

# The Effects of UMA (Unified Model of Aesthetics) and CM (Categorical-motivation Model) in the Application of Aesthetic Preferences for Clothing Products

Ren Qianhui, Mohd Faiz Yahaya

Faculty of Design and Architecture, Universiti Putra Malaysia

Email: gs64232@student.upm.edu.my

Corresponding Author Email: mfaizy@upm.edu.my

Tai Lichen

WenZao Ursuline University of Languages

Email: tailichen@hotmail.com

Wu Qi

Faculty of Design and Architecture, Universiti Putra Malaysia

Email: gs63633@student.upm.edu.my

Chen Hui

School of Distance Education, Universiti Sains Malaysia

Email: chenhui@student.usm.my

To Link this Article: <http://dx.doi.org/10.6007/IJARBSS/v14-i4/21297>

DOI:10.6007/IJARBSS/v14-i4/21297

**Published Date:** 13 April 2024

## Abstract

Aesthetic preferences for artefacts are affected by many factors, such as perceptual factors, cognitive factors, and social factors. Currently, there are two models (the UMA model and the CM model) that provide theoretical support for aesthetic preferences for artefacts. However, most previous studies have focused on testing the cognitive level of the UMA model, and there is still a lack of complete testing of the three levels of the UMA model. Furthermore, categorization motivation models divide artefacts into "rich" and "poor" categories, with different categories having different impacts at the perceptual, cognitive, and social levels. This study aims to examine people's aesthetic preferences for clothing products in mainland China, using the UMA model and CM model as the theoretical basis to study the aesthetic preferences of different categories of clothing products in terms of perception, cognition and

society. This study is the first to completely test the three-level relationship of the UMA model through clothing products and combines the product classification of the CM model to test people's aesthetic preferences from the perceptual, cognitive and social levels.

**Keywords:** UMA(Unified Model of Aesthetics), CM (Categorical-motivation Model), Aesthetic Preferences, Clothing Products

## Introduction

Aesthetics are expressed in the appearance of everyday objects(Whitfield & Allan, 2005). All fields of design explicitly involve aesthetics(Whitfield & Allan, 2005). Aesthetics is a very ancient concept, rooted in the Greek word "aesthesis", which means "an understanding through sensory perception"(Hekkert, 2014). But until the 18th century, the concept was understood to mean sensory pleasure and delight. In line with the original Greek meaning, "aesthetic" or an aesthetic response is defined as pleasure or displeasure derived from the sensory-motor understanding(HEKKERT1, 2006; Hekkert, 2008). In the recent literature regarding aesthetic preference, a UMA model, aesthetic preference is studied from three levels (perceptual, cognitive, and social) and two simultaneously acting evolutionary pressures (i.e., the trade-off between safety needs and accomplishment needs)(HEKKERT1, 2006). These predictions, together with the main balance predictions for each processing level, are the subject of a major research project currently underway called "Project UMA". This project aims to develop and test a unified model of aesthetics that explains our everyday aesthetic preferences for design artefacts. The categorical-motivation Model refers to the motivation model and the categorical model. The categorical-motivation model is based on Berlyne's(1960, 1967, 1971, 1974) influential theory that has dominated experimental aesthetics for the past several decades. Although there are relevant experimental data to verify the collative-motivation model, there are also many inconsistent views. Complexity is but one determinant of aesthetic evaluation in terms of Berlyne's work. However, the preference complexity function has received repeated attention because it represents an interesting and specific prediction derived from the collative-motivation model(WHITFIELD, 1983). The categorical model explains the influence of categories on people's aesthetic response through cognition. Classification models assume that objects are not evaluated per se, but are judged in terms of the cognitive categories to which they are exposed. This means that the way people respond aesthetically to objects will be determined by their understanding of these objects. Determined by the formed category. The application of this model to design assumes that we should seek designed as expected. In fact, a handful of objects should correspond to our internal cognitive representation of that object. For example, a pair of pants should look like a pair of pants, and a dress should look like a skirt. Thus, the categorical model is the opposite of Berlyne's novelty model. The categorical model assumes that We like what we know, pleasure is produced by confirmation of expectations, and familiarity produces pleasure—which is different from contempt. The motivational model predicts that a moderate discrepancy from expectations-novelty-will be favored, while the categorical model predicts that a confirmation of expectations-prototypicality-will be favored. The categorical-motivation model was conceived as a merger of these two conflicting theories (Whitfield & Allan, 2005).

