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ENVIRONMENTAL FACTORS INFLUENCING PATH SELECTIONS IN ARCHITECTURE DESIGN OF VIRTUAL AND REAL SPACES OF TRADE CENTERS WITH AN APPROACH TO EXPERIMENTAL SPATIAL BEHAVIOR

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ABSTRACT

This research aims at developing the direction of selecting path in virtual and real spaces. In an laboratory experiment 42 peels trains were allowed to attend an international exhibit freely and moved without considering specific shop. They explained their choices in a quest honker specific shop. Meanwhile, another 25 subjects experienced the same situation through a virtual environment taken from a computer game called AGI. Moving in a read environment causes environmental information to be transferred to the people. in the present research , regarding the fact that the environmental factors influence : 1.to what extent do the environmental factors influence path selection in real and virtual environments 2.what is the difference in selecting path for pedestrians. According to the result, it was known that the factors influencing path selection in virtual and real environment are different. Light is considered to be the most influential factor in virtual and real environments, but the intensity and order of factors influencing path selection in both environments vary. Also, the factors of age and sex influence environmental factors in real environments while not in virtual environment. therefore , people in cross roads tend to light and in real environments , the factors influencing are other people , sound , passage difference , counter and new path.

KEYWORDS : Path Selection, Virtual Space , Real Space , Environmental Factors

Malls are the centers of supply and demand .the rapid increasing of technology, the emergence of new commodities and their varieties and unfamiliarity with consumer simultaneous with light competition of producers can be regarded the reasons of new mall formation. These malls can provide all kind of information, cultural, art, economic The owner of the information and commodities gather in a certain place to help to exchange information, opportunities and abilities to improve and enhance the job status and discover new grounds. They also can be the most important element of urbanization at the symbolic network of the city and represent the inflection points in spatial organization along with mental memories and liability. Designers can pay attention the deferent issues in urban space designers. Construction technology, lost, available facilitation materials can be among these issues. The people who inhabit the space are less paid attentions to in design. Environment Psychology has recently entered the designers background of thought. Daily many people visit trade canters to provide their needs where they encounter some dilemmas to choose from. While walking in real and virtual environments one finds many different components to choose the path which vary versus the space in that a certain component is influential in each place. In the present research we tried to find mach components of making election and fith path by selecting a computer game and direct the people to the desired path by attractive image making by light and colour. The finding of this research can help the designers of public places restaurants and trade counters to direct to direct and guide people to move to wards these place south they can increase their profit consequently awareness of peoples spatial behaviour of influential factors and their motivations in path finding process is necessary variety and vitality consist most important parts of urban design related activities in the environment. The environment can nurture the personality of individuals and vitalize the urban life. In the present research the desired aims are:1) achieving the factor influencing the people direction in real and virtual environments in trade counters 2) what is the difference for pedestrians in real and virtual environment. the research was carried out in inductive method by questionnaire , field observation and interview. The site of research was international fair of Hamadan and the sample was all the visitors to fair daily consisting of 42 subject unfamiliar with environment, 25 of whom find their direction virtually. (Darvizeh et al., 2006; John 2009 and hul 1943).

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Theoretical Foundations

Virtual Space or Cyber Space

Virtual space was first used by william gimbson-canadian writer of fiction-scientific novels in 1982, as a fiction space produced by connection of computers which have related all humans, machines and information resources .this is almost the same as the meaning existing about the application of virtual space. cyber was derived from creek cybernetic meaning guide, the term cybernetics was first used by norbert wiener in cybernetics and control in communication between animal and machine in 1948 .virtual space can be used to describe all kinds of Information available in computer networks .anderson defines the virtual reality as the reality created by computer in that it doesn't have physical existence and is created by software .in fact ,cyber space is attributed to a set of internal communication of humans through computer and electronic device without considering physical geography .

