A REVIEW OF NEUROAESTHETICS RESEARCHES RELATED TO URBAN EXPERIENCE

Assoc.Prof. Dr. Seda H. BOSTANCI
Namık Kemal University, Faculty of Economics and Administrative Sciences,
Political Science and Public Administration, Turkey
shbostanci@nku.edu.tr

ABSTRACT: Cities are living spaces in which individuals experience with their sensorial properties, collect memories, have visual image, communication and interaction exist. Individual and societies are linked to each other with a language and similarly, cities have pattern system, texture and layers. Therefore, the power of the ability of communication and self-expression of cities can be mentioned. Cities, in historical process, have visual values which they create with the factors such as culture, life style, art, architecture, morphology, climatic conditions. Feeling psychologically and physically good in a certain place is closely related to aesthetic experience and environmental psychology. The main aim of urban design is to realize the multi-component urban variances from ecological balance to socio-cultural life and the spatial designs which the society will feel good by keeping social values. While neuroscience takes decision depending on perception system created by senses, it makes the mechanism and structure of brain observable and visual. The aesthetic experience depended on urban communication and interaction can be expressed as the process which ends when dopamine level increases depending on discovering innovations, feeling pleasure, making a choice. Neuroaesthetics which makes brain's activities measurable while aesthetic perception is experienced has become an interdisciplinary field among health sciences, psychology, art and environmental psychology. The aim of the study is to interpret the urban experience by analysing the studies discussing the subjects of neuroaesthetics, esthetic experience and city together.

Key Words: Urban aesthetics, environmental psychology, aesthetic experience, neuroaesthetics, urban experience

KENTSEL DENEYİM İLE İLGİLİ NÖROESTETİK ARAŞTIRMALARA YÖNELİK BİR İNCELEME

ÖZET: Kentler, duyusal özellikleri ile deneyim yaşanan, anı biriktirebilen, görsel imaja sahip, iletişim ve etkileşim kurulan yaşam alanlarıdır. Kişi ve topluluklar nasıl bir dil birliğine bağlı ise, kentlerin de örüntü sistemi, doku ve katmanları bulunmaktadır. Böylece kentsel sistemin iletişim yeteneğinden ve kendini ifade edebilme gücünden söz edilebilir. Kentlerin tarihsel süreç içinde, kültür, yaşam tarzı, sanat, mimari, morfoloji, iklim koşulları gibi faktörlerle oluşturdukları görsel değerleri bulunmaktadır. Belirli bir mekanda psikolojik ve fizyolojik olarak iyi hissetme, estetik deneyim ve çevresel psikoloji ile yakından ilgilidir. Kentsel tasarımın temel hedefi, ekolojik dengeden sosyo-kültürel yaşama kadar çok bileşenli kentsel değişkenleri, mevcut tarihsel değerleri koruyarak, toplumun kendini iyi hissedeceği mekansal tasarımları gerçekleştirmektir. Nörobilim, duyuların oluşturduğu algı sistemine bağlı kararlar alırken beyin işleyişini ve yapısını, görüntüleme teknikleri ile gözlemlenir ve görselleştirilebilir hale getirmektedir. Kentsel iletişim ve etkileşime bağlı estetik deneyim, yenilikleri keşfetmek, haz duyma, seçim yapma ve bunlara bağlı olarak dopamin seviyesinin yükselmesi ile sonuçlanan süreç olarak ifade edilebilir. Estetik algı deneyimi yaşanırken, beyin faaliyetlerinin ölçümüne olanak tanıyan nöroestetik, sağlık bilimleri, psikoloji, sanat ve çevresel psikoloji arasında

disiplinlerarası bir alan oluşturmuştur. Çalışmanın amacı nöroestetik, estetik deneyim ve kent ile ilgili konuları birlikte ele alan çalışmaları inceleyerek, kentsel deneyimi bu bağlamda yorumlamaktır.

