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An Experience in Architectural Design Studio Regarding the Concept of Soundscape

İşitsel Peyzaj Kavramı Üzerine Bir Mimari Tasarım Stüdyosu Deneyimi

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ABSTRACT

Experiments with the soundscape concept in the architectural design process with the deconstruction of a studio design process can create new opportunities for progressive design solutions. Changing perception priorities (by preferring audial perception to visual) can lead to new possibilities to form new ways of thinking and making connections about design. In 2015 during the fall semester in the Department of Architecture at Anadolu University, the Architectural Design Studio V course experimented this approach and process. In a group of twenty-two students, we gave fifteen minutes long, on-site binaural sound recordings, which are documenting six different soundscapes of pre-determined urban spaces as the sole and primary design data. We expect from students to repeatedly and attentively listen to these recordings then make inferences about topography, density of built environment, climatic conditions, demographic and socio-economic structure of the inhabitants, and period of time. Afterwards, they worked on defining the main design problem for their urban setting, which they only heard, and then create. By proposing this architectural studio education trial, we investigate new ways of studio and design processes, based on one of the fundamental immaterial architectural elements - sound.

Keywords: *Architectural design studio; design process; sound; soundscape; soundwalk.*

ÖZ

İşitsel peyzaj kavramı; mimari tasarım sürecinde, stüdyo tasarım sürecinin yapı sökümüyle yapılan deneyler ve yenilikçi tasarım çözümleri için yeni olanaklar yaratabilir. Algı önceliklerini değiştirmek (ses algısını görsel algıya tercih etmek) tasarım hakkında yeni düşünme ve bağ kurma biçimlerinin oluşması için yeni olasılıklar sağlayabilir. 2015 güz dönemi Anadolu Üniversitesi, Mimarlık Bölümü'nde, Mimari Tasarım Stüdyosu V dersimizde bu yaklaşım ve süreç deneyi gerçekleştirilmiştir. Yirmi üç kişilik öğrenci grubuna, önceden belirlenmiş kentsel alanların altı farklı, on beş dakikalık, binaural ses kayıtları, tek ve temel tasarım verisi olarak dağıtılmıştır. Öğrencilerden bu kayıtları dikkatli bir şekilde ve tekrar tekrar dinlemeleri; topoğrafya, yapı yoğunluğu, iklim koşulları, kullanıcıların demografik ve sosyo-ekonomik strüktürünü belirlemeleri, ve zaman alanına ait çıkarımlarda bulunmaları beklenilmiştir. Sonrasında, sadece duydukları ardından yarattıkları bu kendi kentsel alanlarına ait, ana tasarım problemini belirlemek üzere çalışmışlardır. Bu mimari tasarım stüdyo eğitimi denemesini önererek biz, temel maddesiz mimari elemanlardan olan sesin, yeni stüdyo ve tasarım süreçlerindeki etki ve olanaklarını araştırmaktayız.

Anahtar sözcükler: *Mimari tasarım stüdyosu; tasarım süreci; ses; işitsel peyzaj; ses yürüyüşü.*

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Introduction

Throughout the developing world, especially in rapidly urbanized regions, design-related decisions are mostly made in line with the requirements of the sub-structure system. In this respect, sub-structure systems have become an extension of design interventions. This situation does not just show the varying role of sub-structure in design but also emphasizes the enhanced role and decision-making capacity of the designer in a wide scale of contents ranging from ecology and society to politics.

Instead of a response to a previously defined context, designers are now obliged to re-define and form their contexts.

Among the abstract elements of architecture, sound includes both environmental and perceptional information as well as the interactions between the human/receiver/listener that are influential on design contexts. Soundscape is a sound environment surrounding the human/receiver/listener. Accordingly, the soundscape approach is based on multiple interactions between human/receiver/listener and multiple sound sources, properties of the environment and the society, and in recent years, in urban and architectural planning and in landscape architecture, the soundscape approach has been investigated in a number of studies conducted with multiple perceptional approaches.

Additionally, sound is an important element to define the sense of place which is a vital term to describe the architectural context. David Hummon[1] describes the sense of place as *"an inevitably dual in nature, involving both an interpretive perspective on the environment and an emotional reaction to the environment.... Sense of place involves a personal orientation toward place, in which ones' understanding of place and one's feelings about place become fused in the context of environmental meaning."*

With this respect, the subject of aural architecture has come into prominence and taken its debated place in scientific research and architectural applications. Aural architecture is a formation of real and unreal environment that produces emotional/affective, behavioral and vital reactions of a sensitive living being. Correct analysis of the relationships between sound-perception-place and the concept of soundscape and the related approach can be used as a tool and method to analyze aural architecture. This analysis has a potential to establish new contexts for designers for visual architecture (with the multiple-perception approach). This potential inevitably exists in scientific studies as well as in the education of architects and designers.

The purpose of this experimental study was to examine the effects of the concept of soundscape on architectural design studio training as an architectural design problem. In line with this purpose, the study aimed at redefining the process of architectural design education within the scope of the project course of Architectural Design Studio V via deconstruction. Also, in the study, alternative ways of understanding different layers of place perception were revealed.

In the study, 15-minutes binaural sound recordings obtained in six different urban places determined previously were presented to the students as the single main design data. The students were asked to listen to the sound recordings repeatedly and attentively, and they were expected to make inferences regarding topography, density of built environment, climatic conditions, demographic and socio-economic structure of the inhabitants, and period of time. Following this, the students were asked to determine their own original design problem and to carry out their designs in relation to the urban area they had only heard.

