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Effects of Auditory and Visual Setup on the Perception of Space

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Abstract

People perceive, understand, and read the environment through the senses. Vision and hearing, the two most effective senses in sensing space, provide much more effective and lasting information. The mechanism of action of eyesight and hearing and the determination of the factors affecting these senses are especially important in terms of space design. The study, it is aimed to reveal how and to what extent the visual and hearing sensations affect space design in isolation and together. In this way, the contribution of auditory and visual information to improving the human space experience was investigated. To determine this, the positive and negative effects of the auditory and visual information experienced by people were observed. In the study, One-to-one and collective survey method was followed. The application was carried out with 9 sound and 9 visual materials. Sound, visual materials, and a standard questionnaire were applied to 271 participants. As a result of the study, it was revealed that different combinations of sound, image, and the combination of both are effective on people's perception of space and under what conditions the effect occurs.

Keywords: *Auditory landscape, landscape design, sound, space sensation, visual.*

İşitsel ve Görsel Kurgunun Mekân Algısı Üzerindeki Etkileri

Öz

İnsanlar duyuları aracılığıyla çevreyi algılar, anlar ve okur. Uzayı algılamada en etkili iki duyu olan görme ve işitme, çok daha etkili ve kalıcı bilgi sağlar. Görme ve işitme duyularının etki mekanizması ve bu duyuları etkileyen faktörlerin belirlenmesi özellikle mekân tasarımı açısından önemlidir. Çalışmada, görsel ve işitsel duyumların birbirinden bağımsız ve birlikte mekân tasarımına nasıl ve ne ölçüde etki ettiğini ortaya koymak amaçlanmaktadır. Bu sayede işitsel ve görsel bilgilerin insanın mekân deneyiminin iyileştirilmesine katkısı araştırılmıştır. Bunu belirlemek için insanların deneyimlediği işitsel ve görsel bilgilerin olumlu ve olumsuz etkileri gözlenmiştir. Çalışmada; birebir ve toplu anket yöntemi izlenmiştir. 9 işitsel ve 9 görsel materyal ile uygulama gerçekleştirilmiştir. İşitsel, görsel materyaller ve standart anket formu 271 katılımcıya uygulanmıştır. Çalışma sonucunda ses, görüntü ve her ikisinin kombinasyonunun farklı kombinasyonlarının insanların mekân algısı üzerinde etkili olduğu ve etkinin hangi koşullarda ortaya çıktığı ortaya konmuştur.

Anahtar kelimeler: *İşitsel peyzaj, peyzaj tasarımı, ses, mekân hissi, görsel.*

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1. Introduction

From the moment one first begins life, people interact and communicate with the environment. This relationship is realized by the mechanism of perception (Çanakçıoğlu, 2016). The process of understanding the environment takes place by transmitting data from one of our sensory organs to another and finally transmitting it to the brain. This whole process is called perception (Artantaş, 2007). The mechanism of perception defines and helps make sense of the environment together with the sensory organs. Among our five sensory organs, vision and hearing are more effective in perceiving, making sense of the environment, and creating first impressions.

According to Morgan (1994), our perception is to understand, interpret and express our perceptions as a whole. Lang (1987) reflects perception as an active process and the current state of one's past experiences and requirements; Cüceloğlu (1996) as comprehending the surrounding events and objects through the way of reason; Rapoport (1977), unlike other resources, evaluated perception through the appearance of objects and revealed characteristics that vary between individuals.

Perception is selective. In the process of perception, the person perceives what is happening around him in a way that is limited to his senses. It's holistic. In the perceptual process, every event or object is perceived as a whole, not individually. It's organized. In perception, each element is interrelated. It's immutable. In perceptual concepts, immutableness is provided by concepts such as measurement, shape, brightness, color, and texture. It's a stimulus. Reasons such as increased stimulant in perception and missing cause no change in the message that is intended to be transmitted (Erkman, 1973; Morgan, 1994; Cüceloğlu, 1996; Özgen, 2009).

Human perception is constantly changing and evolving. Perception is refreshed in every image, every sound heard, and every object touched. Perception varies according to conditions and individuals. Perception is influenced by external and internal factors. External factors; current ambient conditions, sound, light, color, temperature, internal factors; past experiences and experiences, social and cultural environment, and mood (Acaralp, 2009; Gezer, 2012). We use our sensory knowledge to learn from our surroundings and to make an idea about something. Many sensations such as the tone of the sound, the temperature of the tea, the brightness of light, or pain felt when touching fire come into play with visual perception, auditory perception, taste perception, smelling and tactile perception dimension and perception specific to each sensory organ (Morgan, 1994; Taşkıran & Bolat, 2013). Within all these sensory and perception mechanisms, vision and hearing are considered primary and others are considered secondary sensory organs. Civilization was also founded largely on the senses of vision and hearing (Özer, 2005).

Space and architecture constitute important data in environmental perception. So that Schulz (1971) defines architectural space as the embodiment of existential space. As a result of the interaction of the individual with his environment, an existential space occurs. Architectural space represents a process shaped according to the needs and wishes of the person.

Personal experiences, good observation, and fine details are effective in the perception of architectural space. The greater the relationship with a space, the greater the sense of belonging to the place. Qualitative factors such as color, smell and quantitative factors such as intensity and duration are perceptually located in the memory of the individual. Therefore, these factors create an interactive relationship not only between space but also between space and life in space (Gezer, 2012). In his book 'The Image of City', Lynch (2015) mentions the concept of direction, noting that circulation must take place in that space in order to perceive the space and the direction. Schulz (1971) explains the effect of movement in architectural space as follows; "Man is the focus of the space and the directions of the space continue to change with the movements of man." According to Bell (1999) and Wallace (2012), perception of the environment is largely due to vision and hearing. When vision occurs, the landscape has many effects on visual perception. One of the most important aspects of visual physiology is contrast and visual sensitivity (Yılmaz, 2008). The concept of auditory landscape entered the literature with Schafer's "*The New Soundscape*" (1969). The concept of auditory landscape refers to the perception of these sounds in the field with the combination of many sound elements.

In light of all this data, the effect of audio and visual setup on the concept of perception and how and to what extent this setup affects space design in isolation and together constitutes the general purpose of the research. At the same time, it is the secondary goal to determine the mechanism of influence in shaping the preferability of space with different sound and image alternatives and different combinations of both. For all these purposes, determining with concrete evidence that hearing and vision have different effects in terms of space design and space users indicates the desired result.

2. Material and Method

2.1. Material

When determining the image categories, the images included in Lindquist relating to the research subject were examined and these categories were developed (Lindquist, 2014). In the selection of images, general images that do not change people's perception and are accepted by everyone are preferred. In the study, sound categories were determined and the sound categories that Schafer (1969) classified according to the reference characteristics were generalized and evaluated within the scope of the study. In the study, the use and the image and sound categories that constitute the material of the study are given in Figure 1 and Table 1 together with their characteristics and reasons for their preference.

In his study, Lindquist (2014) divided the work site by landscape categories. He created fictional design images of images obtained from the field and examined the interaction of reality perception with sound in 3D images. He evaluated his work with 252 participants using 3 questions and four audio categories. When the subjects were given sound, the image investigated the perception of reality and preferability.

Image	Reasons for preference	Image	Reasons for preference
	**G1-Water image:** A non-artificial water surface was preferred, which is completely virgin, no elements that can change the perceptions of the participants are allowed.		**G6-Urban image:** A city view with people of different ages, traffic officers, business centers, and motorized and non-motorized vehicles was preferred.
	**G2-Trafic image:** The closest visualization to a real traffic setting, with a high density of motorized and non-motorized vehicles, was chosen.		**G7-Suburban image**: Real rural view, which is dominated by the village texture and makes you feel a natural life, was preferred.
	**G3-Street image:** A visual that does not include any building elements that would change the perception of the participants and that has a real street setup was preferred.		**G8-Square image:** The view of a square with shopping and business centers, which is used as a gathering and resting area, was preferred.

G4-Park image: A park view with high landscape quality and with groups of people of all ages was preferred.

G9-Trade-craft image: The image of the area with the businesses and sales staff is preferred.

G5-Nature image: A nature image with a high landscape quality and completely composed of a natural setup was preferred.