Trade Centers

Trade centers are closed roof environments insisting of several shops built by humans for social interactions and provision of daily needs, originated from bazar. Business spaces have been the basic element of physical structure of cities and traditional bazars were regarded as the cultural representation of different cities .not long ago, bazar was an urban element was a specific place and urban life and bazar were interwoven and the city became represented by their bazars . The importance of bazars was taken from cultural and religious roles. in most cities of Asian countries such as Iran ,turkey and India ,traditional bazars are the most outstanding representation of public culture while ? the status of traditional bazars in the third world countries is beaming weak .the increasing population and the change in the trade methods have lead to delaine. on the other hard, construction and spread of traditional bazars have been regarded to be inevitable. the shopping malls and trade spaces of the modern era came be regarded as the second wave of trade environmets resulted from industrial revolution and the emergence of modern architecture. peoples attraction to multipurpose complexes in which shopping is combined Leisure and entertainment and caused the bazaar to become a place for touristy and visitors. The political powers of such place have declined greatly. This declination has been observed even for trade centers in Europe and usa. The greatest challenge they on front with is the spread of internet and online shopping which reduce the physical presence in the the shops and consequently change the change the architecture of trade spaces (Stata, 1976).

Environment

The initial classification of the but environment shows arrange of its capabilities. In the simplest form, the hard surface of the environment provide the movement and displacement while soft surface provides comfort ability. The combination of both these surfaces provides a shelter for people to meat his physical and social needs. Some of the capability of an environment can be under stood for a certain people environmental capabilities are divided in to direct and indirect classes the former refers to provision of activities by the environment why the latter refers to symbolic meaning s in general. The behaviour is influenced by environmental factor such as physical data of environment 2)symbolic data of environment 3) architectural data of environment 4 atmosphere

Interaction between environment and in divided

Behavioural settlements are social systems limited to time and place consisting of people and objects spatial and temporal limitation are significant as to know when and where these settlement are the most flexible part of the behavioural settlement .the key feature of his inter relationship of behaviour environment is peoples adjustment in their behaviour in that people set the objects in settlements and are limited by them. The interactions of human and objects are not carried out randomly but its a predetermined order . plan (system) is a key feature of behavioural settlement as it reflects the organization and relationship of participants. Although behavioural settlements are self regulated, they are influenced by factors stemming from outside

Finding Path

Path finding was defined as a process of solving multi dimension of spatial problem, capable of spatial simulation and recognizing spatial information, setting maps to find away and decision making and implementing

them. For posing path finding is insisted of three stages.

1) Visualization of recognition, the process of achieving information and its formation and maintaining the spatial information and spatial knowledge, this process results in the formation of a recognition map or the environmental information stored in memory.
2) Discussion making is the stage when people decide to do something.
3) Implementation is the final stage when people implement their decision some few marketing studies have been done about the process of identifying costumers in shopping malls. Some workers showed a sequence of stages.

a) Path finding and determing the customer's direction.
b) Choosing a destination.
c) Identifying a destination
d) Assessing the environment.
e) Choosing a product
f) Product analysis
g) Identification of product.

