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The Effect of Architectural Forms on Aesthetic Response : *Study Case*

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ABSTRACT

This research seeks to identify building exterior characteristics that are best liked, most pleasing, rated beautiful and exciting by architects. A methodology based on mixed research methods was developed. The study sought architect's preferences for twelve different public buildings. Analysis of 68 responses to the survey questionnaire identified several building's exteriors characteristics that were consistently most preferred aesthetically. Four formal attributes. Complexity, Order, Ambiguity, and Potency, each of which was measured by three variables, and one variable added to the ambiguity, so a total of 13 formal (cognitive / perceptual) variables were included in the study. The effects of these attributes on affective responses, i.e., Arousal and Evaluation, each of which was measured by three variables, were examined. The analysis of the scatter chart identifies the level of association between two dependent variables, aesthetic response and formal features. A medium to a strong relationship has been recognized between aesthetic response with moderate complexity and moderate to high levels of order and organization also with near high levels of novelty and mystery. Though, a weak correlation between the remaining of the dependent variables indicates a thin relationship. The higher the level of ambiguity in the exterior, the more excited the receiver. The higher the classification of mystery and novelty, the higher the degrees of excitement by the respondent. There is also a strong correlation between higher levels of polysemy and ratings of arousal, exciting and stimulation. The aesthetic evaluation (beauty) of the building depends and is influenced mainly by the preference of pleasure and admiration, and these three variables are affected by other variables such as ambiguity, complexity, and order. The aesthetic response is a complex process where each variable is affected by another variable, which ultimately leads to a comprehensive aesthetic evaluation.

1. INTRODUCTION

Beauty has been the ideal of aesthetics, just as good has always been the ideal of ethics and reality, the ideal of rationality. Beauty is difficult to describe since the definition of beauty seems to have evolved significantly over the years. The esthetic appeal of a building is an important concern in architecture and a subjective trait. However, several buildings around the world are appreciated, others are criticized. There are possibilities that some constructed form features exist, which attract the mass of constructions.

difference between what is the idea of beauty now and what is still thought to as beautiful across the ages is actually what shows the factors effecting aesthetic judgement. to evaluate the aesthetic appeal of certain selected public buildings (traditional archeological sites), to measure how those values and the desired functionality of the building are met. The collected data through the experiment indicates that some certain designed formalities are favored by the population and that the esthetic appeal of buildings and their ideological context have a clear positive connection.

There were commonly believed to be "receipts" of beauty and much of the architecture had followed the recipes. It was based on Renaissance and Corbusier ideals, beginning with Vitruvius and the old orders.

What strikes us is that this recipe does not make the building especially beautiful, despite the instinctual belief. That's why we call the Parthenon, the Alhambra Palace, and the Falling Water House beautiful, even though their recipes vary completely. It is also a reality that cultures around the world create certain standards of beauty and attempt often moral, sometimes even science, to explain them, but it is the diversity of cultures that lead us to believe that there is no single (or easy) response to the issue of what beauty should be or that we should try to think as inevitable. The research field is limited in investigating the process of aesthetic response towards architectural forms of exteriors of selective public buildings in KRG region.

This study will explore architect’s perceptions and preferences of public architecture. This research asks the following questions:

How does architectural form effect the aesthetic impressions of built form? What are the form attributes that stimulate perceivers and effect aesthetic response? What are the main factors that affect the aesthetic assessment of architectural form and experience?

2. COGNITION PROCESS

The method of perceiving the world is called perception and it is the most important element in the understanding of cognition method. People perceive and assess environments by means of senses, and all of the data is generated by environmental perception. "Perception" is a method of understanding something in Oxford English Dictionary [1]. Perception is the mechanism by which we organize and perceive stimulus patterns in the world," according to Atkinson, "The way the world looks (sounds, feelings, tastes and smells too) is perception." [2].

Zigler believes that the perception of sensory information is often seen as a creative and positive mechanism leading to concrete meaning [3]. Perception can also define how the sensory input is perceived, interpreted and structured to understand the physical environment [4]. The sensory mechanism consists of nervous system impulses that shift from physical stimuli to the sensory organs. The interpretation of these signals is not the passive transmission, but it forms knowledge, focus, learning and memory.

2.1. Perception of the Built-Environment

We experience the world through the five principal senses of our body, which contribute to the cognition through the transfer of perceived information to the brain. As far as perceptions of the built-up environment are concerned, Rapoport claimed that "The elements need to be interpreted before they can be organized into schemas and evaluated [5]. Thus, awareness is the key mechanism for the relation between people and climate. The designer can understand

how important details are perceived and will encode the world for other types of comportment through an overview of perception processes in the built environment.
thought that "the visual sensory experience can only be obtained by the act of perception." [5]. Thus, the significance of perception in the philosophy of urban design could be understood. The definition of "experience" proposed by Tuan is very similar in this regard. In the experience of Tuan, the feeling, perception and conception of space produces a person who refers to the cycle of awareness by humanity [6].
The physical world has a value for observers for Rapoport and influences the human understanding of the quality of life. The first thing that people obtain, collect and control environmental information, and then eventually analyze the collected data according to your preferences. There are three main phases in Rapoport's environmental perception process: a. Perception, b. Cognition, and c.) Assessment [7]. However, the impact on the arrangement of observable components is taken into account in the context of perception, desires or cultural differences. Architectural form is seen as an important part of the cycle of cognition in this study (figure 1).