Architectural Education and Architectural Design

Architectural education has a position which is open to discussion and renovation throughout the world, which renews and transforms itself and which is discussed in various professional chambers, universities and institutions. Current developments in the nature and context of architectural practice are supposed to transform architectural education.

Different experts from the fields of sustainable energy conservation, lighting, acoustic, soundscape and information technologies should establish coordination between themselves both in the architectural design process and in practice. So researchers and practitioners should quickly transform themselves in a dynamic manner, and it could lead to rapid adaptation of architectural project studies.

In architectural education, architectural design studio is a project-based education which takes its roots from the terms craftsmanship and problem focused put forward by Schön.[2,3] Since the Medieval Age, in line with the guidance and criticisms provided by the studio instructors. architectural studios vary depending on the individual and collective type of "learning by doing", which is based on studying-revising-criticizing.

The nature of studio education is defined by Schön[4] as "reflection in action". This concept is used to define the spontaneous and instinct actions we carry out in daily life without being able to explain how we know it happens. In this respect, the term "reflection in action" defines the reactions of practitioners - who have professional skills –

[1] Hummon, 1992 pp. 253-278.

[2] Schön, 1985. [3] Schön, 1988, pp. 4–10. [4] Schön, 1984, pp. 2–9.

which they routinize in a way appropriate to the problems. This situation is defined by Schön as "knowing in action". In another saying, knowing in action refers to forming action strategies, understanding the phenomena and organizing the problem cases in daily life experiences accordingly.

In this respect, the term "reflection in action" is important for architectural design studios. In an architectural design studio, students learn via the trial-and-error method. Therefore, Schön[3] points out that architectural studio education is not one based on problem solving but "a reflective communication related to the materials/ elements of a situation".

In this light we structured our architectural design studio accordingly to implement the concept of soundscape as an inquisitive term for architectural design education and process. To fully grasp the relationship between sound and environment -to reflect in action- sound recordings were given to students as sole design data in the architectural design studio.

Soundscape and its Perception

Besides the urban structure and the visual quality, the formation of soundscape defines the identity of an area/ town. This formation is multi-dimensional and is based on multi interactions (physical, physiological, psychological and sociological) between the human (receiver/listener), physical environment (limitations) and sounds (sound sources) found in an urban or structural, open or closed place.

The interaction between the sound and the human occurs primarily as a result of perceiving the sound. The environment that stimulates the sound perception is the soundscape that the sounds form. Discussions regarding whether it is 'sounds in places" or "places in sounds" consider architecture to be an auditory structure.

Soundscapes are related to the human and society as well as sounds and acoustic environments. Therefore, soundscape is perceived in a global context involving auditory information besides the information obtained via other perceptional methods/forms.[5]

For the concept of 'soundscape' which was first put forward by Schafer[6] as the auditory equivalent of visual landscape to define the sound environment – independently of positive or negative judgements - which is formed because of multiple interactions. Schafer[7] classifies the main components of a soundscape as 'keynotes', 'signals' and 'soundmarks'. The 'keynote' is defined as the basic sound formed with geographical and climatic characteristics in landscape (for example, the sound of the sea in a seaside society, or the engine sound in a modern city); the 'signal' is defined as the foreground sound formed temporarily and which causes surprise or instant impact (for example, the whistle of a train or ship); and the 'soundmark' is defined as the sound describing the area identity (for example, sounds of prayer calls or the sound of a clock tower, which produces a special acoustic or which attracts tourists). The document of a soundscape is the sound recordings.

For this reason, a number of various factors have influence on the soundscape perception. In Jennings and Cain's[8] study they explain the basic factors influential on the perception of soundscape as follows:

- Effectiveness – Why is the listener in that place, and how do they listen?
- Demographic structure – Who are they?
- Time– When and how long do they listen?
- Space– What is the location of the place? How is it used? What are the physical characteristics of the space?

The basic actors in soundscape perception are defined as the person (listener) and the architectural features of the related area. In this respect, various conceptual and applied studies tended to focus on the evaluation of the relationship between the sound and architecture.

Aural Architecture

The sounds in an acoustic environment flow throughout the place. Aural architecture is the formation of a real and unreal place that produces the emotional/affective, behavioral and life-related reactions of the sensitive living being. A place can produce such feelings as sincerity, anxiety, loneliness, attachment and warmth. Parallel to the visual architecture formed by the place visually experienced, the place is experienced aurally. In aural architecture, the acoustic environment is the auditory restriction of the place; in other words, the boundaries of the place are not visible.[9]

In aural architecture, the purpose is to recreate soundscape as a complete representation/description. On the other hand, landscapes are comparably static and sometimes almost dull/pale, and soundscapes are compulsorily dynamic: they need sound sources and animated activities to create sound events.

Sound/sound sources form some part/piece of the urban environment, and in urban planning and design process, there is as much growing awareness of the importance of the sound as the importance given to visual aesthetic.[10]

Within the context of soundscape, in terms of the overall evaluation of urban environment, a number of studies focused on the types and features of current

[5] Viollon et al, 2002, pp. 493–511. [6] Schafer, 1969. [7] Schafer, 1977.
[8] Jennings, Cain, 2013, pp. 293–299. [9] Blesser, Salter, 2007. [10] Coensel et al., 2010.

sound sources in the sound environment.[11,12] In addition, the influence of visual image on soundscape.[13–15] was examined based on the complex interaction between vision and audition.[16–18]

In a number of studies examining sound sources, the focus was more on soundmarks.[19–22] Besides the urban structure and visual quality, soundscape defines the identity of an area/town, and soundmarks are prominent as a vital component of the phonic identity of a town. In this respect, in aural architecture, soundmarks are important for the original quality of a place.

