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RESEARCH ARTICLE

INVESTIGATE THE AESTHETIC APPRECIATION OF UNITY AND VARIETY THROUGH TACTILE STIMULI

Yan Xuning[1], Hassan Alli[1], Sazrinee Zainal Abidin[1], Allan Whitfield[2] and Deirdre Barron[2]

1. Faculty Of Design and Architecture, University Putra Malaysia, Selangor, Malaysia.
2. College Of Design and Innovation, Tongji University, Shanghai, China.

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Abstract

The Unified Model of Aesthetics (Project UMA) involves three levels, and the current research focuses on the cognitive level. This article will explore its aesthetic experience at a perceptual level. Aesthetic studies tend to use sight and touch as their assessment behaviors. Products are designed to combine unity or order with variety. Current testing on the average person proves that the principles of unity and variety can explain the tactile aesthetics of product design. Therefore, this article tests professional designers and asks them to rate the perceptual level of the touch of the chest of drawers. The results show that Unity and variety are negatively correlated, and both tactile unity and variety have a positive impact on the aesthetic experience. This shows that designers need to unify the design while creating some diverse changes to meet the aesthetic experience of ordinary people.

Introduction:-

According to (SDG) Goal 9: Promote sustainable industrialization and foster innovation. In the process of creating and designing products, designers inadvertently use many aesthetic principles to help enhance the aesthetic appeal of a product. (Lidwell et al., 2010 ; Montague, 2009 ; Quantifying Aesthetic Parameters of Web Applications, n.d. ; Ranscombe, 2013 ; Papachristos & Avouris, 2013) Therefore, some principles have been identified and retained to design products that can help consumers choose satisfactory products. (e.g., MAYA; Loewy, 1951;

Hekkert, Snelders & van Wieringen, 2003). Hekkert (2014) argues that consumers prefer a balance of seemingly opposing design sides (e.g., typicality and novelty) in aesthetic pleasure. According to the UMA project, the design principles described in this paper mainly relate to perceptually, cognitively and socially. In the past research, some scholars have used the Categorical-Motivational Model to test and verify the influence on aesthetic pleasure at the cognitive level (Tyagi, 2017 ; Post et al., 2016 ; Yahaya, 2017). Tyagi et al. (2013, p. 2, 8–9) furthers the notion of mediated tension between forces in terms of safety and risk, which reflect typicality and novelty, and further establishes, in conjunction with Whitfield, a 'modified categorisation model' based on Roschian categorical levels, the Superordinate, Basic and the Subordinate (Rosch, 1978; Whitfield, 2007, p.56).

Corresponding Author:-Yan Xuning
Address:-Faculty Of Design And Architecture, University Putra Malaysia, Selangor, Malaysia.

The stimuli used in this article have been identified as the rich category for chairs and the poor category for chests of drawers (Tyagi, 2017). In addition, the two levels of perceptually (Unity and Variety) and socially (Connectedness and Autonomy) have been proven to have an optimal balance (Blijlevens, 2015; Post & Blijlevens, n.d.). Yahaya's research also demonstrated that visual effects are more significant than touch (Yahaya, 2017).

Therefore, the topic of this research is to further explore the relationship between the principle of unity and the aesthetic appreciation of touch. At present, although there are studies exploring one of the influences of aesthetic appreciation is "unity in variety". And most of the previous research has focused on testing and validation on ordinary people. And the test results of this part of the experiment show that unity and variety are negatively correlated, yet positively attributed to aesthetic appreciation of product design (R. A. G. Post et al., 2016).

Therefore, people prefer to appreciate product designs that maximize both unity and variety. However, it is still unclear whether designers who initially learn and practice these principles also agree with the direct relationship between unity and variety in product design. Therefore, this study will be tested by engaging with product designers.

Project UMA:-
The research is part of Project UMA (Unified Model of Aesthetics). Figure 1 (below) illustrates the model of Project UMA. Research is divided into three levels. Thefirst, the social, involves connectedness and autonomy, i.e. Visual expressions of belonging to a group or being different to that group; the second, termed the cognitive, concentrates on typicality and novelty; the third is the perceptual level focusing on such elements as unity and variety.