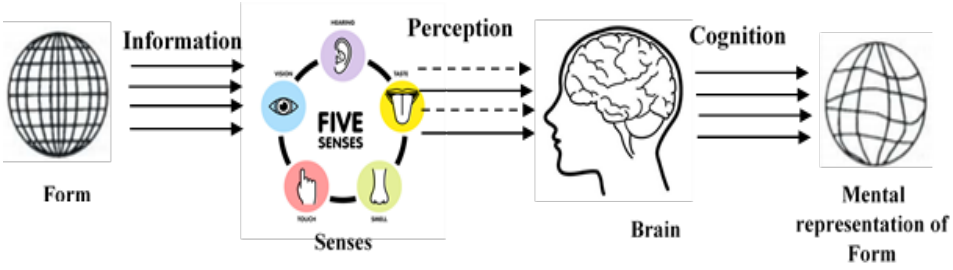


Figure 1: process of perception - cognition of a built form. (golledge & stimsom 1996)

2.2 Cognition, Schemata, and Culture:
The perception and memory of the events of the people is influenced by their assumptions generated by a variety of experiments. The most widely used framework for the hierarchical organization of information is the schema. Therefore, a "schema" is a standardized concept cluster; it typically consists of abstract information and can represent events, sequences of events, precepts, circumstances, relationships and even artifacts.
Jencks believes that the way people perceive the world depends on their definitions (schemas) [8]. Such schemes do not base themselves on intrinsic knowledge but are the product of a step by step method of information gathering, experience gaining and cultural symbols. Perception is described in the schemes. People are not passive receivers of external stimuli, they interpret things according to former perceptions that have mostly been established over time, but the initial need to understand them first, before a person gets interested in the environment created.
The key tool for everyone is schematic environmental knowledge. Schematic knowledge itself is a product of long-term experimental inter-relationships between the individual and the environment and includes information on perceptions, beliefs, norms, etc. Eysenck suggested that schemes as inherent mechanisms for organizing our understanding of the world should be considered a reference to Kant's philosophy [9].
Rapoport claims that: If something has to be transmitted and learnt in human terms it should have cognitive and schematic basis [7]. There is ample evidence that culture is the primary tool for human schemes. That is why in a cultural context the entire behavioral structure consisting of hundreds of thousands of specifics is transferred from one generation to the next explains the fairly smooth existence of acts and reactions within a group of people who belong to the same community.
Likewise, the external environments are "culturized" in different ways already, as they include and manifest cultural verbal and nonverbal symbols. As children learn, through words and symbols they begin to understand and identify their own world. Children inevitably deal with

an environment that is culturally influenced: thus, their conceptual constructs, i.e., schemes, are highly influenced by local culture and its atmosphere as children grow.

2.3. Perception of the Architectural Aesthetics:

Scruton cites in his book "... to describe architectural experience is related to the description of the basic processes of perception. Beyond the possibility that an architectural experience does not occur in the first place without perception, there is a compelling claim" He also believed that the peculiarity of architecture stems from the enjoyment of it rather than from the practice of perception [10]. The conception of his object (function and form) however regulates architectural aesthetics and pleasure.

Architecture is not just a mass of objects or building blocks, but a mix of different items-shapes, colors, texture, materials, technology, details-all of them organized as spaces, volumes and masses with symbols, meanings and functions [10].

As seen in figure 2, deconstructivism believed that a character's belief became predetermined by using their thoughts, understanding, and cultural historical past. The contemporary or orthodox view, taken by way of philosophers and psychologists inside the beyond many years, is that belief and language are not the same thing, and notion or conceptualization does now not occur immediately. Rather, humans first perceive, then we suppose, and thirdly we conceptualize or express thoughts. The distinction between these strategies of perceiving area is essential. The architectural postmodernists used symbolism to give which means to their architectural standards [11].

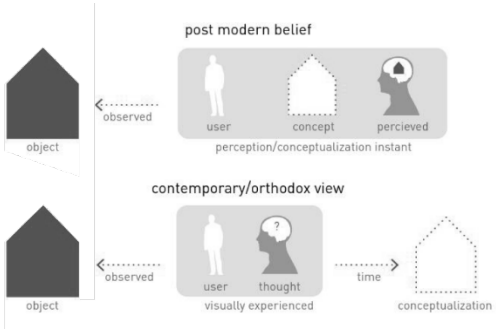


Figure 2: postmodern and constructivism belief of architectural perception. (according to woods, 2015)

2.4. People and Built Environment

According to Parsons and Shils, people attitudinally concentrate their views on objects in three fundamentally different ways (including built forms) [12]. At the cognitive stage, people are separated in the interpretation and definition of objects and in functional relationships. At the cathetic stage, people spontaneously respond to objects with their excitement, enjoyment, and meaning.

At the evaluative level, people set down criteria to ascribe their own behaviors to the objects. For example, a building should offer esthetic enjoyment even though it is dangerous to live in a perceiver. The catechistic mode of attitude affects those who perceive such a building intuitively. [13] [12]. Therefore, all environments are evaluated. The positive or negative reactions to building forms are subject to various beliefs and attitudes of people. For example, many observers who can discover their affordable will have a particular building or atmosphere, what they look for depends on their motives and feelings [14].

2.5. A Theory of Communication Act in Attitude Formation

It is difficult to have relations without contact [15]. An individual with certain attitudes towards a specific building, for example, must communicate them to demonstrate them. According to Newcomb, contact is the required condition for an individual because behaviors

do not take place in a social vacuum. The theory of Newcomb primarily derives from Heider's theory of balance's earlier cognitive suitability, which implies there is a central human propensity and the need to speak to others about one's attitudes (to fulfill association needs) and the built environment.

Such interactions are the foundation of relationships between people that are articulated in constructed ways (amongst everything else). The "ABX method" model of Newcomb (Figure 3), as mentioned previously, focuses in context and in the specific time on the relationships between various entities. Figure 3 displays the minimal components of the A-B-X system.

Under the Newcomb model, one person (A) transmits knowledge to the referent (B, one other person) about objects, constructions or symbols (X) and communicates his understanding of the environmental affordances. Four (this is the minimum number of relationships in which there are three bodies) must be considered, according to Newcomb: A-B, A- X, B-A, and B-X (while there was no B-A answer due to his clear cognitive approach in Heider's theory). This can be positive or negative (loving or disgusting) or moderate.

The system is primarily based on the balance of its internal relationships, which means that changes in one aspect led to change in others to balance the system. The minimum components of the A-B-X system are:

1. An attitude of A towards X that involves both the approach to X as an entity to which cognitive and attributes like meaning or belief are valued and hated.