By understanding the relationship between vision and audition, it is possible to put forward various suggestions for design and improvement regarding soundscape structures of urban/architectural places and to develop new insights in relation to aural architecture. In this sense, studies conducted focused on the relationships between image and sound.[23,24] Researchers of these studies used images as visual stimulants. Carles and colleagues[25] studied on preferences with different sounds and image combinations and found that the harmony between the two stimulants had influence on human's preferences. Viollon and colleagues[5] investigated use of sounds and images demonstrating the difference in the degree of urbanization. Jeon and colleagues,[23] in their study, reported that urban soundscapes are characterized by soundmarks and that acoustic comfort, visual image and the day light dominate the soundscape perception. Lee and colleagues[24] pointed out that alternative scenario presenting the perception of the high-speed train in a rural area to the study subjects within the context of acoustic and non-acoustic factors (1. Only visual image; 2. Only audio data; and 3. Visual and audio combined) were evaluated. In almost all the studies, the images presented had influence on human judgement regarding the sound environment. To put it in another saying, visual arrangement has influence on perceptions/liking/judgment regarding the evaluation of urban sound environment.[7] Human judgment changing depending on the relationship between vision and audition is fairly directive for aural architecture.

Although aural architecture is not a direct tool to solve a complex issue like acoustic sustainability in urban scale, it provides an important framework regarding how to re-examine the disciplinary boundaries of architectural practice.[26] This can be theoretically achieved by interrogating the natural connections between sound/sound sources, perception and space, and Blesser and Salter[9] supports this as a need for 'auditory spatial awareness'. In the development of the theory, there is an explanation considering aural architecture as a candidate as follows:

"…properties of a space that can be experienced by listening. An aural architect, acting as both artist and social engineer, is therefore someone who selects specific aural attributes of a space based on what is desirable in a particular cultural framework. With skill and knowledge, an aural architect can create a space that induces such feelings as exhilaration, contemplative tranquility, heightened arousal, or a harmonious and mystical connection to the cosmos. An aural architect can create a space that encourages or discourages social cohesion among its inhabitants" (p.5).[9]

".... When our ability to decode spatial attributes is sufficiently developed using a wide range of acoustic cues, we can visualize objects and spatial geometry: we can 'see' with our ears. [...] The composite of numerous surfaces, objects, and geometries in a complicated environment creates an aural architecture" (p.2).[9]

In this respect, in relation to theory development, for 'auditory spatial awareness', aural architecture is analyzed with the soundscape notion and approach. It is inevitable for this analysis to be included in the training of architects and designers.[27] This point has directed the designing of the conceptual approach and the structure of the body of the present study (the phases defined by Kuhn[6] for architectural design studio education). Therefore, an architectural design studio experience in architecture education was tested only on the sound data to analyze the relationship between sound-perception-space. In other words, in a sense, an aural architecture experiment was conducted.

Architectural Design Studio Application

In general, in project studios of architecture schools, students start studying on the context and/or on the problem and/or on the program determined by the studio instructor. They carry out their studies using the problem, and/or the context given; conduct analyses regarding the environment and the user; document the context of the design problem; take photos and record videos; and run analyses via these documents. They arrange the data collected via the case analyses; and develop syntheses, mappings and approaches. In addition, they determine the program for the design problem if it is not determined by the instructor. They also prepare the program regarding the needs and the function schemes. They investigate, learn and understand the necessary fields and the technical approaches. Following

[11] Lavandier, Defre´ville, 2006, pp. 912–921.
[12] Yang, Kang. 2005, pp. 61–80.
[13] Kang, Yang, 2002, pp. 76–79.
[14] Schulte-Fortkamp, 2002, pp. 13–18.
[15] Yang, Kang, 2002, pp. 211–129.
[16] Warren, McCarthy, Welch, 1983, pp 413–419.
[17] Marks, 198, pp. 384–394.
[18] Joynt, Kang, 2010, pp. 4368–4875.
[19] Ozcevik, 2012.
[20] Ozcevik, Yuksel Can 2012.
[21] Raimbault, Lavandier, Berengier, 2003, pp. 1241–1256.
[22] Elmqvist, 2013.
[23] Jeon, Lee, Hong, Cabrera, 2011, pp. 3761–3770.
[24] Lee, Hong, Jeon, 2014, pp. 432–439.
[25] Carles, Barrio, De Lucio, 1999, pp. 191–200.
[26] Fowler, 2015, pp. 61–72.
[27] Fowler, 2013, pp. 111–128.

this, for the complex structure of this architectural design problem, as pointed out by Schön,[2] the studio instructor develops design solution strategies and approaches together with all the related participants (Figure 1).

In this approach, which we tested in the Architectural Design V studio in the Department of Architecture at Anadolu University in the Fall Term of the academic year of 2015-2016, the context, problem and program determined by the studio instructors were not given. Instead of this phase, the students were provided with six high-quality 15-minute sound recordings without informing them about where and when the sound recordings were obtained. The students listened to these sound recordings repeatedly and drew conclusions via the data regarding the context, the user and the whole architectural environment. The data regarding all the climatic, topographic, demographic and vegetation, the data regarding the type of traffic, its direction and heaviness, and the data regarding the architectural environment and structure were all obtained by listening to these sound recordings. In other words, the students conducted their analyses via the sound recordings of an urban area which they did not see but heard only. By synthesizing the data, they obtained via the analysis of the sound recordings, the students formed visuals, graphics and maps regarding the urban area they imagined in their minds. The students discussed these data and the maps with the studio instructor in the studio, and for their own specific approaches, each student formed his or her own design problem, area and program appropriate to the studio level. Following this intense and difficult approach, unfamiliar to most students but deductive and interrogative, all the students put forward suggestions appropriate to the programs and design problems they determined in their own specific design areas (Figure 2).

