % in a very high level, 72 % in a high level, 41 % in a medium level, 11 % in a low level, and 4 % in a very low level were capable of imagining space via hearing about visual characteristics (figure 12), which has biological bases according to literature background that reported women to be better than men in auditory perception.

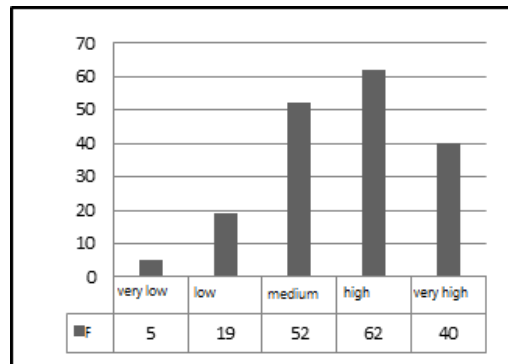


Figure 13. Routing and locating capability using provided comments (source: authors)

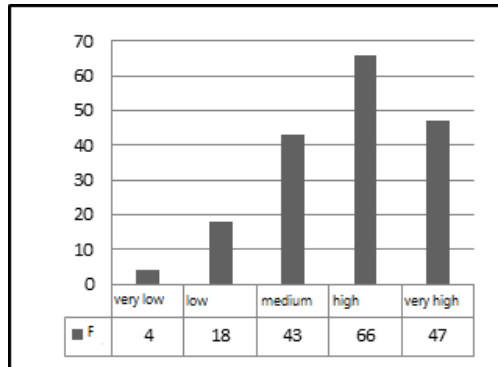


Figure 14. The effect of others' behavior and activities on perception of architectural space (source: authors)

Next question was related to women's ability of finding a route or location according to provided comments, with the results thereof showing that 40 % to a very high level, 62 % to a high level, 52 % in a medium level, 19 % in a low level, and 5 % to a very low level were capable of routing and locating (figure 13). Another component of the study was perception of social space, one question thereof concerns the effect of others' behavior and activities on women's architectural space perception. According to the results given in figure 14, 47 % to a very high level, 66 % to a high level, 43 % to a medium level, 18 % to a low level, and 4 % to a very low level consider others' behavior as influencing the perception of architectural environment and space.

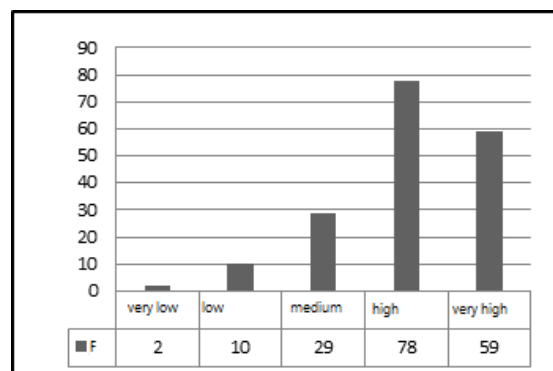


Figure 15. The effect of solitude and bustle of space on women's perception of a space (source: authors)

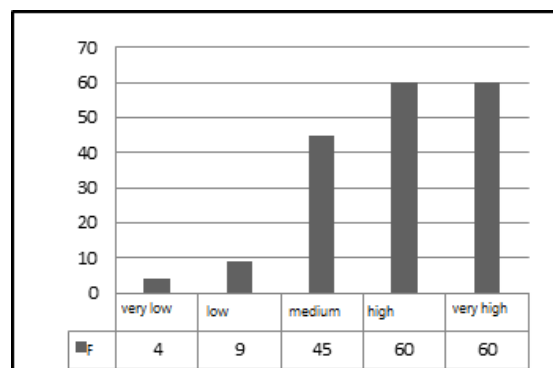


Figure 16. The effect of keeping one's distance from others on architectural space perception in women (source: authors)

Another question of this criteria was the effect of solitude or bustle on architectural space perception, with the results thereof showing that 59 % to a very high extent, 78 % to a high extent, 29 % to a medium extent, 10 % to a low extent, and 2 % to a very low extent considered solitude or bustle of a space as effecting its perception (figure 15). The effect of keeping others at a distance and its impact on architectural space perception was another criteria, with the results showing that 60 % to a very high extent, 60 % to a high extent, 45 % to a medium extent, 9 % to a low extent, and 4 % to a very low extent endorsed the criterion. These statistics show that most women participating in the study considered keeping their distance (harem) in a space, to high and very high extent, effective for perception of that space (figure 16).