Participants in Titus and overt's study performed

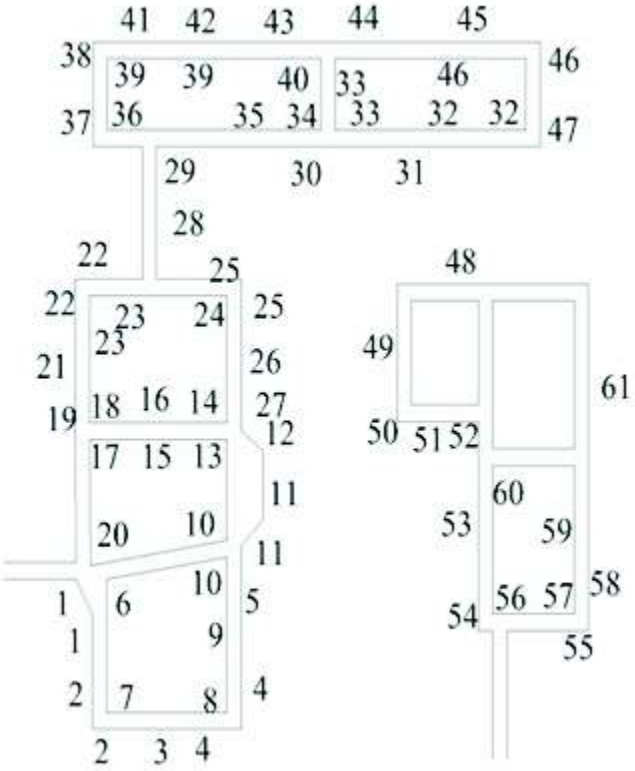


Figure 3: The location of each booth

Figure 1: International Fair the Hamedan

Figure 2: View Of The Exhibition Space

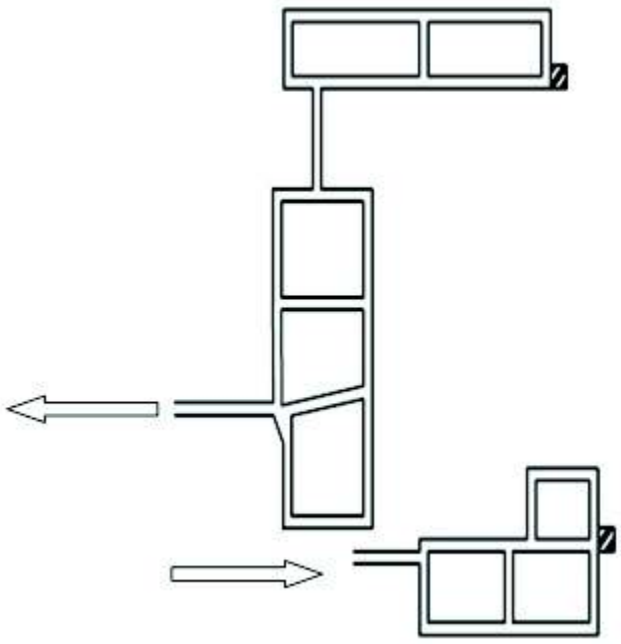


Figure 4: The location of the input and output of the show

Table 1: Stand in Exhibition

Row	Stand	Row	Stand	Row	Stand
1	Pardis Furniture	23	Mumbai Furniture	45	Daqiqeh Furniture
2	Ahmad Furniture	24	Aqasi Furniture	46	Qorbani-Decora Furniture
3	Arshian Furniture	25	Hussein Furniture	47	Chubiran Furniture
4	Leader Furniture	26	Glass Apple Furniture	48	Exhibition Executive Staff Furniture
5	Carnik Furniture	27	Nata Luxury Furniture	49	Modern Furniture
6	Abnus Furniture	28	Tuska Furniture	50	Nader Furniture
7	Khorram Furniture	29	Press	51	Novin Furniture
8	Arian Furniture	30	Soleimani Furniture	52	Matin Furniture
9	Royal Furniture	31	Imen Furniture	53	Anahita Furniture
10	As Furniture	32	Venus Furniture	54	I Tech Furniture
11	Aj Kermani Furniture	33	Diba Furniture	55	Laleh Furniture
12	Asa Choub Furniture	34	Abbas Furniture	56	Amiran Furniture
13	Kaktous Furniture	35	Abbas Furniture	57	Nader Furniture
14	Sepidar Furniture	36	Impax Furniture	58	Sahele Nour Chandelier
15	Mahdi Furniture	37	Lamver Furniture	59	Prince Nader Furniture
16	Chubineh Furniture	38	Rafei Furniture	60	Nazgol Furniture
17	Balsam Furniture	39	Bermuda Furniture	61	Khorshid Shab Chandelier
18	Chubineh Furniture	40	Husseini Bros Furniture	62	Raham Chandelier
19	Mokhtari Furniture	41	Dian Furniture	63	Antic Chandelier
20	Dadashi Furniture	42	Negin Chub Furniture	64	Venus Chandelier
21	Parseh Furniture	43	Padideh Furniture	65	Pouya Chandelier
22	Brand Furniture	44	Takht Tavous Furniture	66	Foge Chandelier

path finding based on three processes successfully. The visualization of identifying consists of choosing and identification of destination, doguand derrick focused on path finding process in Turkey.

Personal identifying of environment and path finding

It carried out by Hull who interested the mice's foresting food in labyrinth. He proposed that environmental learning like learning a path consists of response _inducing behaviors. There are many researches about the recognition map and path finding in different frame work. Recently, it has been known that children could understand the map reading.

Sampling

In this research international fair of Hanioden was used as the research site. This fair is held quarterly and home appliances such as sofa, armchair and luster's. The most of visitors were sommelier. at the four entrance, the visitors were given a questionnaire with general and specific questions about selection of path . the visitors had to specify the path often reaching the cross (juncture) along with the reason of selection .then ,the name of counter or canteen they wanted to visit was determined .as they hadn't visited the far before ,they could decide based on their in tersest and taste .in virtual space ,GTA game was used in which a person is located in a delicacy shop in urban setting .the environment a person is located is very small and he does the same action as real visitors (Figure 1 to 7 and Table, 1).