The structure of this architectural project studio approach - explained in general and tested in the Fall Term of the academic year of 2015-2016, the sound recordings

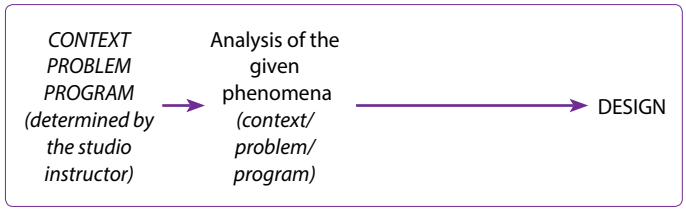

Figure 1. Basic architectural design process.

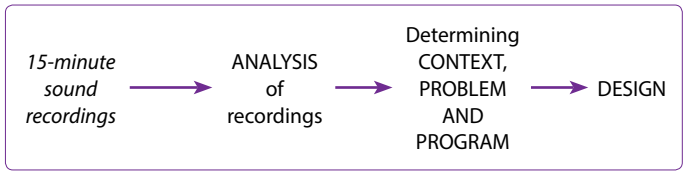

Figure 2. Applied architectural design process.

which were the basic design data of the studio and the outcomes of the studio data are explained below.

Architectural Design Studio V and Studio Structure

The concept of soundscape could create new opportunities in the education process and in the architectural design studio as the starting and focus point of the experiments conducted via deconstruction of the design process. Changing perceptional priorities (preferring the sound perception to visual perception) could result in new opportunities to form new ways of thinking and establishing connections regarding design.

In this respect, a study was conducted on the concept of soundscape within the scope of the course of Architectural Design Studio V in the Department of Architecture at Anadolu University. The content of the course was as follows: (4+8 9,0);

"Examining architectural design problems in different project phases; Examining the space with its different layers; Investigating alternatives of material and construction system in design in different scales and in details; Developing rational and creative suggestions for complex design problems; Analyzing the design data and developing the skill in transition between solutions in different scales."

The weekly schedule for the course is presented in Table 1.

A total of 21 students (16 female, 5 male) participated in the studio work. Six randomly determined groups of four students in each were given six sound recordings as the study records. In addition, the students were also given the other records besides their own study records and were allowed to obtain reference information about the other records. This situation supported the discussion environment regarding the project in terms of execution of the studio within the context of 'studio culture'.

The students were just told that the sound recordings were binaural records, and they were not provided with any other information about the sound recordings. In addition, the students were asked to listen to the records repeatedly using appropriate professional headphones and to identify the design data via the records. For this purpose, a short sound training was given to the students. During this training, brief basic sound information was given to the students, and the soundscape concept and approach was explained to them. Also, they listened to different samples of sound recordings, and the records were interpreted and evaluated. Lastly, examples were given in relation to the methods to be applied to decide on which interpretations could be regarded as the data for analysis.

Accordingly, the students individually conducted the following analyses regarding their 15-minute study records:

- Design data (topography, landscape, climate, user with

Table 1. The weekly schedule for the course

Syllabus for 2015-2016 (Fall) Architectural Design Studio V		
Week	**Data**	
1	29 September	Introducing the studio
	2 October	Listening to the sound recordings for the first time
2	6-9 October	Seminar on the concepts of soundscape and sound
		Discussion on sound recordings and on the analysis process of the sound recordings
3	13-16 October	Analysis of the sound recordings and discussion on the find ings
		Initial studies – draft drawings for the sound recording route
4	20-23 October	Analysis of the sound recordings and discussion on the findings
		Initial studies – draft drawings for the sound recording route
		Studio work on the drawing and design of the layout plan/map
5	27-30 October	Conceptual reading: Juhani Pallasmaa – The Eyes of the Skin: Architecture and the Senses
		Studio work on the drawing and design of the layout plan/map
6	3-6 November	1st Midterm Exam – the jury for the analysis process, findings and syntheses
7	10-13 November	Discussion on design problems; evaluation of the goals of the design
		Study on concepts and literature
8	17-20 November	Discussion on design problems
		Study on data collection and individual design problems
		Conceptualization of the design problem
		Studio work on the needs program and function scheme
9	24-27 November	Studio work, studio critics–the service core and design idea, structure, function and program-focused design development
10	1-4 December	Studio work, studio critics–the service core and design idea, structure, function and program-focused design development
11	8-11 December	Studio work, studio critics –the service core and design idea, structure, function and program-focused design development
12	15-18 December	2nd Midterm Exam – jury for the design alternatives
13	22-22 December	Studio work, studio critics –– structure, technology and material-focused design development
14	29 December	Studio work, studio critics –– structure, technology, material, fronts and landscape-focused design development – presentation techniques
15	5 January	Studio work, studio critics – drawing, modelling and presentation techniques

the sociocultural and economic structures, the urban context – figure ground ratio, heights of constructions, road widths, historical structure and features)

