A Research on Permeability Concept at an Urban Pedestrian Shopping Street: A Case of Trabzon Kunduracilar Street

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ABSTRACT

This research in which components of permeability concept is tried to be set forth, presents the results of a field study conducted on a pedestrian-shopping street in Trabzon, a coastal city in the eastern Black Sea Region. The criteria affecting permeability are dealt with in physical, functional and perceptual properties. Accordingly, three hypotheses are proposed in this article. The study was a two-stage survey. The first survey is prepared to determine user preferences. With the second survey prepared in the light of the data obtained from the first one, characteristics defining the permeability concept were sought for. As a result, permeability level of a street is found to be closely related with the physical, functional and perceptual properties providing such permeability and, permeability is determined to be best provided by considering all the three properties together, and new perspective to the concept of permeability is brought with this model.

Keywords: Accessibility, legibility, pedestrian-shopping streets, permeability, variety

Kentsel Yaya Alışveriş Sokaklarında Geçirgenlik Kavramı Üzerine Bir Araştırma: Trabzon Kunduracılar Caddesi Örneği

ÖZET

Geçirgenlik kavramının bileşenlerinin ortaya konmaya çalışıldığı bu araştırma, Doğu Karadeniz Bölgesi kıyı ili olan Trabzon'da bir yaya-alışveriş sokağı üzerinde yapılan alan çalışmasının sonuçlarını ortaya koymaktadır. Geçirgenliği etkileyen kriterler fiziksel, işlevsel ve algısal boyutta ele alınmıştır. Buna bağlı olarak bu makalede 3 adet varsayım öne sürülmüştür. Çalışma iki aşamalı anket tekniği ile yapılmıştır. Birinci anket çalışması kullanıcı tercihlerini saptamaya yönelik olarak hazırlanmıştır. Bu anket çalışmasından elde edilen veriler ışığında hazırlanan ikinci anket çalışması ile geçirgenlik kavramını tanımlayan sıfatlar aranmıştır. Çalışmanın sonucunda, bir sokağın geçirgenlik düzeyinin, geçirgenliği sağlayan fiziksel, işlevsel ve algısal boyutlarla yakından ilişkili olduğu saptanmış ve geçirgenliği sağlamanın en iyi yolunun bu üç boyutun birlikte ele alınmasıyla sağlanacağı belirlenerek, oluşturulan model ile geçirgenlik kavramına yeni bir bakış açısı getirilmektedir.

Anahtar kelimeler: Ulaşılabilirlik, okunabilirlik, yaya alışveriş sokakları, geçirgenlik, çeşitlilik

INTRODUCTION

People have directed their necessities of all kinds towards shopping centers, shopping malls and internet shopping, growing and developing along with the era. Initially, the main purpose was literally shopping, whereas today, purposes such as spending time, entertainment, recreation etc. has got ahead of shopping activity. People desire to have quality and comfort as well while performing such activities. For this reason, shopping centers have become powerful attraction points.

Gradual decrease in the feature of being an economical and social attraction point of pedestrian-shopping streets and thus, city centers, is considered to be a significant issue for city centers. Some characteristics of pedestrian-shopping streets, having lost their efficiency against the shopping centers, need to be strengthened to regain these back in the city life in a more powerful way. Making conceptual proposals to increase the use of space positively is the primary purpose of this study.

Permeability is a feature which successful spaces should possess. Permeable spaces or areas may be defined as spaces preferred and used by their users. Considering the point of view that many properties of environments end up with being preferred or rejected and preferred spaces are those which provide satisfaction for people (Rapoport 2004), it could be said that properties which let a space to be preferred and used contain permeability. According to Bentley, permeability is defined as "the extent to which an environment allows people a choice of access through it, from place to place" (Bentley 1985). Bentley furthermore suggests that "choices can be

increased with alternative routes by making areas accessible" (Carmona at all 2003). Stamps, on the other hand, define permeability as "the ability of something to move through another thing" (Stamps 2003).

In literature research, the concept of permeability is seen to be interrelated with the concepts of "plurality", "variety", "accessibility" and "legibility" (Bentley 1985; Bentley 1993; Bentley 2007; Carmona at all 2003; Campbell and Cowan 1999; Karaman at all 2001; Thompson 2001; Montgomery 1995). Some other researches on the other hand, suggest that "successful spaces should include variety" (Rapoport 1977; Bentley 1985; Gehl 1987; White 1994).