2. The attitude of A to B in the same way as that of number 1, but of a human. 3. The actions of B towards X. 4. B's approach to A. A. The model may display similar (+ + /-) or different (+ /+) attitudes of the mutual attraction between A and B and A, but the orientation between A and B and X is presumed to be congruent. A and B are both meant to be members of separate classes, but both may be those with the same cultural context. In that cultural context it determines all attitudes towards other members. When an architect, for example, has a very positive outlook towards traditional religious forms or their spiritual possibilities it is very prone to modernist attitudes and their abstract and formalist ideas and constructions. Modernists may have the same mindset and style towards traditionalists. The object or atmosphere has an important effect on the linking between individuals and their attitudes. Persons A and B are mutually dependent because of the correlation of an attitude of an individual with the object. B may also reflect concepts, beliefs, tastes and norms of people in the model.

While we shape our cultural schema, we reply negatively to variations of it. Then we characteristic emotion to specific objects that effect the institutions we make in the course of belief. All of this effect is hormones and receptivity. On the identical time, habituation works to bore us of our environments, so we've internal conflicts among conservatism and choice for brand spanking new studies. Those cognitive methods form how we deal with every other, and objects are fundamental in formation of these perceptions [15].

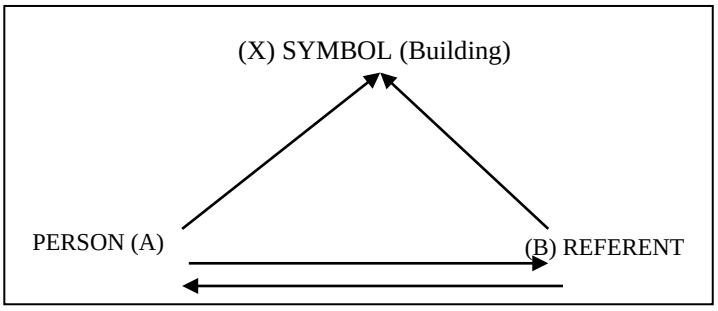


Figure 3: schematic illustration of the A-B-X system of communicative acts (Source; Newcomb, 1953)

3. THE DEFINITIONS OF AESTHETICS

Aesthetics is a science that tests beauty, its characteristics and its perception by human experiences [16]. The word "aesthetics" was described by Webster's dictionary as a study of beauty theory and its psychological answers. The theorists of the art school, seeking to justify fashion and beauty first articulated the idea of "aesthetic." Moving ahead, esthetics has also been used in other areas such as sociology, anthropology, marketing and psychological sciences [17]. Here, the distinction between "aesthetics" and "beauty" must be explained. The field of "esthetics" deals with beauty philosophy and art theory. "Beauty" is, on the other hand, the attribute of an object a person or position who gives a sense of pleasure and purpose. The study of beauty and its appreciation is called aesthetics. Figure 4 indicates the relations between beauty and esthetics

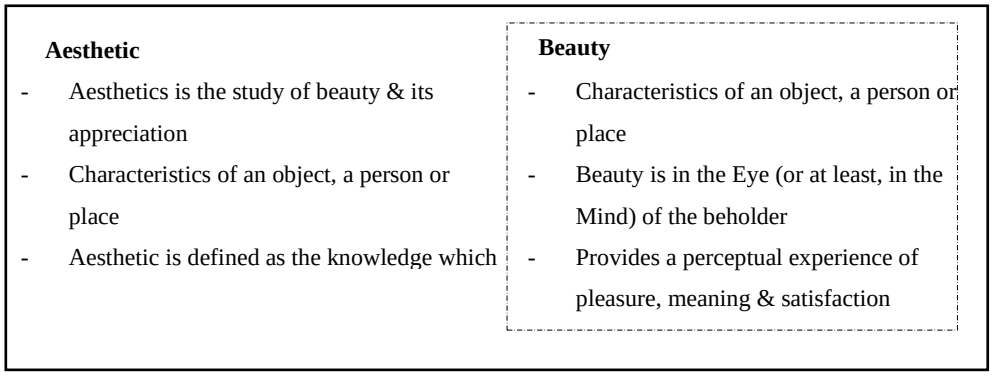


Figure 4: Differences and interrelation between aesthetics and beauty. (Developed by Author. Adapted from Baumgarten, 1750; Balling & Falk, 1982; Postrel, 2003; Rees, 2003).

The concept "aesthetics" derives from the Greek terms "aistheta" [18], which means perceptible objects, "aisthanesthai," meaning "to perceive." The word definition of esthetics is defined as the senses 'awareness [19]. In "Aesthetica" esthetics as a term for an independent discipline was first introduced. Aesthetics means "science concerned with sense cognition" in the concept of Baumgarten [20]. Subsequently the study of aesthetics instigated as a field of Western philosophy and philosopher continues to dispute the meaning, nature and attractiveness assessments of aesthetics [21] [22]. The essence of the esthetic experience can now be seen as a part of the sociology dimensions, psychology, marketing and anthropology. Aesthetics was, for Schopenhauer, a subjective experience that could lead to beauty, instead of some other property in the esthetic object [21]. An analysis of the literature reveals that the word "esthetics" has numerous connotations in numerous majors [23].

3.1. Different Approaches in Aesthetics Assessments

The research on "aesthetic" literature shows that aesthetic evaluation of the built environment is addressed in various ways. Thesis approaches can be divided into three major categories: subjectivity versus objectivity and logical against romanticism; and the most important approaches to these approaches will be expert versus perceptual (see Table 1). Expert versus perception approaches. Knowing these methods will help speed up the assessment process by concentrating on the particular assessment method.

Table 1: Different methods in aesthetic evaluations

A	Objective aesthetic (Physical aesthetic)	Subjective aesthetic (Psychological aesthetic)
B	Rationalistic view	Romanticist view
C	Expert aesthetic	Public preferences

The Kant Theory of aesthetic provides a framework in order to distinguish subjective characters from objective attributes in an esthetic judgment[24]. Subjectivity vs Objectivity Approach in urban esthetic evaluations. A decision on esthetics is defined as the sole evaluation of an object's sense of pleasure. Therefore, the esthetic decision may be adequate to be assessed using "I feel in this case." One result of this is that the emotional state determines just how a person thinks, but not any part of the physical entity.