Investigating The Factor Of Path Change In Virtual Environment And That In Read Environment

As two factors of path change in virtual and real environments are nominal variables, the kolmorov smirnova test was used. According to table 2 & 3 there is a

Figure 5: Input and Output Hamedan International

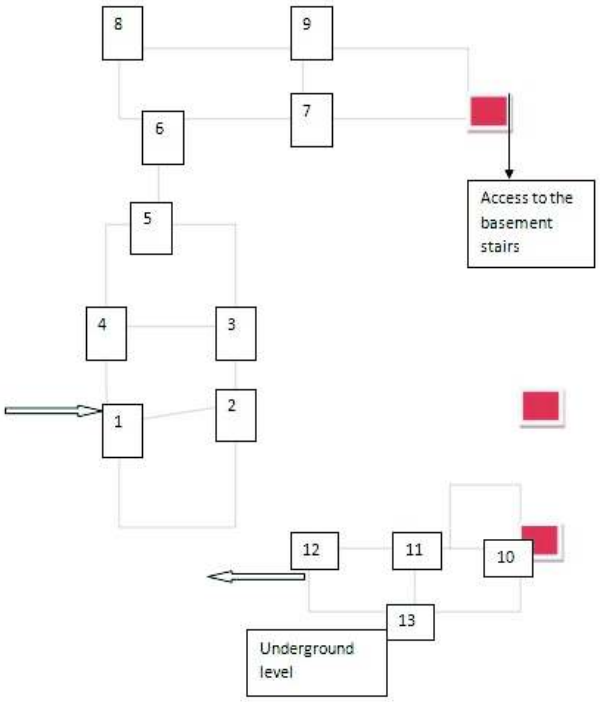


Figure 6: The number of intersections of the natural environment

Table 2: Two-Sample Kolmogorov-Smirnov Test

	Comparisons	N
Combining categories	Real	546
	Virtual	325
	total	871

Table 3: Compare Grouped Variables

		TALFIGHEGOROHA
Most differences are	Absolute	.190
	Positive	.190
	Negative	-.075
KS		2.715
Asymp. Sig. (2-tailed)		.000

Test Statistics

significant difference between the Avery of two factors of virtual and real path change at the error level of %1 and confidence level of 99% (sig=0) .in another word ,the influential factors of path change in real and virtual environment are different.

Cross table between factors of path change ,cross number and direction in virtual environment

As seen from table 4, in the first cross of virtual environment, 10 persons changed their paths to right for light ,and 4 persons to left and 1person the straight direction .in fact ,light was the most influential factor to change path .in the second cross of virtual environment ,the new path factor was influential for 11 persons it is seen that light ,new path ,passage differences ,sound and other people are the influential factors, respectively (Diagram 1 & 2).