Anahtar Kelimeler: Kent estetiği, çevresel psikoloji, estetik deneyim, nöroestetik, kentsel deneyim

INTRODUCTION

Aesthetics, which theoretical infrastructure improves through the interaction between philosophy and art evolved into the communication as a consequence of bilateral dialogue among work of art, artists and society with the conception of producing the beauty and its perception. “Regarding aesthetic experience and its behaviours, it is essential to be understand art fields theoretically. Personal experience in aesthetic perception, experience and passions in some fields become important. While fulfilling these expectations, the objects which are able to make difference are defined as work of art” (Kostelanetz, 1989). Today while artist creates his work of art, he/she starts to work interacting with society, city and socio-politic developments. Therefore, artist has gained some features that sometimes strengthens moral values of society, sometimes criticises socio-politic structure and prepares society for future. “The consciousness of the artist is a specially descriptive consciousness. Reaching aesthetic shape occurring in an intensive activity shows itself as a result of his tendencies in some way, habits and numerous experiments” (Timuçin, 1998: 182). “Aesthetic experience is explained by emerging pleasure from assessment of knowledge based on previous experiences in the face of an aesthetic object of an individual. What matters in aesthetic experience is that the object has a stimulatory effect as well as the motivation of the subject/viewer. The conscious system can be explained by the motivation, aesthetic vision process that occur in the connection of emotions, perceptions, imagination, and thoughts” (Aydınlı, 1993: 32, 33). “Neuroscience seems to have the potential to illuminate the mystery of artistic creativity, which is one of the most specific cognitive abilities” (Bora and Alper, 2005: 3). “Art and technology have been converging rapidly in the past few years; an important example of this convergence is the alliance of neuroscience with aesthetics, which has produced the new field of neuroaesthetics” (Massey, 2009: IX). Today aesthetic value of a work of art is considered with its aspects which make society think and communicate with it. Sense of aesthetics based on communication enabled different models to develop in the fields of architecture, urban design and urban art.

Urban planning and design fields' endeavour to produce multi-component solution at different levels leads these disciplines to search for a testable model. With this point of view, studies which can be measured and modelled within the analysis of urban aesthetics is emerged. Relativity of aesthetics and productivity of artist in his conscious and unconscious intersection caused the concept of measurable aesthetics cause intense criticism. Besides, neuroaesthetics emanated when aesthetic preferences was started to determine with functional magnetic resonance imaging techniques measuring dynamism in brain tissue added a different dimension to this field. Advancements in experimental and computational aesthetics develop

alternative perspectives in order to produce a more liveable urban environment. During this process, cities benefit from interdisciplinary researches in order to improve their diversity and adaptation relations and communication skills. Therefore, urban art elements, fairs, expositions and parks which are designed considering the experimental approaches in neuroaesthetics transform cities into unforgettable living spaces.

"Since ancient times, humankind has perceived the stimulants by forming a cause-result relation with where they found or created them or the other related object, event, fact, concept around" (Usal and Kuşluvan, 2006: 76). This causal relation is also used in modelling of the human interaction with physical urban space. Brain develops some approaches in order to adapt to the environment and maintain its life based on lifelong past experiences using cognitive models. There are city models, which brain created similarly, as well. That's why it is possible to feel a safety in familiar places like urban areas, streets, areas and parks based on past experiences (Eagleman, 2016: 65).

1. THE CONCEPT OF NEUROAESTHETICS

Neuroscience is the discipline which researches about functioning mechanism of the nervous system and the brain, human behaviours, molecular features of tissues of neurological disorders, and the mysteries of human brain through new technologies. Particularly developments in behavioural and cognitive neuroscience make the subject more attractive for studies of social sciences. "Nervous system functions as a network of closed mutual interactions and always ends in a change in the mutual interaction of similar or different components in every change of the mutual interactions between these certain components. Lively systems are cognitive systems and living as a process is a cognitive process" (Capra, 1996: 98, 99). "Perhaps the greatest challenge of neuroscience is understanding the neural mechanism responsible for the higher levels of human mental activity, such as self-awareness, and language, and mental imaginary. Research at this level, called cognitive neuroscience, studies how the activity of the brain creates the mind" (Bear, Connors, and Paradiso, 2007: 14). "The immediate future of neuroscience is unmistakably multidisciplinary. The challenge ahead is to foster the synthesis and integration of the data and models produced in the past two decades" (Gomez, 2010: 167, 168). Computational neuroscience brought about breakthrough developments on visualising cognitive processes on the nervous system. These developments provided a basis in terms of improvement of the field of neuroaesthetics. "In the neuro-cognitive psychology of aesthetics, the objective observations comprise measures such as electroencephalography, magnetoencephalography, event-related brain potentials (ERPs), functional magnetic resonance imaging (fMRI) or positron emission tomography" (Jacobsen, 2010: 185). "Computational neuroscience community to adopt and build community models. By committing to the use of community models scientists establish a common structure that can be presented to the larger neuroscience community, not as just

another model, but as a model that has been built, verified, tested, and accepted" (Bower, 2013: 133).