Against this backdrop, aesthetic experience is intricate and multidimensional, although individual studies have identified certain mechanisms to explain observed aesthetic preferences (Berghman & Hekkert, 2017). Hekkert created the UMA model and empirically tested the framework through a series of studies to try to reconcile various aspects of product

design aesthetics. At the perceptual level, previous research provides strong support for the importance of unity-in-variety in aesthetic evaluation stimuli. In the field of product design, unity is negatively correlated with variety but has been found to increase aesthetic appreciation when statistically controlling for each other (Berghman & Hekkert, 2017). Therefore, this indicates that maximization of these two characteristics is best (R. A. G. Post et al., 2016). At the cognitive level, the literature finds a negative correlation between typicality and novelty, but both have a positive impact on aesthetic appreciation (Carbon, 2010; Clementine Thurgood, Paul Hekkert, 2003). In the field of product design, the balance between these two is classified under the acronym MAYA – “most advanced, yet acceptable” (Hekkert et al. (2003) design where aesthetic appreciation will be highest. At the social level, research on the importance of the social dimension is not very extensive in the field of design aesthetics. Yet, existing research that have been conducted so far do lend support to a positive impact of both connectedness and autonomy (Blijlevens, 2015).

Nevertheless, the effects of aesthetic preference on clothing products have not been paid enough attention. At present, few studies on product aesthetic preference have been tested with clothing products. In China, there is still less research on the aesthetic preference of clothing, and the main research focuses on the aesthetic elements of clothing. As China's consumption upgrade deepens and spreads, the aesthetic upgrade of clothing products is the next stage of consumption upgrade. According to Baidu's life aesthetics change trend from 2012 to 2018, the life aesthetics index increased from 90 in 2012 to 209 in 2018. This shows that consumers' aesthetic consciousness has begun to awaken. The “upgraded generation” women's clothing consumption concept shows a trend of emphasizing cost-effectiveness, aesthetics and personalization. Therefore, it is the general trend to design clothing products that are more in line with consumers' aesthetic tendencies and emotional resonance. Previous research has used clothing products to conduct research at the cognitive level (typicality and novelty) (Ceballos et al (2019), but there is a gap in research at the perceptual and social levels. For other product designs, previous research has mainly focused on perceptual (unity-in-variety) and cognitive design principles (such as MAYA). Future research could assess how different modality levels (perceptual, cognitive, and social) interact in explaining aesthetic appreciation of product design (Blijlevens (2015), especially as clothing products have not yet fully evaluated all three levels. Perhaps, for product categories for private consumption (e.g., vacuum cleaners), consumers place more weight on cognitive and perceptual design principles and less on social design principles in explaining their preferences, whereas for product categories for public consumption (e.g., clothing) this may be the other way around.

This paper makes three key contributions. Firstly, to the best of the author's knowledge, this is the first research to completely test the relationship between the three UMA models for clothing products, while previous studies only focused on the cognitive or perceptual effects of the UMA model. Based on this new research gap, this study is expected to establish the first research literature on the relationship between the three levels of clothing product design in the UMA model that has not been explored in previous studies. This will provide theoretical reference value for subsequent research on aesthetic preferences. Secondly, this study focuses on how to define and measure the aesthetic pleasure of everyday objects. This research is different from the research on abstract art aesthetics, but uses scientific and empirical methods to measure the aesthetic pleasure of designed products with a proven, reliable, and generalizable scale. The study of clothing aesthetic preferences has important theoretical and practical significance. Thirdly, the research results can serve costume

practitioners to use scales to reliably evaluate the aesthetic pleasure caused by creations, so as to fully understand their design impact and the various factors behind character design. The research findings could ultimately have practical implications for fashion designers in creating beautiful fashion design products. Furthermore, this research has important implications for the fashion industry and aesthetic research. It can not only help designers better understand consumers' evaluation and motivation of clothing aesthetics, but also provide targeted design and marketing strategies for fashion brands.