Theoretical Framework and Scope of the Study

In the light of these evaluations, permeability is taken as a concept having positive impacts on street qualities. From a physical point of view, a good and qualified pedestrian area should be a space offering people choices to pass through, interconnected and convenient for walking. From a perceptual and functional point of view on the other hand, a qualified pedestrian area should have suitable centers as being meaningful, easy to comprehend and access, secure and comfortable, incorporating varieties, appealing to emotions, attractive places to reach and should possess accessible and different buildings.

The concept of permeability was concluded to be explained with three components as a result of literature research and these components are determined to be the physical, functional and perceptual. The

effects of these components on the space are considered to strengthen permeability and it is acknowledged that spaces with high permeability levels are preferred, used and accepted more by their users. Stamps emphasized that open spaces in which people can see things is rather significant (Stamps 2010) and physical and visual permeability in the space is effective in creating a feeling of confidence (Stamps 2005).

Permeability is taken in the study as a concept creating a positive impact on users. The assumption that permeability may be explained depending on physical, functional and perceptual components is illustrated in Table 1 (Yavuz 2009).

Table 1. Permeability Model I (adapted from Yavuz, 2009)

PERMEABILITY		
Physical Properties	Functional Properties	Perceptual Properties

When the expressions defining permeability in previous studies are examined, sub-concepts accommodated by physical, functional and perceptual features directly related to permeability are also seen to support the level of permeability. In determining these concepts, it is seen that permeability can be explained with;

• Accessibility, in the meaning of physical accessibility due to explanation by easy access: physical properties,
• Variety, due to explanation by plurality: functional properties,
• When both of the above are determined to be evaluated according to user preferences, legibility, according to the criteria of recognition, comprehension,

being meaningful, distinctiveness, uniqueness and experience: It has been seen that it can be explained by perceptual properties and the permeability model is developed as indicated in Table 2 (Yavuz, 2009, 61).

Table 2. Permeability Model II (adapted from Yavuz, 2009)

PERMEABILITY		
Physical Properties	Functional Properties	Perceptual Properties
Accessibility	Variety	Legibility

Hence, permeability within this study is considered to be an accessible, perceivable concept offering functional varieties to create successful spaces. Each of the three concepts above has found itself a place with an equal weight within the permeability model created. However, out of these, accessibility is acknowledged to be the prerequisite of permeability. The permeability model (Table 2) created as a consequence of such evaluation is being improved through implementation studies.

Purpose and Assumptions of the Study

The purpose of this research is to validate the model suggested for explaining the concept of permeability with a field study. For this purpose, 3 basic hypotheses are determined for the research.

Hypothesis 1: Is determined to be as: "pedestrian shopping streets incorporating accessibility, variety and legibility have a permeable quality and permeability has a direct relation with these sub-concepts". Permeability is tested with 3 sub-hypotheses based on this hypothesis. These are: "permeability is related with the number of people using that space, level

and frequency of use"; "permeability is related with the functional variety within that space" and "permeability is related with spaces or centers creating permanent images in users' minds".

Hypothesis 2: "permeability is positively related to these concepts".
Hypothesis 3: "streets with a high level of permeability are pleasing".

MATERIAL and METHOD

The research is conducted in city of Trabzon, a city located in Eastern Black Sea region in the north of Turkey (Figure 1).