"Like other sub-fields of neuroscience, neuroaesthetics collects neuro-based data via empirical methods. Neuroimaging has turned out to be the primary method of empirical studies in the field of neuroaesthetics. This technique provides the opportunity to monitor neural activities of the brain in response to aesthetic appreciation. However, the empirical data gained through neuroimaging studies require be evaluated in relation to other fields such as neuropsychology and evolutionary aesthetics" (Darcan, 2014: 8, 9).

"Current developments in neurophysiologic sciences revealed the opinion that the brain structure is made up of two major parts, each undertaking a different side of human reactions to the stimuli of the external world. One of these sections has assumed immediate revelations and a short reaction that is largely conditioned, that is, based on past experiences. So it has the virtue of being fast. However, in contrast to this speed, it is limited to routine, simple and reasonless reactive schemes. The second part, which is quite small in volume, is responsible for the special links among contradictory principles, irreducible rules, rationality, and scientific knowledge. The modelling by reference to these structures on the mind contains deviations and differences compared to the main form that they offer" (Moles, 2001: 27, 28).

"Semir Zeki and some other researchers developed neuroaesthetics area by the relations between abstraction and aesthetics effects in human brain" (Bora and Alper, 2005: 3). "One of the functions of art is an extension of the major function of the visual experience of the brain" (Zeki, 1999: 76). "Neuroaesthetics, or the study of the neural bases of aesthetic experience, offers a model for understanding the changing and dynamic features of aesthetic life, for understanding the relationships between the arts, and for understanding how individual differences in aesthetic judgment shape the varieties of aesthetic experience. Aesthetic experience relies on a distributed neural architecture, a set of brain areas involved in emotion, memory, perception, imagery, and language. But more than this, aesthetic experience emerges from networked interactions, the workings of intricately connected and coordinated brain systems that, together, form a flexible architecture enabling us to develop new arts and to see the world around us differently" (Starr, 2013: XV).

Arnheim has inspiring studies about visual thinking, cognitive process and brain activities in art studies. In his words; "the eye and hand are the father and mother of artistic activity. Drawing, painting, and modelling are kinds of human motor behavior, and they may be assumed to have developed from two older and more general kinds of such behavior, expressive and descriptive movement. Expression is the cognitive process for art work. Expression defines as modes of organic and inorganic behavior displayed in the dynamic appearance of perceptual objects or events. The structural properties of visual models are not limited to what is grasped by the external senses, they are conspicuously active in the behavior of the human mind, and they are used metaphorically to characterize infinity of non-sensory phenomena: low morale or the high cost of living, the spiraling of prices, the lucidity

of argument, the compactness of resistance. If expression is the primary content of vision in daily life, the same should be all the more true of the way the artist looks at the world. The expressive qualities are his/her means of communication. They capture his/her attention, they enable him/her to understand and interpret his/her experiences, and they determine the form patterns he/she creates" (Arnheim, 1954: 171, 445, 455).

2. URBAN AESTHETIC EXPERIENCE

Urban communication defines a multi-dimensional dialogue and interaction process such as perception of city, experiencing city, it's creating an image on the memory, its giving a new meaning and corroborating sense of belonging. Urban communication includes movements and observations in city, and two or three-dimensional visualising such as photography, promotional video and document. Postcards, city guidebooks, tourist guidebooks are city-dwellers' and tourists' favourite recollection cards on which landmarks are emphasized. Therefore, it is seen that the communication with city has changing images for different roles such as being a tourist or a city-dweller, identity and meaning values. Urban aesthetics stands at the junction of all these values. From facade scale to urban skyline scale, the holistic impact creating all third dimension facade community, form elements and visual harmony are the important subjects in terms of aesthetic evaluation.

"Aesthetic experience is defined as invented existential core of architectural production when it is questioned on the basis of the concepts of perceptual ambiguity and existence. The individuality of architectural production at urban level, its sensual and historic uniqueness provides aesthetic experience with its antagonism" (Aydınlı, 2014: 105).

Visual features of cities are related to some concepts like sensation, perception, meaning, shape, function, harmony, legibility, variety which are taken places in spatial aesthetic components occurred in the course of time. Aesthetics in contemporary art is defined as the communication between the observer perceiving and the work of art perceived. Communication potential forms the basis of urban aesthetics. There are various interdisciplinary approaches of urban aesthetics such as environmental psychology, experimental aesthetics, and computational aesthetics. It is seen that some of these approaches examine human behaviours depended on conscious, unconscious aesthetic perception. Therefore, neuroaesthetics enables the potential impact of a work of art to be interpreted as well as guiding urban designers, landscape architects and architects in order them to show the ordinary process of daily life, urban communication, and to create places where people feel good.