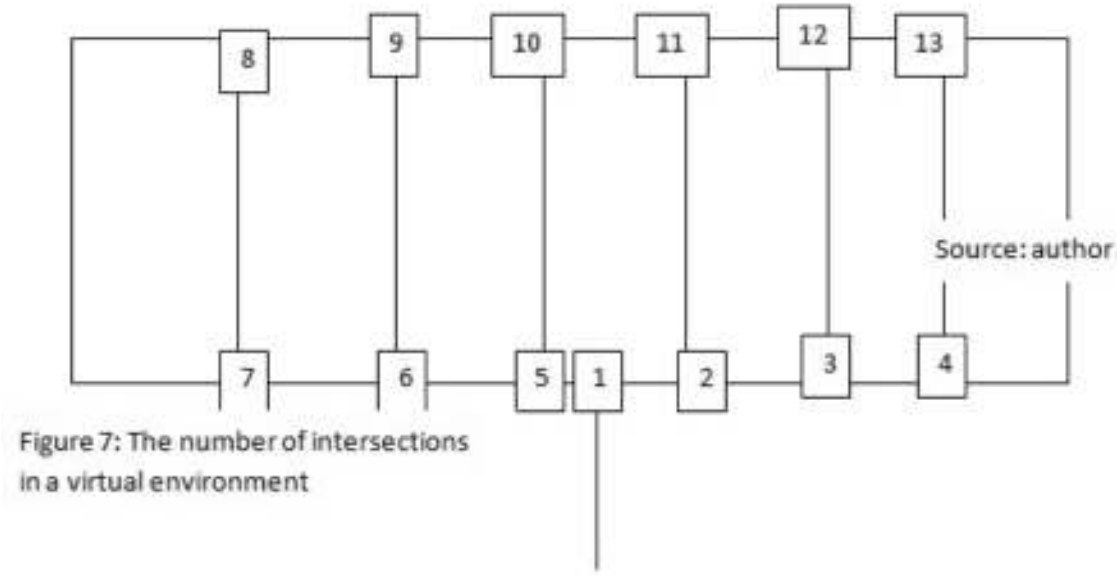


Figure 7: The number of intersections in a virtual environment

Diagram 1: Frequency change direction at intersections in a virtual environment agent-based

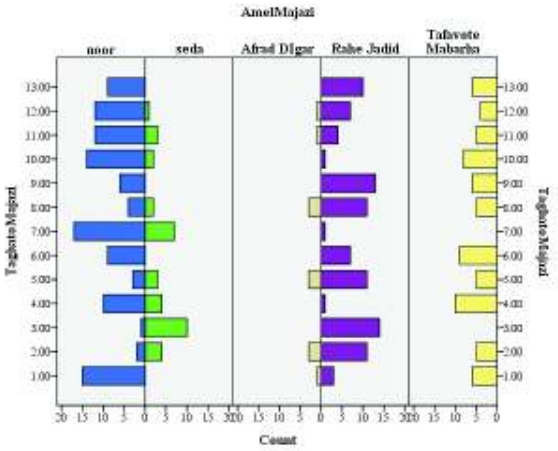


Diagram 2: Frequency of operating in a virtual environment

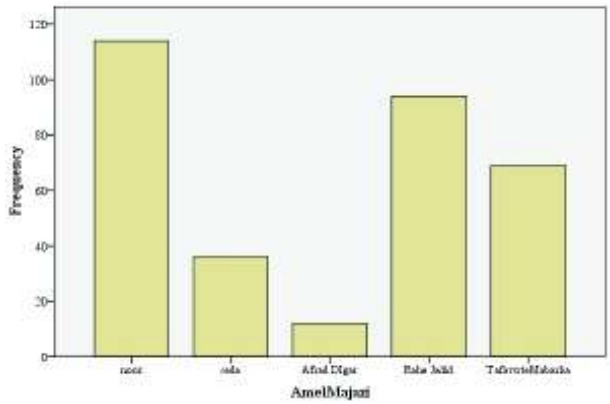
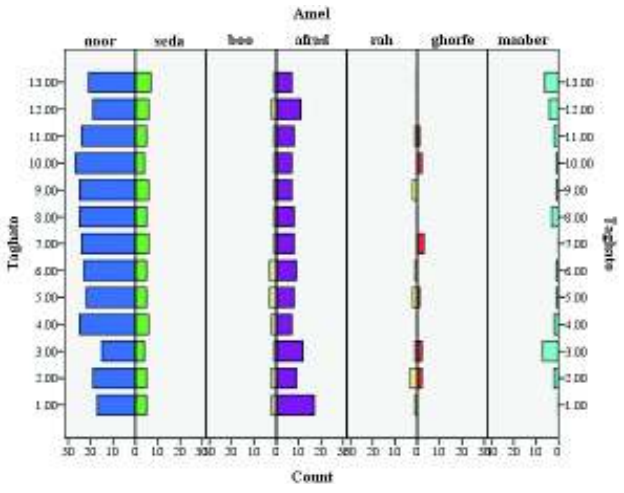


Diagram 3: Frequency change direction at intersections based on actual operating environment



Cross table in real environments

According to table 5, in the first cross of real environment , light and other people with 17 frequencies are the most important factors to select the path, as seen, in the first cross of real environment 9 persons went to right, 7 persons to left and 1 person straight direction for light. in the second cross, among 19 persons, 11 persons chose to go to right and 7 persons to left. in the real environment , light is, indeed, the most important factor to choose path followed by sound , passage difference, odor, canteen and new path. (Diagram 3 & 4).