Figure 1. The image categories and reasons for preferences (Greenplanner, 2019; Guiaenmarruecos, 2019; Guzelresimler.info, 2019; Manzara, 2019; Nomadicmatt, 2019; Pics4learning, 2019; Pinterest, 2019; Pixabay, 2019; Shutterstock, 2019)

Selected image categories are general images from urban and natural habitats that can appeal equally to everyone. While the audio categories, which are the second part of the working material, were selected; sounds from natural and urban living environments were evaluated, which matched the appropriate image categories. The contents of the selected sounds are as follows.

Table 1. Sound categories and characteristics (A World Sound 1-3, 2018; Black Striker, 2018; Current Posts TV, 2018; Çağdaş Kaya 1-3, 2018; Guzelresimler.info, 2019; Relaxing and Useful Sounds, Noises and Videos, 2018; Sound Effects 1-2, 2018; YouTube 1-2, 2018)

Sounds	Characteristics
1. sound	It is preferred by combining relaxing water sound and rain sound in harmony with the water visual.
2. sound	Motorized and non-motorized vehicle sounds and horn sounds are preferred in accordance with the traffic visual.
3. sound	Human voices and bird sounds are preferred in line with the street-street visual.
4. sound	Street music, bird sounds, and human voices were preferred in line with the park visual.
5. sound	Bird sounds and wind sounds are preferred in harmony with nature.
6. sound	In harmony with the city, motor vehicle sounds, tram sounds, speech sounds and step sounds were preferred.
7. sound	Tractor sounds and lamb sounds were preferred in harmony with the countryside.
8. sound	Speaking sounds, bird sounds and the voices of salespeople were preferred in harmony with the square.
9. sound	In line with trade, crowded human voices and salespeople voices were preferred.

2.2. Method

The method of the study consists of four main stages; in the first stage of the study, the appropriate material selection was made for the research subject. When selecting materials, audio categories and image categories were determined by taking into account the sources reviewed about this research subject (Schafer, 1993; Lindquist, 2014).

In the second stage, adjective pairs that can express these categories and reflect the moods of the participants were created. When creating adjective pairs, the Turkish dictionary of the Turkish Language Institution was used and the emotional adjectives reflecting people's moods were selected according to the scope of the research among 1326 adjective groups. These adjectives were further generalized and reduced to 18 adjective types. Adjective pairs were chosen to be used in the study; It

is Happy-Unhappy, Pessimistic-Optimistic, Free-Restricted, Safe-Insecure, Emotional-Rational, Delightful-Unhappy, Relaxed-Tense, Stagnant-Dynamic, and Peaceful-Restless.

In the third phase of the study, the stages of creating, implementing, and analyzing the survey are included. When creating the survey, the audio, visual, and visual-audio categories are divided into three sections. 9 categories were created for each audio, 9 categories for each image, and finally 9 categories for each audio. The survey was conducted with 271 participants. These participants are students of English Language Literature, Food Engineering, Graphic Design, Psychological Counseling and Rehabilitation, Sociology, Plant Protection, Medicine, Nursing, and Landscape Architecture. The implementation of the survey was carried out as follows; the audio and visual material, which will be presented primarily to the participants, has been prepared as a PowerPoint presentation. Stereo speakers were used to play the sounds during the survey. Each sound within the 9 Audio category was played for 8 seconds and the participants were asked to choose adjectives expressing their feelings about the sounds, after which this was applied separately for 9 visual and 9 visual-audio categories.

In the fourth part, which is the final stage of the research, survey analyses were carried out based on the survey data. For these analyses, frequency distribution and the Cros Table test were analyzed using SPSS 16.0 program. In parallel with the audio and visual survey, a standard survey was applied that allows the acquisition of personal information, data such as perception, and instant emotional state.

3. Experimental Results

The questionnaire applied to the participants was analyzed and the obtained data is given in detail in this section. Survey; It consists of 57% women and 43% men. 25% of the participants in the survey are 1st grade, 21% are 2nd grade, 42% are third grade and 12% are 4th-grade students. The survey was conducted in nine different academic departments. The distribution of the participants according to the departments is given in Table 2.

Table 2. Percentage distribution by departments

Department	%	Scope	Total
English Language and Literature	5	Social and humanities	25
Psychological Counseling and Guidance	10		
Sociology	10		
Food Engineering	5	Engineering	13
Plant Protection	8		
Nursing	9	Health	29
Medicine	20		
Graphic Design	7	Design	33
Landscape Architecture	26		

The professions of the families of the survey participants are 25% civil servants and self-employed, 12% private sector, 7% tradesmen, 20% retired, 3% unemployed, and 8% farmers. Also, 88% live in the city and 12% in the village.

Although the left and right brains work together, they specialize independently of each other. According to Sperry (1981), the left part of the brain is responsible for verbal and rational thinking, and the right part is responsible for perceptual and visual thinking. Visual perception occurs in the right brain. During visual analysis, details are noticed, perception is strengthened, observation occurs, and imagination is activated (Laseau, 2001).

Survey participants were also asked which hands they use. Because it is known to be related to the way the brain works. 86% of the participants use their right hand, 7% use their left hand, and 7% use both hands. The participants were also asked about their mood at the time of the survey (Table 3).

Table 3. Percentage distribution by mood

Mood	**%**
Happy	17
Unhappy	6
Pessimistic	6
Optimistic	13
Free	3
Limited	3
Safe	1
Insecure	1
Emotional	3
Rational	1
Pleasant	4
Seedy	10
Comfortable	5
Nervous	5
Severe	16
Dynamic	2
Peaceful	2
Restless	2

Participants were asked where they would like to live. The participants said 8% were villages, 24% were urban, 8% were in the forest, 48% were coastal towns, and 12% were lakeside. Participants were asked whether they were acting with logic or emotions. The participants answered that they act 39% with their emotions and 61% with logic.

Since the questionnaire measures visual and auditory perception, the position of the participants in relation to the image and sound source during the survey is important. For this reason, the sitting positions of the participants during the survey were also marked. These values are shown in Table 4.

Table 4. Percentage distribution by location

	The image and sound source		
	Left	Middle	Right
Front	%7	%14	%12
Middle	%8	%20	%11
Back	%7	%12	%9

As a result of the frequency analysis, the adjectives that were most, least, and not preferred by the participants in the categories of sound, image, and image-sound were determined (Table 5).

Table 5. Preference and percentage values of adjectives in three category types

Adjectives	Sound (%)									Imagine (%)									Imagine and Sound (%)								
	1	2	3	4	5	6	7	8	9	1	2	3	4	5	6	7	8	9	1	2	3	4	5	6	7	8	9
Happy	8	2	41	15	13	11	45	24	4	51	4	18	31	40	5	41	3	25	38	2	34	30	30	6	40	14	18
Unhappy	5	10	4	7	7	8	8	2	15	2	25	4	7	7	15	5	17	6	6	21	8	7	10	15	12	12	15
Safe	1	4	6	1	2	11	9	10	7	4	1	23	15	15	5	11	5	5	3	4	14	11	12	7	11	7	3
Insecure	14	14	3	10	18	9	2	5	16	2	20	3	1	2	20	2	15	8	5	17	3	2	1	15	2	7	10
Pleasant	4	2	13	15	4	11	13	10	5	12	2	10	16	14	1	13	3	15	13	2	15	11	10	6	10	10	13
Seedy	18	18	4	10	14	8	1	7	15	1	14	3	1	1	10	2	14	6	4	18	2	5	4	12		10	9
Comfortable	5	2	8	8	3	5	6	10		6	1	13	13	4	1	10	2	6	6	2	7	12	3	3	6	7	5
Nervous	16	15	1	7	12	12	2	5	11		15	1	1	1	14	1	7	4	4	14	1	3	4	10	2	7	6
Severe	4	2	3	1	4	3	2	4	1	4	1	14	1	2	1	1	6	5	1	3	3	3	2	2	2	9	2
Dynamic	4	7	3	12	2	8	2	3	10	1	7	1	2	1	6	1	7	6	2	10	3	5	3	10	1	7	10
Peaceful	6	1	14	5	2	1	4	4	1	14	1	6	3	9	1	6	1	2	8	1	4	4	8	2	3	1	2
Restless	6	7	1	2	8	5	1	4	4		4		1	1	6	1	7	3	3	4	1	4	2	4	1	2	2
Free	2	3	3	4	3	4	2	2	2	3	1	1	4	3	1	2	2	2	2	2	1	2	2	1	4	2	3
Limited	1	10		2	3	1	1	5	3		3	3	1		3		4	2	1	3	1	1	1	3	1	2	2
Pessimistic	2	2	1	2	3	1		1	1		1	1			2	1	2		1	1	1	1	1	1	1	1	1
Optimistic	1		1	1	2		1	2		1		2	2	1	1	1		3	1			1	1	1	1	1	3
Emotional	1				1	1		1					1			1		1	1			1	1		1		
Rational		2		1	1	1	1	1	1					1	1	1	2	1						3	1	1	

*The gray colored boxes in the table indicate the most preferred adjective in that category.