- Information about the direction of all the sounds and sound sources and about the time-line defining these sounds and sound sources in detail
- The story-line explaining the scenario of the sound recordings (user, function, time, topography, climate, vegetation, direction, urban context and so on)
- While forming the scenario of the sound recordings, the referential directive sounds defining the identity of an area; that is, the soundmarks
- The layout plan/map which showed the sound recording route regarding the wind effect, sound level (reflection) and absorption, direction of hearing, the distance between the source and the receiver and the referential sound/sound source and which demonstrated the road-structure relationship for the area suggested by the students
- Urban analyses on the layout plan/map determined (floor height, function, figure ground ratio, physical environment and so on)

Depending on the data obtained via the analyses of the sounds and on the related evaluations, the context data were determined, and accordingly, each student defined his or her own specific design problem and formed the needs program and function schemes via literature review for the design problem. In addition, the students selected the appropriate design area for their own design problems regarding the designed routes of the records. The projects suggested by the students were carried out with the studio work, discussions and studio critics that occurred between the studio instructors and the students in relation to the students' design contexts.

In the process, the associations (reason-result relationships) with the sound recordings were made, and different experts – architects (design experts), construction engineers, acoustic experts – were invited to contribute to the studio and asked for their views. The academic term ended with the participation of these experts in the end-of-term final jury.

Studio Basic Data – Sound Recordings

For this studio work, binaural sound recordings obtained with the soundwalk method in six urban areas in Istanbul (Bağdat Street in Anatolian Side and Beşiktaş and Ortaköy Pier Squares, Bebek Park, İstiklal Street, Meclis-i Mebusan Street and Fındıklı Park in European Side) were used (Figure 3).

In order to conduct the soundscape analyses, Semidor[28] suggested the "soundwalk method" as a qualitative and quantitative evaluation method. The most important creative/innovative aspect of this method is that the technique of binaural sound recordings characterizing the spatial distribution of the sound energy is used to describe the outer environment. In recent years, a number of researchers have made use of the soundwalk method in their soundscape studies and suggested certain procedures and methods for the evaluation of soundscape.[29–32] It is a well-known fact that stereophonic sound perception is important for creating the real picture of the physical environment. Therefore, it is important to use this technique in terms of the quality of urban sound environments.

Figure 3. Selected areas in Istanbul.

The soundwalks in the areas selected were done and documented with photos;

- in the appropriate season determined according to the climate conditions in which the sound environment was heard best and most clearly for the quality of the records
- on the day when the sound environment was perceived in the best way to reflect the area identity, and
- in the time interval in which the soundmark or the soundmarks for each area were recognizable in the sound environment.

The walkings completed in periods of about 15 minutes when the simultaneous sound level measurements and binaural sound recordings were obtained were carried out in the routes determined to exemplify the related sound environment by considering the general use of the areas (Figure 4). Table 2 presents the sound sources that form the soundscape structure and soundmarks in urban areas.

Studio Outcomes/Products

In the study conducted in the 14-week program, the students' individual diagnoses (the soundscape structures of the areas, soundmarks, design data and so on) were quite close to the reality. In addition, depending on the previous spatial experiences of the students, there were even those who defined the related urban areas directly using their names. However, this was confuted to prevent any bias/limitation/conditioning and to contribute to the students' thinking and design process.

What makes this studio work different is that the only data source provided for the students was the sound recordings with soundscape information about the urban areas which the students knew nothing about. For the students who were not informed about the sound recordings, there was no obligation to define any certain urban area, history or structure. In addition, the difference within the group, or individual originality, was supported.

[28] Semidor, 2006.
[29] Westerkamp, 2001.
[30] Berglund, Nilsson, 2006, pp. 938–944.
[31] Adams, Bruce, 2008, pp. 552–558.
[32] Schulte-Fortkamp, Jeon, Genuit, 2010.

Figure 4. Routes and photos of the soundwalks in the selected areas.

In this respect, all the students – including those studying on the same study recording – formed different area, scenario and design problems. In line with the students' different design problems, as can be seen in Table 3, the students produced a wide variety of project subjects.

These various design problems were supported by the studio instructors and helped vary the deductive interactive communication in the studio and enrich the discussions. The students discussed different design problems together and developed related approaches.

Table 2. Main characteristics of soundscape and the soundmarks in the selected areas

Study areas	Sources that form the soundscape	Soundmarks
Bağdat Street	Dense traffic (public transportation, luxury and modified cars) Music broadcast from the cars Pedestrian, bycles and buggies Functional diversity at street Commercial music broadcast	traffic noise, sounds of children and shopping, music and voices
Beşiktaş Pier Square	Dense traffic and sea transportation through Bosphorus Piers, bus and taxi stops Functional diversity in square Commercial hails as a type of sales approach	traffic and sea transportation noise, sounds from the pier, sounds of wind, sea/wave, birds, sale approach (commercial hails) and voices
Ortaköy İskele Meydanı	Sea transportation through Bosphorus Pier and mosque Functional diversity in square Commercial hails as a type of sales approach	Sea transportation, sounds from the pier, sounds of wind, sea/wave, birds, shopping, Ezan, sale approach (commercial hails) and voices
Bebek Park	Sea transportation through Bosphorus Traffic near the park Pier, mosque, playground and sports ground Recreational functions (riding, walking, exercising a dog etc.)	Sea transportation and traffic noise, sounds from the pier, sounds of wind, sea/wave, birds, children, Ezan and voices
İstiklal Caddesi	Different ways of sales approaches supplied with music broadcast and advertisements Pedestrian Functional diversity at street (social, cultural and artistic activities) broadcast, nostalgic tram and	Bales approaches supplied with music the nostalgic tram densely voices
Meclis-i Mebusan Street& Fındıklı Park	Sea transportation through Bosphorus Traffic and tramway Mosque, little commercial units (serving tea/coffee) and playground Recreational functions (riding, walking, exercising a dog etc.) Sculptural activities of art students	Sea transportation, traffic and tramvay noise, sounds of wind, sea/wave, birds, children, students' activities and voices

The variety of products obtained via the studio work was due to the variety of the sound analyses conducted individually by the students. Figure 5–8 illustrate various analyses.

