The Effects Of Perceived Complexity And Perceived Time And Distance On Path Choice Behavior And Walking To Reach A Destination

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Abstract:
Walking to reach the destination is the most important kind of walking in the daily activities. Path choice behavior in different parts of the city contributes to walking behavior for the people who want to reach to their destination in a daily basis. Literatures indicate that shortest path is the most important factor for path choice behavior. Perceived complexity is another important factor. The situation in which a path between some paths with the same length should be selected, raise the importance of perceived complexity for path choice. Such a situation also raises the importance of perceived time and distance rather than actual time and distance. On the other hand there is a relationship between perceived complexity and perceived time and distance. Therefore this paper considers that how perceived complexity affects path choice through correlation with perceived time and distance. Due to importance of gender in considering the relationship between different factors and path choice, all considerations should be done respecting different genders. By finding the adequate context and using the observation and survey questionnaire it was found that perceived time is more important for men rather than women and perceived complexity is more important for women rather than men related to path choice behavior. Therefore it was found that perceived complexity through affecting perceived time has higher impacts for path choice of men rather than women this is while perceived complexity, itself is more important for women rather than its importance through the relationship with perceived time. Due to importance of sense of progression along the urban paths, the relationship between this factor and path choice was also considered. It was found that this factor is important for path choice of the people who want to reach to their destination.

Keywords: walking to reach the destination, path choice behavior, perceived distance, perceived time, perceived complexity

1. INTRODUCTION

Studies focused on walking behavior have indicated the effects of different factors of built environment on walking behavior. A new stream of such researches point to the influences of various built environmental variables such as aesthetics and distance on walking behavior on the basis of purpose of the trip, whether one walks to reach destination or for recreational purposes (Handy and Clifton 2001; Pikoraa et al, 2003; Corti and Donovan, 2002; Owen et al, 2004; Suminski et al, 2005)

However, as most people move between different points in a city, walking to reach destination forms the highest rate of travel mode in daily activities. Furthermore, path choice that is how people react and choose their favorite path in decision points such as urban nodes and junctions is correlated with walking behavior. Therefore, understanding what environmental factors affect path choice contributes to understanding walking behavior on those paths. In the other word, having considering the factors related to path choice of pedestrian contribute to encouraging people to walk for reaching to their destination daily.
As mentioned by literature shortest path is the most important factor for path choice behavior of pedestrians (Hill, 1982). Complexity is the second important factor for path choice behavior of pedestrian (Hill, 1982). The condition in which a path among some paths with the almost same length need to be chosen (such a condition mostly is taken place in the cities with rectangular form), raise the importance of perceived complexity rather than shortest time and distance for path choice behavior (Hill, 1982). On the other hand paths which represent the almost same length can generate different rates of perceived time and distance, thus regarding to importance of shortest time and distance, such a situation raise the importance of perceived time and distance rather than actual time and distance for path choice behavior. Furthermore it should be regarded that there is a relationship between perceived complexity and perceived time and distance in which increasing the perceived complexity and its components increase the perceived time and distance along the paths (Sadala 1980; Nasar 1985; Katayama et al, 2004; Jansen-Osmann and Berendt, 2002; Jansen-Osmann and Wiedenbauer, 2004; Issacs, 2001). From abovementioned relationship, this question would be arising that in the situation in which a path between some paths with the almost same length should be chosen, how perceived complexity through correlation with perceived time and distance affects path choice behavior.

The main goal of this paper is to consider how perceived complexity through correlation with perceived time and perceived distance affect path choice behavior. To reach the goal of paper the following relationships as objectives of the paper need to be considered:

1. To consider the effects of perceived time and perceived distance on path choice behavior

2. To consider the effects of perceived complexity on path choice behavior which in itself need to consider the components of complexity along the path, contributed to generate the perceived complexity.

3. To consider the relationship between perceived complexity, perceived time and perceived distance

As mentioned by literature complexity has a different rates of effects based on the different gender (Seto, 2008; Hill, 1982), therefore in considering the effects of path complexity on path choice, different genders need to be taken into account.