For the sound category, the most, least preferred, and not preferred adjectives of the participants are given in Table 6.

Table 6. Sound categories

Sounds	Most preferred adjectives	Least preferred adjectives	Adjectives not preferred
Sound 1	Seedy	Restricted, optimistic and emotional	Rational
Sound 2	Seedy	Peaceful	Optimistic and emotional
Sound 3	Happy	Nervous, restless, pessimistic, optimistic	Restricted, emotional and rational
Sound 4	Happy and pleasant	Safe, calm, optimistic and rational	Emotional
Sound 5	Insecure	Emotional and rational	Optimistic
Sound 6	Nervous	Peaceful, restrained, pessimistic, emotional and rational	-
Sound 7	Happy	Unhappy, restless, restrained, optimistic and rational	Pessimistic and emotional
Sound 8	Happy	Pessimistic, emotional and rational	-
Sound 9	Insecure	Still, peaceful, pessimistic and rational	Emotional

For the image category, the adjectives that the participants most, least prefer and do not prefer are given in Table 7.

Table 7. Image categories

Images	Most preferred adjectives	Least preferred adjectives	Adjectives not preferred
Image 1	Happy	Seedy, dynamic and optimistic	Nervous, restless, limited, pessimistic, rational and emotional
Image 2	Unhappy	Comfortable, severe, peaceful, free and pessimistic	Optimistic, emotional and rational
Image 3	Safe	Nervous, dynamic, free and pessimistic	Restless, emotional and rational
Image 4	Happy	Insecure, seedy, nervous, severe, restless, limited and emotional	Pessimistic ve rational
Image 5	Happy	Seedy, nervous, dynamic, restless and optimistic	Limited, pessimistic and emotional
Image 6	Insecure	Pleasant, comfortable, severe, peaceful, free, pessimistic, optimistic and rational	Emotional
Image 7	Happy	Nervous, severe, dynamic, restless, pessimistic, optimistic, emotional and rational	Limited
Image 8	Unhappy	Peacefulandoptimistic	Emotional
Image 9	Happy	Emotional ve rational	Pessimistic

For the image-sound category, the most, least preferred, and not preferred adjectives of the participants are given in Table 8.

Table 8. Image-sound categories

Images-sounds	Most preferred adjectives	Least preferred adjectives	Not preferred adjectives
Image-sound 1	Happy	Severe, limited, pessimistic, optimistic, and emotional	Rational
Image-sound 2	Unhappy	Peaceful and pessimistic	optimistic, emotional and rational
Image-sound 3	Happy	Nervous, restless, free, limited and pessimistic	optimistic, emotional and rational
Image-sound 4	Happy	limited, pessimistic, and optimistic	Rational
Image-sound 5	Happy	Güvensiz, limited, pessimistic, optimistic, and emotional	Rational
Image-sound 6	Unhappy	free, pessimistic, and optimistic	Emotional
Image-sound 7	Happy	Dynamic, restless, limited, pessimistic, optimistic, emotional, and rational	Seedy
Image-sound 8	Happy	Peaceful, pessimistic, optimistic, and rational	Emotional
Image-sound 9	Pleasant	Pessimistic and emotional	emotional and rational

Sound categories according to gender were compared and analyzed. In 9 sound categories, a semantic relationship was found between the 1st sound, 4th sound, and 5th sound ($p<0.05$) (Table 9).

Table 9. Comparison of gender and sound categories

Gender	*Preferred adjectives for sound 1	%	*Preferred adjectives for sound 4	%	*Preferred adjectives for sound 5	%
Woman	Nervous	21.3	Pleasant	16	Insecure	20.2
Man	Seedy	21.6	Happy	20.1	Happy	15.8

(*p<0.05 Significant relationship)

The image categories according to gender were compared and analyzed. Only the 4th image was found significant in 9 image categories (p<0.05). 29.8% of women and 25.9% of men felt happy for the 4th image. According to gender, image-sound categories were compared and analyzed. The 1st picture sound and 6th picture sound were found important in 9 categories of picture sound (p<0.05) (Table 10).

Table 10. Comparison of gender and image-sound categories

Gender	*Preferred adjectives for the 1st image-sound	%	* Preferred adjectives for the 6th image-sound	%
Woman	Happy	45.2	Insecure	15.4
Man	Happy	29.5	Unhappy	15.8

(*p<0.05 Significant relationship)

The question of "the place of residence of your family (Village \ City)" in the questionnaire; was examined separately in sound, image, and image-sound categories. As a result of the analysis of the comparison of sound and residence, only the 8th sound in 9 sound categories was found to be very important (p<0.05). 24.6% of urban residents and 15% of villagers felt happy about the 8th sound. In other sound categories, there was no significant difference between the users' families living in the city or village (p>0.05).

In the question "place of residence of the family", no semantic relationship was found in the comparison of residence-image and residence-image-sound (p>0.05). Comparative analysis was carried out in the categories of sound, image, and image-sound according to the department of the participants. As a result of this analysis, the most preferred adjectives in categories with significant relationships were determined. In the comparison of the department and sound categories, it was found a very significant relationship for the 1st sound (p<0.001). It was determined as a result of the analysis that there is a significant relationship between the 4th sound, 7th sound, 8th sound, and 9th sound. (p<0.05) (Table 11).

Table 11. Comparison of department and sound categories

Department	** Preferred adjectives for sound 1	%	* Preferred adjectives for sound 4	%	* Preferred adjectives for sound 7	%	* Preferred adjectives for sound 8	%	* Preferred adjectives for sound 9	%
English language and literature	Insecure	23.5	Happy	23.5	Happy	47.1	Seedy	35.3	Dynamic	23.5
Food engineering	Seedy	35.3	Seedy	41.2	Happy	88.2	Restless	17.6	Seedy	29.4
Graphic design	Happy	27.3	Happy	22.7	Happy	22.7	Pleasant	27.3	Dynamic	22.7
Psychological counseling and guidance	Nervous	21.2	Insecure	27.3	Happy	57.6	Happy	27.3	Insecure	24.2
Sociology	Peaceful	23.5	Dynamic	20.6	Happy	41.2	Happy	23.5	Insecure	29.4
Nursing	Comfortable	20	Pleasant	30	Happy	53.3	Happy	26.7	Nervous	20
Plant Protection	Seedy	32	Happy	28	Happy	36	Pleasant	28	Nervous	24
Medicine	Seedy	16.9	Happy	16.9	Happy	35.4	Happy	24.6	Dynamic	16.9
Landscape architecture	Nervous	22.6	Dynamic	16.7	Happy	29.8	Happy	29.8	Unhappy	17.9

(*p<0.05 Significant relationship**p<0.001 Very significant relationship)

There is a significant relationship between the 3rd image and the 5th image when comparing the department and image categories (p<0.05) (Table 12).

Table 12. Comparison of department and image categories

Department	* Preferred adjectives for image 3	%	* Preferred adjectives for image 5	%
English language and literature	Safe	41.2	Happy	41.2
Food engineering	Happy	47.1	Happy	41.2
Graphic design	Safe	18.2	Happy	23.8
Psychological counseling and guidance	Comfortable	21.2	Happy	48.5
Sociology	Safe	41.2	Happy	52.9
Nursing	Happy	16.7	Happy	43.3
Plant Protection	Safe	32	Unhappy	36
Medicine	Happy	23.1	Happy	27.7
Landscape architecture	Happy	16.7	Happy	43.4

(*p<0.05 Significant relationship)

No significant relationship was found as a result of the analysis made in the comparison of image-sound by departments (p>0.05).

The family occupation question in the questionnaire was compared separately for sound, image, and image-sound categories. No significant relationship was found as a result of the analysis made in the comparison of the family profession and sound (p>0.05). In the comparison of family occupation and image categories, it was determined that there was a significant relationship (p <0.05) for the 2nd image, and a very significant relationship for the 5th image (p<0.001) (Table 13).

