
ROLE OF ARCHITECTURE ON THE PSYCHE OF USERS

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ABSTRACT

The relationship between architecture and psychology goes hand in hand. This research aims to understand the role of architecture on the psychology of a user and how design factors evoke the senses of the mind. The study methods involve literature reviews of theories & studies and case studies of architectural works. It analyses various design principles and factors that can affect and provoke mental stimuli in the users.

Keywords: Architectural Psychology, Cognitive Stimulus, Architecture, Behavioral Stimulus, Built Environment And Psychology, User Behavior.

I. INTRODUCTION

The relationship between psychology and architecture is as old as mankind itself. Architecture at its core is for & about people, and their codependence plays a crucial role. Though it began as a means of shelter and protection the built form has evolved to be the place where humans spend the vast majority of their time. It is only natural that the characteristics of these spaces are a factor in mental well-being. Looking into this age-old relationship will help in better articulating the human cognitive responses towards the architectural form which will in turn aid architects in designing superior and suitable spaces of living. This paper analyses this interrelationship to understand not only the level of impact, but also the factors that influence the human psyche. It poses the question of how the character of spaces affect human behavior & cognitive response.

II. BACKGROUND

Perceptions are not universally the same, just as all experiences are also not universal. Yet the human mind stimulates predictably. Human behavior has defined architecture since the beginning. It will continue to do so even when trends and movements in design come and go, as the skeleton is not bound to change. As technology develops and the field moves toward leaning on artificial intelligence, it is now more important to understand the role of built form on the psychology of its users and to intricately understand the role its factors play on cognition. The human mind is programmed in a way to look for significance and interpret patterns in all sensory information it receives (Popow, 2000). This particular research looks at how parameters such as light, open & closed spaces, spatial and scale & proportions have an impact on mental stimulus. It then compares their presence and application through different case studies.

III. LITERATURE REVIEW

The influence of the built form on a user can be either positive or negative. The understanding of this role begins with recognizing what causes favorable impacts and how to reduce or eliminate the unfavorable factors. The psychiatrist Osmond, in 1957, characterized two general qualities in a building as sociofugal and sociopetal. 'Sociofugality' refers to a design that discourages or prevents the formation of human relationships, while 'sociopetality', refers to a design that encourages and fosters stable personal relationships (H. Osmond, 1957).

As Lipman mentioned, to believe that architecture and the built environment are factors that solely influence and around which the human behavior revolves is a fallacy (A. Lipman, 1969). Human behavior cannot be influenced by the physical environment as people have will and choice and this will result in a behavior of choice which might vary on the basis of an individual to behavior in social groups (Philip. D, 1996). It is crucial to neglect the assumption that all physical environments will remain unchanged as people tend to interfere in their modification over time, keeping in mind that architecture should not aim at manipulating, but instead should be manipulated in a suitable way to provide flexibility to the individual and as well as the social group. The paper states that it is a downfall on the part of psychologists as they fail to provide useful and practical tools for architects to implement. Empathy and sympathy for the user-clients are important, but they play no practical role. This leads to state that it is critical to study practical factors that aid architects and engineers as well as having empathy and sympathy for understanding the user-clients of the space.

The architectural components modified to suit the user are re-shaped by human behavior through time and use. It is hence understood that it is not the influence of one over the other but a loop of inter-influence. There is an apparent gap between comprehending the influence of contributing factors of design and their practical implementation. Through a review of the literature and applied studies through case studies, this paper will carry out a further study to identify the ways in which this gap can be minimized.

3.1 Parameters of Study

3.1.1 Impact of Parameters and Behavioral Stimulus

To further understand the impact of the built environment on its users, it would be vital that it is perceived as a sum of its parts rather than as a singular whole. By deconstructing, the factors in design can be viewed as parts and individually understood. Though as professionals in the field of architecture basic understanding of the role and importance of factors like lighting, ventilation, noise control, materials and furniture are present, the built form's role is beyond these. By dismantling an architectural form into its foundational factors and characteristics, the parameters of the study were determined. These were then studied towards better comprehending how they influence a design and in turn, its users.