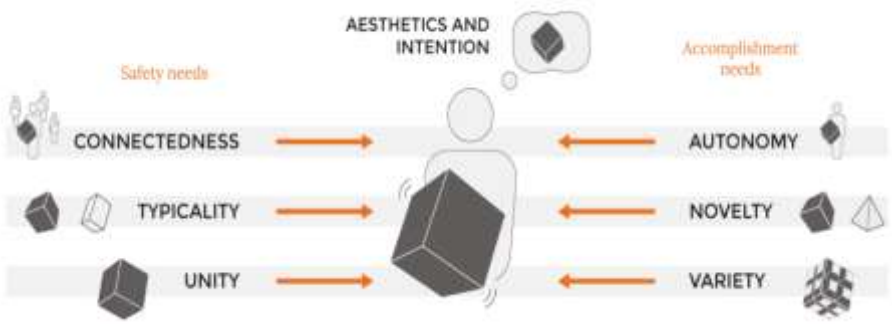

Figure 1 Project UMA Model (Berghman & Hekkert, 2017)

The Three Levels of the Project UMA Model:
Connectedness And Autonomy:-
Blijlevens shows that products have social symbolic value to consumers. For example, an embroidered silk dress might represent high social status, while baggy trousers paired with an oversized sweatshirt might be associated with hip-hop culture (Rahman et al., 2010). They use product design to communicate messages that represent themselves to others (Belk, 1988).

Although Blijlevens' research has provided fundamental insights into the new design principle "Autonomous, yet connected". It is only suggested that this principle can be used as an alternative to the MAYA principle and increase the likelihood that consumers will choose novelty products (Blijlevens & Hekkert, 2015). However, only this new opportunity to try is proposed, and there are still a lot of gaps in the research on the actual realization of Connectedness and Autonomy.

It has been demonstrated that social safety and risk associated with product categories shift the best balance to a preference for Connectedness and Autonomy, but how to investigate this principle and further explore its relationship to aesthetic appreciation remains unresolved. (Blijlevens et al., 2016). Therefore, this study aims to

address the relationship between Connectedness and Autonomy for explaining how they interact in terms of aesthetic appreciation of product design.

Novelty and Typicality:-
So far, Tyagi (2017) and Dennae (2020) have proved cognitive issues from different angles by testing Australians and Taiwanese. But Whitfield points out that outdated models ignore the role of "social or material culture," lack "cross-cultural validity," and remain ambiguous about what constitutes "aesthetics." However, the attractiveness of a product may be influenced by sociocultural, socioeconomic, historical and technological influences. For example, China is one of the world's largest consumer countries.

Chinese consumers think Levi's 501 jeans are exotic and modern. But American consumers may consider it authentic and classic. (Rahman et al., 2010) Therefore, for global designers and large corporations, understanding the aesthetic motivations of consumers in global and cross-cultural contexts can maximize business success. Additionally, running the same test multiple times ensures the quality and reliability of all results. (Desrues & Viggiani, 2004). Therefore, this study will use the same stimuli as Tyagi and test them in mainland China.

Unity and Variety:-
The principle of unity of variety was well known to early Greek philosophers and has a long history (Benhabib, 2007). However, there is little empirical research on how unity and variety work together to influence aesthetic appreciation. When people are able to discover ordered patterns, they experience unity, perceive wholeness and find coherence between and within elements. (Berghman & Hekkert, 2017) One of the ways to affect unity is to apply the well-known Gestalt grouping laws (Post & Blijlevens, n.d.). People don’t focus easily, and if little variety or stimuli is offered, humans actively avoid boredom by seeking out variety (Pieters & Van Raaij, 1988; Fisher, 1998).

Open people actively seek out experiences and tend toward variety variables such as imagination, people prefer variety, originality, and artistry (mccrae & Costa, 1997). This may be because people's perception of variety has become pleasant because of its promise of learning (Berlyne, 1971; Biederman & Vessel, 2006; Hekkert, 2014). In addition, there are already studies that can use Unity and Variety's verbal rating as a standard. And since a large body of literature suggests that these are based on visual principles such as symmetry, simplicity, and contrast, there is uncertainty about the need to record subtle Gestalt principles with the eyes of the interviewee.