Table 13. Comparison of the family profession and image categories

Family profession	*Preferred adjectives for image 2	%	**Preferred adjectives for image 5	%
Officer	Insecure	24.7	Happy	37.5
Self-employment	Unhappy	28.8	Happy	47.6
Private sector	Unhappy	26.3	Happy	42.1
Artisan	Unhappy	33.3	Peaceful	29.2
Retired	Insecure	20	Happy	38.5
Unemployed	Insecure	41.7	Happy	25
Farmer	Unhappy	29.6	Happy	33.3

(*p<0.05 Significant relationship**p<0.001 Significant relationship)

As a result of the comparative analysis of family occupation and image-sound categories, a significant relationship was found only for the 3rd image-sound category (p<0.05) (Table 14).

Table 14. Comparison of the family profession and sound-image categories

Family profession	* Preferred adjectives for image-sound 3	%
Officer	Happy	35.8
Self-employment	Happy	30
Private sector	Peaceful	26.3
Artisan	Happy	20.8
Retired	Happy	43.1
Unemployed	Happy	50
Farmer	Happy	33.3

(*p<0.05 Significant relationship)

The "mood" question was compared separately in terms of sound, image, and image-sound categories. In the comparison of mood and sound categories, a significant relationship was found only for the 3rd sound (p<0.05) (Table 15).

Table 15. Comparison of mood and sound categories

Mood	*Preferred adjectives for sound 3	%
Happy	Happy	36.4
Unhappy	Happy	23.8
Pessimistic	Happy	33.3
Optimistic	Happy	47.6
Free	Happy	50
Limited	Pleasant	30
Safe	Dynamic	50
Insecure	Comfortable	50
Emotional	Happy	55.6
Rational	Comfortable	50
Pleasant	Happy	57.1
Seedy	Happy	57.6
Comfortable	Happy	29.4
Nervous	Peaceful	28.6
Severe	Happy	37.7
Dynamic	Happy	28.6
Peaceful	Happy	40
Restless	Pleasant	28.6

(*p<0.05 Significant relationship)

In the comparison of mood and image categories, a significant relationship was found only for the 9th image (p<0.05) (Table 16).

Table 16. Comparison of mood and image categories

Mood	* Preferred adjectives image 9	%
Happy	Happy	20
Unhappy	Happy	33.3
Pessimistic	Pleasant	19
Optimistic	Happy	23.8
Free	Happy	20
Limited	Pleasant	40
Safe	Happy	50
Insecure	Happy	50
Emotional	Happy	22.2
Rational	Unhappy	33.3
Pleasant	Happy	50
Seedy	Happy	24.2
Comfortable	Happy	17.6
Nervous	Happy	28.6
Severe	Happy	28.3
Dynamic	Restless	28.6
Peaceful	Optimistic	40
Restless	Safe	14.3

(*p<0.05 Significant relationship)

In the comparison of mood and image-sound categories, a significant relationship was found only for the 4th image-sound category (p<0.05) (Table 17).

Table 17. Comparison of mood and image-sound categories

Mood	*Preferre adjectives image-sound 4	%
Happy	Happy	29.1
Unhappy	Pleasant	23.8
Pessimistic	Happy	19
Optimistic	Happy	33.3
Free	Safe	20
Limited	Comfortable	40
Safe	Happy	25.2
Insecure	Happy	25
Emotional	Happy	33.3
Rational	Dynamic	33.3
Pleasant	Happy	35.7
Seedy	Happy	33.3
Comfortable	Happy	29.4
Nervous	Happy	35.3
Severe	Happy	28.3
Dynamic	Happy	57.1
Peaceful	Happy	40
Restless	Happy	28.6

(*p<0.05 Significant relationship)

The question "Which hand do you use" has been compared separately for sound, image, and image-sound categories. In the comparison of "which hand" and sound categories, there is a significant relationship only for the 1st image (p<0.001). %18.1 of right-handers felt nervous, % 20.8 of left-handers, and %31.8 of both of them felt seedy for sound 1.

In the comparison of which hand and image categories, it was determined that there was a semantic relationship between the 6th image and the 7th image (p<0.05) (Table 18).

Table 18. Comparison of "Which hand" and image categories

Which hand	* Preferred adjectives for image 6	%	* Preferred adjectives for image 7	%
Right hand	Insecure	18.5	Happy	37.7
Left hand	Insecure	41.7	Happy	66.7
Both of them	Nervous	22.7	Happy	36.4

(*p<0.05 Significant relationship)

No significant relationship was found as a result of the analysis in the image-sound category comparison for the question "Which hand" (p>0.05).

The question "Where you want to live" has been compared separately for sound, image, and image-sound categories. According to the analysis results, there was no significant relationship in the comparison of "desired place to live" and sound categories (p> 0.05). In the comparison of "desired place to live" and image categories, a significant relationship was found only for the 8th image (p <0.05) (Tablo 19).

Table 19. Comparison of "desired place to live" and sound categories

Desired place to live	*Preferred adjectives for image 8	%
Village	Limited	17.6
Urban	Unhappy	17.9
Forest	Nervous	19.2
Seaside town	Unhappy	18.6
Lakeside	Insecure	15.4

(*p<0.05 Significant relationship)

In the comparison of the "desire place to live" and image-sound categories, a meaningful relationship was found for the 2nd image-sound and 7th image-sound. (p<0.05) (Table 20).

Tablo 20. Comparison of "desire place to live" and image-sound categories

Desired place to live	* Preferred adjectives for sound-image 2	%	* Preferred adjectives for sound-image 7	%
Village	Nervous	21.4	Happy	57.1
Urban	Insecure	21.8	Happy	34.6
Forest	Seedy	42.3	Happy	46.2
Seaside town	Unhappy	26.3	Happy	40.4
Lakeside	Seedy	28.2	Happy	30.8

(*p<0.05 Significant relationship)

The question "Which one is in for your foreground" was compared separately for sound, image, and image-sound categories (p <0.05). According to the analysis results, there is a significant relationship only for the 9th sound in the comparison of "foreground" and sound categories. 19.8% of the emotional ones preferred the adjective unhappy, and 18.9% of the logician ones preferred the adjective seedy.

As a result of the analysis performed in the comparison of image and video-sound categories for the "foreground" question, no significant relationship was found (p>0.05).

The positions of the participants in the classrooms were compared separately for sound, image, and image-sound categories. According to the results of the analysis, a significant relationship was found only for the 8th sound in the comparison of position and sound categories (p<0.05) (Table 21).

Tablo 21. Comparison of position and sound categories

Position	* Preferred adjectives for sound 8	%
Front left side	Comfortable	17.4
Front middle side	Happy	37
Front right side	Happy	38.5
Middle left side	Pleasant	25
Middle side	Happy	26.9
Middle right side	Happy	25
Rear left side	Happy	19
Rear middle side	Happy	18.4
Rear right side	Safe	13.8

(*p<0.05 Significant relationship)

No significant relationship was found as a result of the analysis performed in the image category comparison for the locations of the participants (p>0.05).

In the comparison of position and image-sound categories, a significant relationship was found only for the 3rd image-sound (Table 22).

Table 22. Comparison of position and image-sound categories

Position	* Preferres adjectives for image-sound 8	%
Front left side	Happy	30.4
Front middle side	Happy	32.6
Front right side	Happy	33.3
Middle left side	Happy	32.1
Middle side	Happy	35.8
Middle right side	Happy	27.8
Rear left side	Happy	28.6
Rear middle side	Happy	42.1
Rear right side	Happy	34.5

4. Results

The results obtained within the scope of evaluating the sound, image and video-sound categories separately are as follows.

• While a negative adjective was preferred in the 1st sound, a positive adjective was preferred in the 1st image and 1st image-sound categories.
• A negative adjective is preferred in the 2nd sound; 2nd image and 2nd image-sound.
• A positive adjective was preferred in the categories of 3rd sound, 3rd image, 3rd image-sound, 4th sound, 4th image, 4th image-sound, 7th sound, 7th image and 7th image-sound.
• While a negative adjective was preferred for the 5th sound, a positive adjective was preferred for the 5th image and the 5th image-sound categories.
• Negative adjective was preferred for the 6th sound; 6th image and 6th image-sound categories.
• The adjective that is preferred negatively in the 8th image is preferred positively in the 8th sound and the 8th image-sound category.
• Negative preferred adjective for the 9th sound was preferred positively in the 9th image and 9th image-sound category.

In this direction, adjectives varying for three categories are expressed in Table 23.