This research has both theoretical value and practical application value. This research adopts scientific and empirical methods belonging to experimental aesthetics. This study completely tested the UMA model, filled in the overall research of the UMA model in the aspects of perception, cognition and society, and provided theoretical reference value for subsequent research. The research result not only helps designers better understand consumers' evaluations and motivations for clothing aesthetics but also provides fashion brands with targeted design and marketing strategies.

### ***Theoretical Background***

#### ***Perceptual Level- Unity and Variety***

As mentioned above, unity-in-variety is critical for product design at perceptual level. In the field of product design, it is well established that maximization of these two characteristics, unity and variety, is best (Post et al., 2016). For this purpose, unity-in-variety is important in explaining the perception of aesthetic preferences. In addition to this, the principle of unity-in-variety has been proven not only in the visual field, but also in non-visual fields, such as music Post et al (2017), food Paulsen et al (2015), etc. This principle is not limited to visual and auditory modalities, but is also evident in tactile stimulation (Ragpostudelftnl, 2014).

Unity-in-variety is a fundamental principle in design that aims to achieve aesthetic balance by combining diverse elements into a cohesive whole. From the literature review of previous research, it has been found that maximizing the two is best. This study will test the relationship between unity and variety of different types of clothing products based on the unity-in-variety principle at the perceptual level of the UMA model. Therefore, the conceptual and theoretical support of this study comes from the UMA model and the CM model. This is consistent with the unified model of product aesthetics developed by Hekkert et al. (Berghman & Hekkert, 2017), which explains our daily aesthetic preferences for artifacts on the one hand, the CM model developed by Allan et al. Whitfield (2000), which explains aesthetic preferences through the classification of different products on the other hand.

The principle of unity in diversity has been known since ancient Greece, and it has been very influential in the field of aesthetics ever since (Berlyne, 1971). Unity-in-variety (UiV) is an aesthetic principle that explains aesthetic appreciation through objective and competent design factors. It is supported not only in the fields of vision Hekkert (2014) and touch Gallace & Spence (2011), but also in the field of human-computer interaction (Post et al., 2017). The effect of the perceptual level is more prominent than other levels because unity and variety can be manipulated in a more direct way. They refer to the organization of perceivable design elements as they relate directly to design practice. Thus, unity and variety can be considered very reliable determinants of aesthetic appreciation (Berghman & Hekkert, 2017).

Previous literature reviews have emphasized the importance of unity of diversity in design aesthetics. The potential of this principle to help create visually appealing and consumer-acceptable design solutions is highlighted. Although some studies have shown that unity and diversity independently and positively affect aesthetic appreciation, and that maximizing

unity and diversity simultaneously achieves the best balance and the highest aesthetic appreciation, there are not much studies on the relationship between the two for different product categories.

*Cognitive Level- Typicality and Novelty*

The main components of the field of cognitive aesthetics include typicality and novelty. Typicality and novelty have often been shown to be related to human aesthetic preferences in artworks. Therefore, typicality and novelty, as two key factors at the cognitive level, need to be verified through a wider range of product types to verify their interrelationship. There is also a principle called "MAYA" which is the acronym for "most advanced, yet acceptable". The research results of Hekkert et al. Hekkert et al (2003) provide an empirical basis for the industrial design principles created by Raymond Loewy. Table 1 shows typicality and novelty and the definition and interpretation of the MAYA principle.

Table 1

*Typicality, novelty and MAYA of cognitive aesthetics.*

<b>Cognitive Aesthetics</b>	<b>Definition and Interpretation</b>
Typicality	The typicality of a product depends on how similar it is to the category prototype (Blijlevens et al.,2011; Veryzer & Hutchinson, 1998). People prefer a typical or familiar object because it satisfies the need to seek safety(Hekkert, 2014).
Novelty	Novelty is unusual or unexpected, and therefore a good way to draw the attention of consumers (Hekkert et al. 2003). Stimuli that are novel are liked as well for enabling us to learn and enrich our experience (Bornstein, 1989).
MAYA (most advanced, Yet acceptable)	Aesthetics preference is given to products with the best combination of typicality and novelty. people prefer novel designs as long as the novelty does not affect typicality, or, phrased differently, they prefer typicality given that this is not to the detriment of novelty.