Natural lighting

The light absorbed by the human eye directly affects the circadian rhythm. Due to this, light therapy is a common method used to adjust sleep patterns. Exposure to daylight or intensities similar to daylight during waking hours is crucial for maintaining a healthy circadian system (G. Steffy, 2023). A study conducted on daylit schools (Nicklas, M. H., & Bailey, G. B., 1996) shows that lighting plays an efficient role in reducing depression and improving mood. Research also revealed that students in full spectrum light were noted to have 9 percent fewer dental decays in comparison due to the absorption of vitamin D. An alternative study conducted on adolescents showed that dynamic and diffused lighting cause a reduction in stress levels and have a healthy impact on the circadian system (Figueiro et al, 2011).

According to literature review (Ramadan, A., & Kamel Ahmed, E., 2019) lighting is the second most effective sensorial stimulus after nature. Designs that welcome natural light have an influence on improving the quality of work while encouraging a healthier circadian rhythm (Alharbi, S., & Basaad, H., 2022). It should also be acknowledged that the interpreter's previous experiences, culture, and mood all play a role in how they perceive the psychology of lighting. Although not all people have similar experiences, lighting affects perceptions in a significant and somewhat predictable way. Numerous people can relate to feelings of comfort, intimacy, trepidation, and clarity, among other significant influencing factors such as brightness, location, distribution, and intensities of luminance (G. Steffy, 2023).

Scale and proportion of space

While scale is the comparison of the size of something to another or with reference to a standard, proportion corresponds to the relationship of a part and its whole. Scale is the perception of one in relation to another and deals with magnitude & size. In regards to this case, scale could be the comparison of one space with another or the comparison of the user with the spaces. Proportions are not only that of size and dimensions but also of rhythm and harmony. When a form is built on the multitudes of its part, even if not noticed at first, the user is bound to sense it or recognize it through experience. Their repeated application can result in harmonious relationships between spaces while also binding them visually, thus establishing order. A proportioning system is an equality of ratios, and thus it is a permanent quality and not bound to change. This sets a consistent visual relationship between the parts and its whole. Although there have been multiple proportioning systems, their value and principles always remain the same (Ching, F. DK, 2007).

This mathematical relationship among dimensions is seen in nature and human beings have not only observed it but also derived from it continuously. Replicating the learnings has led to adding aesthetic value to the design of the built form (Gangwar, G., 2017). Gangwar articulates that the systems of proportions also have key principles that were as follows:

- a) Repetition of a key ratio throughout the design
- b) Additive properties so that the whole can later be divided into different parts easily
- c) Be adaptable to the architect's technical means

Open and closed space associations

Visual associations with nature have been shown to lower blood pressure and pulse rate (Brown, D. K et al, 2013), while also improving mental focus and attentiveness (Ryan, C. O. et al, 2014). Exposure to nature through views or direct incorporation of nature, landscape design, or indoor plants in the design were noted to be stimuli (Ramadan, A., & Kamel Ahmed, E., 2019). The review also noted through a survey of more than 4000 members of the American horticultural society that peace and calm were the most important feelings for more than 80% of them while interacting with nature. A larger portion of the visual cortex is stimulated through a nature sight when compared to one that is non-natural. This in turn results in prolonged interest and a faster recovery process as the brain's pleasure receptors are activated (Brown, D. K et al, 2013).

An indoor space with ample room and full wall windows that gives opportunity to communicate with the outdoors would set off positive psychological and physiological effects as opposed to a space with little to no openings to communicate with the outside which may result in negative feelings and elevated stress (Ergan, S., et al, 2019). It can be understood that exposure to the outdoors should play a non-negotiable role in the psychology of users in the built environment. The inclusion of open spaces especially those which include nature or natural aspects can trigger positive reactions in user behavior.