Table 23. Adjectives preferred for three category types

Categories	Sound	Image	Image and sound
1	Seedy	Happy	Happy
2	Seedy	Unhappy	Unhappy
3	Happy	Safe	Happy
4	Happy	Happy	Happy
5	Insecure	Happy	Happy
6	Nervous	Insecure	Insecure
7	Happy	Happy	Happy
8	Happy	Unhappy	Happy
9	Unhappy	Happy	Happy

In the comparison of sound and image sound, a significant relationship was found between the 2nd sound and 2nd image sound, 3rd sound and 3rd image sound, 5th sound and 5th image sound, 6th sound and 6th image sound ($p < 0.05$). It was found that there is a significant relationship between the 7th sound and the 7th image sound ($p < 0.001$). There is no significant correlation in the comparison of 1st sound and 1st image-sound, 4th sound and 4th image-sound, 8th sound and 8th image-sound, 9th sound and 9th picture-sound categories ($p > 0.05$).

As a result of the statistical analysis, the percentage values in which the adjectives show the greatest variation in the comparison of sound and image-sound of the participants are given in Table 24.

Table 24. Comparative analysis results of sound and image-sound categories

Sound	Preferred adjectives for sound	Preferred adjectives for sound and image	%
2.	Peaceful	Unhappy	96
3.	Restless	Happy	66.7
5.	Emotional	Peaceful	98
6.	Pleasant	Insecure	61
7.	Limited	Safe	96

The most preferred adjectives of the participants in the comparison of sound categories and image-sound categories are as follows.

• Adjectives that are positively preferred for the 2nd sound were preferred negatively for the 2nd image sound. Adjectives that are negatively preferred for the 2nd sound are also preferred negatively for the 2nd image sound.

- Adjectives that are positively preferred for the 3rd sound are preferred positively for the 3rd image sound. Adjectives preferred negatively for the 3rd sound were preferred positively for the 3rd image sound.
- Adjectives that are negatively preferred for the 5th sound were preferred positively for the 5th image sound.
- Adjectives that are positively preferred for the 6th sound were preferred negatively for the 6th image sound.
- Adjectives that are positively preferred for the 7th sound are preferred positively for the 7th image sound. 7. Adjectives preferred negatively for sound were preferred positively for the 7th image sound.

A comparison was made in the image and image-sound categories. A significant relationship was found in 1. image and 1. image-sound, 2. image and 2. image-sound, 3. image and 3. image-sound, 4. image and 4. image-sound, 5. image and 5. image-sound, 7th image and 7th image-sound, 8th image and 8th image-sound, 9th image and 9th image-sound categories ($p < 0.001$). There is no significant relationship in the comparison of the 6th image and 6th image-sound categories ($p > 0.05$).

As a result of the statistical analysis, the adjectives that show the most variation in the comparison of image and image sound are expressed in Table 25 according to the percentage value.

Table 25. Comparative analysis results of image and video-sound categories

Images	Preferred adjectives for image	Preferred adjectives for image-sound	%
1	Seedy	Pleasant	96
2	Comfortable	Insecure	97
3	Happy	Happy	61.8
4	Restless	Pleasant	96
5	Restless	Pleasant	97
7	Emotional	Happy	97
8	Happy	Happy	57.1
9	Restless	Happy	50

The most preferred adjectives and results of the participants in the comparison of image categories and image-sound categories are as follows.

- Adjectives preferred negatively for the 1st image were preferred positively for the 1st image sound.
- The adjective positively preferred for the 2nd image was preferred negatively for the 2nd image sound.
- The adjective that is adversely preferred for the 3rd image is favored for the 3rd image sound.
- Adjectives preferred negatively for the 4th image were preferred positively for the 4th image sound.
- Adjectives preferred negatively for the 5th image were preferred positively for the 5th image sound.
- Adjectives preferred negatively for the 7th image were preferred positively for the 7th image sound.
- Adjectives preferred negatively for the 8th image were preferred positively for the 8th image sound.
- Adjectives that are positively preferred for the 9th image are preferred negatively for the 9th image sound.

According to the 18 emotion adjectives, individual perception maps were created for the three categories within the percentages determined by the participants. The graphical representations of these perception maps are expressed in the following ways, according to the evaluation of perception maps, the most dispersed distribution is the adjective 'happy' and the least dispersed is the adjective 'emotional'. Other types of adjectives have generally moved away from the center and shown distribution. In general, there have been more accumulations in the image-sound association (Figure 2).

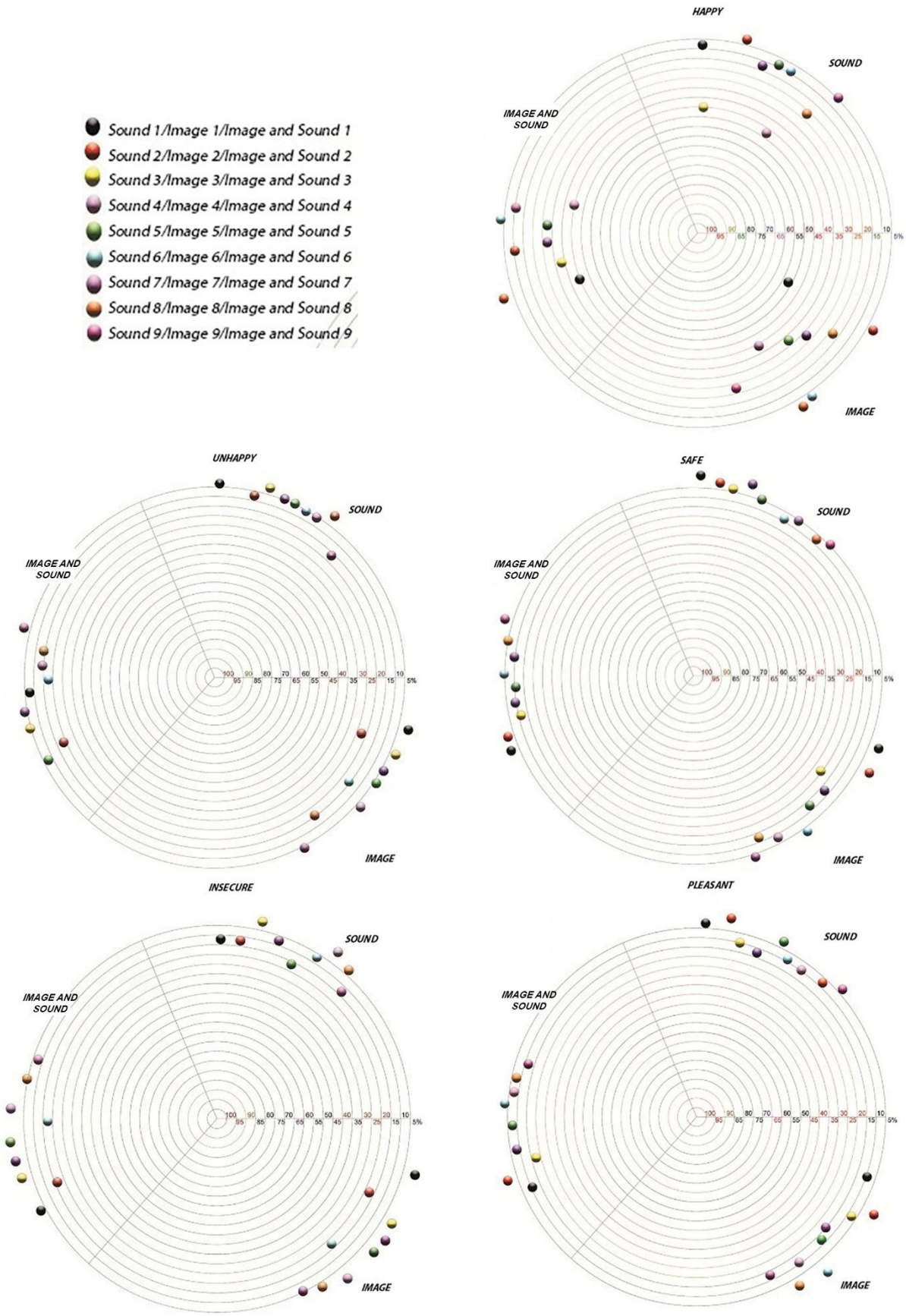

Figure 2. Perception map of three categories according to the percentage values of the adjectives