This paper starts with a brief background on walking behavior especially walking with the purpose of reaching destination and its importance. It further discusses the relationship between path choice behavior and walking to reach the destination. Next, with highlighting the important factors for path choice, as mentioned above, consisting of perceived time and distance and perceived complexity, these factors will be more described. Finally by using the case study in Tehran-Iran which provides the necessary characteristics to do the current research, the abovementioned relationships to reach the goal of the research would be considered.

It should be mentioned that in this paper Addition to abovementioned factors, the other factor which called sense of progression along the walkways and its relationship with path choice behavior would be considered. This factor is not related to the goal of research but due to its importance along the urban paths as mentioned by Lynch (1960) and its relationship with both perceived complexity and perceived time and distance we effort to consider it during current research.

### 1.1 Background of Study

Walking is an activity almost everyone engages in. It offers a wide range of benefits to both individuals and society (Gehl, 1987). From a transportation standpoint, walking leads to less vehicular travel and thus less traffic, air pollution and other environmental impacts. A growing number of empirical studies from the have contributed to the debate on the relationship between built environment and walking behavior (Black et al, 2001; Greenwald and Boarnet, 2001; Handy and Clifton, 2001; Cervero and Duncan 2003; Corti and Donovan, 2002; Ball et al 2001). put differently, Those studies provide an evidence for a correlation between built environment and walking.

However, in recent years, the issue concerned on the impact of built environment on pedestrian behavior may depend on the purpose of the trip, whether walking to reach the destination or walking for recreational purposes. Recently some researchers have tried to divide walking in terms of its purposes and consider the effects of different variables of built environment on walking for these two different purposes separately (Handy and Clifton 2001;
This paper, therefore, focuses on walking to reach destination as the main pattern of walking contributing to our daily activities.

1.2 Path choice behavioral model and the factors which affect path choice behavior

Path choice or in other words, how people react and choose their favorite path in decision points such as urban nodes and junctions is correlated with walking behavior. Therefore, understanding what environmental factors affect path choice contributes to understanding walking behavior on those paths.

Pedestrian’s path choice like any other environmental behavior is directly linked to how one understands and encodes the spatial environment (Seto, 2008). Path choice behavioral model is applied to understand how people behave in the decision points. The following two steps demonstrate the process of perceived behavioral model for path choice:

i. Different environmental factors especially visual factors contribute to accumulating spatial knowledge which is used to form the spatial representation (Seto, 2008). This step which depends on familiarity with urban spaces explains how visual information and spatial knowledge is stored and retrieved to form the cognitive map of the place and therefore the spatial representation.

ii. The spatial representation depending on the purpose within the environment and through correlation with preferences contribut to the path choice. Therefore, this step determines how people choose their favorite path which is correlated with walking behavior of people who want to reach their destination daily.

Therefore, the mentioned process illustrates that the factors affecting walking experience along the paths depending to the rates of familiarity and preferences can affect path choice behavior. Hill (1982), who worked on decision-making process for path choice of pedestrian, found that shortest path or in the other word shortest distance or time is the most important factor for path choice behavior. He also indicates that in the parts of the cities with rectangular form which make the condition in which a path should be chosen among the paths with the same length, complexity is the other important factor, affecting path choice behavior. He concludes that complexity, which he defined it as number of turns along the path, depending on the gender and age of respondent affects path choice behavior.

1.3 Distance to destination, perceived distance and time and their relationship with the complexity of the paths

Findings of studies which surveyed the effects of environmental factors on walking, by segregating it into walking to reach destination and walking for recreation, indicate that distance to destination is one of the most effective factors on walking to reach destination (Suminski et al, 2005; Owen et al, 2004; Pikoraa et al, 2003).