Eagleman (2016) compares brains components to urban system. Brain creates the interaction of the system formed by numerous biological concepts just as urban components with neural networks just as roads and the complex structure made of probably related choice priorities.

The signals from both system as a result of various interaction, preference and transmission transform into the reality of life.

Brain's system which works on modelling inspired the up-to-date computer-aided studies on city. Virtual space analysis, fractal geometry, space diagram, geographic information modelling, informatics aesthetics and similar approaches give innovative point of view to urban transformation scenarios. Locating the problem as well as forecasting are common threads of these studies which has interdisciplinary contents. Brain balances its ability to forecast and its willpower on which it consumes a lot of energy and decision systems and motivations depended on multi-options for a better future. Brain's ability of renouncing of today's opportunities and rewards increasing the level of dopamine for a better future can be related to urban resilience.

At this point, the concept of neuro-resilience in the area of health and physical activity can be linked to the concept of urban resilience and cognitive cities in urban areas "Neuro-resilience practices are based on the latest neuroscience findings, guiding clients to build mental robustness. Whether it's managing stress or improving potential experts provide effective and scientifically documented training to put your mind and body into a sustainably improved performance state" (Neuro-Resilience, 2016). In the study of Ernstson's concept of resilience in relation to urban systems resilience in cities and resilience of cities are defined by two conceptual relations. According to him, "resilience in cities, which operates at the city scale and deals with sustaining local-to-regional ecosystem services. Resilience of cities, which instead operates at the scale of a system of cities, which is a concept from geography meaning a set of cities tied to each other through relations of exchange, migration, trade, or others that sustain the flow of energy, information and matter among the cities" (Ernstson, 2010: 533). "Cognitive city, deliver information to others (e.g., other devices and sensors, machines, operating platforms, humans) to allow these systems to learn from and adapt their behaviour. This allows citizens to move towards a more efficient and sustainable use of resources and it allows service providers such as utility companies or transportation authorities to continuously adapt to provide more efficient and cost-effective services" (Moyser and Uffer, 2016:16). "Cognitive cities are not only a necessary but as an enhancement also a more appropriate concept, especially when it comes to addressing the challenge of urban resilience. (Finger and Portmann, 2016: 4). It can be thought that cities have certain consciousness and they give messages to the cities in order to survive. Moreover, the subjects like monitoring movements in city and reducing the urban stress are related to the investigation of neurological and psychological effects to human health. Cognition have some variation in body movements and motions in the city.

"Literature shows a body of research on the variety of ways in which individuals impact and differ of this difference on their environmental cognition. Walking is more intimate to the environment and therefore allows a more articulated process of remembering and interpretation. Cycling and active car driving are the other part of movement in urban space.

At the last stage, in which no active contact is made with the environment, is the experience of passive passengers in a car or on public transport. As research has shown, the latter group are least able to remember their routes and to draw a coherent map of urban road system they use" (Madanipour, 1996: 64, 65). This study shows the relation between motion and experience in perceiving the image of the city.

There are significant differences between experimental areas and urban experience. Experimental spaces are the places where how the target audience is exposed to the visual and communicative concepts are fictionalized, and where the process is under safe control. Urban experience, unlike this phenomenon, has potential uncertainty. In addition to the current visual characteristics of city; art activities such as festivals, exhibitions, fairs have different stylistic and visually fictionalized spatial organization in the process of indoor and outdoor displays. Such urban environments have fictional and experimental features. In the experimental environment, the user or visitor is a part of a designed fiction. Its behaviour and orientation in space is fictionalized hypothetically in advance. In fictional experimental safe places, people become observers and their roles are determined. These artistic places are organized in the way that participants can see the most in a short time with the help of various directives. "Experience has been an important theme in psychoanalytic thinking in recent years. In terms of psychoanalysis, what is at stake is the amphiboly of experience and relation. Among learning through experience, there is a will to accept and change the afflictions and emotions that emanate from encountering the unknown. In order to experience, the basis of existence based on disaster and chaos must be accepted as a humanbeing" (Robins, 1996:53, 54). So while individual is faced with a threat, he gains experience. Experiential space has features that can offer innovations that its user is not able to realize before. "The essence of human development is to improve the capacity to experience more complex experiences day by day" (Sennet, 1999: 155). Urban experience is experienced with its aspects of being impressive, scary, and exciting and these accumulations create a spatial awareness. Despite a variety of risks, cities with the opportunity of increasing diversity enable the mind work more effectively. Diversity, on the other hand, increases the population density and creates a source of environmental stress. "Environmental stress depends on the nature of life, different lifestyles, perceptions and cultures. Stress can be reduced if the organism reaches a balance with ecological resources, social obligations and limitations. Organisms are prone to create compatibility between environmental quality and environmental pressures to reduce the effect of environmental and stress. In order to give a meaning to the environment, creating norms in cognitive schemes and reducing unfamiliar cases with which are difficult to form a communication in the environment is a common method in reducing stress" (Ünlü, 1998: 68-75).