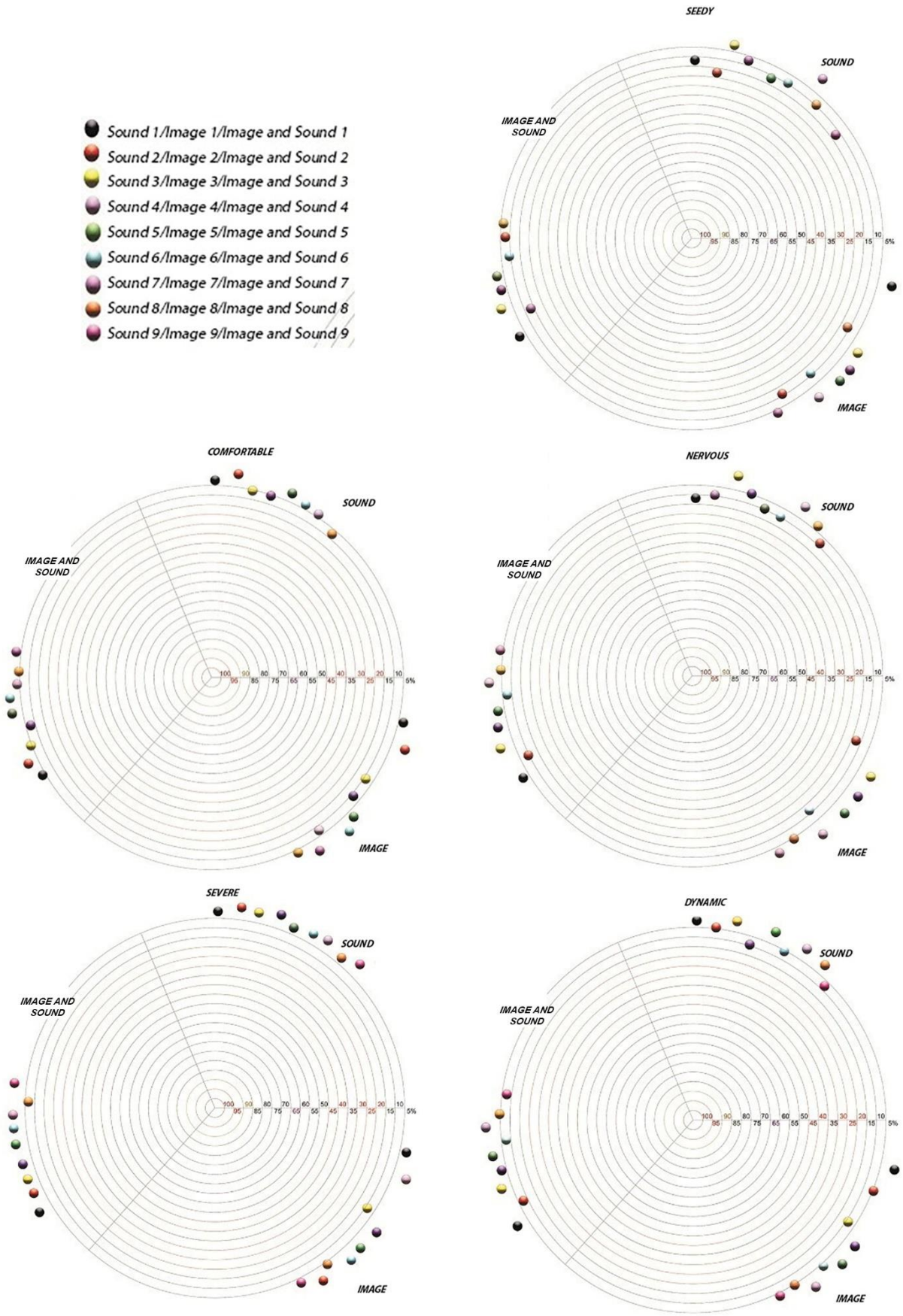

Figure 2 (Continue). Perception map of three categories according to the percentage values of the adjectives

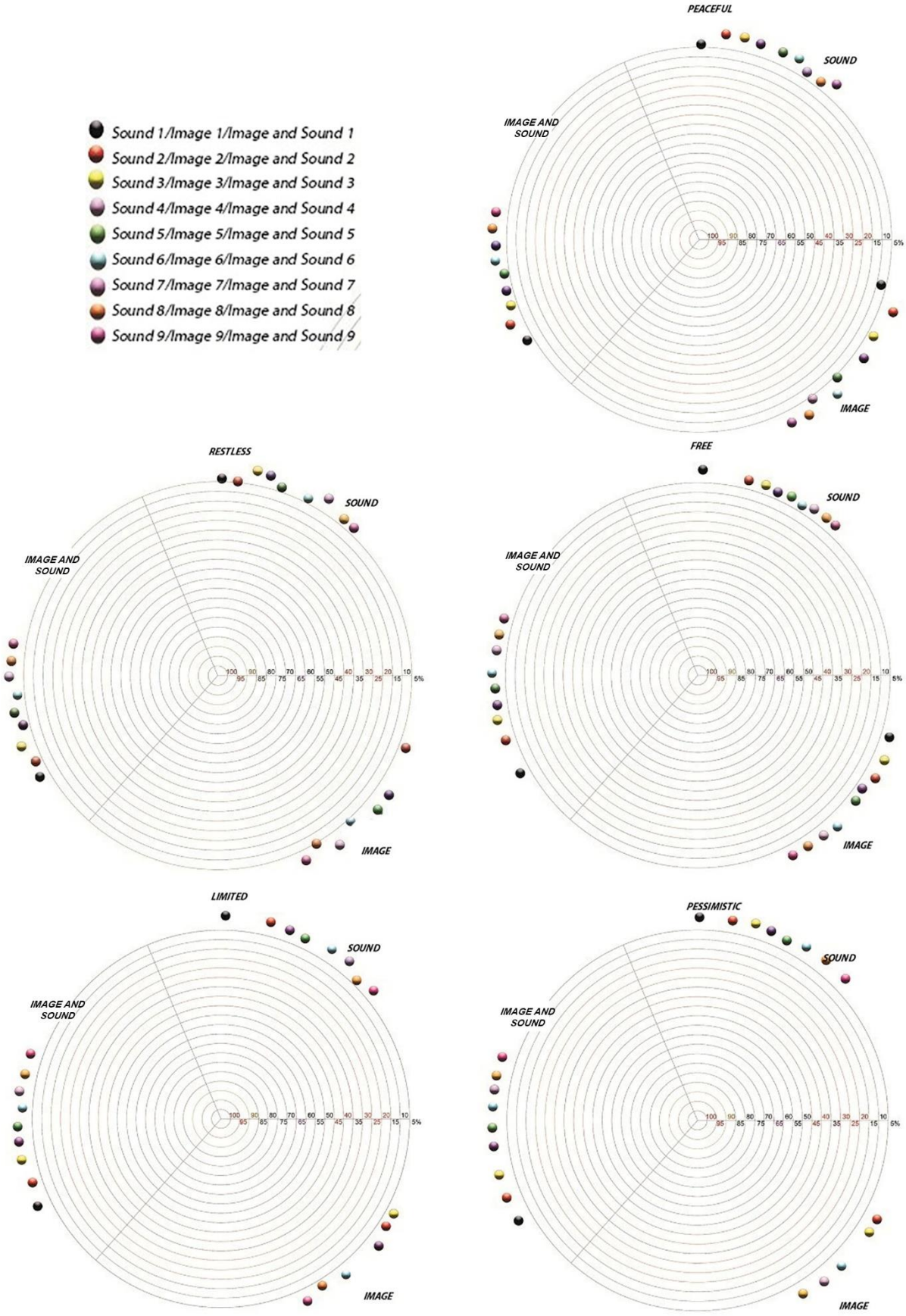

Figure 2 (Continue). Perception map of three categories according to the percentage values of the adjectives