Hekkert(2003), Snelders, and Van Wieringen have shown that both typicality and novelty predict people’s aesthetic preferences for a number of consumer products. It is possible to optimize novelty while preserving typicality. A negative correlation between typicality and novelty. People prefer a balance between typicality and novelty for aesthetic pleasure for product designs. A series of subsequent products demonstrated the relationship between typicality and novelty in table 2.

Table 2

*The relationship between typicality and novelty*

Categories	Typicality	Novelty
Sanders	p<0.01	p<0.01
Telephones	p<0.01	p<0.01
Teakettles	p<0.05	p<0.05
Industrial Boilers	p<0.01	p<0.01
Toothbrushes	p<0.05	p<0.05
Mouses	p<0.000	p<0.000
Chairs	p<0.05	p<0.05
Pants	p<0.01	p<0.01
Jackets	p<0.01	p<0.01
Shirts	p<0.05	p<0.05

Previous research on the typicality and novelty of clothing products was mainly research on poor products, as well as the product design of other non-clothing products, but on the typicality and novelty of rich products, especially the rich categories of clothing. There isn't much research on the product. The relationship between typicality and novelty has been verified in many artifacts. Based on previous research, it is speculated that product designs in rich categories may be more tolerant of novelty than product designs in poor categories.

In recent years, research at the cognitive level has mainly tested typicality and novelty through product design and whether the MAYA principle is applicable. There are still very few studies on the design of clothing, a product with strong social value. Table 3 lists previous studies that tested the relationship between typicality and novelty through three types of clothing products. In the future, we can carry out cognitive level education through the design of other types of clothing products, especially clothing products in rich categories.

Table 3

*The clothing hypotheses testing results*

Categories	Hypotheses	Result	
Pants	H 1a	Supported	Preference-for-prototype holds for pants.
	H 2a	Not supported	
Jackets	H 1b	Supported	Preference-for-prototype holds for jackets.
	H 2b	Not supported	
Shirts	H 1c	Supported	The MAYA principle holds for shirts.
	H 2c	Supported	

[H1: Products perceived as more typical will have a greater impact on consumers' aesthetic preferences as compared to products perceived as less typical(Lina Maria Ceballos Ochoa, 2017). H2: Products perceived as more novel will have a greater impact on consumers' aesthetic preferences as compared to products perceived as less novel (Ochoa, 2017).

#### *Social Level- Connectedness and Autonomy*

The design principles described in the previous literature mainly include perception and cognitive levels. However, products also serve a social symbolic value to consumers; they use product designs to communicate something about themselves to others (Belk, 1988). At social level, there is a design principle in which the opposing needs for safety and accomplishment are fulfilled by product designs has been identified and investigated, which shows a

relationship with aesthetic appreciation similar to the cognitive and perceptual design principles: product designs that communicate connectedness and autonomy simultaneously are the most aesthetically appreciated Blijlevens (2015), because consumers are simultaneously motivated to fulfil the basic evolutionary needs for safety and accomplishment (Hekkert, 2014).