Information about distance plays an important role in human activity. It helps us orient ourselves and locate places during navigation. knowledge of distance in the environment affects the decision to stay or go, the decision of where to go and the decision of which path to take. Distance in spatial representation is not encoded in terms of metric distances but in a schematic measure such as perceived storage space, perceived time or perceived effort (Jansen-Osmann and Wiedenbauer, 2004). By using the results of several studies working on perceived distance and related environmental factors, it has been discovered that the more turns, slopes, intersections and features a walk has, the longer it appears (Sadalla 1980; Nasar et al 1985; Katayama et al, 2004; Jansen-Osmann and Berendt, 2002; Jansen-Osmann and Wiedenbauer, 2004). From the studies related to perceived time and environmental factors, the similar results were taken (Issacs, 2001). The results of these studies support that the more information there is to be observed about a journey, the longer it will seem (Montello, 1997). Since the rates of information in the environment is directly related to the factor which called complexity it can be mentioned that The more complex a path, the more it is over-estimated; the simpler the path the more it is under-estimated. It should be mentioned that since the spatial representation of the path and process of storing and retrieving the information along the path mostly is done more qualitatively, the perception of the information along the path is more important than the information itself. It means that perceived complexity along the path is more important than complexity, itself for path choice behavior. To account the perceived complexity there is a need to understand what components of complexity along the paths contribute to generating the perceived complexity. In the following chapter the definition of complexity and its components, especially in urban space will be discussed.
1.4 Perceived complexity and its components in the urban spaces

Some researchers like Heaps and Handel (Heaps and Handel, 1999) defined complexity as the degree of difficulty in providing a verbal description of an image. According to Heylighen (1997), the perception of complexity is correlated with the variety in the visual stimulus. Perceived visual complexity is correlated to the number and variety of the materials and objects. Through one way of categorization, complexity may be related to the surface variety or it may be related to the object variety presented in the space without being attached to the surfaces. Additionally, the perception of visual complexity is likely to be dependent on the scale of observation (e.g. looking at a bookshelf or the books level) and familiarity with the scene (Heylighen, 1997). The consensus on the definition of complexity in the environment is that complexity refers to the visual richness of a place. The other definition is that Complexity is described as “a condition of being hard to understand and to be formed of many numbers of related pieces” (Erem, 2003).

Reviewing the literature related to the complexity in the environment, Kaplan and Kaplan (1982) which studied the visual preference in the environment mention that presence of complexity is belonged to the environment with enough in the presence scene to keep one occupied. Amos Rapaport (1990) mentioned that complexity is related to the number of noticeable differences to which the viewer is exposed per unit time. In the urban environments complexity is resulted from varying building shapes, sizes, materials, colours, architecture and ornamentation. Other elements of the built environment such as trees and landscape also contribute to complexity (Arnold, 1993, Jacobs, 1993). Nazar (1987) mentioned to the rates of signage of the path contributing to the complexity which showed the correlation with people’s preference in those paths. Similarity Jacobs (1993) mentioned to the complexity made by rates of signage of some paths in Hong Kong.

Erem (2003) mentioned that some factors such as the number of turns and kinds of angles and number of junctions along the paths affect the final rates of complexity.

From the related literature the components of complexity in urban spaces are as following:

1. Variety of details and colors of surfaces consist of façade and sidewalk surfaces
2. Variety of signage
3. Number and variety of the urban furniture such as benches, street lights outdoor dining and others
4. Variety of the landscape elements
5. Number of the people along the path
6. Number of turn along the path
7. Number of junction along the path

However the complexity of urban environments involves various aspects, but basically one kind of categorization consist of two aspects can be identified. The first is concerned with the urban structure (number 1, 2 and 3), and the second is more to do with the social activities of humans within urban environments (number 5) (Jiang, B., 1999).

To measure the perceived complexity, it should be considered that with what rates, the components of complexity, represented along each path, contribute to the perceived complexity along the path.

1.5 Sense of progression as an important factor for walking to reach destination

Addition to the abovementioned factors which contribute to reaching the goal of the paper, the other factor which is called sense of progression would be considered.