Figure 1. Research Area

Kunduracılar Street is chosen to be the implementation area due to its characteristic of being the first street dedicated to pedestrians solely. The street is 350 m long, with a width varying from 5 m up to 8, 90 m. It is parallel to the shore with a distance approximately 245 m to the sea. Location plan of and impressions from the street can be seen in Figure 2.
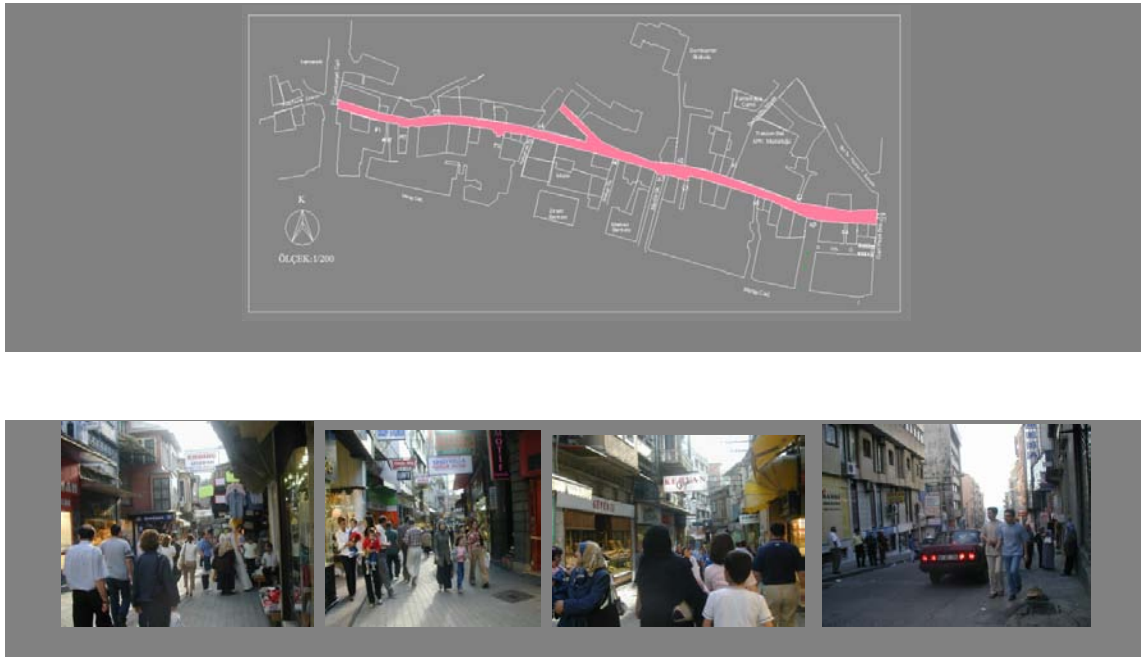

Figure 2. Location Plan of and Impressions from the Street

Methods used in environmental research are gathered into two groups as one-to-one research in the field and research conducted in laboratory environment In addition, it is also known that different techniques are used in combination to complement each other (Bechtel and Zeisel, 1987; Ng Fan, 2003; Yavuz, 2009).

This research is conducted face to face in the field and in the form of a survey study with two phases. In phase one, data obtained from the survey study is synthesized and a database is set up for phase two. Since it is considered during phase one that user preferences demonstrate significant relations with permeability, requests, positive opinions, criticisms and general views of users has been inquired. In phase two, terms defining permeability in pedestrian-shopping streets and the relationships between such definitions are inquired by using the semantic differentiation scale between the determined definition pairs.

Phase One

Participants
During the pre-observations, rate of use is determined to be the highest in summer and the lowest in winter. Therefore, the research is conducted in autumn, when the rate of use is around medium level and besides, where annual education period begins and those who had come for tourist & vacation purposes return, thus being a period yielding the highest rate of home

city users. Considering that user behavior might differ on different days and hours in a week besides psychological characteristics of individuals, it is found appropriate to gather the data to be taken as basis for the research into a time interval in which all types of use would exist. This range is assumed to be a weekly time range, days and hours to represent the week are determined with pre-observations. Surveys are conducted on Mondays, Wednesdays and Saturdays, by taking the beginning, middle and end of the weeks as basis.

Since sex and age factors are known to be also effective, due care is taken so that users are split equally as males and females as well as choosing both groups from different age intervals within themselves.

The Questionnaire
Components which are considered to be related with permeability are questioned in the surveys. These are directed towards inquiring the times, reasons and frequency of use of the street by the users as well as their expectancies, positive opinions and also their criticisms. Also, physical, functional and perceptual characteristics of the street were inquired and furthermore, users were asked to define the street. Such definitions are evaluated and used during the subsequent phase. There are open ended and closed ended questions in the questionnaires. Moreover, socio-demographical data are also inquired (Table 3).