"Autonomous, yet connected", distinguishes itself from other aesthetic principles because it thinks about product design from a completely different point of reference, the extent to which product design is likely to satisfy our societal concerns about connectedness and autonomy (Deci & Ryan, 2000). The need for connectedness is described as an inherent social need that involves the desire to feel connected to others Deci & Ryan (2000) and to have a sense of closeness with others (Baumeister & Leary, 1995; Brewer, 1991). Literature shows that the desire to form and maintain social bonds has survival and reproductive benefits as groups can share food, provide mates, and help care for offspring (Ainsworth, 1989; Hamilton, 1981). Thus, through connecting with other human beings and maintaining group affiliation, humans nurture their evolutionary need for safety. At the same time, people have inherent feelings of autonomy (Snyder & Fromkin, 1977). This need includes the desire to see oneself as a unique and differentiated living being, as well as to be free and in control (Brewer, 1991; Deci & Ryan, 2000). Regarding relatedness and autonomy, the choice of these two issues is confirmed not only by evolutionary theory, but also by important facts of concern in the context of consumption. Applying this to the context of aesthetic appreciation of product design, we propose and investigate the following hypothesis: product design leads to the highest aesthetic appreciation when it achieves an optimal balance between fostering the consumer's simultaneous need for relevance and autonomy (Blijlevens & Hekkert, 2019). Blijlevens and Hekkert (2015) used sunglasses and bicycles to test the relationship between connectedness and autonomy. The results were consistent with the hypothesis that autonomy and connectedness had a positive effect on aesthetic appreciation of both product categories. That is, product designs that communicate connectedness and autonomy through design are positively aesthetically appreciated by consumers. At the same time, conveying both connectedness and autonomy, then it is aesthetically the most pleasing. The results of the study on different categories of products show that autonomy has a greater impact on the aesthetic appreciation of bicycles than sunglasses, while connectedness has a greater impact on the aesthetic appreciation of sunglasses than bicycles.

Previous research has focused on perceptual (e.g., unity-in-variety) and cognitive (e.g., MAYA) design principles. Future research could assess how different modality levels (perceptual, cognitive, and social combined) interact in explaining aesthetic appreciation of product design. For personal consumption product categories (e.g., vacuum cleaners), consumers place more emphasis on cognitive and perceptual design principles and less emphasis on social principles in explaining aesthetic preferences, whereas for public consumption product categories (e.g., clothing products) this may go the other way. Clothing products design are strongly social in nature. Previous research has shown that when product categories already provide sufficient safety, people choose to reduce autonomy rather than increase connectedness in risky conditions compared to safe conditions. The shift in the balance of preferences between connectedness and autonomy depends on the risk/safety associated with the product category, implying that the underlying evolutionary need for safety and achievement does drive an aesthetic appreciation of autonomy and connectedness. This means that designers and marketers can use connectedness in product design to increase aesthetic appreciation for product categories with high social risk, while autonomy can be

used more effectively to influence aesthetic appreciation for product categories with lower social risk. Future research into consumer psychology and the marketing of aesthetic appreciation of product design no longer ignores these social dimensions.

### CM Model

With respect to the study of categories, the experiment explored the hypothesis that the members of a category that are considered most typical share the most attributes with other members and the fewest attributes with other categories. The results of the experiments showed that the typicality of a member is positively correlated with the extent to which its attributes are distributed in the category (Rosch & Mervis, 1975). Typicality was negatively correlated with the attributes that members shared with superordinate members of other categories and with members of comparison categories (Rosch, 1975). In past research, attribution of category membership has typically been viewed as a digitized, all-or-nothing phenomenon. However, recent research has shown that some natural categories have family-like relationships, i.e., there is some similarity between category members rather than sharing the same attributes. Rosch (1975) explored the principles that underlie the formation of the internal structure of natural semantic categories (Rips et al., 1973). Category members are regarded as typical of the category as a whole in proportion to the degree of their family resemblance to other members. By examining the distribution of attributes, it is possible to reveal the internal structure of categories and the relationships between members. This principle is consistent with the attribute validity processing model and the prototypical model of categories, and provides new perspectives for understanding the process of category formation and cognition. There is a significant correlation between family similarity structure and typicality. The more attributes an item shares with other category members, the better and more representative member of the category it is considered to be. The most typical items in each category tend to share many attributes with each other. The illusion of common elements in the superordinate category is due to the fact that the most typical items share many attributes. The categorical-motivation model therefore is related to the psychological inclination of humans that Berlyne (1971) notes as an "avoidance of extremes". As Hekkert Clementine Thurgood, Paul Hekkert (2003); HEKKERT1 (2006) explained, consumers want something that is innovative, but not to the point that they might not be able to recognise it. In other words, novelty should not jeopardise typicality, and vice versa. Thus, the most desirable products are novel; yet, they can still be categorised with similar stimuli and be compared to the goodness-of-example. Lidwell et al (2010) included the categorical-motivation model in discussing the most relevant universal principles of design in their attempt to explain the motivations behind why individuals are attracted to certain characteristics of designs. Crilly et al (2004) also discussed the importance of stereotypes (e.g. prototypes) and both properties of typicality and novelty when understanding consumer response to visual product design.