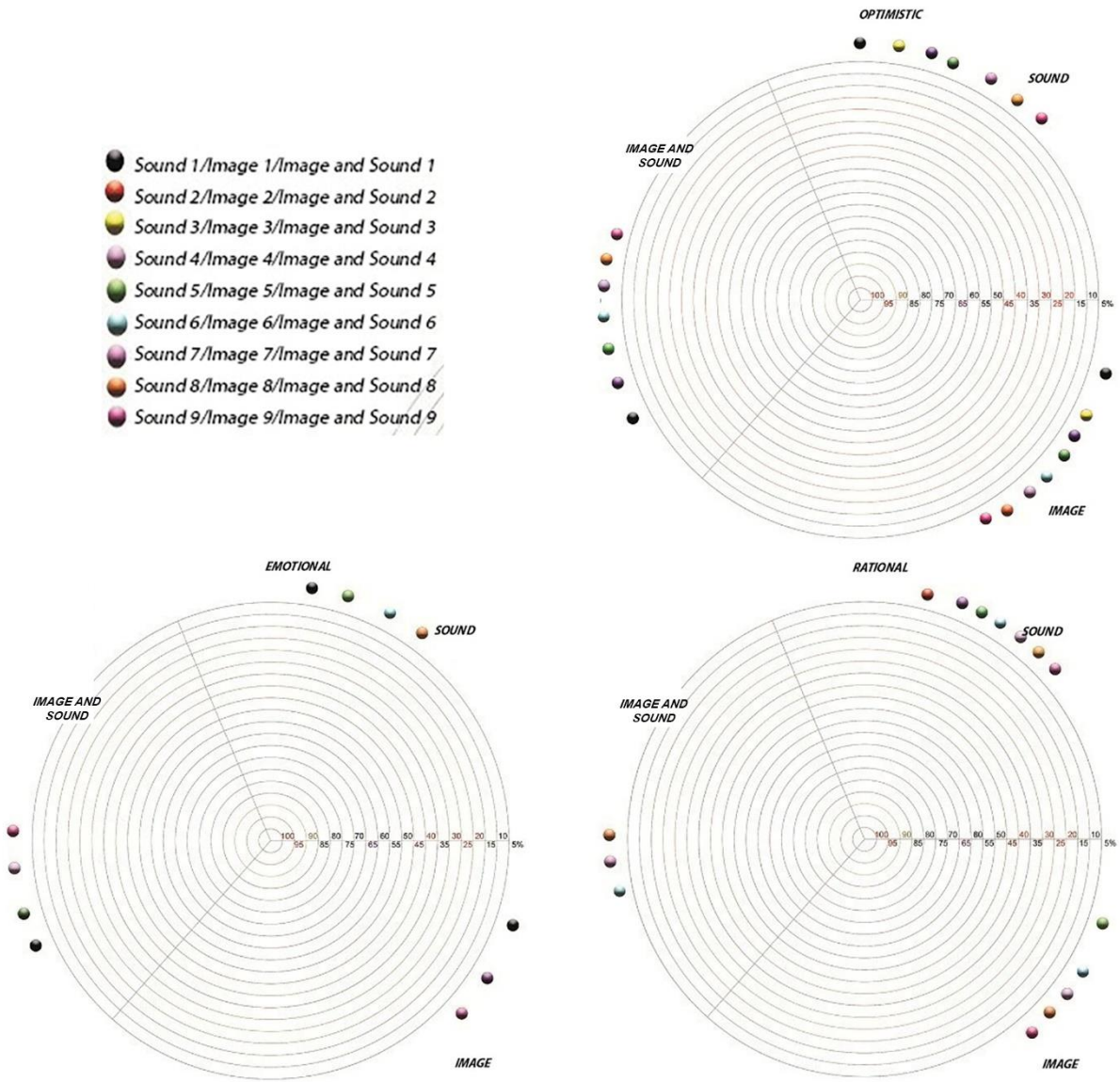

Figure 2 (Continue). Perception map of three categories according to the percentage values of the adjectives

The adjectives preferred by the participants for the audio, visual, and visual-audio categories vary according to gender. Especially for the 5th sound, female participants preferred a negative adjective, while male participants preferred a positive adjective. Positive and different adjectives were preferred in both groups for the image and audio and audio categories.

While whether the families of the participants lived in the village or city varies only for the specified sound categories, this variability for the visual and visual-audio categories was not observed in the adjectives preferred by the participants. As a result of this situation, it was determined that there is a perceptual difference for the sound category depending on the social life experienced.

The adjectives preferred by the participants according to the departments they studied varied in the audio and visual categories, and the educational status affected auditory and visual setup, causing a perceptual difference. This variability is not observed for the visual-audio category.

The adjectives determined by the families of the participants based on their professions differed for the category of visual and visual-audio, and the family profession, i.e., the socio-economic situation, varied perceptually.

The current mood question posed to the participants differs in the preferred adjectives for the audio, visual, and visual-audio categories, and the mental state of the individual changes the preferences perceptually.

It is obvious that right-handed people use the left part of the brain, left-handed people use the right part of the brain, and the right part of the brain develops in the field of design, and therefore visual thinking and visual intelligence are given more space. The left part of the brain also functions logically and analytically. Based on this information, the participants' use of their right hand, left hand and both hands varied in the audio and visual categories, while this variability in the visual-audio combination resulting from matching the appropriate images with the appropriate sounds did not make any difference in which hand the participants used in the adjectives they determined.

The right brain stands out intuitively, and the left brain comes to the forefront logically, so the answers given by the participants for the question "emotional intelligence?", or "logical intelligence?" varied only in the sound category. The question of emotional intelligence and logical intelligence did not affect the answers given by the participants for the visual and visual-audio categories.

As a result of the answers given to the question of where you want to live (village, city, forest, coastal town, and lakeside), the adjectives they determined for the image and image-sound categories varied. As a result, the sound and visual materials prepared made it suitable for areas such as cities, villages, coastal towns, and forests. When the places where the participants want to live to match the appropriate images and sounds, there is a perceptual difference. The question of where to live did not vary only for sound categories. The difference that occurs as a result of the combination of appropriate sounds with appropriate images reveals the importance of the combination of both materials.

The event of image detection varies all over the visual field. Within the cone specified about the event of vision, there are several cones called the surrounding area, the area being looked at, and the center area. The peak angles of these cones constitute the angle of vision. According to these visual angles, differences are seen in the image. For example, the clarity of the image deteriorates as the peak angle grows, and as the viewing angle decreases, the image becomes clearer. As you move from the center to the edges of the visual area, the clarity of the perceived image is disturbed. Based on this information, the adjectives determined by the participants when answering the survey questions varied in the audio and visual categories according to their positions. The difference that appears when the appropriate images are matched with the appropriate sounds is highlighted in the location question.

5. Discussion

As a result of this research, auditory and visual factors were evaluated according to their nature, purpose, and source. As a result of these evaluations, the situations and effects that may occur in individuals only with sound effects, the situations and effects that may occur in humans only with visual editing, and the situations and effects that may occur as a result of the combination of both were evaluated by the survey application and evaluated within the scope of this study to reveal statistical analysis methods and data analyses.

Concrete evidence that hearing and vision have different effects on space design and space users is determined within the scope of this research, and concrete data that both designers can evaluate when designing spaces and contribute to the reading of the perceptual and psychological impact of a designed space on users have been added to the literature.

As a result of the evaluations, the adjectives preferred by the participants in each audio, visual and visual-audio matching generally varied and differed. Perception, as an active process, reflects on the past experiences and needs of the person (Lang, 1987; Koç, 2012). Due to some variables in the environment, differences in human perception can be seen. In perceptual selectivity, factors such as the severity, variability, and size of the stimulus, which are caused by external factors, affect perception. At the same time, the mood that the person feels at that moment and personal values affect perceptual selectivity (Cüceloğlu, 1996; Özgen, 2009). Perception reveals features that vary between individuals (Rapoport, 1977).

As a result of this situation, the perception of the participants varied in three categories. The adjectives that participants determine only when the sound is played and the adjectives they determine as a result of matching the sounds with the appropriate images are generally different. As a result, it was

determined that perception differs especially in the combination of image and sound, and its comprehension increases.

Val et al., (2005) visual landscape value is associated with the psychological process as a result of perceptual and emotional concepts. In the study, it was observed that auditory data outweighed the positive in people due to psychological perception. It has been determined that hearing is not acting alone, that the combination of hearing and vision is effective in perception, but also increases comprehension and sense of reality in the combination of image and sound.

As Wallace (2012) noted; it should be known that auditory phenomena should develop depending on visual fiction, auditory data should be included in management studies as well as in the field of planning and design, and the perceptiveness of an area or space will increase and change by adding auditory data to visual studies.

Where the right brain intuitively comes to the fore, the left brain comes to the fore logically (Yakın, 2012). For this reason, the answers given by the participants to the question of "emotional intelligence/logical intelligence" varied in sound and image-sound categories. The question "emotional intelligence/logical intelligence" did not affect the answers given by the participants for the image categories.

Within the scope of this work, when making space designs, it will be important for the design to prefer positive sounds depicting the particular space in a style that reflects the spirit of the space in accordance with the atmosphere of the space. In the same way, when designing an area, more effective and more fact-reflecting designs will come to the fore as a result of the positive interactions of auditory and visual setups. A positive and appropriately used sound will also be effective in determining the characteristics of that space.