Spatial relationships

The main psychological factor affecting the user's psyche in public buildings is "spatial arrangement." The key characteristics of this stimulus are believed to be its effective distribution and connections between the various building zones (Ramadan, A., & Kamel Ahmed, E., 2019).

Circulation spaces are an integral part of any design and consume a notable portion of a building. The architect can choose to implement it as a mere link between spaces or treat it as accommodating towards its users. This can be providing space for pause, rest and taking in views, if necessary, while also being a space utilized for connectivity & movement (Ching, F. DK, 2007). If spaces are created in a way that obstructs the patterns of the users, it might hinder movement and actions. This might directly result in anger and frustration (Margarete, 2018). The consequences of a deficient space might lead to dysfunctional and destructive patterns of behavior, passive-aggressive denial, or distorted self-perception. Hence, it is important that a project should be repeatedly optimized during its planning stage in order to prevent shortcomings.

Double-height rooms, semi-outdoor walks, or external reference areas can be used as techniques to delineate the borders between various spaces and to make navigation easier [8] (Ramadan, A., & Kamel Ahmed, E., 2019). According to literature review (Ching, F. DK, 2007) a space may vary according to:

- Its boundaries,
- The entrances that open into it,
- Qualities of scale, proportion, light and view,
- Its form relates to the form of the spaces it links,
- It handles changes in level with stairs and ramps.

3.2 Case Study Analysis

After the scrutiny of these parameters individually, the analysis of their application has been done through case studies in different typologies and scenarios. The case studies were chosen on the basis of them containing the above-studied parameters and also their relevance. An additional factor that influenced the selection is that all projects selected had direct or visual access to nature/open space.

The goal of this analysis is not to declare or rank the psychological effects of these projects but to understand the role the above-mentioned parameters play and the method of application, therefore impacting the quality for user behavior.

3.2.1 The memorial to the murdered Jews of Europe by Peter Eisenman

For the purpose of this paper, the analysis of the case study focuses only on the ground level design and disregards the underground museum.

- Lighting – the premises of the project is set over-ground where the spaces require no other lighting than natural. The landscape of 2711 concrete pillars and the spaces they create between are open-air alleys where lighting is not controlled but instead the numerous pillars play a role in light & shadow on the pathways.
- Scale and proportion - The project seems to follow a rational grid at first sight. However, it has the potential for dissolution over time. Although all the pillars are of the same proportion and dimensions (95cm x 2.375m) in plan, their heights vary from zero to four meters. Even though the placement of these concrete block-like pillars creates a seemingly rational and ordered grid, as the repetition grows too large and out of size from its intention, it loses its touch with human reasoning. This is how the project reveals the inherent disturbance and the plausibility of chaos that can be present in order (Berlin Memorial to the Murdered Jews of Europe 2005 - EISENMAN ARCHITECTS, 2005).
- Open and closed spaces – the memorial is an open space itself. It creates views through the grid lines that seem to be the pathways formed between the pillars. The views are mostly unobstructed views of the sky or of trees present at the boundaries of the premises.
- Spatial relationship – these relationships are between the sea of pillars as it is a place that is accessible by the surrounding community and is free to interpret. The paths turn narrow as they deepen creating a multifaceted experience at every point (Berlin Memorial to the Murdered Jews of Europe 2005 - EISENMAN ARCHITECTS, 2005).
- . In an interview (Peter Eisenman: Field of Otherness, 2020) Peter Eisenman states that the space might be interpreted differently from its original purpose, for instance, children might run around and it might be their playground, even if temporarily, though the space was not planned for it.