3.2. Aesthetic Preference Research

Aesthetic preference research approaches originally developed by the natural resource management field have evolved to support urban planning-design agencies. Methodology of involving public participation and guiding forward-looking planning strategies and design decisions have been successfully implemented by urban planning departments [25].

3.3. Preference Theories

Researchers have established and substituted a rather standardized criterion known today as' preference,' with some of the primary adjectives that were originally used in difficult semantic techniques. Similar theory has been developed and tested by testing one's preference for different landscapes and built environments and related variables of the scene as in (Aoki, 1999; Daniel, 2001; Nassar, 1988; Porteous, 1996; Zube, 1984). General hypotheses of inquiries, the analysis of content and interpretation of findings and the explanation of findings may be based on following theories.

3.4. Collative variables of built form and preference

In this section we will explore the relationship of collative variable of built form with the affective appraisal variables

3.5. Enclosure, Mystery and ambiguity and Preference

The "enclosure" is a spatially related variable frequently used in terms of human comfort for spaces created between buildings as a place or a court, or spaces built for human use in buildings such as an entrance or an opening [26] [27]. "The enclosure research and linked variables propose that people prefer limited space to broad open spaces or tightly closed spaces .The measure of human curiosity named' mystery' can be closely connected to the

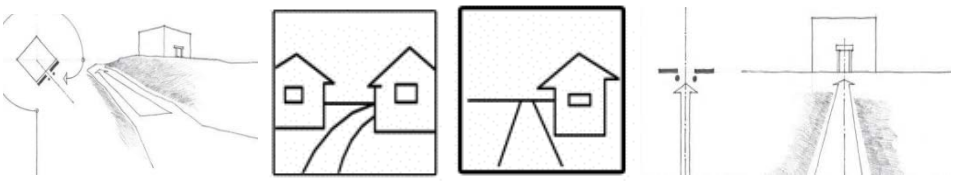


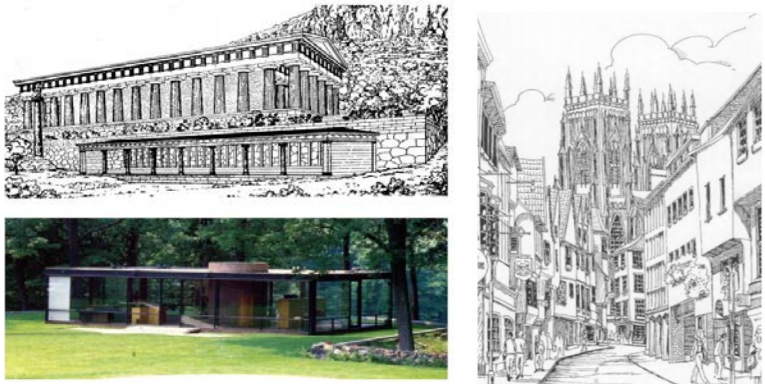
Figure 5: straight path and curved path. Ching, 2015

enclosure [27]. In the discovery or shape of a specific environment, mystical aspects may be correlated with the human interest on the basis of clues suggesting that more can be expected [26]. A partially obscured view rather than a blocked or entirely exposed view as well as a subtly curving path rather than a straight path will establish an optimal degree of mystery (figure 5). Mystery was especially successful in the creation of highly favorite scenes [26]. Only small amounts of uncertainty or ambiguity "..can make a substantial difference in how comfortable people feel in a place [26].

3.6. Complexity and Preference

A reliable measure of aesthetic preference may be moderate complexity such as the enclosure. A dynamic scenery". The visual elements are difficult to look at. The complexity of the picture creates anticipation and confusion for human beings and the people are most interested in discovering an environment of moderate complexity.

If too complex, the landscape can appear to be overwhelming and distracting, but the landscape can appear transparent and boring if not complex enough. Complexity may be the most effective predictor of urban study preference. since it may be used to measure the



"surface and shape of buildings".[26] [28] [27] [25]. See figure 6.

Figure 6: Coherence Complexity, mystery and simplicity (Porteous, 1966)

3.7. Familiarity, novelty and Preference

Herzog founded that in the analysis of city center houses, familiarity was related to greater preference. Because familiarity offers the source of human comfort by instilling a sense of location, this also provides an important predictor in predicting preference [26]. This also constitutes a predictive predictor of a sense of place. Literature reveals Repeated sensitivity to a stimulus enhances the attitude of the individual towards it".[29]

3.8. Connection among emotional/affective appraisal and perceptual / cognitive procedure

Perception / cognition and affect /emotion are linked with different parts of the brain. The limbic system plays a dominant role in affect and emotion. The limbic system is a fairly old part of the brain and one that humans share with other vertebrates. The limbic system is responsible for most of the basic drives, affects and emotions. On the other hand, perception/cognition takes place in the neocortex. The neocortex is a relatively new part of the brain and only higher-level vertebrates including humans have it. The neocortex is responsible for perception, cognition, and voluntary behaviors. Cognition and affect are, therefore, separate systems [30] [31]. Esthetic researchers have suggested that emotional/affective assessments are closely linked to cognitive/perceptual assessments, and empirical studies support that concept. Nasar, for example, found two components of likable places in two US cities, [32]. Appleyard has found that most visible buildings in a city have generated strongest assessments. [33]. If these two systems are related, the nature of the linkage takes on theoretical importance. Lazarus argues that feeling (affect / aesthetic judgment} is evoked only after a cognitive process is done [34]. In contrast, Zajonc claims that affective reaction needs not depend on cognition [35]. He sees the first stage of response to stimuli as consisting of global, generalized affect related to preference and approach-avoidance behavior. Affect can arise with little info because of certain stimulus characteristics called "preferenda" by Zajonc. The pattern-forming preferenda evoke positive feelings before its attributes are recognized. However, Kaplan criticized Zajonc's idea. He suggested that cognition is wider than conscious thought. Information processing such as categorization, assumption, and inference, frequently happens without awareness [36]. He suggested that affect occurs rapidly without conscious thought, but this inference (cognition) is also very rapid. Thus, Kaplan argued that the conclusion that preference (affect) is independent of cognition is misleading and that cognition plays a role in preference. There is another approach which argues that emotion is generated by matching between an instance and the default values ln the existing