General Studio Evaluation

The outlines of the course of Architectural Project V, which the present study focused on, were determined via the process below in line with the design phases summarized by Kuhn[6] in his architectural design studio education process:

For the first phase, traditionally, the student is given the architectural design problem, the program, the user and the urban and environmental contexts by the studio instructor. One or more than one of these data might have been defined in advance.

In the first phase of the architectural design studio

Table 3. Students, study areas, their analysis-soundmarks and design problems decided by them

Student	Study Areas	Analyses- soundmarks	Design problem determined by students
Stu.1	İstiklal Street	Street vendors, Football fans Foreign tourists, Significant decrease in roaring at the end of the recording	Fenerium (a football club) shop for jerseys and memorabilia
Stu.2	Bebek Park	Water (like sea) – sound of waves (on the left), Wind, Moderate traffic, Basketball play, Bicycles	Social club for a university
Stu.3	Ortaköy Pier Square	Ferry – sea waves, Traffic – ambulance, Turkish tea glass, Kids playing on playground, Foreign tourists	Pier, shops and night club
Stu.4	Meclis-i Mebusan Street	Foreign tourists, traffic, Ferry, sea gulls, tramway	Hotel & Hostel
Stu.5.	Beşiktaş – Üsküdar Pier Squares	Birds & sea gulls, car horns, akbil- token, Ferry and announcements, Heavy bus traffic, Sea waves and water sloshing sounds	Transportations headquarters for municipality buses
Stu.6	Beşiktaş – Üsküdar Pier Squares	Ferry, ambulance, turnpike-token, Pedestrians, Traffic, Young people	Youth center
Stu.7	Ortaköy Pier Square	Crowd, foreigners, moderate traffic, kids, bicycles, vendors, park activities, birds, rings,	a Hotel with restaurant
Stu.8	Meclis-i Mebusan Street	Put emphasis on her findings on the symbol voices of kids voices, sounds of productions, feet – high heels sounds	a Design center of a toy company with its shop and cafe
Stu.9	Beşiktaş – Üsküdar Pier Squares	Sound of crowd, Heavy traffic, Vapur, People asking directions	Hotel
Stu.10	İstiklal Street	Vendors, Tram, Foreign tourists Football fans, Music and tableware, Shops	Hostel and cafe
Stu.11	İstiklal Street	Footsteps, Football fans, Harley motors, Tableware, Street musicians, Traffic, Foreign tourists	Butique hotel
Stu. 12	İstiklal Street	Pedestrians, Vendors, Street musicians, Roarings, Football fans, Music, Tableware	Sports club/gym
Stu.13	Meclis-i Mebusan Street	Traffic, Wind, Seagulls, Tram Ferry, Construction	Yatch club
Stu.14	Meclis-i Mebusan Street	Traffic, Wind, Birds, Tram Ferry, Vendors, Construction Foreign tourists, Bus - plane	Culinary school with accommodation
Stu.15	Ortaköy Pier Square	Ferry – sea waves, Traffic, Birds, Tableware, Vendors, Street musicians	Photography club and cafe
Stu.16	Ortaköy Pier Square	Pedestrians – footsteps, Tourists, Vendors, Tableware	Hotel
Stu.17	Bağdat Street	Children, Turkish tea glass and table ware, Traffic	Daycare
Stu.18	Bağdat Street	Traffic, Footsteps, Kids, Commerce	Publishing House
Stu.19	Bağdat Street	Traffic, High heeled footsteps, Commerce, Tableware	Fashion House
Stu.20	Bağdat Street	Traffic, Pedestrians	Hotel
Stu.21	Bebek Park	Sea wave, Wind, Moderate traffic with specific sound "expensive car's motor sound"	Ferrari club
Stu.22	Bebek Park	Waves, Wind, Birds – seagulls Playground and children	Children Psychology center