3. EXAMPLES OF EXPERIMENTAL RESEARCHES ON COGNITIVE PERCEPTION OF URBAN SPACE

Environmental psychology stands at the junction of urban space, aesthetic experience and cognitive perception. Aesthetic experience can be defined as the cognitive improvement process including aesthetic and psychological experiences (Parsons, 1987). “Perception is defined as comprehension of wholeness in psychology” (Tunalı, 2004). “Being aware of phenomenal world happens owing to the perception” (Norberg-Schuls, 1698: 27). The environment which individuals are aware of is the environment which life experiences give a meaning to through senses. Interaction with environment is the main reason of surviving. “People are influenced by their environment, environmental features have impact on both people's life and their happiness” (Şentürer, 1995: 328). “City had structural and fictional features. Learning, perceiving or having information about a city means conceptualizing the organization of the environment” (Ünlü, 1998: 5). “Daily experiences are formed by some comprehensions such as significance, order, cause-effects to facts. What people experience constitutes a perception scheme through some factors like observation and culture. Therefore, when someone experiences something new, past experiences guide them in order to explain the new situation. Situations are accepted depending on the perception scheme” (Norberg-Schuls, 1968: 27, 28, 50).

When how the urban space is perceived and the processes of spatial experience are considered, cognitive mapping techniques are among the most common experimental research techniques in this area. According to Downs and Stea, “cognitive maps are convenient sets of shorthand symbols that people all subscribe to employ and recognize: these symbols vary from group to group, and individual to individual resulting from their , prejudices, biases, and personal experiences. Cognitive mapping is a process composed of a series of psychological transformations by which an individual acquires, codes, recalls, stores, and decodes information about the relative locations and attributes of phenomena in his/her everyday spatial environment. Given a cognitive map, the individual can formulate the basis for a strategy of environmental behavior. Cognitive mapping can be viewed as a basic component in human adaptation, and the cognitive map as a requisite both for human survival and for everyday environmental behavior” (Downs and Stea, 1973: 9, 10). Gestalt principles are also an important intersection part between, urban experience, neuroesthetics and psychology. “The neighbourhood model in urban morphology provides global constraints for guiding the global partitioning of building sets on the whole map by means of roads and rivers, by which blocks, enclaves, superblocks or neighbourhoods are formed; whereas the local constraints from Gestalt principles provide criteria for the further grouping of enclaves, blocks, superblocks and/or neighbourhoods” (Yan and Chen, 2004: 513).

The experimental studies in the urban areas and architectural buildings are begin to institutionalize. “In architecture, new awareness of the complexity of cognitive and emotional processes involved in the daily experience of designed environments has rapidly grown. Such interest also led to the foundation of the Academy of Neuroscience for Architecture (ANFA) in 2003 in San Diego” (Papale, et al., 2016: 2). Some empirical studies are made by Choo et.al. for understanding how the brain effects by the architectural styles of the buildings. This

study shows that "subordinate categories of buildings, architectural styles, are represented in the neural activity patterns of several high-level visual areas in human temporal cortex. This study shows that neural correlates of human classification of visual categories are driven not only by perceptual features but also by semantic and cultural facets, such as expertise of architectural styles and architects of buildings" (Choo, et.al, 2016: 8, 9).

Urban life is a dynamic system with codes languages and signs. Signs are important communication elements in way finding and living in the city. They are the languages of the city and some of them are created by the effects of culture and some are universal. The process of urban experience occurs with movement and sensory communication system in city. Today, urban experience can be experienced in real and virtual places. Virtual urban spaces provide a suitable basis in order to work on experimental studies and the brain system. "Virtual reality is the technological promise of an alternative and ideal world" (Robins, 1996: 11). Çubukçu's used the experimental approaches of environmental psychology in her researches on virtual spaces and road navigation. According to Çubukçu; "wayfinding requires knowledge about one's current location, destination, and the spatial relation between them: spatial knowledge. Empirical studies can provide information that designers and planners can use to improve way finding" (Çubukçu, 2003: 1, 2).