Table 3. Phase One Questionnaire

DEMOGRAPHICAL DATA	
	Gender / Age / Educational Status / Career Information
INQUIRY TOWARDS GENERAL USE	
1	Please indicate with which frequency you use this street generally.
2	Do you use during weekdays or on weekends?
3	At what times of the day do you use this street?
4	How long, in general, is your estimated time of stay in this street?
5	With which purpose(s) are you using this street at the moment?
6	In your opinion, what is the best liked feature of this street?
7	In your opinion, what is the most criticized feature of this street?
8	If you had the power to change this street, what would you do?
PHYSICAL INQUIRIES	
9	What do you think about the distribution of open areas within this street?
10	Do you think the length and width of this street is sufficient, can you comfortably walk around?
11	Would you prefer the top of the street to be covered to protect from rain and sunlight?
12	Can you use this street during all seasons?
FUNCTIONAL INQUIRIES	
13	Do you think the commercial functions on this street (e.g., garment shops, jewelries, banks etc.) are sufficient?
14	Do you think the social activities on this street (e.g., for resting, having a conversation, dining etc.) are sufficient?
15	Would you use this street if there were activities made to keep this space alive during the evenings?
16	If you were to meet a friend, would you use this street as a meeting point?
PERCEPTUAL INQUIRIES	
17	If you were to mention about his street to a stranger, how would you describe it with a single word?
18	Do you think this street is crowded? If your answer is yes, on which days and during which hours?
19	What do you do in this street when you feel tired?
20	Do you think shop street façades and showcases are attractive?

Survey Implementation

Surveys are conducted face to face by physically showing up in the space in different time intervals. User profile is selected randomly depending on the determined criteria. Participants are asked questions and the answers are noted. Choices are also communicated with closed ended questions. 110 users were interviewed, separately.

Data Analysis

Data obtained from participants is evaluated by using the SPSS application. Data obtained from the open ended questions are subsequently grouped and evaluated. Groups with the highest percentage values are used in the research.

Phase Two

Participants

Second survey implementation is made within the same period by taking the same criteria as basis. Surveys are conducted on Mondays, Wednesdays and Saturdays, by taking the beginning, middle and end of the weeks as basis. Due care is taken so that users are split equally as males and females as well as choosing both groups from different age intervals within themselves.

The Questionnaire

With the data obtained from the first survey, adjective (term) pairs are formed defining the street to be used in the second survey. Adjective pairs asked as well as the groups represented by them are given in Table 4.

Table 4. Adjective pairs selected according to physical, functional and perceptual properties

Physical Properties	Functional Properties	Perceptual Properties
Accessibility	Variety	Legibility
Narrow-Wide	Boring-Entertaining	Crowded-Calm
Short-Long	Inactive-Active	Dull -Lively
Closed-Open	Few opportunities-Lots of opportunities	Ordinary-Attractive
Congested-Fluent	Expensive-Inexpensive	Disturbing-Peaceful
	Few activities-Lots of activities	Repulsive-Inviting
	Inconvenient- Convenient	Stranger-Familiar
	Non-functional-Functional	Unpleasing-Pleasing
Not Permeable-Permeable	Not Permeable-Permeable	Not Permeable-Permeable

Socio-demographical data is also asked in order to set forth user profiles. The survey is conducted with the purpose of seeing how the users define this pedestrian-shopping street with such adjective pairs, to determine the relation of permeability with these adjectives as well as defining permeability. In this stage, semantic differentiation scale is used. The use of semantic differentiation scales are developed by Osgood et al. (1957). The semantic differentiation scale has a linguistic origin and expressed by a scale consisting of opposite adjective pairs (Table 5).

Survey Implementation

The survey is conducted on shopping streets with 250 persons and only 204 surveys from which sound data are obtained are included for evaluation.

Survey implementation is made face to face by physically showing up in the space in different time intervals. User profile is selected randomly depending on the determined criteria. The users are asked to mark the adjectives which they find appropriate for the pedestrian-shopping street and make an evaluation by assigning a value to such adjectives. On the semantic differentiation scale, those selected among values +1, +2 and +3 are evaluated as positive and among -1, -2 and -3 as negative.