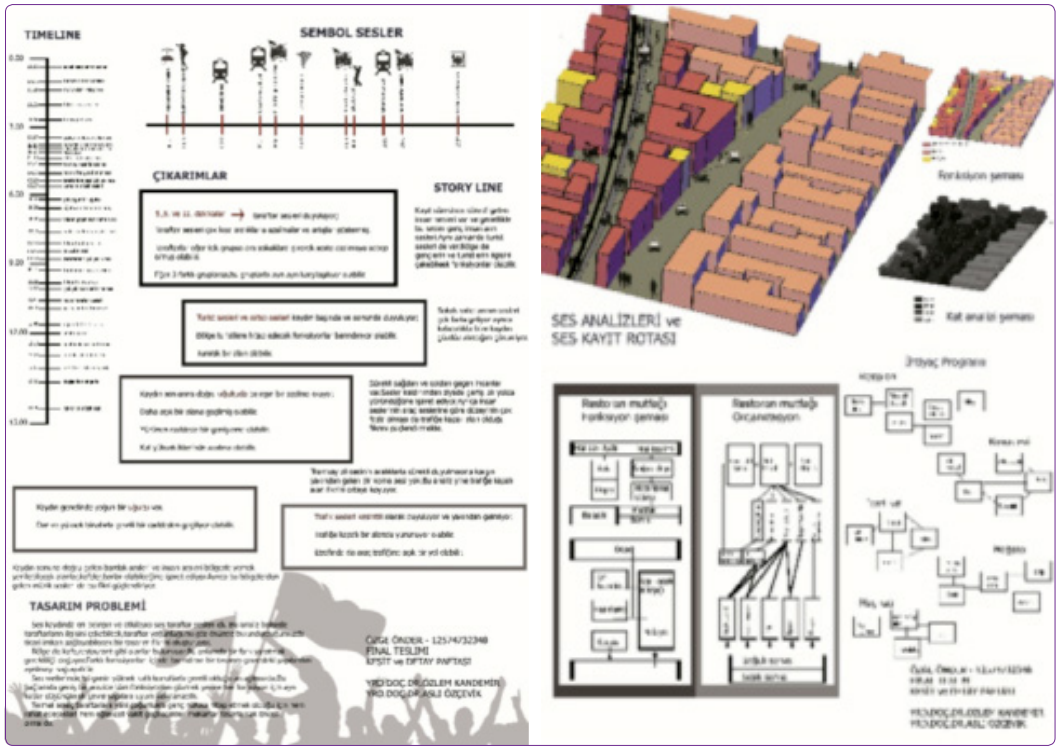

Figure 5. The analyses (timeline, story line, soundmarks), design problem and its program with the route of sound recording determined by Stu.1.

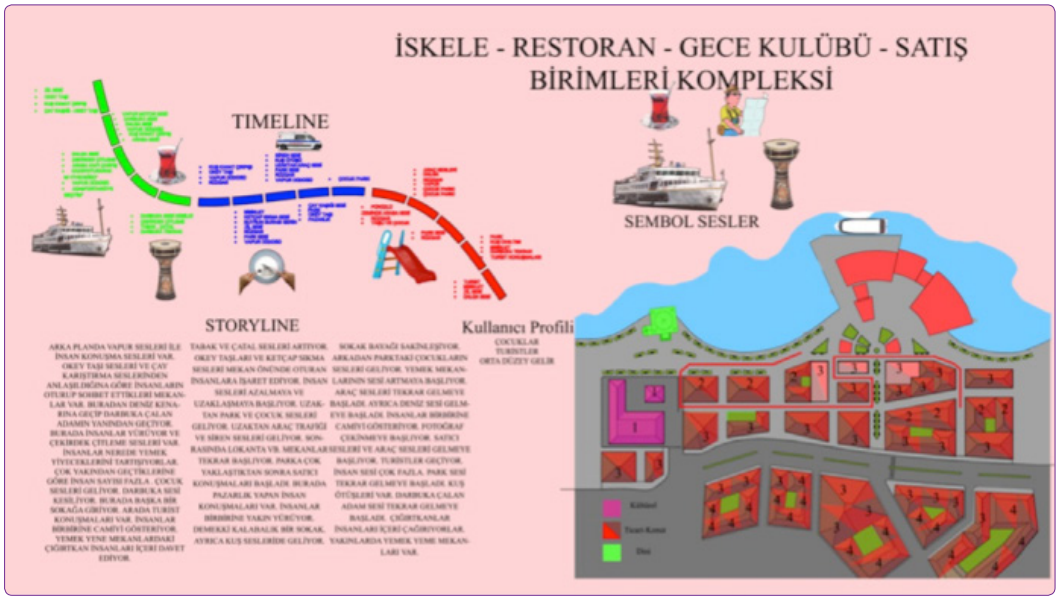

Figure 6. The analyses (timeline, story line, soundmarks), design problem and the map determined by Stu.3.

experience, it was suggested that the design problem which was not previously defined should be transformed using only the high-quality binaural sound recordings. Each of the six groups of about four students was given one record. The students themselves managed their architectural design processes with the support of their studio instructors, and they studied on and analyzed these records and discussed the records together with cross-reference. Depending on the analyses supported with these careful feedbacks and repeated listening-discussions, the students put forward their own design areas and formed their architectural design problems by determining their urban areas and problems-data-users. In this process, the students were not informed about the land/design area or about context/user/physical data (special design problem, any area, time, climate, topography and sociocultural structure and so on), or no related definition was provided.

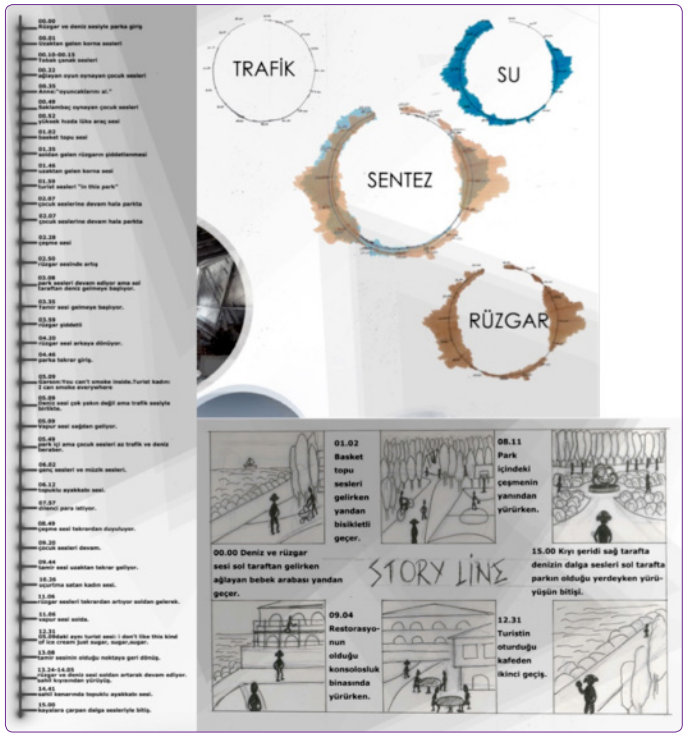

Figure 7. The analyses (timeline, story line, soundmarks) determined by Stu.2.