Past research has focused on the analysis of the effects of typicality and novelty on aesthetic appreciation and the early stages of perception. (Blijlevens, Carbon, Mugge, & Schoormans, 2012; Goode, Dahl, & Moreau, 2013; Hung & Chen, 2012). However, the exploration of unity and variety has been ignored. Therefore, this article will systematically assess its underlying dimensions by examining the general workings of the principle of "Unity-in-variety". Trying to find the aesthetic preference interaction mechanism for Unity and Variety.

Tactile Aesthetics and Perception:-
Currently, there is very little for tactile aesthetics and perception. Knowledge of tactile aesthetics can be compared to our knowledge of visual and auditory aesthetics, with haptic need scores positively correlated with visual product aesthetic centrality scores and consumer demand for uniqueness scores. (Etzi, Spence, & Gallace, 2014) But touch is considered an objectifying sensor due to the way it interacts, which requires contact with the skin in order to evaluate anything.

Although tactile aesthetics and visual aesthetics share many similarities, they are still different (Gallace & Spence, 2011). Tactile beauty is a feeling that leads to an aesthetic experience different from sight. In the development of aesthetics and product design, the design of exhibits that can be touched can bring more experience to the audience. This goes beyond the physical aspects of the product that vision alone cannot. Such as weight, texture, roughness, and sharpness are all more prominent aesthetic experiences than those brought by visual stimuli.

In addition, studies have shown that the similarity and closure of Gestalt laws also affect people's tactile perception and aesthetic experiencSome scholars have also proved that people can feel the aesthetic experience of unity and variety through touch. Therefore, this article believes that people can also perceive the experience of unity and variety through touch. To determine and assess whether touch can really affect perceptual levels, a study was conducted using chests of drawers as stimuli.

In existing aesthetic research, touch, as an important sensory channel, remains relatively neglected. Most studies focus on the visual field, emphasizing how design principles such as unity and typicality influence consumers' aesthetic judgments through visual cues. However, tactile aesthetics not only involves surface material, weight, and texture, but also stimulates users' emotional associations and functional expectations of products (Edmonds & Korozi, 2024).

Compared to visual aesthetics, tactile experiences are often more direct and immersive. Although research is limited, some scholars have conducted theoretical derivations within the UMA model. Past experience has shown that the expression of typicality and novelty in terms of touch has been tried (Yahaya, 2017). The tactile development of typicality and novelty was the earliest. Later, scholars also conducted preliminary explorations of the principles of variety and unity in the automotive field (Post et al., 2014).

Therefore, we need to clarify how the principles of unityand variety manifest themselves in product design. Furthermore, cross-cultural research shows that users from different cultural backgrounds differ in their aesthetic preferences. For example, European and American consumers place greater emphasis on novelty and individuality, while East Asian users prioritize harmony and unity (Yuan, 2011).

This suggests that when exploring the tactile aesthetics of unity and variety, cultural differences must be incorporated into the analytical framework. Furthermore, existing literature primarily focuses on ordinary consumers, lacking systematic research on professional designers.

The fact that designers' aesthetic judgments, formed through long-term training, may differ from those of the general population remains understudied. Therefore, combining tactile experience, cross-cultural comparisons, and research within a designer community will provide more comprehensive theoretical support for the application of the principle of unity and variety in product design.

Method:-

Hypothesis:-

For the principles of unity and variety, similar to the test results in the visual domain, tactile unity and variety were negatively correlated. And perceptual level positively affects aesthetic appreciation.

Stimuli selection:-

Based on previous research, this study continued testing with chests of drawers. Because this study is a further exploration of previous studies, the choice of stimuli was first referred to Tyagi's study, and the stimuli were further adjusted and modified (Tyagi, 2017). Ten kinds of drawer cabinet designs with different tactile experiences in Unity and variety are selected as stimuli.

Together, they represent the wide range of product designs that can be found on the market today. In fact, there are many kinds of materials for the chest of drawers. In order to reduce the impact on aesthetics due to material differences and better test their tactile experience, they are all replicas of Figure 2, and the materials used in the replicas are highly similar to the original.