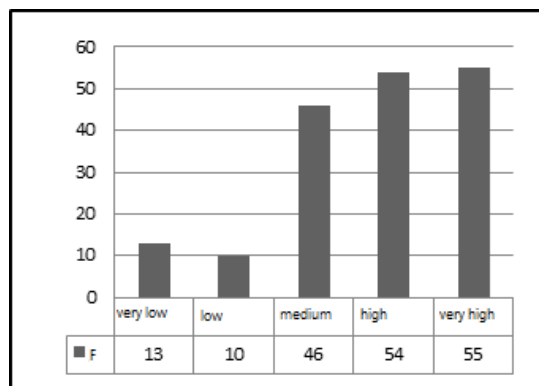


Figure 17. Women's view regarding identification of an individual's architectural taste through personality and social behavior (source: authors)

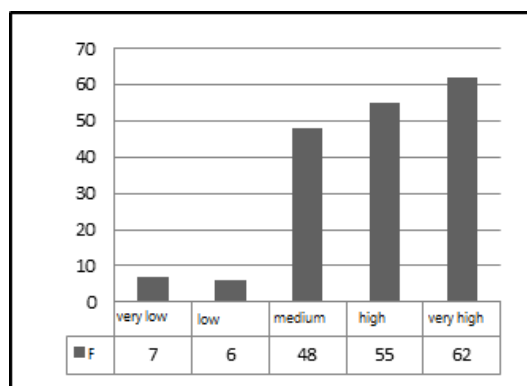


Figure 18. The impact of social behavior on architectural space perception in women (source: authors)

According to the study's results, the %age that women expressed regarding identification of individual's taste in architecture with respect to personality and social behavior showed that 55 % to a very high level, 54 % to a high level, 46 % to a medium level, 10 % to a low level, and 13 % to a very low level are able to identify individuals' taste concerning space architecture through their personality and social conduct (figure 17). Given the importance of the effect of conduct on different aspects of individuals' lives, this study questioned the effect of social behavior on architectural space perception in women, with the results thereof showing that 62 % to a very high level, 55 % to a high level, 48 % to a medium level, 6 % to a low level, and 7 % to a very low level gave credit to the effect of social behavior on space perception (figure 18). The above findings considered women's perception with respect to hypotheses one and two, and the results for each one were reported separately. In hypothesis three i.e. women's level of attention to visual elements

comprising a space is affected by age and education, Spearman's test was used, and the following results were produced after experimenting this hypothesis with respect to the four criteria under study:

Table 1. Relationship between perception type and education

Relationship between types of perception and education level	Correlation coefficient	Significance level	Result
Relationship between visual perception and education	-0.002	0.97	reject
Relationship between 3D space perception and education	-0.04	0.4	reject
Relationship between auditory perception, space and education	0.002	0.97	reject
Relationship between social space perception and education	0.07	0.97	reject

Source: authors

Table 2. Relationship between perception types, age and education

Age group	Education	Under diploma	Diploma	Associate's degree	B.S.	M.S.	PhD and higher
10-20	frequency	7	32	3	7	0	0
	frequency ratio	1.8	8.2	0.8	1.8	0	0
21-30	frequency	2	17	19	111	26	3
	frequency ratio	0.5	4.4	4.9	28.5	6.6	0.8
31-40	frequency	0	4	10	70	19	4
	frequency ratio	0	1.0	2.5	18	4.9	1
41-50	frequency	0	10	0	15	17	8
	frequency ratio	0	2.5	0	3.8	4.4	2
51 and over	frequency	0	3	0	0	1	2
	frequency ratio	0	0.8	0	0	0.2	0.5

Results of investigation showed that there was no significant relationship between age groups, education and perception of visual space elements and mental spatial imagination, auditory imagination and perception of social space. Besides, due to the limited volume of the research paper, instances of this study have been conducted by the authors and will be reported extensively in another study.

Discussion and conclusion

Most behaviorists' studies believe that environmental forces act to determine final product in the form of dynamic patterns, which induce and motivate behavior, and in this regard, psychological theories consider the quality of sensing and perceiving environmental incentives present in a setting or space by man. This study was done in that regard.

Finding of this research imply a significant relationship between gender and the extent of visual spatial elements as well as a significant difference between perceptions of different visual elements. Also, significant differences are seen in the findings of the study regarding the extent of perceiving visual spatial elements by women in different ages and education levels. All these results is in conformity with existing scientific and theoretical discussions concerning the extent and quality of visual spatial elements perception by women and effective factors in the perception. In addition to having a significant relationship between visual spatial elements perception, differences and order of the extent of attention to each one of visual elements and significant effect of others' presence in perceiving the nature of an architectural space and the high correlation between these elements imply that modification of each one of these elements and criteria in designing architectural spaces can have a considerable impact on the quality and extent of a space's acceptability for its users. Therefore, these conclusions can be used as measures to increase acceptability of spaces designed by architects. Since, in recent years, attention to expectations and behavior of architectural space users have gained more importance in design and the role of women in society has become more evident as employer, user, or designer in the profession of architecture and urbanization, it is expected that further attention to perceptive characteristics of women in designed environments and spaces lead to increased efficiency and acceptability of space. The process of matching an environment with behavioral patterns, including modification of skeletal setting in order to respond to demands and users' behaviors and activities considering specific conditions such as gender, education, aesthetic cognitive tastes or to create consistency between these items and skeletal setting in architecture, has been noticed. In this process, the general conclusion is that the quality of perception, and reaction and behavior of individuals in the environment are the most important determinative factor in design methods.

Recommendations

According to the results of the present study, it is recommended that, due to women's presence in various social fields, measures be taken in which, through achieving a scientific recognition of women's perception of architectural setting and space, women have active and useful roles in the design of public and private spaces and especially spaces specialized for them. That said, interest in space and somehow tranquility could be created in spaces and the user would feel satisfied and happy to be in that space. Investigations show that most designs performed in cities ignore psychological aspect in women and men and this is the major reason for having a sense of alienation, lack of identity and lack of interest in the environment.

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