Moreover, user satisfaction level with regard to the street was further inquired with a second question by using Likert's Attitude Scale. Likert's Attitude Scale is a scale for attitudes suggested by Likert in early 1930's. The users selected one of the choices according to these expressions.

Table 5. Phase Two Questionnaire

1. Question: Please evaluate this street with the adjective pairs given below.							
	High	Medium	Low	Equivalent	Low	Medium	High
	3	2	1	0	1	2	3
Calm								Crowded
Wide								Narrow
Entertaining								Boring
Active								Inactive
Long								Short
Lots of opportunities								Few opportunities
Lively								Dull
Inexpensive								Expensive
Attractive								Ordinary
Peaceful								Disturbing
Open								Closed
Fluent								Congested
Inviting								Repulsive
Lots of activities								Few activities
Familiar								Stranger
Pleasing								Unpleasing
Convenient								Inconvenient
Functional								Non-functional
Permeable								Not Permeable

2. Question: As to the expression "I like and use this street";

☐ Strongly Agree   ☐ Agree   ☐ No Idea   ☐ Disagree   ☐ Strongly Disagree

Data Analysis

Data obtained from 204 participants is evaluated by using the SPSS application. For assessment of the questionnaires, values -3, –2, -1, 0, 1, 2, 3 on semantic differentiation scale are converted into figures 1, 2, 3, 4, 5, 6, 7 to facilitate calculations. In Likert's Attitude Scale, user answers are converted into figures 1, 2, 3, 4, 5 for the same purposes.

Concepts related to permeability are tried to be demonstrated through a correlation test. Besides this, interrelation between the adjectives included within the test is also determined. Then, the models best describing permeability are shown through a regression analysis conducted on the adjectives to which permeability is related.

FINDINGS

User Preferences

On the first questionnaire, users are asked questions about physical, functional and perceptual properties. With the general questions, it was intended to obtain data on general use of users of the pedestrian-shopping street (e.g. when, with which frequencies and purposes people use such streets, things they like and dislike about these streets etc.). As some researchers associated successful spaces with their capability of being used during different time periods in daytime and at nights necessitated such data to be inquired (Montgomery 1998).

Findings considered to be significant from the questions on general use are as follows;

39% of participants indicated that they used the street everyday and 28% once a week. 58% are found to use the street during weekdays and 42% on weekends, percentage of those using the street between 15:00–21:00 is 42%. Those staying for a few hours turned out to be 51% while 49% stayed upto half an hour, 38% used the street for shopping purposes where 36% used for transportation and 9% for entertainment. For the question "In your opinion, what is the most liked feature of this space", users gave the the following answers: shopping opportunities-convenience by 17%, shopping choices-variety by 24%, and lack of traffic by 24%. Such results support the view that "trade is the key to all successful urban spaces", suggested by Montgomery (Montgomery 1998).

For the question "In your opinion, what is the most criticized feature of this street?", 33% gave the answer that the street was crowded, % 9 said it was narrow and 14% pointed out the lack of places for refreshment. To the question "If you had the power to change this street, what would you do?", 19% answered as they would add places to sit, 16% said they would create entertainment facilities, 6% said they would increase the green spaces.

Some striking answers obtained from perceptual inquiries can be summarized as follows: To the question "If you were to mention about this street to a stranger, how would you describe it with a single word?", users gave the answers of crowded by 29%, shopping opportunities by 23% and beautiful by 9%.

Adjectives Defining Permeability in Pedestrian Streets

Adjectives indicated by users for the street they were in are given in Table 6 with associated percentage values. 92% of users define the street as busy, 87% as crowded, 82% as lively, 80% as familiar, 77% as long, 76% as convenient, 64% as narrow. Such findings are found to be significant since they are to be used to define permeability. Another finding of this survey run is the use of expression "I like and use this street" by 75% of users.