Table 4: Frequency Change Direction at Intersections In a Virtual

Number intersection	Virtual intersection		Virtual agents					Total
			Light	Sound	Other people	New Way	Different approach	
1	Redirection virtual	To Right	10		1	3	5	19
		To left	4		0	0	1	5
		Direct	1		0	0	0	1
	total		15		1	3	6	25
2	Redirection virtual	To Right	1	0	0	1	0	2
		To left	0	0	2	4	1	7
		Direct	1	4	1	6	4	16
	total			4	3	11	5	25
3	Redirection virtual	To Right	0	5		8		13
		To left	1	5		6		12
	total		1	10		14		25
4	Redirection virtual	To Right	4	1		1	2	8
		To left	6	3		0	5	14
		Direct	0	0		0	3	3
	total			4		1	10	25
5	Redirection virtual	To Right	0	1	2	5	2	10
		To left	1	1	0	5	2	9
		Direct	2	1	1	1	1	6
	total			3	3	11	5	25
6	Redirection virtual	To Right	5			5	5	15
		To left	4			2	4	10
	total					7	9	25
7	Redirection virtual	To Right	8	6		0		14
		To left	9	1		1		11
	total			7		1		25
8	Redirection virtual	To Right	1	1	2	7	4	15
		To left	3	1	1	4	1	10
	total			2	3	11	5	25
9	Redirection virtual	To Right	0			3	3	6
		To left	6			6	3	15
		Direct	0			4	0	4
	total					13	6	25
10	Redirection virtual	To Right	8	1		0	6	15
		To left	6	1		1	2	10
	total			2		1	8	25
11	Redirection virtual	To Right	2	2	1	1	0	6
		To left	8	1	0	3	3	15
		Direct	2	0	0	0	2	4
	total			3	1	4	5	25
12	Redirection virtual	To Right	6	0	0	5	1	12
		To left	6	1	1	2	3	13
	total			1	1	7	4	25
13	Redirection virtual	To Right	3			3	3	9
		To left	5			6	1	12
		Direct	1			1	2	4
	total					10	6	25

Table 5: Frequency Change Direction at Intersections Based on Actual Operating Environment

Number intersection	Intersects the real		Real factors							total
			Light	Sound	smell	Other people	New Way	Booths	Passages	
1	The real path	To Right	9	1	0	1	1			12
		To left	7	3	1	10	0			21
		Direct	1	1	1	6	0			9
	total			5	2	17	1			42
2	The real path	To Right	11	4	2	7	2	0	0	26
		To left	8	1	0	2	1	2	2	16
	total			5	2	9	3	2	2	42
3	The real path	To Right	3	2	0	6	1	0	6	18
		To left	8	2	1	3	0	1	1	16
		Direct	4	0	0	3	0	1	0	8
	total			4	1	12	1	2	7	42
4	The real path	To Right	2	1	0	2			0	5
		To left	4	0	0	0			0	4
		Direct	19	5	2	5			2	33
	total			6	2	7			2	42
5	The real path	To Right	6	0	1	0	0	0	0	7
		To left	7	2	2	4	2	0	0	17
		Direct	9	3	0	4	0	1	1	18
	total			5	3	8	2	1	1	42
6	The real path	To Right	15	5	3	4	1		1	29
		To left	8	0	0	5	0		0	13
	total			5	3	9	1		1	42
7	The real path	To Right	14	3	1	1		0		19
		To left	7	3	0	4		2		16
		Direct	3	0	0	3		1		7
	total			6	1	8		3		42
8	The real path	To Right	18	2	0	4			2	26
		To left	1	1	0	0			0	2
		Direct	6	2	1	4			1	14
	total			5	1	8			3	42
9	The real path	To Right	16	3	0	4	1		1	25
		To left	9	3	1	3	1		0	17
	total			6	1	7	2		1	42
10	The real path	To Right	5	0	0	2		0	0	7
		To left	11	2	1	4		2	1	21
		Direct	11	2	0	1		0	0	14
	total			4	1	7		2	1	42

(Contd.)