The more the relationship is established with a place, the more the sense of belonging to that place. The sound heard or the smell felt in a place is revived as an image in the memory by establishing a relationship with past experiences and accumulations. In line with all these effects, the person and the place are in constant interaction. The place is shaped according to the person. The person also adapts according to the place (Gezer, 2007).

Auditory and visual perception in the field of landscape architecture is found in foreign literature. However, this concept is extremely limited in the literature in Turkey. Although the idea of the study is new, it has been researched in the scope of different disciplines abroad and in Turkey, but the work in the field of landscape architecture is very limited and extremely few. This scope of research will make an important contribution to both the field of design and especially the professional discipline of landscape architecture.

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References

Acaralp, Ö. (2009). *Perceptional differences depending on social diversity and their effects on use of public space.* Unpublished Master's Thesis, Istanbul Technical University, Institute of Science and Technology, Department of Architecture, Istanbul.

Artantaş, C. (2007). T*he research onto communıcatıon appliances that used in urban landscape design in the frame of Turkey*. Unpublished Master's Thesis, Ankara University, Institute of Science and Technology, Department of Landscape Architecture.

A World Sound (1) (2018a). *Sound of Wind*. Retrieved from https://www.youtube.com/watch?v=m7SvE8wz45g.

A World Sound (2) (2018b). *Goat Voice*. Retrieved from https://www.youtube.com/watch?v=RGoFLGOfcI8&list=PUkOuIjmb8V7huiy7B8NCL9A&index9.

A World Sound (3) (2018c). *Lamb Sounds*. Retrieved from https://www.youtube.com/watch?v=uFihdgMDes&index=57&list=PUkOuIjmb8V7huiy7B8NCL9A.

Bell, S. (1999). *Landscape: Pattern, Perception, and Process*. E & Fn Spon, New York.

Black Striker (2018). *Crowd, Humming, Sunday, Crowded Voice.* Retrieved from https://www.youtube.com/watch?v=jIj1HQwVyjQ.

Current Posts TV (2018). *Natural Bird Sound*. Retrieved from https://www.youtube.com/watch?v=LUbU6jp2VhE.

Cüceloğlu, D. (1996). *İnsan ve Davranışı Psikolojinin Temel Kavramları*. Remzi Bookstore.

Çağdaş Kaya (2018a). *Taksim Sound Landscape, Istiklal Street Tram Sound*. Retrieved from https://www.youtube.com/watch?v=NBxvjCZ8hdk.

Çağdaş Kaya (2018b). *Taksim Sound Landscape. Istiklal Street Craftsmen*. Retrieved from https://www.youtube.com/watch?v=kj8176bQxYo.

Çağdaş Kaya (2018c). *Taksim Sound Landscape. Istiklal Street Human Originated Voices*. Retrieved from https://www.youtube.com/watch?v=-FAPr0qadVg.

Çanakçıoğlu, N. G. (2016). *Analysis of perceptual processes of individuals using pediatric spaces by the methods of cognition and space syntax*. Unpublished Master's Thesis, Istanbul Technical University, Institute of Science and Technology.

Edwards, B. (2011). *Beynin Sağ Tarafı ile Çizim*. Inklap Bookstore Publishing Industry and Trade Inc.

Erkman, U. (1973). *Mimaride Etki ve Görsel İdrak İlişkileri*. İstanbul: İ.T.Ü.

Gezer, H. (2012). Components of perception during the process of space perception. *Istanbul Commerce University Journal of Social Sciences,* 11(21), 1-10.

Guiaenmarruecos (2019). *Market Place*. Retrieved from http://guiaenmarruecos.com/inicio/souk-1627045/.

Guzelresimler. Info (2019). *Nature Photos*. Retrieved from https://guzelresimler.info/detail/dogafotograflari_fotograflari_resimleri/yesil-doga_fotografi_resimleri-16455.html.

Koç, B. (2012). *Cognitive boundaries in spaces designed for children*. Master's Thesis, İstanbul Technical University, Institute of Science.

Lang, J. (1987). *Creating Architectural Theory*. Van Nostrad Reinhold Com, Newyork.

Laseau, P. (2001). *Graphic Thinking for Architects and Designers*. John Wıley and Sons.

Lindquist, M. W. (2014). *The Impact of Sound on Virtual Landscape Perception an Empirical Evaluation of Aural-Visual Interaction for 3d Visualization*. Doctoral Thesis, The University of Sheffield, Department of Landscape, England.

Lynch, K. (2015). *The Image of the City*. Isbank Cultural Publications.

Manzara. (2019). *Lake Pictures*. Retrieved from http://www.manzara.gen.tr/gol-resimleri-4

Morgan, C. T. (1994). *Introduction to Psychology*. Hacettepe University Department of Psychology Publications, 265, 268.

Özer, B. (2005). *Human Psychology and Landscape Design*. Master's Thesis, Ankara University, Institute of Science and Technology, Department of Landscape Architecture, Ankara.

Özgen, S. (2009). *Evaluating the effect of three-dimensional studies to the perception of the facades in historical environments*. Unpublished Doctoral Dissertation, Karadeniz Technical University, Institute of Science And Technology, Department of Architecture, Trabzon.

Nomadicmatt. (2019). *New York Itinerary*. Retrieved from https://www.nomadicmatt.com/travel-blogs/suggested-nyc-itinerary/.

Pics4learning. (2019). New York City traffic. https://www.pics4learning.com/details.php?img=nyc11.jpg

Pinterest. (2019). *Countryside Photos*. Retrieved from https://in.pinterest.com/pin/130745195417209245/?lp=true.

Pixabay. (2019). *Square and People*. Retrieved from https://pixabay.com/photos/pittsburgh-pennsylvania-city-people-83838/.

Rapoport, A. (1977). *Human Aspects of Urban Form: Towards a Man-Environment Approach to Urban Form and Design*. Urban and Regional Planning Series 15. Oxford: Pergamon Publishing.

Relaxiıng and Useful Sounds, Noises and Videos (2018). *Rain Sound*. Retrieved from https://www.youtube.com/watch?v=lN-hP1F-nPg.

Schafer, R. M. (1969). *The New Soundscape: A Handbook for the Modern Music Teacher*. Associated Music Publishers.

Schafer, R. M. (1993). *The Soundscape: Our Sonic Environment and The Tuning of The World*. Destiny Books, Rochester, Vermont.

Schulz, C. N. (1971). *Existence, Space& Architecture*. New York: Praeger Publishers Inc, 119.

Shutterstock. (2019). *Landmark United States*. Retrieved from https://www.Shutterstock.Com/Th/Video/Search/Landmark-United-States?Page=4.

Sound Effects. (1) (2018a). *Crowd Chat Speech Sound*. Retrieved from https://www.youtube.com/watch?v=mxPTRb7uaOU.

Sound Effects. (2) (2018b). *Traffic Noise*. Retrieved from https://Www.Youtube.Com/Watch?V=Mjkxjfst42k.

Sperry, R. W. (1981). *Split Brain*. Nobel Prize in Physiology or Medicine.

Taşkıran, N., Ö. & Bolat, N. (2013). *Reklam ve algı ilişkisi: reklam metinlerinin alımlanmasında duyu organlarının işlevleri hakkında bir inceleme*. *Beykent University, Journal of Social Sciences*, 6(1), 49-70.

Val, G. F., Atauri, A. J. & Lucio, J. (2006). Relationship between landscape visual attributes and spatial pattern indices: A Test Study in Mediterranean-Climate Landscapes, *Landscape and Urban Planning,* 77, 393-407.

Wallace, M. Y. (2012). *Coustic Ecology in Landscape Architecture: a Case Study in the Soundscapes of Izmir*. Unpublished Doctoral Thesis, Ege University, Institute of Science and Technology, Department of Landscape Architecture, İzmir.

Yakın, B. (2012). *An analytical approach to the relationship between visual thinking and visual expression in the design process*. Master's Thesis, Hacettepe University, Fine Arts Institute, Interior Architecture and Environmental Design Department.

Yılmaz, S. (2008). *A design approach based on perceptual ıllusions for enhancing the width impact of zoo exhibition areas*. Unpublished Doctoral Thesis, Karadeniz Technical University, Institute of Science and Technology, Department of Landscape Architecture, Trabzon.

Youtube (2018a). *Sound of Water*. Retrieved from https://www.youtube.com/watchv=grXdIqBsiDA.

Youtube (2018b). *Tractor Sound*. Retrieved from https://www.youtube.com/watch?v=P4EbWAEstxI