Table 6. Definitions by Kunduracılar Street Users as to the Street

Calm	9%	**Crowded**	**87%**
Wide	26%	**Narrow**	**64%**
Entertaining	**45%**	Boring	43%
Active	**92%**	Inactive	6%
Long	**77%**	Short	11%
Lots of opportunities	**56%**	Few opportunities	37%
Lively	**82%**	Dull	10%
Inexpensive	33%	**Expensive**	**45%**
Attractive	35%	**Ordinary**	**52%**
Peaceful	34%	**Disturbing**	**45%**
Open	33%	**Closed**	**53%**
Fluent	**73%**	Congested	19%
Inviting	**59%**	Repulsive	23%
Lots of activities	31%	**Few activities**	**62%**
Familiar	**80%**	Stranger	13%
Pleasing	**60%**	Unpleasing	21%
Convenient	**76%**	Inconvenient	16%
Functional	**68%**	Non-functional	16%
Permeable	**52%**	Not Permeable	24%
I like and use this street			**75%**

From the definitions by the users, it is intended to determine what kind of a relation exists between the determined adjectives and permeability. For this reason, correlation test is found appropriate to be used. The element with which a relationship would be sought is called dependent variable and elements which might be related are called independent

variables and the correlation test was implemented. With such approach, the relations between dependent variable "permeability" and independent variables consisting of adjectives are tested with the correlation test. Correlated adjectives with significance level of 0.01 are marked with ★★ (Table 7). Adjective pairs with which permeability turned out to be correlated based on this table are then tested with regression test and adjective pairs defining permeability are found. According to the correlation values, the correlation between permeability and variables (adjective pairs) is found to be significant at the level of 0.01. Permeability in pedestrian-shopping streets is determined to be positively correlated with the following adjectives: familiar, functional, inviting, fluent, pleasing, convenient, open, entertaining, peaceful (Table 7). This shows that permeability is primarily correlated with these adjectives and if evaluated in terms of the properties they represent, that perceptual properties are the first ones to have such effect, followed by functional and physical properties respectively. It could be said that the higher the existence of such adjectives, the higher the permeability value becomes.

Variables best describe permeability are determined by regression analysis (Table 8). According to this analysis, three models defining permeability with a 0.00 significance level are given below. According to Table 8, if the power of adjectives for defining permeability on their own is to be assessed, the adjective "familiar" defines permeability better than adjectives "functional" and "fluent" whereas "functional" defines permeability better than "fluent". Adjectives "familiar" and "functional" are less effective to define permeability than the definition model where "familiar", "functional" and "fluent" are together. The best model to define permeability is, on the other hand, is determined to involve familiar, functional and fluent all together. These identifiers are determined to be statistically significant.

Looking at these identifiers, familiar is determined to be related with perceptual properties whereas functional is related with functional properties and fluent with physical properties. Permeability "to be defined by accessibility, legibility and variety components" was initially emphasized among the hypotheses of this study. With these results, the three components to define permeability are seen to reinforce this hypothesis in terms of the properties they are related with.

Table 7. Trabzon Kunduracılar Street Correlation Values

	Crowded	Wide	Entertaining	Active	Long	Lots of opportunities	Lively	Inexpensive	Attractive	Peaceful	Open	Fluent	Inviting	Lots of activities	Familiar	Pleasing	Convenient	Functional	Permeable
Crowded	1.000																		
Wide	0.242**	1.000																	
Entertaining	0.050	0.244**	1.000																
Active	-0.155	0.037	0.177	1.000															
Long	-0.006	0.080	0.046	0.053	1.000														
Lots of opportunities	-0.053	0.174	0.234**	0.273**	0.289**	1.000													
Lively	-0.221**	-0.050	0.218**	0.356**	0.061	0.327**	1.000												
Inexpensive	0.180**	0.154	0.280**	0.066	0.127	0.051	0.016	1.000											
Attractive	0.102	0.185**	0.334**	0.136	0.075	0.203**	0.204**	0.172	1.000										
Peaceful	0.237**	0.256**	0.295**	-0.061	0.014	-0.004	0.084	0.132	0.340**	1.000									
Fluent	0.045	0.091	0.221**	0.132	0.033	0.186**	0.195**	0.055	0.095	0.178	0.309**	1.000							
Inviting	0.061	0.173	0.403**	0.131	0.109	0.216**	0.200**	0.148	0.330**	0.305**	0.421**	0.267**	1.000						
Lots of activities	0.102	0.251**	0.101	0.098	0.201**	0.300**	0.136	0.113	0.336**	0.215**	0.281**	0.176	0.152	1.000					
Familiar	-0.013	0.111	0.177	0.123	-0.017	0.100	0.197**	0.116	0.024	0.133	0.139	0.230**	0.284**	-0.015	1.000				
Pleasing	0.168	0.247**	0.279**	0.094	0.165	0.187**	0.288**	0.086	0.254**	0.441**	0.358**	0.335**	0.363**	0.218**	0.273**	1.000			
Convenient	0.025	0.254**	0.255**	0.053	0.204**	0.215**	0.050	0.006	0.106	0.281**	0.305**	0.284**	0.249**	0.165	0.196**	0.434**	1.000		
Functional	-0.053	0.132	0.232**	0.271**	0.188**	0.374**	0.192**	0.109	0.188**	0.153	0.317**	0.332**	0.371**	0.273**	0.183**	0.293**	0.423**	1.000	
Permeable	0.058	0.134	0.222**	0.148	0.119	0.133	0.104	0.101	0.077	0.211**	0.252**	0.338**	0.340**	0.113	0.469**	0.279**	0.271**	0.365**	1.000