11	The real path	To Right	9	0	0	0	0	0	2	11
		To left	15	5	1	8	1	1	0	31
	total			5	1	8	1	1	2	42
12	The real path	To Right	0	0	1	0			0	1
		To left	13	5	1	6			1	26
		Direct	6	1	0	5			3	15
	total			6	2	11			4	42
13	The real path	To Right	6	5	1	2			2	16
		To left	8	1	0	4			2	15
		Direct	7	1	0	1			2	11
	total			7	1	7			6	42

Diagram 4: Frequency of Operating in a Real Environment

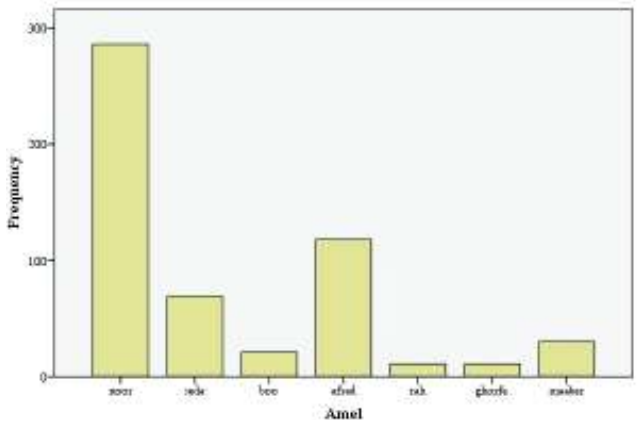


Table 6: Correlation is Significant at the 0.05 Level

			Factor	Sex
Spearman's rho	Factor	The correlation coefficient	1.000	.312*
		Sig. (2-tailed)	.	.044
		N	546	42
	sex	The correlation coefficient	.312*	1.000
		Sig. (2-tailed)	.044	.
		N	42	42

Using spearman's correlation coefficient test Table, 6 we obtained there is a significant relationship at the error level of 1.5 and confidence level 95% between two variable of path selection and sex . the participants choose different paths based on sex.

The relationship between path selection and sex in virtual environment according to Pearson's correlation table 7, there is not a significant relationship between path charge and sex.

Table 7: Pearson's Correlation

			Virtual sex	Managing Virtual
Spearman's rho	Virtual sex	The correlation coefficient	1.000	.277
		Sig. (2-tailed)	.	.181
		N	25	25
	Managing Virtual	The correlation coefficient	.277	1.000
		Sig. (2-tailed)	.181	.
		N	25	325

Relationship between path selection and age in virtual environment according to Pearson's correlation coefficient, there is not any significant relationship between age and path selection in virtual environment.

Table 8: Relationship Between Age and Path

		Managing Virtual	Virtual Age
Managing Virtual	Coefficient Pearson	1	-.193
	Sig. (2-tailed)		.355
	N	325	25
Virtual Age	Coefficient Pearson	-.193	1
	Sig. (2-tailed)	.355	
	N	25	25

Relationship of path selection and age in real environment

According to table, 8 Pearson's correlation coefficient , it was know that there is significant relationship between age and path selection in real environment at the error level of 5% and confidence level of 95%.

CONCLUSION

This research airs at determining the factors influencing path selection in real and virtual environment, focusing on Pearson's behavior in real and virtual environment, based on the research, it was known that influential factors in selecting path are different in real and virtual environment. While light is the most important factors in environment, the order and intensity of other factors are different. in real environment other people, sound , passage difference , order , canteen and new path and in virtual environment, new path, passage difference , sound in selecting path in real environment , they don't have significant effect in virtual environment.

REFERENCES

Darvizeh, Zahra, Bildes, Mark and Blot, J. M. Olgi, Silvia, and Suraj Paul, Roy., 2006. Analysis of the capability of routing and map reading in 4-5 year old children. New Educational Thought Journal. Faculty of Education and Psychological Sciences. Alzahra University, Tehran.

Creation of architectural theory: the role of behavioral science in environmental design. By John Long, translated by Alireza Eynifar. Tehran, University of Tehran Press, 2009.

Mortazavi, Shahrnaz, Environmental Psychology.

Hull, C. L., 1943. Principles of behavior. New York, NY, USA: Appleton- Century-Croft.

Golledge, R. G., Smith T.R., Pellegrino, J.W., Doherty, S., & Marshall S.P., 1985.

A conceptual model and empirical analysis of children's acquisition of spatial knowledge. Journal of environmental psychology, **5**(2), 125-152.

Stea, D., 1976. Program notes on a spatial fugue. In G.T. Moore & R.G. Golledge (Eds), Environmental knowing theirues, research, and methods :106-120. Stroudsburg, PA, USA: Dowden, Hutchinson and Ross.