Sense of progression is a quality of path which offers people a sense of approaching to destination thus helping them do the task of getting to their destinations. It can be explained in this way that the path is perceived, in fact, as a thing which goes towards something. The path should support this perceptually so that it is given a sense of progression while the opposite directions are unlikely (Lynch, 1960). Lynch indicates that sense of progression can be generated by strong termini especially when it is visible along the path, a gradient or a directional differentiation. Therefore sense of progression is a quality of the path which not only is related to the realizing the position along the path but also is related to the fine navigation towards destination. The importance of the sense of progression for path choice and walking to reach the destination need to be surveyed.
2. METHOD

Firstly, it should be mentioned that this study is the primary study to consider the effects of some factors such as perceived complexity and perceived time and distance on path choice behavior. To achieve more clear results the researchers tried to measure the related factors more quantitatively. The tools consist of open-ended questionnaire and onsite observation. Forty-eight respondents participated consist of thirty men and eighteen women, between 21 to 56 years old. Case study and its physical characteristics are discussed in the following sections.

2.1 Case study

As explained before the selected case study should offer the following characteristics:

1. Since this study focuses on walking behavior related to walking to reach the destination as well as path choice behavior, the selected area should present a high level of walking which is used mostly by the people in their daily activities.

2. The selected area needs to present some paths between the same origin and destination with almost the same length (this condition usually occurs in the cities with the rectangular form).

3. To get the vivid results of current study, the actual time for passing each path in the selected area needs to be between 5 to 20 minutes. the studies related to perceived distance and time mention that having less than 5 minutes to pass the path, the real time and perceived time are very similar to each other, thus to consider the perceived time and get more clear results there is a need to pass each path by walking more than 5 min. on the other hand the literature studying walking as a mode of transportation mention that people in their daily transportation usually do not walk more than 20 min. thus the maximum time of walking along the path need to be less than 20 min.

This paper use a compares between selective paths in terms of the perceived complexity. Different rate of perceived complexity along different paths would help to get more clear results in terms of the relationship between perceived complexity and path choice behavior.

In the base of the abovementioned conditions, a case study located between two main squares consisting of Qods square and Tajrish square in the north of Tehran, Iran, in which represent three paths with almost the same length between these two nodes, was selected to survey (Fig 2). These paths are used mostly by the people in their daily activities. Path 1 is sidewalk of the street which it seems that most of the people use this path. Most of the buildings along path 1 are belonged to modern architecture consist of three to four floor. Several shops can be seen along route1 some shopping centers are located beside path 1 which they get entrance from both path 1 and path 2. path 1 dedicate the larger scale in terms of the height of the buildings and width of the walkways and street, compared to
other paths. The views of the mountains located at far distance are visible along path 1 which creates the more attractive scenery along path 1. Path 2 is the path of bazaar. Bazaar is the central of the business in the Iranian cities, therefore many people use this path for shopping. Path 2 shows the smallest spatial scale compared to other Path. This path represent almost 3 to 4 meter width among most of its length. It also is covered with the ancient roof based on the structure of traditional architecture of bazaar. It dedicates the most compact path compared to other path in terms of the number of shops and variety of the details of the surfaces, and also in terms of the density of the population. In consideration of the visual complexity, since visual complexity is related to the variety and number of different physical features along the path, it should be mentioned that, however both path 1 and path 2 represent many shops along their length, but path 2 with the more smaller spatial scale in terms of the width of the path and height of the buildings, shows the more density in terms of the number of the people and also details of the views, compared to path 1.based of the design of the historical design of bazaar there are two special spaces as two nodes along path 2.these kinds of spaces which have a large spatial scale compared to the usual spaces of bazaar dedicate some special functions such as the center for the business of the carpet as it can be seen in one of these two nodes along path 2. Path 3 which is located at the backside of Bazaar shows the lowest rates of density in terms of both details of building’s façade and number of people. It seems that minority of the people use this path. The spatial scale of the path 3 is very similar to path 2 but the difference is that it is not covered by roof as it can be seen for path 2.some shops can be seen along path 3, but there are lots of buildings dedicated to housing along path 3.mix of the new and ancient buildings would be found among path 3.path 3 in one side end to the building of Emanzade Saleh which as a remarkable building and landmark raise the importance of path 3.