knowledge. Default values are called template or schema. A schema is the most typical example of the group to which an instance belongs [37]. In this theory, Preferences and other affecting experiences result from a combination of autonomic arousal nervous system due to a schematic difference and subsequent assessment of cognitive processing [38]. In theory, a difference that can be resolved through change toward an existing schema will result in preference and interest while the inability to achieve such a relationship will result in negative responses. The result of the cognitive process governs the type of affective responses. Kaplan suggests one idea that helps to understand these different models [36]. According to him, there are two types of relationships between cognition and affect. Sometimes, the contents of cognition are associated with affect, and at other times, cognitive processes themselves carry affective implications. Certain contents evoke affective reactions. Lazarus's and Zajonc' s models are this case. The processes of cognition also result in affective implications. A failure of recognition can result in confused and painful feelings. Conversely, recognition of difficulty and uncertainty can be a source of pleasure. Mandler's model is this case. As in psychology, environmental psychologists have also considered the relationship between perception / cognition and emotion/affect. Environmental psychological studies have also considered both perceptual/cognitive contents and processes. Meanwhile, visual properties are processed as the main inputs by perception and cognition for environments; many environmental investigations have treated visual properties as perceptive/cognitive content and have examined their effect on affective/emotional responses. Visual properties theories and models may be subdivided into five categories: collative-arousal, ecological, schematic, symbolic and lighting models. The cognitive process focuses differently on each model.

4. STUDY CASE

4.1. Project selection criteria

In this research we will study 12 buildings exteriors, located in the three main cities of KRG (Erbil, Sulaimani, Duhok). The functions of the buildings are mainly public buildings and that as it is more vulnerable to the recipient on a regular basis and also being available and not restricted for public use. The functions of the buildings are 6 government buildings (Ministry, Municipality, Court, Provincial Council, General Directorate of Agriculture, General Directorate of Tourism), a commercial center building, a public library, a restaurant, a hotel, and a university. Medium rise buildings were chosen to control variations of building sizes which might affect the responses. 2. The extreme expressive character of buildings, such as a church with a cross on the roof or a mosque with a minaret and a dome, were avoided as much as possible to stabilize the symbolic variable. 3. different types of building designs, built during the twentieth and twenty first century were chosen to cover a wide range of architectural styles and to some degree control historical factors which might influence the responses. 4. the buildings were selected to have a wide range of the properties (from least to most) of the interested building attributes, i.e., simple-complex, ordered-disordered, novel-common, mysterious-clear, etc. 5. other elements, such as building perspective, contrast between building and its background, amount of vegetation, and cloud patterns which might affect the responses, were kept as consistent as possible. Figure 7 shows the case studies.

Figure 7: case studies of the research

4.2. Study design

Four building attributes. Complexity, Order, Ambiguity, and Potency, each of which was measured by three variables, and one variable added to the ambiguity, so a total of 13 formal (cognitive / perceptual) variables were included in the study. The effects of these attributes on affective responses, i.e. Arousal and Evaluation, each of which was measured by three variables, were examined. twelve different slides of building exteriors were assigned to view by architects from different scientific degrees and different locations responding to thirteen perceptual/cognitive variables and six affective variables. Sixty-eight architect spotted in all major cities of Kurdistan region to serve as subjects in the experiment.
one set of twelve color slides was prepared for the scenes. Participants were asked to rate the scenes on all thirteen visual properties and six affective appraisal scales. The thirteen visual property scales were seven-point scales where 1 and 7 stood for 'very' for each side, 2,3 and 5,6 for 'fairly', and 3 for 'neutral'. The six affective appraisal scales were seven-point bipolar scale, 1 and 7 stood for 'very' for each side, 2,3 and 5,6 for 'fairly', and 4 for 'neutral'.

4.3. Stimuli's of the experiment

12 twelve colored slides of building exteriors were used as stimuli. These were selectively photographed from various architectural sources.

4.4. Variables of the study:

A. visual property variables:

- Complexity: A degree of complicatedness or diversity of physical elements in a visual stimulus (building). The number of elements on the scene, how many items are there to look at, how rich does the scene contain many elements of different kinds?
- Order: A system of composing a visual stimulus or a building.
- Potency: The strength or power of a visual stimuli
- Coherence: How good does the scene hold together? is it easy is it to organize and structure the items of the scene?
- Mystery: How much does the environment potential more to be seen if you can walk deeper in it? To what degree does the environment hide positive or negative encounters that might lie ahead?
- Familiarity / Novelty: How well do you know the environment OJ How much actual experience do you have in the area in the scene? A degree of familiarity of a visual stimulus. To what extent does the scene seem to be a typical sample of its category? How well an example is the scene of the category it fits to?

B. affective appraisal scales:

Six affective / appraisal scales were used (arousing – Boring / Stimulating – unstimulating / Exciting - - calming / Beautiful - ugly / Pleasant – unpleasant / Like – dislike)

4.5. Participants:

Due to the spread of the COVID-19 epidemic in the period parallel to the preparation of this research, the questionnaire was distributed electronically through Google Forms, and the architects were targeted by the team sending the questionnaire link to the personal e-mails of the teaching staff members at universities (Salah al-Din, Sulaymaniyah, Dohuk, Cihan, Nowruz and The American University in Duhok and the American University in Sulaymaniyah) and it was sent to the architects employed in the government departments in Erbil, Sulaymaniyah and Dohuk, and the questionnaire was published on the architectural groups that are affectionate on the social media pages to reach the architects in all parts of the Kurdistan region. A total of 71 architects participated and 68 valid responses were received.