Figure 2 Stimuli (Tyagi, 2017):

Respondents:-
Since the tests of previous studies were conducted in the Netherlands and Australia, this study was conducted in mainland China. A total of 58 professional designers from China participated in the study. Respondents were rewarded with RMB 10 for participating in the activity as compensation for their contributions to this study.

Answers for incomplete questionnaires and language difficulties were deleted. And the answers were checked, for all answers only extreme values (1 or 7), only intermediate values (4), only continuous values (3, 3, 3...3, 3, 3). Respondent answers were deleted. Final conclusions and analyses were conducted from 52 respondents (mean age = 23.8, SD = 4.2, 28 males).

Procedure:-
All respondents received stimuli, and respondents were asked to indicate their level of agreement with the product design statements in the description questionnaire using a Likert scale (1=strongly disagree, 7=strongly agree). This questionnaire was adapted from a questionnaire measuring the same factors in the visual domain (Tyagi, 2017). Unity is measured by the following items.

'This design feels unified', 'This design feels orderly' and 'This design feels coherent'. Variety was measured using the items: 'This design conveys variety', 'This design is made of different parts' and 'This design is rich in elements. The order of the items and the order of the stimuli were randomized to prevent the effects of order.

Because the chest of drawers is too large, the furnishings are limited by the location and cannot be displayed on the desktop. So, the test is done in a larger room. The interviewee walked into a room with ten huge cloths covering the front. This way, the interviewee cannot see the test object. Respondents took the time to touch all the chests of drawers before taking the test.
Analysis of the test results was carried out by means of a paper questionnaire. Respondents were not restricted from using either side of the hand while taking the test and could spend time touching the chest of drawers.

Results:-
Pearson correlations were calculated for unity, variety and aesthetic appreciation. Consistent with the previously proposed hypothesis, Unity and variety were negatively correlated ($r = -.385$, $p < .001$). Unity and aesthetic appreciation were positively correlated ($r = .540$, $p < .001$). The relationship of variety to aesthetic appreciation is also significant.

However, there was no significant correlation between variety and aesthetic appreciation ($r = -.044$, $p > .05$). For previous studies, the findings on tactile aesthetics were similar to those on the perceptual level of vision, unity and variety.

The effect of sexual reciprocal inhibition on aesthetics. The partial correlation between unity and aesthetic appreciation was higher than the bivariate correlation ($r = .532$, $p < .001$). To further explore this issue, this paper performed a linear regression analysis. The regression model explained 37.6% of the variance in aesthetic appreciation for the predictors of unity ($p < .001$, $\beta = .678$) and variety ($p < .001$, $\beta = .198$).

Discussion and conclusion:-
The topic of this research is to further explore the relationship between the principle of unity and the aesthetic appreciation of touch. In this research, this paper establishes that the principles of unity and variety affecting visual experience also apply to tactile experience. And explain the results of the study. Both the unity and variety of touch have a positive impact on the aesthetic experience.

The results of this study further expand the applicability of the unity and variety UMA model as an aesthetic principle in China and provide empirical evidence for the development of tactile unity and variety in tactile. However, the results of this study are also similar to those in the Netherlands. This proves that the principles of tactile and perceptual levels apply to ordinary people as well as designers, through the application.

And they propose that this principle can serve as a nexus for tactile aesthetics to better understand the perception of material properties (e.g. Stiffness, elasticity) and Gestalt properties (e.g. Symmetry, closure), and their subsequent

aesthetic appreciation (e.g., stiffness, elasticity) (Post et al., 2014). This means that when designers and ordinary people share the same aesthetic principles, designers can better create product designs that can be widely recognized by ordinary people.

Because the chest of drawers has elements such as cabinets and handles, this usually needs to be designed uniformly. Professional designers will arrange these layouts as harmoniously and uniformly as possible and have more aesthetics. But the positive impact of unity and variety on aesthetics is also significant. This shows that designers need to unify the design while creating some diverse changes to meet the aesthetic experience of ordinary people.

Therefore, the aesthetic principles ofunity and variety play an positive role in product design, while tactile design in product design requires designers to give special consideration in order to create products that are more aesthetically pleasing and tactile.

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