It seems that the lengths of all three paths are same, But observation showed that path 2 dedicate the higher rate of perceived time compared to other path. It maybe relates to the high rate of density of this path. As it was mentioned, the selective paths show the different kinds of density of the physical element in which path 2 shows the most compact path in terms of the spatial and physical elements along the path. These differences in terms of the density of the physical elements along the path which can be felt during the observation contribute to generating the different rates of perceived complexity along three paths. Such a different rate of complexity among the paths is the important factor which helps to understanding the effects of different rate of perceived complexity for path choice behavior. Therefore it’s necessary for reaching the goal of this paper.

3. Analysis and Results
In the base of the sequence of objectives, as explained above, the results are presented in the following sections. Title of each part, indeed is one of the objectives of paper. In each part, if necessary, some steps were designed. Results are discussed in this section. Section 4 answers the main question of the paper through a final discussion of the results presented in section 3.

3.1 Considering the effects of perceived time and distance on path choice behavior
To consider the effects of perceived time and distance for path choice behavior the following steps were designed. In each step the related results are discussed.

3.1.1 Finding the importance of shortest path for path choice behavior

It was found that shortest path is an important factor for path choice for both men and women.

3.1.2 Finding out how respondents account the time and distance allocated to each path

Since 93% of respondents mentioned that they guess the time and distance, It means that perceived time and distance rather than time and distance should be taken into account. Importance of shortest path for path choice behavior shows the importance of time and distance to destination. Moreover, since more than 90% guess the time and distance in the base of their experience among the paths, therefore the importance of the perceived time and distance rather than actual time and distance for path choice behavior is apparent. To understand how perceived time and distance would affect path choice behavior still there is a need to do the following steps:

3.1.3 Measuring the perceived time and distance for each path and comparing it with the real time and distance allocated to each path (Table 1)

<table>
<thead>
<tr>
<th></th>
<th>Real time(min)</th>
<th>perceived time(min)</th>
<th>Real distance(meter)</th>
<th>Perceived distance(meter)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>men</td>
<td>women</td>
<td>men</td>
<td>women</td>
</tr>
<tr>
<td>Path 1</td>
<td>05:10</td>
<td>07:40</td>
<td>07:40</td>
<td>450</td>
</tr>
<tr>
<td>Path 2</td>
<td>05:05</td>
<td>11:17</td>
<td>13:30</td>
<td>450</td>
</tr>
<tr>
<td>Path 3</td>
<td>05:40</td>
<td>07:30</td>
<td>9</td>
<td>480</td>
</tr>
</tbody>
</table>

1. Three paths show almost the same actual distance and time among three paths
2. Roughly respondents perceived the time and distance more than actual time and distance.
3. The lowest rate of perceived time and distance is related to path 1 and path 3 for both gender groups with an almost similar rate.
4. The highest rate of perceived time and distance respecting both gender is allocated to path 2.

From abovementioned relationship we know that shortest distance and time are important factors for people to choose the path. The rates of actual time and distance are similar to each other among the selected paths, but perceived time of path 2 shows a remarkable difference compared to other paths. This is while; however, perceived distance for path 2 shows the highest rate among three paths, but it is not remarkable, compared to its rate in other paths. Since there is a remarkable difference between the paths in terms of the rates of perceived time compared to perceived distance and there is a need to make a comparison to understand the effects of perceived time or perceived distance on path choice, therefore only perceived time would be taken into account in the continuing steps. The highest rate of perceived time is allocated to path 2 for both kinds of gender which indicate the importance of considering path 2 in terms of the effects of perceived time on path choice.