5. ANALYSIS OF THE RESULTS

5.1. discussion of the cases:

A-1: ministry of endowments and religious affairs:

the analysis of sample A1 we find that responders rated the exterior with slightly over the medium rates regarding order, coherent, organized, complex, mysterious, massive and rugged variables. While the affective appraisal variables such as stimulating, arousing, exciting, beautiful and pleasantness had more neutral ratings as the building felt more confusing and misleading and that led to a negative rating for the likeness variable.

A-2: Erbil Court

When analyzing the results of A2 sample, we find high degrees of evaluation of the order variable, organization, and coherence, and at the same time, a moderate degree of complexity variable is evaluated, which is commensurate with the high aesthetic evaluation (beauty). At the same time, high degrees of order and organization are proportional to medium and semi high ratings for the variable exciting, stimulating, and the arousing.

A-3: Zaytoon Library

When reviewing the results of the evaluation related to the condition A-3, we find that the responders evaluated the building with moderate degrees in terms of order and organization, and also in terms of novelty and mystery. Therefore, we find a moderate aesthetic evaluation and a low evaluation of the variables of pleasure, liking and excitement, the building appears rigid and unimpressive.

A-4: Taj Restaurant

The analysis of the questionnaire results in relation to the case A-4 shows a high response in terms of pleasure, stimulating and excitement towards the building in proportion to the high themes of the variable of mystery, novelty and multiple meanings with an average evaluation of the complexity variable, with a fairly high evaluation of the beauty variable.

B-1: Sulaimani Municipality

The analysis of the questionnaire results in relation to the case B-1 shows a high evaluation of the order and organization variable, and also a high degree of complexity, which is consistent with the low aesthetic evaluation (beauty). In addition to an above average evaluation of the variables of excitement, pleasure, liking and stimulating. That due to the high degree of evaluation of the multiple meanings variable and also to external influences such as the cultural code and reminders of heritage buildings.

B-2: Sulaimani Provincial Council

upon analyzing the results of the evaluation related to the condition B-2, we find that the responders evaluated the building with moderate degrees in terms of order and organization, and also in terms of novelty and mystery. Therefore, we find a moderate aesthetic evaluation and a low evaluation of the variables of pleasure, liking and excitement, the building appears rigid and unstimulating.

B-3: Titanic Hotel

The results of the questionnaire regarding case B-3 show an average evaluation of all the variables in terms of arrangement, organization, complexity, weirdness, ambiguity, and higher than average evaluations regarding the variable of pleasure, liking and beauty. And we see a high rating of the excitation variable, where the huge size of the building and the large glass surfaces play a role in the sensory excitement of the recipient.

B-4: Family Mall

The above average evaluation of the variables of ambiguity and novelty appears consistent with above average and high results for the variables of stimulating, excitement, liking and pleasure. Despite this, we find an average evaluation of the building's beauty values due to the high ambiguity and novelty attached to a high evaluation of the massiveness variable.

C-1: Duhok Court

Case C-1 received high ratings in terms of arrangement, organization and coherence, and medium and higher than average ratings in terms of strangeness and ambiguity in proportion to the high aesthetic evaluation and high ratings in terms of stimulation, pleasure and exciting. Which means that the building is more impressive, more pleasant and more enjoyable for the responder.

C-2: Directorate of Agriculture

Case C-2 received high ratings in terms of order, organization and coherence, and a below average rating tends to be simple in terms of the complexity variable. And at the same time, less ratings regarding the variable of novelty and ambiguity, where the evaluations indicate that the building is clear and familiar, and evaluations tend to consider the building massive, solid and rugged in proportion to medium and less than average evaluations of the aesthetic and pleasure variables, where the building is considered less exciting and Less liked and less pleasant for the responder.

C-3: General Directorate of Tourism

Case C-3 showed a high rating in terms of organization and order, and a low ranking in terms of the variable of complexity, leading more to simplicity in proportion to the low aesthetic evaluation, as well as low ratings in terms of excitement, liking, pleasure and stimulation. A low evaluation of the variables of pleasure, liking, and beauty may be associated with informal influences related to local culture and shared perceptions in society.

C-4: American University in Duhok

Case C-4 received high ratings in terms of arrangement, organization and coherence, and medium and higher than average ratings in terms of strangeness and ambiguity in proportion to the high aesthetic evaluation and high ratings in terms of stimulation, pleasure and exciting. Which means that the building is more impressive, more pleasant and more enjoyable for the responder.

5.2. Relationship between variables:

research questions that were debated to explicate the Relation between architectural physical characteristics and aesthetic response. The study described 13 physical features or independent

variables that could affect dependent variables (aesthetic response). Details of the difference between the mean value of different variables are given in this section

5.3. Complexity / pleasure relationship:

The relationship between pleasure and complexity has been studied by many previous researches, and some theories predict an inverted U shape relationship. While, the highest degrees of evaluation of the variable of pleasure correspond to medium degrees of complexity and the lowest degrees of aesthetic evaluation correspond to very high levels or very few levels of complexity. When analyzing the questionnaire, we find a similar relationship with the theory with some slight changes due to the influence of other variables over the complexity variable. As we see in figure 8, that case and case has received highest levels of pleasure rating while receiving moderate levels of complexity ratings, also case has received low beauty ratings and high complexity ratings.