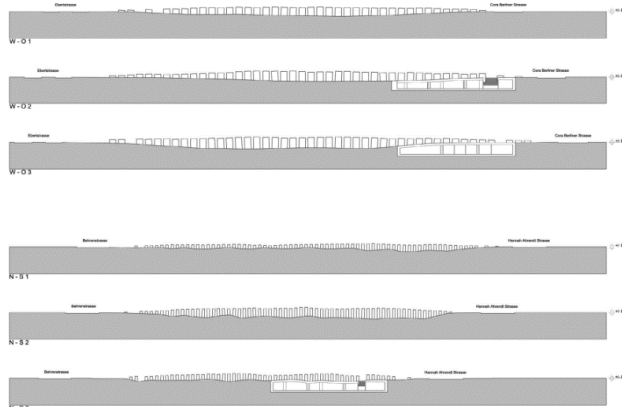
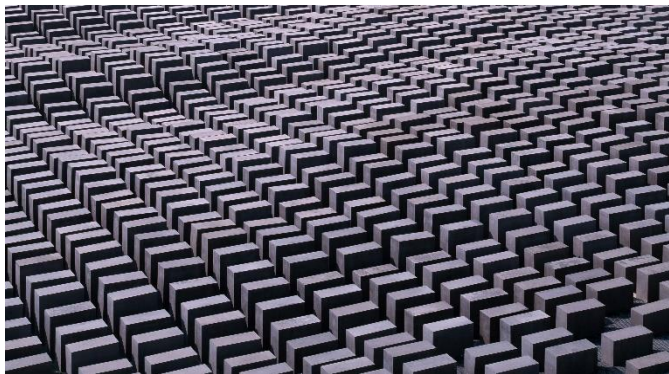


Figure 1: (i) top left: the view of the pillars from top (ii) bottom left: section drawings of the memorial (iii)right: passageways between the height varying concrete cuboids. (Source: <https://eisenmanarchitects.com/Berlin-Memorial-to-the-Murdered-Jews-of-Europe-2005>).

3.2.2 Carlos Ramos Pavilion by Alvaro Siza

The Pavilion is an architectural school building restored by Alvaro Siza. The pavilion is a part of the series of structures at the Porto School of Architecture, Portugal. This particular building is located on the edge of the estate and is u-shaped in plan.

- **Lighting** – By creating pure transparency in the inner facades, Siza has allowed for the interior spaces to be well-lit studios for students to work. Apart from the transparent walls, skylights were later added into the structure to draw natural light into the main spaces (1995 Faculty of Architecture, 2011).
- **Scale & Proportion** - The modest two-storey classroom building is an abstracted U-shape in plan with its two arms at a sharp angle that encloses a concise representation of the courtyard. The 3 arms of the building are similarly proportioned. Studio spaces are of human scale, and only the staircase is double height. This makes the common space more open and the workspace more personal.
- **Open & closed spaces** - The windows that face the courtyard provide transparency between the inside and the outside that not only encourages the user to have a connection with the outdoors but also with the natural views beyond - the garden and river (1995 Faculty of Architecture, 2011).
- **Spatial relationships** -. Through the transparent inner facades, the studios are visually linked. This allows the users to have a sense of community which might act as a motivational aspect in a place of study such as this one. The arms of the building close in towards the courtyard thus making the three inner faces of the building face each other.