Nowadays, the innovative evolution of aesthetic perception is the eye tracking measures for the image recognition. The eye tracking measure made by computer program and some of the examples for these measures are smooth-pursuit eye movements, saccades, papillary dilation, and fixations during scene and face perception. The experimental studies used in behavioural sciences and psychological studies (Karatekin, 2007: 283). Eye tracking studies also for landscape analyses and urban aesthetics (Parsons, et.al, 2002). In the studies of De Lucio, a model is developed by the combination of eye tracking and factor analyses and this allowed him to identify some characteristic patterns in natural landscape observation by different subjects. In the study the patterns of visual exploration of a colour landscape photograph are compared. From the findings of this experimental study: (1) A general scanning strategy with a systematic, even and thorough inspection of the scene as opposed to strategies which focus on particular areas. (2) An exploration pattern with a marked interest in different parts of the scene. (3) Interest in the central pans of the scene and areas with contrasting elements as opposed to a strategy considering the fringes of the scene. (De Lucio, et.al, 1996: 135). These kinds of studies give an opportunity to understand the unconscious aesthetic felling about urban images.

Artificial intelligence is holistic study about modelling decision-making system developed from analysing and modelling the structure of the brain. So this area is a locomotive part of neuroscience, but neurosicience has critical focus on human mental structure, spiritual, philosophical and social conditions of the cognitive decision making process, so these studies exhibit rather complex structure. A neural network models are the technical parts for creating the decision making operation of artificial intelligence. "A neural network model for visual

pattern recognition is a new approach for understanding visual model for experiencing urban areas. This is a hierarchical network consisting of many layers of cells, and has variable connections between the cells in adjoining layers. It can acquire the ability to recognize patterns by learning, and can be trained to recognize any set of patterns" (Fukushima, 1988: 119).

Today, social media applications with visualization features allow people to reveal their aesthetic pleasures of urban space without any direction of researchers. Thus, attractive visual features can be determined through the photographs that citizens and tourists take without any directive in cities they visit. These visual data also constitute a new field of research for experimental studies. And also these studies are increasing (McQuire, 2008 and Crandall, et.al, 2009).

CONCLUSION

In this study, thoughts on city and aesthetics have been tried to interpreted by literature research discussing the concept of neuroaesthetics as a part of neuroscience, which today enable to do exciting researches on various fields from economy to architecture and whose scientific background is difficult to conceptualize. In this very dynamic field whose literature is developing fast, a limited literature research of urban aesthetics on its cognitive journey has been done. Although it is limited, the research can be characterized as an exploratory study to develop a consecutive, consistent approach. While subjective and objective evaluation methods are being developed on urban aesthetics, the main goal is to design spaces where universal standards make the majority feel positive emotions in common, or to develop tools in order to detect and protect such spaces. Because aesthetics is a cognitive process, visual modelling studies related to brain functioning give different interpretations to this issue.

After reading in the field of neuroscience, it is seen that conscious and unconscious experiences give an important clue especially to be able understand and link the urban experience. Visual perception can be expressed as a process in which the shape and all relations previously acquired and stored in memory are compared with the images in the new encountered environment. As mentioned in the study, there is a mental fictional city model which, in addition to the consciousness that the mind can survive, forms itself in order to feel safe, to make sense to various emotions, to find directions. Being able to not feel out of things, to know what to do, to use a map to find places to eat, to visit and realizing all of these observing visual images and feeling pleasure at time same time for a person who is in a city for the first time is related to its mental elasticity. But the picture may not always be full of beauty as described in the tourist guides. People have the possibility of being faced with urban risks (e.g. natural disasters, robbery, movements, terrorism, etc.) at any moment while going through an urban experience.