In the second phase defined by Kuhn,[6] during the academic term, with the increasing complexity of the problem for the students, the product designed, and the context-related decisions are redefined and adapted.

During the studio experience in this study, in cases of a need or indecisiveness, the students listened to the sound recordings with feedbacks to redefine, rearrange and adapt the problem/case. In addition, when necessary, the studio instructors supported with seminars, discussions and readings for the evaluations of the sound recordings.

The third and fourth phases of this studio experience were conducted parallel to the traditional architectural design studio education process, and the critics for the project of each student continued with the support of visitor experts, students and instructors. During the critics, heterogeneous information and solutions which added other aspects of the complexity were included in each project. From the beginning of the academic term to its end, the instructors used various sources/mediums to inform the students about different design approaches and projects appropriate to the situation on which it was necessary to focus. The instructors provided the supports and limitations required by all the projects.

Conclusion

In determining perceptional tendencies, the sound perception psychology has secondary importance. This is a natural result of the fact that visual perception in human's

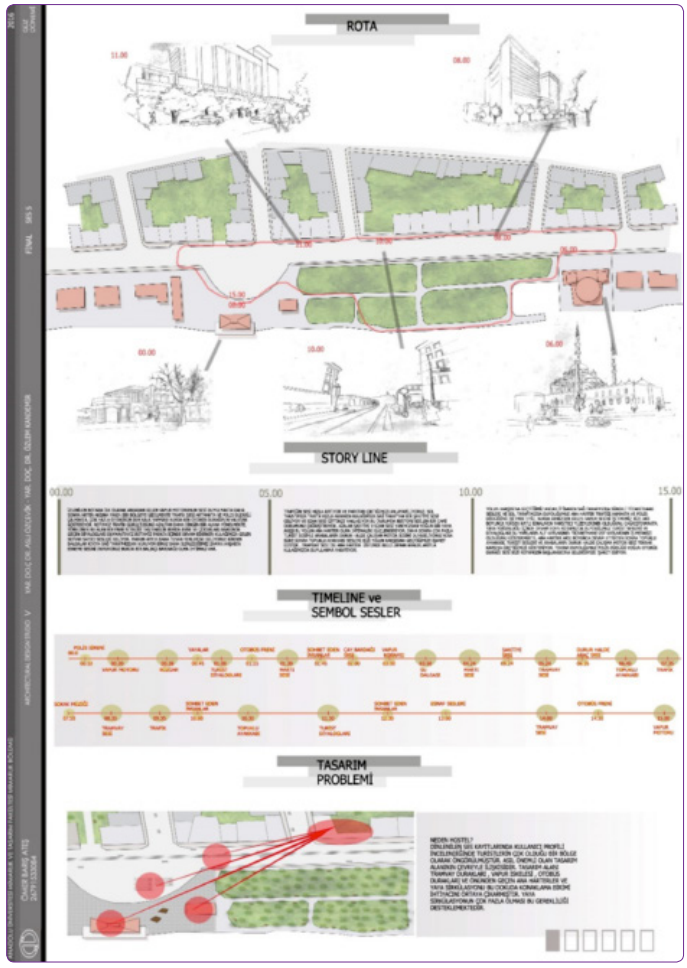

Figure 8. The analyses (timeline, story line, soundmarks) and the map determined by Stu.4.

perception of the environment covers the biggest area with a ratio of 90%.

The only condition for defining a place is not the concrete-hard material. In order to define a place, it could be enough to hear, smell and touch it besides vision it. We can experience the place with all our senses. However, if we by-pass such main sources of this experience as the senses of touching, smelling, vision and tasting and focus on the sense of hearing, then we can become aware of all the auditory features of a place. In this respect, we can keep understanding and gathering the architectural information with the help of the sense of hearing alone. With this awareness, having architectural and urban place experience via sound recordings and determining and defining its elements will provide us with the definition of the architectural design problem.

Experiencing/perceiving a place without vision starts when a person defines sounds based on the sounds he or she has experienced (heard) before and on the sound sources that produce these sounds (he or she has seen).

In this study, by focusing on the aural sense, which is among our senses that we use for experiencing a space, an architectural design problem was determined. The study investigated not only the importance of the multiperceptional approach and especially of the soundscape approach in design but also the spatial opportunities provided by the sound and sound experience.

In the traditional architectural design studio education process, context analysis, design problem, concepts regarding the problem and all the related data are determined in general and given to students by studio instructors. This studio experiment tried to restructure the architectural design process with the help of the concept of soundscape as an architectural design problem in architectural design studio education. In this respect, in theory development, an aural architectural experiment (analysis of the relationship between sound – perception – place) was conducted. This experiment constitutes a leading/directive example in terms of creating new contexts for designers for visual architecture (with the multiple perceptional approach). The number of related experiments is intended to be increased with national or international architectural design studio experiments and workshops.

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