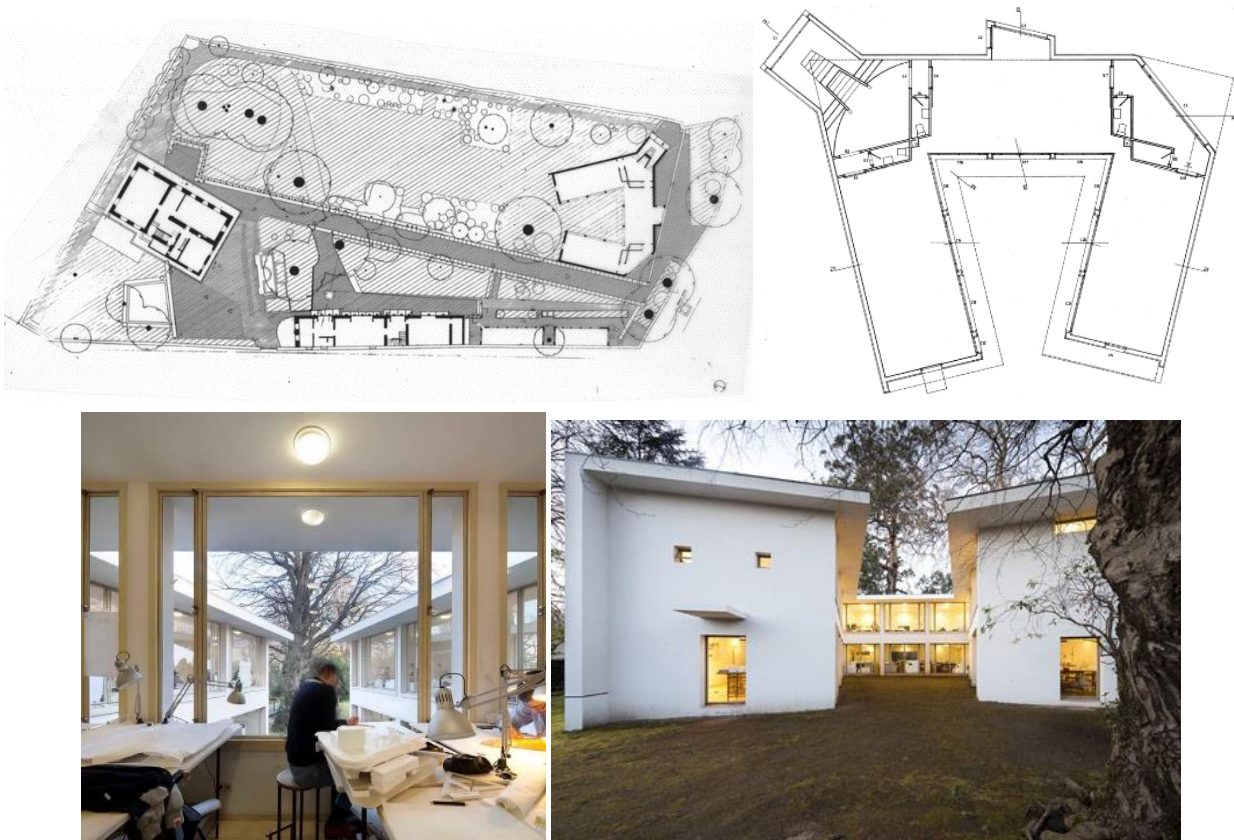


Figure 2: (i) top left: site plan and location of the pavilion (ii) top right: Plan and shape of the Carlos Ramos Pavilion (iii) bottom left: image showing the view from inside the studio (iv) bottom right: view of the pavilion building towards the courtyard. (Source: <https://www.alvarosizavieira.com/1995-faculty-of-architecture/>).

3.2.3 A Traditional Japanese House

Figure 3 shows a sample plan of a traditional Japanese house including the house plan and its surrounding spaces.

- **Lighting** – Figure 4 illustrates an image of a typical Japanese house’s interior space opening onto the outside through sliding doors. It exposes the user to views of nature while allowing for natural light to flood the space.