In addition, there are risks of adverse urban contact based on the psychological and physiological structures of individuals. For example, when a wheelchair user encounters a pavement or an overpass that he cannot move, or a person who is accustomed to a residential area with a small population and has social phobia is exposed to an intense environmental stress in one of the very crowded metropolitan areas, urban experience can become complicated. While coding urban modelling area for these two individuals, negative urban interruption areas which are initially engraved in conscious and then in subconscious. These people become sceptical about negativities that they experienced before when travelling to a new city. An individual who does not have any problem moving with a wheelchair in several cities his/her visits begins to develop positive emotions that may motivate new urban experiences. Solutions of physiological problems in urban areas have more predictable characteristics. At the same time, the first condition for a city to be evaluated as high in life and visual quality is that the city has to be accessible to everyone. Besides, the urban aesthetic experience based on psychological problems of people which gets stronger with negative feelings often has unprecedented features for designers. For an individual who cannot overcome a phobia against crowded environments, the only focus will be not to hit other people while passing through the city's to be seen the most impressive historical structures. Thus the image of the city will form in his mind as a chaotic scene which is full of scary crowds. People who exhibit this type of structure are more likely to want to be in experimental or virtual spaces.

Considering the fact that the formation of human consciousness and the development of personality are shaped by the age of three, it can be accepted that the most basic urban space model for the individual is not conscious but developed in this period. People experience various feelings in urban outdoor areas. Thus, just as how a musical piece brings back a living memory, an associative urban space can make feel various emotions. This approach is partially contradictory to the urban value creation process, particularly by developing formal aesthetic assessment and universal design norms.

When someone travels to new cities, his/her cognitive perception capacity develops and the person feel himself renewed and be able to cope with problems more easily. Similarly, the city where someone lives has variety and innovation properties that enable to communicate in a correct way, it can provide aesthetic experience opportunities for refreshing minds. Urban art items, town festivals, city lightings at night and light shows can be given as examples for these kinds of livable cities.

Regarding urban transformation, with this approach, it can be thought as though a potential influence would brought innovation to the city, but this is a misconception. However, urban transformation has implications, especially in an area with certain living conditions, such as an interruption of visual experience in terms of neuroaesthetics, loss of a sense of genius loci and disintegration of the visual whole. Since urban transformation process changes the visual connection created with a city and the fitted imaginary codes, it has impacts which can break

the urban communication of citizens. At the same time, seeing the absence of spatial memories causes one's emotional frustration and weakens their sense of belonging. Taking these conditions into consideration, in the process of urban transformation, the ways of protecting integrally the most valuable urban images for memories should be sought by examining the effects of cognitive codes and neuroaesthetics.

Protection of urban composition with cognitive sense values may enable the future generations to create connections with city. The ones who have an opportunity to grow in such an urban space where they will see themselves as a part of it can feel good psychologically and physiologically, listening to past urban memories, creating their own memories and experiences.

REFERENCES

Arnheim, R. (1954). Art and Visual Perception: A Psychology Of The Creative Eye. University of California Press.

Aydınlı, S. (2014). Mimari Güncellemeler. Şengül Öymen Gür (Ed.), Mimari Güncellemeler içinde Farklı bir Bakışla Estetik, (p. 81-106). Ankara: Nobel Yayıncılık.

Bear, M. F., Connors, B. W. and Paradiso, M. A. (2007). Neuroscience (Vol. 2). Chapter 1: Neuroscience: Past, Present, and Future, Lippincott Williams & Wilkins.

Bower, J.M. (2013). 20 Years of Computational Neuroscience, Chapter 5: The Emergence of Community Modelsin Computational Neuroscience: The 40-Year History of the Cerebellar Purkinje Cells, New York, NY: Springer.

Bora, E. and Alper, Y. (2005). "Sanatsal Yaratıcılık ve Beyin", In Yeni Symposium, 43(1), 3-8

Capra, F. (1996). Yaşamın Örgüsü: Zihnin Ve Maddenin Yeni Bir Sentezi, (The Web of Life: A New Synthesis of Mind and Matter), Beno Kuryel (Çev.) İstanbul: Yapı Merkezi.

Choo, H., Nasar, J., Nikrahei, B. and Walther, D. B. (2016). Neural Codes Of Architectural Styles. bioRxiv.

Crandall, D. J., Backstrom, L., Huttenlocher, D., and Kleinberg, J. (2009, April). Mapping the world's photos. In Proceedings of the 18th international conference on World wide web (p. 761-770). ACM.

Darcan, T. (2014). An Intermodal Resonance Approach to Archıtectural Aesthetıcs (M.Sc. Thesis), Istanbul Technical University/Institude of Science, Istanbul.

De Lucio, J. V., Mohamadian, M., Ruiz, J. P., Banayas, J., & Bernaldez, F. G. (1996). Visual landscape exploration as revealed by eye movement tracking. *Landscape And Urban Planning*, 34(2), 135-142.

Downs, R. M. and Stea, D. (1973). Image and Environment: Cognitive Mapping and Spatial Behavior. Transaction Publishers.