The Categorical-Motivation model distinguishes between 'rich' and 'poor' object categories. Rich object categories have many sub-categories. For example, chair is a rich object category with many sub-categories. There are dining chairs, armchairs, deckchairs, office chairs, and in the USA the electric chair to execute people. Piano is a poor object category. There are only two sub-categories: upright and grande. The Categorical-Motivation model posits that rich object categories are more tolerant of novelty than poor object categories. As such, chair is tolerant of many colours and materials, while piano will only tolerate black and brown as colours, and wood as the material. Previous studies only explain the relationship between

one dimension (perceptual, cognitive, and social level) and aesthetic preferences. Therefore, no studies have tested all three levels in their entirety. This study mainly studies the influence of UMA model on aesthetic preference of clothing products at these three levels. I choose two products, one is rich and another is poor. Previously, we concentrated on the cognitive level of aesthetics, and focused upon novelty and typicality. Now we wish to incorporate the other two levels of aesthetics, the perceptual and the social. Connectedness and Autonomy: The influence of social connectedness and autonomy on aesthetic pleasure derived from product designs. People use product designs to communicate things about themselves. For example, someone can display social group membership through the appropriate choice of a wristwatch (e.g., a classical design versus a sporty design) and thus enjoy the safety conferred by bearing the stylistic traits of that specific group. However, the same watch might also help someone else express his or her autonomy and feel like a unique individual (e.g., sporty, but quirkier than the common sports watch). Because people have both a need for connectedness and an opposing need for autonomy, we can assume that people find product designs that provide a balance between feeling connected and feeling autonomous as the most aesthetically pleasing. Yet, in daily life, social pressures may shift this balance towards a preference for connectedness over one for autonomy, or the other way around. Such pressures might include social risk, chronic regulatory focus, and in- versus out-group pressure. We are currently investigating the influence these social pressures exert on the perceived aesthetic pleasure evoked by a product’s design. Overall, this research will provide insights into the social functions of product designs.

**Hypotheses**

Based on the theoretical support that perception, cognition and social factors of the UMA model affect aesthetic preferences and the "poor" and "rich" product classifications of the CM model may also affect aesthetic preference judgments, this article puts forward the following hypotheses based on past experience, see Figure 1.

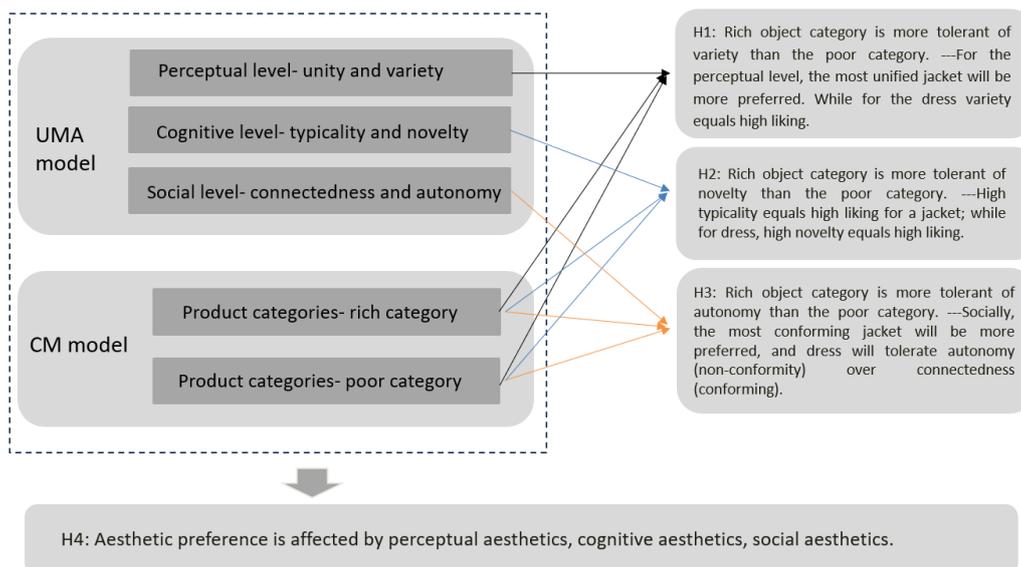


Figure 1. Research Hypotheses

**Perceptual Level- Unity and Variety and CM Model**

As the theoretical basis of the perceptual level of the UMA model, unity and variety play an