3.1.4 Getting the rates of the use of the selective paths

Path 1 dedicates the highest rates of use among the selective paths for men and women. The lowest rate of use belongs to path 3 for women, while it is allocated to path 3 and path 2 with the similar rate for men. It should be mentioned that path 2 has a medium rate of use for women.

3.1.5 Considering the relationship between the rates of use and the perceived time for each path

It can be understood that high rates of perceived time has correlation with the lower rates of use by men whereas it is not significant for the rate of use for women. On the other hand low perceived time is a significant factor which increases the rate of use of men whereas the low perceived time does not show any significant effects on path choice behavior of women. Therefore it can be understood that although perceived time is an important factor for path choice behavior of men; it is not significant factor for path choice behavior of women.

3.2 Considering the effects of perceived complexity on path choice behavior
To consider the effects of perceived complexity on path choice behavior the following steps were designed. In each step the related results are discussed.

3.2.1 Finding the importance of perceived complexity along the path for path choice
Roughly complexity along the path is more important for women rather than men for path choice behavior. There is a medium rate of importance of perceived complexity for men to choose the path; this is while perceived complexity is important for women to choose the path. Although it was understood that perceived complexity is the important factor for women rather than men, but to understand the effects of perceived complexity on path choice the following steps should be done.

3.2.2 Finding the different rates of perceived complexity along the selective paths: (Fig 3)
Roughly women perceive a higher rate of complexity than men. Path 2 allocates the highest rate of perceived complexity respecting both genders especially for women. Path 1 allocates a lower rate of perceived complexity compared to path 2 for both kinds of gender. Path 3 allocates the lowest rate of perceived complexity among the selective paths especially for men.

3.2.3 Considering the relationship between the rates of use of each paths with different rates of perceived complexity allocated to each path
The highest rates of perceived complexity, as it is along path 2, has an inverse proportion with the rates of using the paths for men in which men rarely use path 2. Path 3 with the lowest rates of perceived complexity has a medium rates of use by men and lowest rates of use by women. Path 1 with the medium rates of perceived complexity has a highest rate of using by both kinds of gender.
It can be understood that highest rate of complexity as it can be seen along path 2 has a negative effect on path choice behavior for men. Such a relation cannot be seen for women in which women sometimes use path 2 in their daily activities which shows that high rate of perceived complexity does not have negative effects on path choice for women. On the other hand lowest rate of perceived complexity as it can be seen along path 3 has a negative effect on path choice behavior for women but such a relationship cannot be seen for men.
These relationships show that women mind to the perceived complexity for path choice and the medium rate of perceived complexity is the most appropriate amount of complexity for path choice of women. This is while perceived complexity along the path not only has a less importance for path choice behavior of men rather than women but also the high rate of it along the path makes rarely use of the path by men in their daily activities. These findings are compatible with the results of Fiedeldey (1995) which found that there is a reverse relationship between environmental preference level and complexity in which the preference increases with complexity, but too much increase decreases preference level.

3.3 Considering the relationship between physical features along the path and perceived complexity
Researchers reviewed the components of complexity in urban spaces. Firstly there is a need to clarify the presence of each component of complexity along each path. If any of these features show the small rate along the path it can be ignored for being taken into account. The features contributing to generating complexity in selective paths in the base of the observation are as follow:

1. Variety of details and colors
2. Variety of signage
3. Number of people
4. Number of trees along the path
Then, it should be surveyed that how abovementioned features contribute to the perceived complexity along each path

1. Number of people is an important factor contributing to the perceived complexity among the selective paths respecting both kinds of gender.

2. Variety of signage and variety of details and colors are the least important factors for generating the perceived complexity for male this is while these features in addition to number of people are important for females to generate the perceived complexity along the selective paths.

