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Neuroscience and the Impact of the Designed Space on the Health and Well-Being of Users

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Abstract

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People in economically developed societies spend approximately 90% of their time in the built environment. During the pandemic, this time has increased even further. The architecture and built environment can be designed in a way that not only does not harm the health of users but also optimizes their daily functioning. To operate in accordance with these principles, knowledge from the field of neuroarchitecture can be applied as a tool, utilizing neuroscience in the design process. It aims to design user-friendly buildings and spaces that provide optimal comfort conditions for people. It influences issues such as accessibility in healthcare facilities, the inclusiveness of public spaces, and the universal design philosophy. This topic aims to analyze the design tool of neuroarchitecture, which utilizes neuroscience in the design process to have a direct beneficial impact on the health and well-being of users.[6]

Keywords: Neuroscience; Brain; User; Architecture; Design.

1. Introduction

The ability to examine and analyze how the environment affects people's physical health, and well-being is an extremely valuable source of information for architects and spatial designers of all kinds.[3] Space is characterized by factors that influence the users within those spaces. According to data, people in economically developed societies spend approximately 90% of their time in the built environment. We've observed an increase in this time during the pandemic. This highlights the significant importance and direct impact of designed spaces on their users.[11]

It was important to ensure a high quality of life for people through city revitalization, improving spaces and buildings, and maintaining order and green spaces. While architectural aesthetics are an integral part of the city, this cannot come at the expense of providing services that meet the needs of users.[9]

2. Materials and Methods

The main goal is to understand neuroscience and its impact on the design process, examining the experiences and perceptions of users in the designed space. Emerging elements must be analyzed; relationships and their cause-and-effect contexts must be examined, and conclusions drawn. All this is based on classical methodology, including observational and comparative methods, as well as the use of intuitive methods. It is crucial to examine the designed space and identify the causes that lead to imperfect spaces in terms of user health and well-being.

2.1 Neuroscience in architectural and urban design

Elements such as poverty, air pollution, and the impact of building design and surroundings largely reflect the standards of the built environment. These elements are crucial when considering their impact on human health.[1] Both physical illnesses and mental disorders can be caused or exacerbated by direct and indirect influences from the built environment.[12]