important role in design aesthetics. Previous research has empirically verified the independent but mutually restrictive relationship between unity and variety, revealing that both Maximizing is best. Both unity and variety have a positive impact on aesthetics, both in the visual and tactile domains. At the same time, due to the pulling effect between the two, there is an optimal balance between them, i.e., aesthetic appreciation is highest when there is an optimal balance between uniformity and diversity (Post et al., 2016).

From a perceptual perspective, unity and variety are very important design principles in art design. Furthermore, recent research demonstrates that “unity-in-variety” is considered an important factor in explaining aesthetics (Post et al., 2016). At the perceptual level, we derive aesthetic pleasure from stimuli that satisfy our need for unity and variety (Berghman & Hekkert, 2017). As in the visual field, R.A.G. Post's research proves that the "unity-in-variety" principle also applies to the tactile field. The results replicate those found in the visual domain and provide evidence for “unity-in-variety” as a design principle for multisensory aesthetics. Based on the relationship between unity and variety, the following hypothesis was made with reference to the research results on different categories of products (poor categories and rich categories) at the cognitive level. Accordingly, hypothesis 1 is given, as follows:

Hypothesis 1. Rich object category is more tolerant of variety than the poor category. --- For the perceptual level, the most unified jacket will be more preferred. While for the dress variety equals high liking.

#### *Cognitive Level- Typicality and Novelty and CM Model*

Many previous researchers have argued that both typicality and novelty predict aesthetic preferences for many artifacts. It is possible to optimize novelty while maintaining typicality, and there is a negative correlation between typicality and novelty. For artifacts, people prefer to seek a balance between typicality and novelty to obtain aesthetic pleasure (Thurgood & Hekkert, 2003). In addition, there are many empirical studies not only in the visual field, but also in the tactile field, showing that people prefer safe and typical product designs, and the research has confirmed the MAYA principle (Suhaimi, 2021)(Yahaya, 2017). But for different types of artifacts, not all products follow the MAYA principle. In the study, Ceballos (2019) found that the test results of clothing products such as pants and jackets were that people preferred prototype designs, while shirts were in line with the MAYA principle. At present, there are many empirical studies on typicality and novelty, and the product range is rich, covering many artefacts such as cars, web pages, industrial boilers, mice, toothbrushes, chairs, etc. Most of the previous product empirical studies belong to the "poor" category of the CM model product classification. Currently, the research on the typicality and novelty of the "rich" category products mainly includes chairs and shirts. Therefore, it follows from previous research that products in the “rich” category are more tolerant of novelty than products in the “poor” category. Accordingly, hypothesis 2 is given as follows:

Hypothesis 2. Rich object category is more tolerant of novelty than the poor category. --- For the cognitive level, high typicality equals high liking for a jacket; While for dress high novelty equals high liking.

#### *Social Level- Connectedness and Autonomy and CM Model*

“Autonomous, yet connected”: A social design principle explaining consumers’ aesthetic appreciation of products (Blijlevens & Hekkert, 2014). This shows a relationship with aesthetic appreciation similar to the cognitive and perceptual design principles: product designs that

communicate connectedness and autonomy simultaneously are the most aesthetically appreciated.

People’s preferences and types of possessions have roots that are characteristically social in their desire to belong to a group (i.e., “affiliation seeking,” cf. Markus and Kitayama, 1991; Kleine et al., 1995). The need for connectedness is described as an inherent social need that involves the desire to feel connected to others (Deci & Ryan, 2000) and to have a sense of closeness with others (Baumeister & Leary, 1995; Brewer, 1991).