3. Number of trees has a medium rate of effect on generating the perceived complexity especially for females along path 1 since path 2 and 3 have a small amount of trees and landscape elements; this feature has a small proportion on affecting perceived complexity along abovementioned paths

3.4 Considering the relationship between perceived complexity and perceived time and distance

It was found that perceived time along the paths should be taken into account. The highest rate of perceived complexity belongs to path 2 which allocates the highest rates of perceived time distinctively. Path 3 with the lowest rate of perceived complexity dedicates the lower rates of perceived time. Therefore it can be understood that increasing the perceived complexity as it can be seen for path 2 clearly increases the perceived time for both genders and decreasing the rate of perceived complexity, as it can be seen for path 3, decrease the perceived time respecting both gender.

3.5 Considering the importance of the sense of progression for path choice behavior

Most of respondents emphasize on the importance of this factor along the different paths which shows high effects of sense of progression for path choice behavior. In comparison between men and women, sense of progression affects path choice behavior of men more than women. Due to importance of the sense of progression for path choice behavior, this factor and its components along the path needs to be more considered.

4. Discussion

It was found that perceived distance shows the almost equal rate among the selective paths. Therefore, to get the better results perceived distance was ignored to be considered, but perceived time due to show the different rate in the selective paths was taken into account.

It was also found that perceived time is the more important factor for path choice of men rather than women in daily basis. The relationship between rate of the use and perceived time allocated to each path also shows that path 2 with the high rate of perceived time allocates the lowest rate of use for men. Due to importance of the shortest perceived time for path choice, specially for men, it can be assumed that high rate of perceived time as it can be seen along path 2 makes the low rate of use by men.

According to literature, there is a relationship between complexity and perceived distance in which increasing the perceived complexity and its components increases the perceived distance along the paths(Sadala 1980; Nasar 1985; Katayama et al, 2004; Jansen-Osmann and Berendt, 2002; Jansen-Osmann and Wiedenbauer, 2004) Issacs (2001) which surveyed the relationship between perceived time and environmental factors, as indicators of complexity, found the similar results in terms of the relationship between complexity and perceived time among the path.

This paper found that path 2 allocates the highest rates of perceived time and it also shows the highest rate of perceived complexity, therefore such a relationship between perceived time and perceived complexity among path 2 supports the results of Issacs(2001) which found that higher rate of perceived complexity based on its components contributes to increasing the perceived time of the path.

It should be mentioned that this paper aims to consider the effects of some environmental factors such as perceived complexity in the daily basis to reach a destination. Issacs(1998) without mentioning to complexity found that number of the people among the path is one of the important physical feature for pedestrians in their daily basis. In
the other hand, literature indicates that number of the people as the feature contributing to creating the complexity among the path (Jiang, 1999; Erem, 2008). According to Erem (2008), physical features such as number of the people which consists of the mobile elements, compared to architectural diversity, are more important to perceive the complexity along the path.

It is also found that between the physical features contributed to the perceived complexity (these features in the urban spaces have been reviewed), number of people is the most important factor contributing to the perceived complexity among the selective paths. In another words, respondents mostly mentioned to the density of people among the features, contributing to creating the perceived complexity. This results support Erem (2008) which found that number of the people is the important factor for generating the perceived complexity of the path. Based on the purpose of current research, our respondents were the pedestrians who choose one of path to reach a destination in their daily basis, therefore this result in terms of the relationship between different physical features and perceived complexity supports the result of Issacs (2001) which mentioned to the importance of the density of the people along the path for path choice of pedestrians in their daily basis.

Since number of people is the most important factor contributed to perceived complexity along the selective paths, among the physical features contributing to creating the perceived complexity of the path, there is a powerful relationship between number of the people as the main component contributing to perceived complexity and perceived time of the paths.

To discuss about the relationship between perceived complexity and path choice behavior, it should be mentioned that high rate of perceived complexity as it can be seen along path 2 does not have the negative effects on path choice behavior of men in which men mostly use path 2 in their daily basis, but path 2 is rarely used by men. In the other hand, it was found that perceived complexity is the significant factor for path choice of women but it does not have such important effects on path choice behavior of men. The high importance of the complexity for path choice of women let us say that high rate of complexity as it can be seen for path 2 is the main factor affecting the path choice of women positively, in which women mostly use path 2 in their daily basis, but since complexity is the factor, less important for the path choice of men rather than women, it is hard to say that high rate of complexity is the factor which make the low use of the path by men.