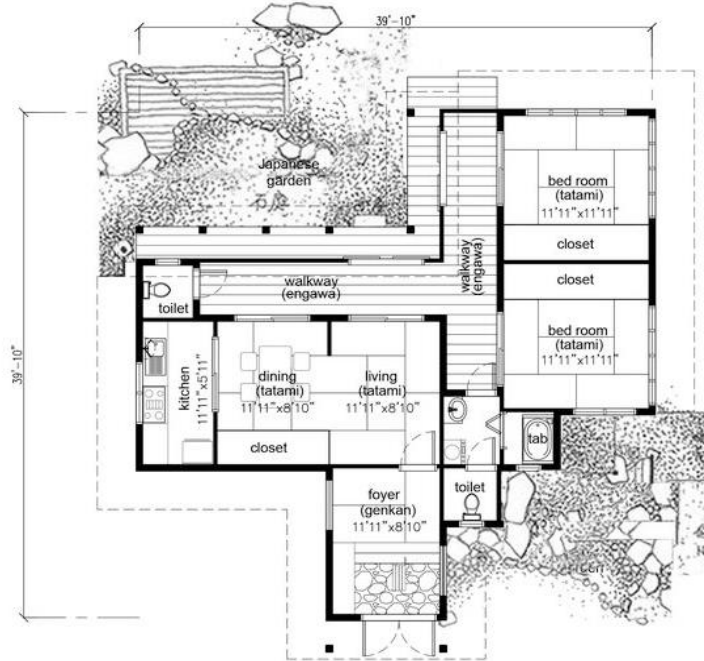


Figure 3: Plan of a traditional Japanese house using the kyo-ma method



Figure 4: interiors and views from a traditional Japanese house.

(Source: <https://www.worldhistory.org/article/1426/a-traditional-japanese-house/>)

- Scale & proportion - In medieval Japan a unit of measure called ken was developed and the design of all traditional Japanese houses were based on this unit (fig 5). It later evolved to also be an aesthetic module that defined not only the space but also structure and also the materials of Japanese architecture (Ching, F. DK, 2007). The size of a room is usually determined by the kyo-ma method where the traditional floor mat (90x180cm) is of a 1:2 proportion and was designed for two people to sit or one person to sleep on (fig 6). This module allows for the room to be flexibly arranged in any space.

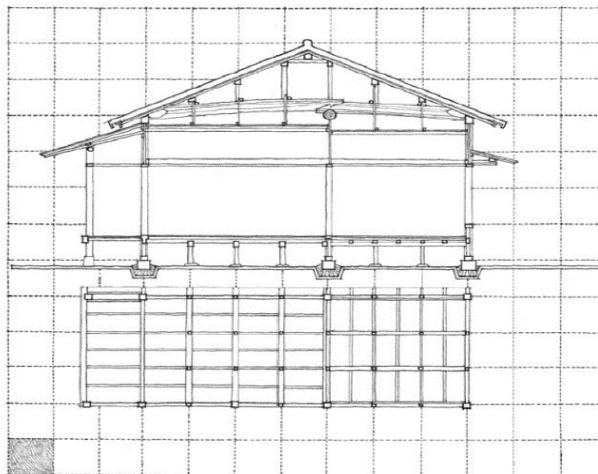


Figure 5: Design of a traditional Japanese house with ken method (Source: Ching, F. DK, 2007)

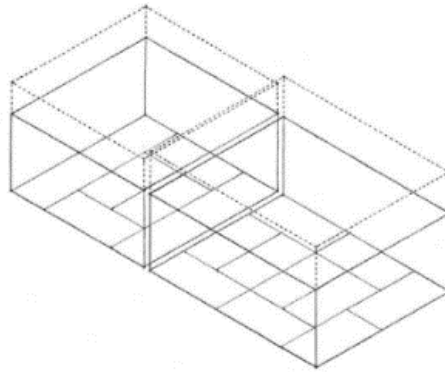


Figure 6: Proportion of a room with the kyo-ma method (Source: Ching, F. DK, 2007)

- Open & closed spaces - It can be seen from the plan that the dining, living and bedroom spaces open onto a semi-closed passageway. This is directly associated with the back garden. The house also has a garden space near the entrance.
- Spatial relationships - The walkways not only act as a circulation space but also keeps the user in constant connection with the outdoors. In this case the garden space being the implemented nature also provides for a calming environment. The semi open walkways allow for it to be used as a space of rest and pause instead of as a mere link between places.