Eagleman, D. (2016). Beyin: Senin Hikayen, çev. Z. A. Tozar, İstanbul: Domingo Bkz Yayıncılık.

Ernstson, H., van der Leeuw, S. E., Redman, C. L., Meffert, D. J., Davis, G., Alfsen, C. and Elmqvist, T. (2010). Urban transitions: on urban resilience and human-dominated ecosystems. *Ambio*, 39(8), 531-545.

Finger, M. and Portmann, E. (2016). What Are Cognitive Cities?. (In Towards Cognitive Cities) (pp. 1-11). Springer International Publishing.
Fukushima, K. (1988). Neocognitron: A hierarchical neural network capable of visual pattern recognition. *Neural networks*, 1(2), 119-130.

Gomez, J. (2010). A New Foundation for Representation in Cognitive and Brain Science: Category Theory and the Hippocampus. (Unpublished doctoral dissertation), Escuela Tecnica Superior de Ingenierus Industriales, Spain.

Jacobsen, T. (2010). Beauty and the brain: culture, history and individual differences in aesthetic appreciation. *Journal of Anatomy*, 216(2), 184-191.

Karatekin, C. (2007). Eye tracking studies of normative and atypical development. *Developmental Review*, 27(3), 283-348.

Kostelanetz, R. (1989). Esthetics Contemporary, New York: Prometheus Books.

Li, Z., Yan, H., Ai, T. and Chen, J. (2004). Automated building generalization based on urban morphology and Gestalt theory. *International Journal of Geographical Information Science*, 18(5), 513-534.

Neuro-Resilience, (2016). Grow Your Potential Date of access: 4.11. 2006, http://www.neuroresilience.net/

Norberg-Schulz, C. (1968). Intentions in Architecture. MIT Press.

McQuire, S. (2008). The Media City: Media, Architecture and Urban Space. Sage.

Madanipour, A. (1996). Design of Urban Space: An Inquiry into a Socio-Spatial Process. John Wiley & Son Ltd.

Massey, I. (2009). The Neural Imagination: Aesthetic and Neuroscientific Approaches to the Arts. University of Texas Press.

Moles, A. (2001). Belirsizin Bilimleri: İnsan Bilimleri İçin Yeni Bir Epistemoloji. çev., N. Bilgin, Yapı Kredi Yayınları.

Moyser, R. and Uffer, S. (2016) From Smart to Cognitive: A Roadmap for the Adoption of Technology in Cities, (pp. 13-35). Springer International Publishing.

Papale, P., Chiesi, L., Rampinini, A. C., Pietrini, P. and Ricciardi, E. (2016). When neuroscience 'touches' architecture: from hapticity to a supramodal functioning of the human brain. *Frontiers in Psychology*, 7(866), p: 1-8.

Parsons, M. J. (1987). How We Understand Art: A Cognitive Developmental Account of Aesthetic Experience. Cambridge University Press.

Parsons, R., & Daniel, T. C. (2002). Good looking: in defense of scenic landscape aesthetics. *Landscape and Urban Planning*, 60(1), 43-56.

Robins, K. (1996). İmaj, çev. Nurçay Türkoğlu, İstanbul: Ayrıntı Yayınları.

Sennet, R. (1999). Gözün Vicdanı. çev. S.Sertabiboğlu and C. Kurultay, İstanbul: Ayrıntı Yayınları.

Starr, G. G. (2013). Feeling Beauty: The Neuroscience of Aesthetic Experience. Mit Press.

Şentürer, A. (1995). "İnşaa-Edilmiş Çevre Kalitesinin Yükseltilmesinde Etik ve Estetik Açıdan Bakış", Mimari ve Kentsel Çevrede Kalite Arayışları Sempozyumunda sunulmuş tebliğ, İstanbul Teknik Üniversitesi, İ.T.Ü. Matbaası, 328-333.

Timuçin, A. (1998). Estetik. İstanbul: İnsancıl Yayınları.

Tunalı, İ. (2004). Estetik. Remzi Kitapevi.

Usal, A. and Kuşluvan, Z. (2006). Davranış Bilimleri: Sosyal Psikoloji. Fakülteler Kitabevi Barış Yayınları.

Ünlü, A. (1998). Çevresel Tasarımda İlk Kavramlar. İstanbul Teknik Üniversitesi Yayınları.

Zeki, S. (1999). Art and the brain. *Journal of Consciousness Studies*, 6 (6-7), 76-96.