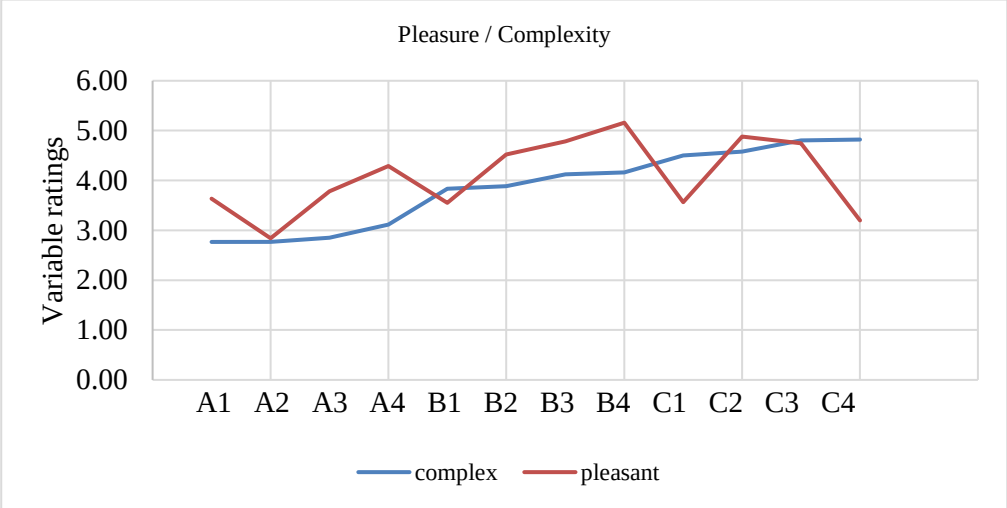


Figure 8: Relationship of complexity and preference.

5.4. Aesthetic response and affective appraisal variables

The findings suggest that the variants of various physical characteristics of the building's exteriors are correlated with variations with regard to the six factors relating to aesthetic response. Figure 9 shows the 'mean plot' across the twelve cases exteriors to recognize the relationship between the six variables of aesthetic response. In this plot, the average score for different cases is essentially comparable.

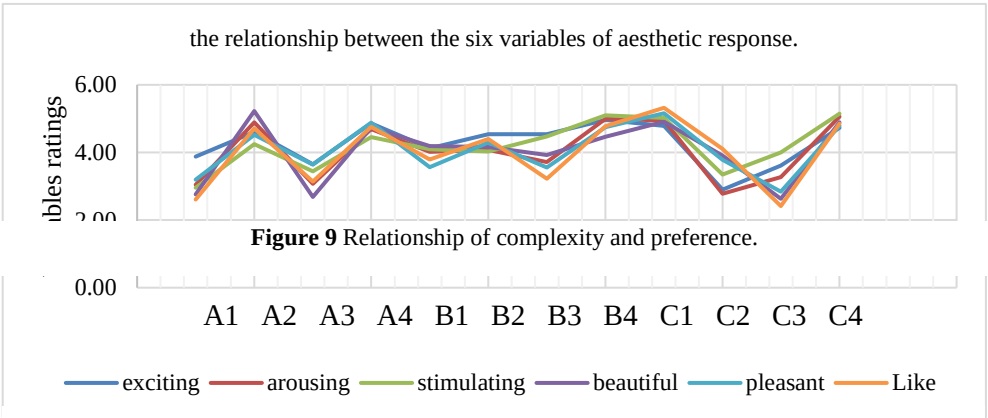


Figure 9 Relationship of complexity and preference.

Figure 9: Relationship between the six variables of aesthetic response. by researcher.

5.5. Ambiguity / excitement relationship

The relationship between ambiguity and excitement shows varying degrees of evaluation as the greater the level of ambiguity in the interface, the greater the excitement of the recipient. As we see that the higher the rating of mystery and novelty are associated with higher ratings of excitement by the responder (Figure 10). This does not mean a positive aesthetic

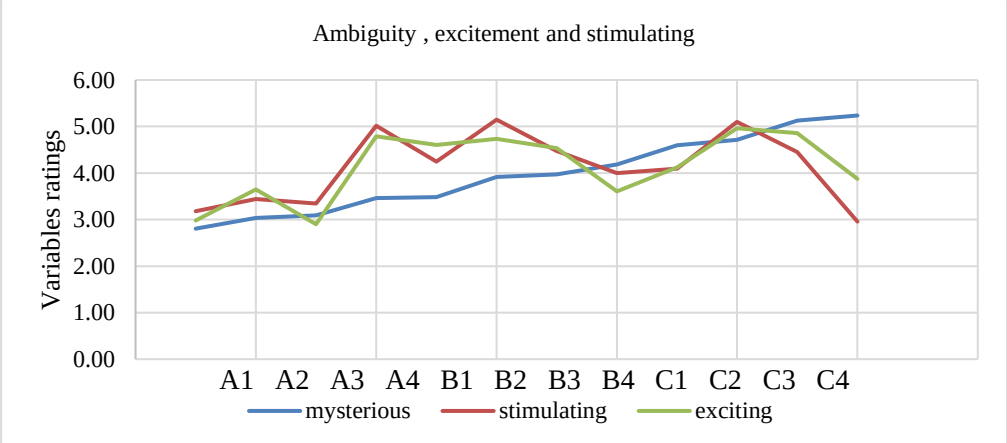


Figure 10: Ambiguity, excitement and stimulating variables ratings.

evaluation, but rather revolves around assessing the level of the facade artifacts for the attention and senses of the responder. Also, we find a strong relationship between higher levels of multi-meaning ratings and ratings of excitement, arousing and stimulating, but in the case of A1, we find that the ratings of excitement, stimulating and arousing decrease, due to the influence of other variables such as high complexity and much diversity (Figure 11).

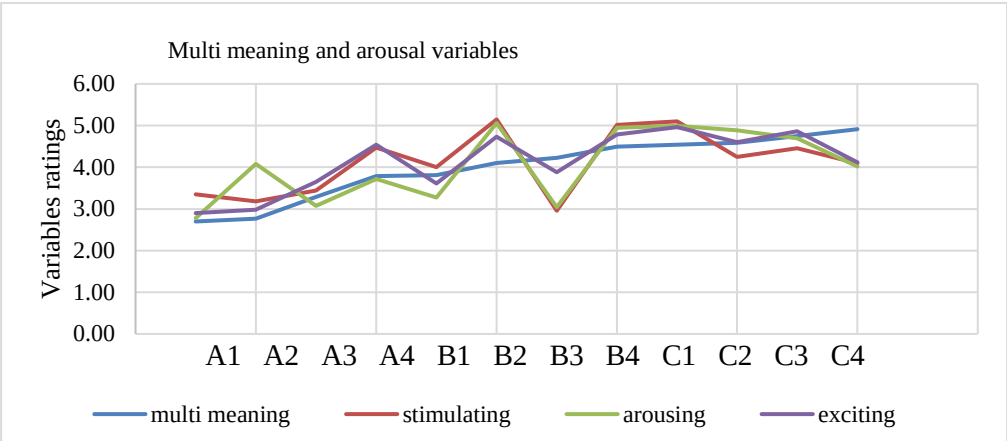


Figure 11: Multi meaning and arousal variables.