** Correlations significant at 0.01 level

Table 8. Regression Analysis of the Scoring on Explanatory Permeability

Variable	Unstandardized Coefficients		Standardized Coefficients	
	B	Beta	t	Sig.
(Constant)	0,10		0,21	0,00
Familiar	0,41	0,37	6,43	0,00
Functional	0,25	0,24	3,84	0,00
Fluent	0,16	0,17	2,72	0,00
n= 204; R= 0,57; R²=0,33; R²adj:0,32;F=32,205 (Sig.=0.000)				

RESULTS AND DISCUSSIONS

Pedestrian-shopping streets are open public spaces where people come together, build up social relations and interact with each other while meeting their basic needs on the other hand. Many researchers have made numerous studies on streets and pedestrian-shopping streets. However, the concept of permeability, included in the measures intended to design sustainable urban spaces as well as high quality environment, has not been a subject of research on pedestrian-shopping streets. With this present research defining permeability on pedestrian-shopping streets, the aimed hypotheses are validated.

As a result of this study having a guiding nature for Landscape Architecture, urban design and planning processes and suggesting a model for concept development; it was initially indicated that permeability was likely to be strengthened by accessibility, variety and legibility, depending on the trio of physical, functional and perceptual properties. Based

on this, the results relevant with the assumptions are suggested as follows:

Hypothesis 1: Adjectives defining permeability are inquired in connection with the questions in the survey with the help of the techniques used during phase two of the implementation study conducted on Kunduracılar Street and as a result, the first adjective to define permeability (Table 8) is determined to be familiarity, the second identifier adjective is determined to be functional and the third is to be fluent. Based on these sub concepts, the assumption as "permeability is the compound of accessibility, variety and legibility" is validated depending on the impact powers of model proposals given in Table 8. According to this assumption, "pedestrian shopping streets incorporating accessibility, variety and legibility have a permeable quality". Designs allowing for these three concepts are important measures for successful urban spaces. Basic assumption is validated depending on the testing of three concepts listed below.

Accessibility: being fluent, as a sub-concept of accessibility among the findings of the survey carried out during phase two of the implementation study, is among the concepts which users repeat the most with 73% (table 6). To create spaces fluent and thus accessible is a factor increasing the level of permeability. Comfort is an important concern for users. The street should be fluent in the first place. Being crowded and narrow negatively affects comfort and thus fluency. From this point, the view stating that "if pedestrian flow is facilitated in a space, people will be able to wander the space which they are in and can easily pass from that space to other spaces through connections" is supported (Montgomery 1995). Moreover, with this

finding, the view stating that "the relation between being closed and permeability on vertical plane is in negative direction, the less closed a space is, the more permeable it will be" as indicated in one of the researches made by Stamps is also validated (Stamps 2003).