IV. INFERENCE

Though the parameters studied make critical impacts on design and the user behavior each, their impact can be more positively reinforced when implemented in association with the others. For instance, the transparent walls in the Carlos Ramos pavilion allowed for natural lighting to light up the workspaces. But by exposing this part to the courtyard, it created a connection to the outdoors and the nature beyond it, hence developing an environment that is more pleasant than just being a well-lit space. This was taken up a notch as the arms of the u-shape face inwards as the transparency allows for a sense of connectivity among the users of the spaces. The lighting, the relationship with open spaces, and the spatial inter-relationships all play a collective role hence reflecting stronger on the user than if the space was only just well-lit.

It is also possible that even though order and aesthetics can be established through the use of a proportioning system in design, the repetition of the same might cause monotony when overused. When designing to create a space built of a proportion, the designer should keep in mind not to lose the space itself to the proportion. The Japanese ken system is a great example of this where the spaces are modeled on the kyo-ma method but their purpose is not lost while implementing the proportioning system.

Exposure to outdoor spaces or fabricating a visual connection to open spaces from indoors not only eliminates negative psychological feelings but also sets off positive reactions. It is seen to be even more beneficial when these spaces involve nature or natural aspects like gardens or courtyards. This can also be used along with natural lighting by involving large openings in the spaces hence interacting with the outside while also providing lighting and views. A naturally lit workspace, like the studios of the Carlos Ramos pavilion, makes up a space of comfort and improves the quality of work.

Spatial layouts and their relationships have a better impact when they are designed with flexibility in their purpose rather than a rigid space. Allowing for a space to be more than its function creates for interesting interpretations by the users. The passageways in the Holocaust memorial might not be designed with the thought that children might play hide and seek among the pillars someday but it makes for an interesting interpretation by the user groups and allows for all groups of people to enjoy the space even when they do not fully understand its purpose and depth. Similarly, the semi-open walkways in the traditional Japanese house could be seen as more than for just circulation and be used as a place of rest or relaxation by the users as it faces out onto a Japanese garden with views of nature.

Table 1 tabulates the inferences and concise comparison of the case studies in accordance to the parameters.

Table 1. inferences from case studies

Parameters	Case Studies		
	Memorial of the murdered jews	Carlos Ramos Pavilion	Traditional Japanese house
Lighting	lit by daylight, concrete pillars cause play in light and shadow	studio spaces are well-lit by natural light through large wall openings	sliding doors that open to allow natural air and light
Proportion & Scale	repetition of proportion crosses from rational order to reveal the possibility of chaos in order	human scale indoor spaces for comfort and relatability. 3 arms of the u-shape are proportionate to each other	uses ken system and the kyo-ma method in designing and planning. Creates comfort in use & visual aesthetics.
Open & Closed Spaces	the over ground memorial is completely open to air and the views are of sky or distant nature	transparent facades connect user with courtyard & nature beyond	circulation paths links with the outdoors such that rooms open out to visuals of nature/ garden
Spatial Relationships	the grid of pathways allows for flexible & unplanned interpretation of use. e.g.: as spaces of play for children	visual connect between studios fosters community and a motivated environment	all spaces are linked to the outside physically & visually. circulation paths can be used as relaxation spaces than just as linking spaces

V. CONCLUSION

To conclude, the study of this paper set out to trace the impacts of architecture on the psychological well-being of its users. Through scrutiny of the parameters both individually and also in co-relation to the others through case studies, it was noted that though their implementation impacts the user groups positively they are also practically applicable. An architect’s goal when designing any space is to make sure the space is efficient to use by the user, be it one person or groups of users. It then becomes apparent that during the design process understanding the needs of the user for that space is the most important. It is equally crucial to keep in mind the impacts the space and its characteristics might in turn have on its user. It should be noted that though these parameters are aids in designing towards the user’s well-being, they are not solely responsible for it.

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