5.6. Order and Beauty relationship:

Many theories state that there is a straight association between the order variable and the change of aesthetic evaluation (beauty), and we find this situation present in the evaluation of study cases with some exceptions. also, we find low aesthetic rating of the states A3 and C3, and this is due to the influence of other variables such as superficiality and the light cohesion between the elements of the interface. There was also the influence of the cultural code, which clearly affected the decrease in the aesthetic evaluation of C3 (Figure 12).

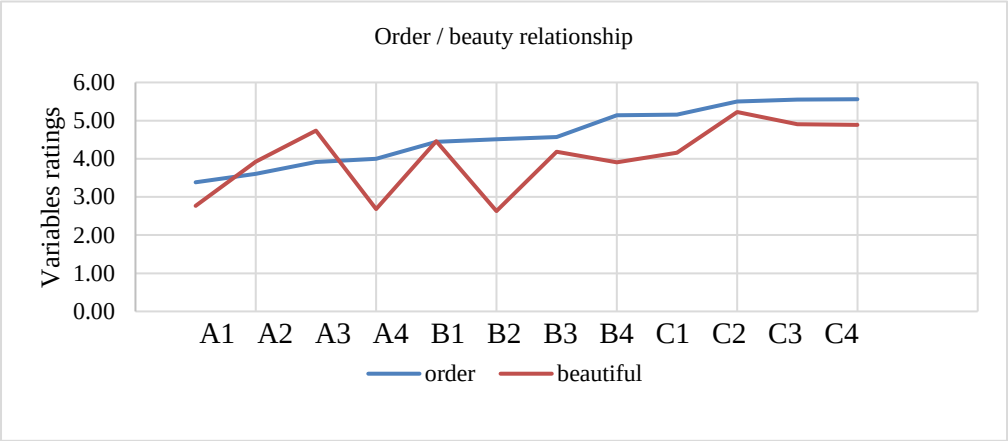


Figure 12: Relationship between ratings of order variable and beautiful variable.

5.7. Likeness, pleasure and beauty:

Aesthetic evaluation, preference, and liking are three closely related states. As the cases that received a high aesthetic evaluation at the same time, the index of evaluation of pleasure and liking was also high. We can say that the aesthetic evaluation (beauty) of the building depends and is affected mainly by the evaluation of pleasure and the evaluation of liking, which are influenced by other variables such as ambiguity, complexity and order (Figure 13).

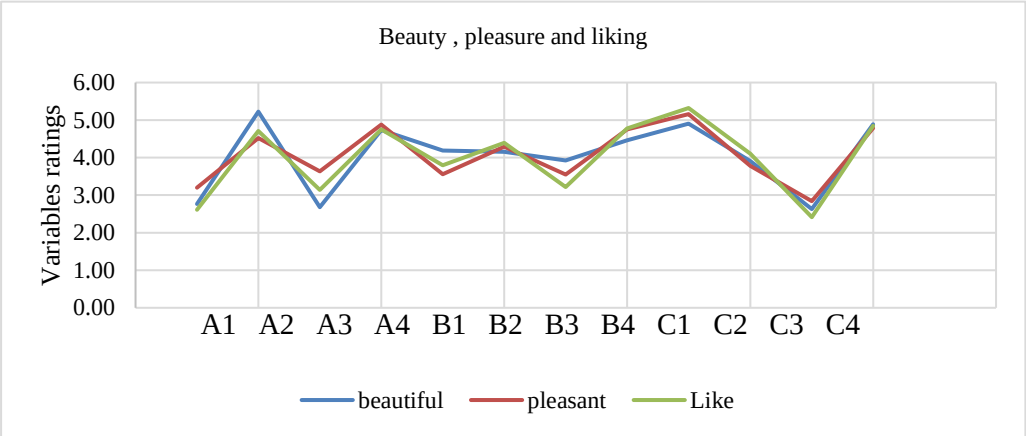


Figure 13: The relationship between beautiful, pleasure and liking variables.

6. CONCLUSIONS

The study of the scatter chart was used to define the interaction levels between two dependent variables, the aesthetic response and the formal properties. A medium to strong relationship has been recognized between aesthetic response with moderate complexity and moderate to high levels of order and organization also with near high levels of novelty and mystery. Though, a weak relationship suggests a faint relationship between the remaining dependent variables. Changes in different physical characteristics of architectural exteriors appear to be associated with variations in aesthetic response. For the responses like: pleasant-unpleasant, like-dislike, beautiful-ugly, the cases A-2 (Erbil court) and C-1 (Duhok court) and C-4 (American university in Duhok) are significantly different to cases A-3 (Zaytoon library) and C-3 (general directorate of tourism in Duhok). For stimulating- unstimulating, exciting – calming and arousing – boring, the A-4 case (Taj restaurant) and B-4 (family mall in Sulaimani) differ from case C-2 (general directorate of agriculture in Duhok)

The higher the level of ambiguity in the exterior, the more excited the receiver. The higher the classification of mystery and novelty, the higher the degrees of excitement by the respondent. There is also a strong correlation between higher levels of polysemy and ratings of arousal, exciting and stimulation.

The aesthetic evaluation (beauty) of the building depends and is influenced mainly by the preference of pleasure and admiration, and these three variables are affected by other variables such as ambiguity, complexity, and order.

The aesthetic response is a complex process where each variable is affected by another variable, which ultimately leads to a comprehensive aesthetic evaluation and it is a mistake to reduce the extent of aesthetic evaluation only in the variable of beauty and ugliness alone.

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