Variety: is determined as the most favored property of the pedestrian street in the first survey study. From this result, permeability can be said to be related with the functional variety available in the space. As the variety level increases, permeability of that space will also increase positively. Variety, used to enhance the functional richness in designs is one of the required principles to create successful urban spaces with a high level of permeability. Researches also indicate that variety is significant for streets in economic and social terms (Jacobs 1961; Montgomery 1998). Such findings demonstrate that spaces offering many different use opportunities are much more attractive than those limited with a certain type of use. In this instance, since alternatives, multi functional usability, flexibility and number of users will also increase; the view that this will provide permeability to such space is supported (Bentley 1985; Jacobs 1961; Lennard and Lennard 1987; Moudon 1991; Karaman at all 2001; Whyte 1980). Such finding confirms the basic assumption of this study.

Legibility: Familiarity is determined to be among the best favored properties of the pedestrian street. In phase two of the implementation study, adjectives defining permeability are inquired in connection with the questions in the survey and consequently, familiarity is determined to be the first adjective to define permeability (Table 7). The reasons for people to be available in particular spaces or their

preference of particular spaces for meeting others or similar reasons are directly related with perception and show that such space is easy to be perceived, comprehended and defined. The relation between perception and permeability within the scope of this study is interpreted as the evaluations being finalized in preferences. Accordingly, the study shows that those using the street for meeting purposes match it with the familiarity sub-concept and such situation is related with legibility. With such approach, permeability concept is seen to be related with spaces or centers creating permanent images in users' minds.

Hypothesis 2: Adjectives defining permeability are determined with correlation test. In this table, all adjectives whose relation is inquired have permeability correlation values above 0 and all positive. In this context, one reaches the conclusion that "relation of the concepts represented by the inquired adjectives with permeability is also positive". With this approach, the assumption stating that "permeability is positively related with such sub-concepts" is also confirmed. Similarly, Lang also expresses successful spaces as spaces providing physical comfort, offering a continuous behavior model, yielding pleasant emotional experiences and possessing positive symbolic attachments for their users (Lang 1987).

Hypothesis 3: In this study, users mostly define the pedestrian street with the properties of being familiar, functional and fluent (Table 8). These properties can match with the concepts legibility, variety and accessibility. For this reason, the pedestrian-shopping street subject to this research is thought to possess permeability. A high percentage of 75% of users are determined to use this street with

admiration (Table 6). Depending on such comments, it can be said that optimum level of permeability in the pedestrian-shopping street, which is evaluated in parallel with the direction of such user preferences, requests and criticisms, increases user satisfaction as a result of this study. Thus, the assumption stated as "streets with optimum level of permeability are satisfying for their users" is seen to be also confirmed within this context. This finding also overlaps with the view as to "people would benefit from the preferences and advantages offered by an environment if they understand such environment and what is going on in there" (Bentley 1985).

It is shown that permeability can be defined with accessibility concept and fluency term within physical properties context; with variety concept and functionality term within functional properties context; and with legibility concept and familiarity term within perceptual properties context. The permeability model created based on the assumptions and purpose of the study is given in Table 9.

User appreciation and satisfaction will also increase when level of permeability of a street can be increased. Studies in which the concept of permeability is examined separately in urban parks and shopping centers based on this study is presently being carried on by the authors. Further studies can be set up prospectively, in the light of this study, on the determinants of permeability in other urban open spaces and towards enhancement of such determinants and the effects of plant material on determining permeability in open spaces as well as the relationship between natural or artificial landscape elements and permeability can be inquired.

Table 9. Permeability Model (adapted from Yavuz, 2009, 168)

PERMEABILITY		
Physical Properties	Functional Properties	Perceptual Properties
Accessibility	Variety	Legibility
Fluency	Functionality	Familiarity

Further studies improving user appreciation of pedestrian-shopping streets need to be conducted. Users definitely encounter pedestrian-shopping streets during their visits to different cities and make a comparison with the streets with which they have experience. Therefore, new desires and requests as well as criticisms of users can be determined by conducting widely participated surveys on pedestrian-shopping streets from time to time and design works can be enriched through implementing such concepts to such streets. Spaces should keep pace with time and user needs. Pedestrian-shopping streets should be turned into spaces to provide positive energy rather than being spaces used by the users just for plain necessities. People trying to allocate time to go to mega shopping complexes created with contemporary technology and usually located outside the city should actually be able to meet their necessities on such pedestrian-shopping streets existing within city borders as traditional spaces, without having to go so far from their cities.

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