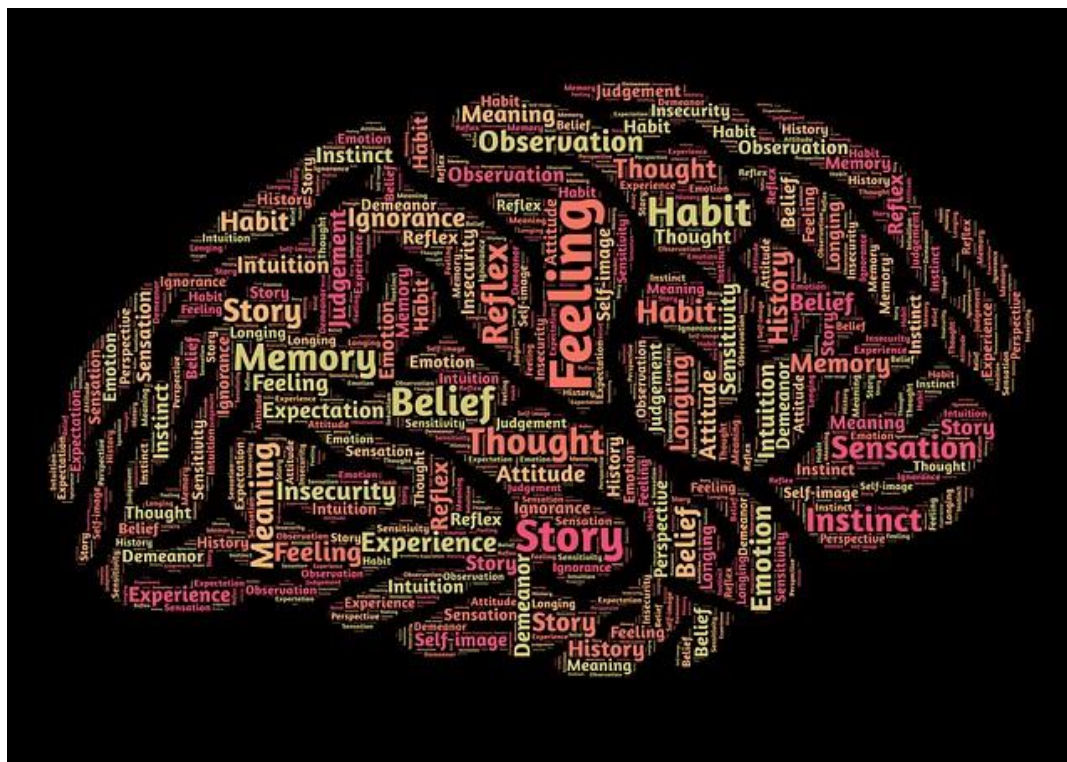


Figure 1. Mapping brain knowledge, source: <https://www.mp.pl/pacjent/neurologia/aktualnosci/192765,mapa-mozgu-pomaga-zrozumiec-jak-myslimy-i-zapamietujemy> [13.05.2026].

Human behavior enables adaptation to the surrounding environment through specific actions. Cognitive processes are the resource that allows for interpretation and appropriate response to various factors and signals from the environment, as well as appropriately changing human attitudes. Cognitive processes have a direct impact on human behavior.[8]

2.2. Environmental stress

Environmental stress, known as stressors, refers to various factors in the environment that burden the body and trigger physiological responses that lead to specific behaviors.[7] Each type of stress has its own psychological and behavioral effects and consequences. The intensity of behavioral responses depends on the strength of the stressors and the duration of their exposure. A severe stressor can be permanently remembered and act as a chronic stimulus. Psychological stress is also a significant stressor that affects health. Analysis of stressors is used in architectural research.[12]

2.3. Neuroarchitecture

Neuroarchitecture is a field that has become widespread in the world of science and architecture recently. However, interest in it has been evident for quite some time. Neuroarchitecture combines neuroscience and architectural psychology.[4] Its role is to design spaces to minimize the influx of harmful stimuli and reduce the associated stress and anxiety. The design of space is important from a psychological perspective. Its goals include designing spaces to promote feelings of happiness, satisfaction, and, in addition to well-being and productivity.

Chronic stress harms health, leading to heart disease, diabetes, and mental health problems. Designed spaces should address the health needs of their users. Neuroarchitecture identifies factors that influence health and addresses conventions that negatively impact well-being. Good design techniques can improve mental health and brain function.[10]

3. Results

The study involved integrating interdisciplinary approaches and disciplines into a broad perspective on space, including neuroarchitecture, health architecture, environmental psychology, and sociology. Harnessing the synergies between these scientific disciplines allows for health-promoting activities and urban transformation. This represents a shift toward an advanced ecosystem focused on values such as regeneration, health, and well-being. In this context, positive feedback is most tangible and noticeable. Designed spaces are no longer solely tailored to the city's economic and transportation needs. Essential design elements that are crucial when designing and transforming spaces include:

- Functional layout and ergonomics;
- Aesthetics and design of the built environment;
- Lighting, solar and visual exposure;
- Acoustic properties and noise reduction in the space;
- Greenery;
- Air quality;
- Ecological solutions.

The way solutions are implemented in the designed space determines their impact on the health and well-being of users.

4. Discussion

Designing buildings and their surroundings appropriately is crucial, as space should foster a harmonious, pleasant environment that supports the health and well-being of its occupants.[2] If architecture evokes positive feelings and impressions, it creates a pleasant and comfortable atmosphere. This makes people want to return to that place. Neuroscience should consider this to meet the needs of diverse users. The designed space should evoke positive emotions and mitigate negative stimuli from the environment.[5]

5. Conclusions

No doubt designed architecture—that is, buildings and the surrounding space—has a profound impact on people's lives and health. Poorly designed spaces can negatively impact health and well-being, resulting in difficulties and delays in the effective treatment of illnesses and the overall recovery process. Poorly designed architecture, which introduces additional, unfavorable stimuli, negatively impacts the well-being of its users. The way space is designed is crucial to human health and well-being.

Environmental psychology, neuroarchitecture, and salutogenic architecture are modern and effective approaches to designing spaces that promote the health and well-being of their users. Rebuilding social connections should take into account diverse types of communities and activities. Buildings, as places of residence, should support health and pose no risk to people.

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