This difference related to gender for the effects of the complexity on path choice was indicated by Hill (1982) which found that women unlike men usually choose the path with the higher rates of complexity. He defined the complexity as the number of turn along the path. It should be discussed that number of turn and junction mostly is related to the complexity of the path in the larger scale of study, in which the correlation between the different segments of the path in the intersections and junction, along the path, needs to be considered. These relationships between different segments of the path lead to generating the number of turns along the path. Therefore in such a scale of study, number of turns need to be taken into account to measure the perceived complexity of the path. In current study, since the entire selective path represents the straight paths between two square and there is not any other junction along all selective paths; complexity is defined based on the other physical features which was mentioned in the last parts. This finding which shows that perceived complexity is the factor, more important for path choice of men rather than women supports the results of Hill (1982) which found such a relationship between preference of the path choice and complexity of the path depends on genders.

To further discussion about the relationship between preference and complexity, it should be mentioned that according to Fiedeldey (1995) there is a reverse relationship between environmental preference level and complexity. Preference increases with complexity, but too much increase decreases preference level. In this paper, path 2 with the highest rate of perceived complexity mostly used by women and rarely used by men. As it was mentioned, due to importance of the perceived complexity for women, high rate of perceived complexity does not affect preference of the women for path choice negatively in which women mostly use path 2. To consider this relationship for men, as it was mentioned, there is a lower importance of the perceived complexity for path choice of men rather than women which leads us to assume that there is not a powerful relationship between perceived complexity and preference for path choice of men. Therefore, our result does not support the results of Fiedeldey (1995) in terms of the relationship between preference related to path choice and perceived complexity of the path. Future researches need to be focused more on the relationship between preference of path choice and complexity of the path.

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To consider the relationship between perceived complexity, perceived time and path choice behavior respecting the gender, it should be mentioned that perceived time is more important for path choice of men rather than women and perceived complexity is the more important factor for path choice of women rather than men. Therefore, due to high importance of perceived time for path choice of men, it can be assumed that perceived complexity through affecting perceived time affects path choice of men in which the high rate of perceived complexity (path 2) through increasing the perceived time decreases the rate of use by men. Due to the higher importance of the perceived complexity and lower importance of perceived time for path choice of women rather than men, the effects of perceived complexity on path choice of women, can be considered independently rather than through considering its relationship with perceived time. High rate of perceived complexity along path 2 generates the high rate of perceived time for women, but due to the less importance of perceived time for women rather than men, it affects path choice behavior of women positively in which women most of the times use path 2 in their daily basis.

The abovementioned relationship between perceived time, and path choice behavior of pedestrian related to different gender needs to be more surveyed at future researches. Firstly, there is a need to use the larger scale of path choice study which some features such as number of turns can be taken into account for measuring the perceived complexity. In the other hand, according to the literature, number of turn and junctions are the physical features prominently affects perceived distance of each path (Sadala 1980; Jansen-Osmann and Wiedenbauer, 2004). Therefore addition to perceived time, perceived distance also could be taken into account for path choice behavior. Since high rate of perceived complexity makes the high rate of use of the path by women and it was discussed that this relationship can be considered independently, it is unclear that through what procedure perceived complexity affects path choice behavior for women. The other probable procedure which through it, complexity affects path choice behavior is that perceived complexity through generating affective responses such as interesting, pleasant and comfort affects path choice behavior (Issacs, 2000). Future research can consider this relationship for describing the path choice behavior especially for women. It’s also surveyed the importance of the factor which called sense of progression for path choice. It was found that this factor is important for path choice behavior, but the definition of this factor and its components in the urban paths need to be scrutinized at future researches.

REFERENCES


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