The need for autonomy involves a desire to see oneself as a unique and differentiated being and as being free and in control of oneself (Snyder & Fromkin, 1977). Within the safe confines of the group, we benefit from standing out to some extent. Exploring complex and novel designs helps to build a broader knowledge base that aids in responding to future situations or stimuli in the environment.

Clothing design products are more social than other design products. Currently, there is a paucity of empirical research on the social dimension. Hypothesis 3 is proposed based on the assumptions at the perceptual level and cognitive level and the product classification of the CM model, accordingly, hypothesis 3 is given, as follows:

Hypothesis 3. Rich object category is more tolerant of autonomy than the poor category. --- Socially, the most conforming jacket will be more preferred and dress will tolerate autonomy over connectedness.

## Research Methodology

### Research Design

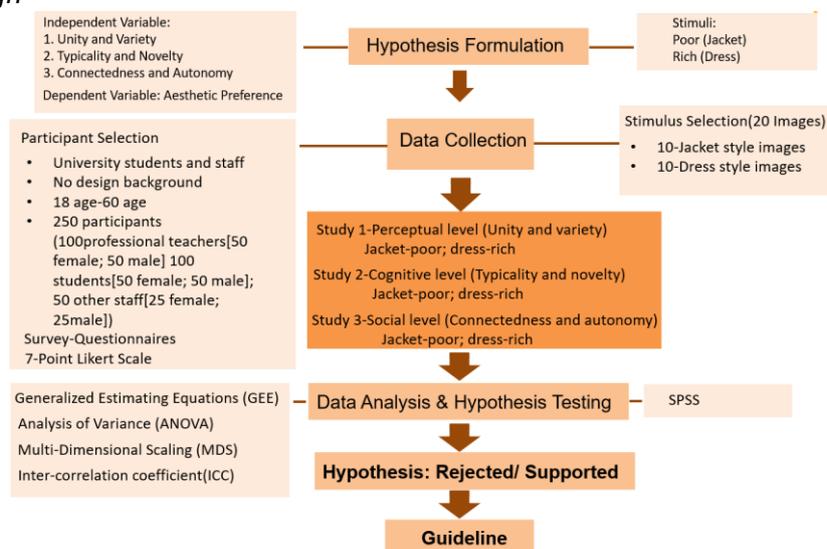


Figure 2 Research Design

This is a quantitative study. The main objective of this study is to investigate the predictors and determinants of aesthetic preference for clothing design products. Unity and variety, typicality and novelty, connectedness and autonomy in the UMA model have been identified as independent variables determining and predicting the dependent variable aesthetic preference. Therefore, this paper provides an overview of the underlying theories and models that examine the role of these three dimensions of UMA in aesthetic preferences. An in-depth examination of how all of these models connect, correlate, and shape our current understanding of the roles of unity and variety, typicality and novelty, connectedness and autonomy as predictors and determinants of aesthetic preference, and how they influence

preferences for design products, is conducted in this study. The dependent variable is aesthetic preference. The independent variables are perceptual aesthetic, cognitive aesthetic and social aesthetic.

### *Survey Methodology*

There were 250 samples that were selected for the first data analysis among college students, professional teachers, and other staff at universities. This is because on the one hand, this study addresses the aesthetic preferences of Chinese consumers, and on the other hand, the study requires a variety of participants. By recruiting participants in public places such as libraries, dining halls, and academic buildings, a variety of people from different academic or professional fields and backgrounds were involved. These participants were identified as the most common consumer users of the products tested. Special emphasis is placed on students, faculty and other staff with design backgrounds being expressly excluded. Previous research has shown that when students or design professionals with design backgrounds evaluate products aesthetically, their expertise influences their judgment, and they are likely to be more receptive to novelty than those without design expertise, and therefore are not representative of the public.

### *Measurement Items*

The questionnaire was conducted using a multi-item method based on the three levels of the UMA model, with each level corresponding to two questions. Each question was measured based on a 7-point Likert scale, ranging from "strongly disagree" to "strongly agree" ". A study by Blijlevens (2017) developed an investigation of reliable, valid, and generalized scales to measure aesthetic pleasure in the field of design. We found that aesthetic pleasure can be validly and reliably measured with five items: ". . . this is a beautiful [object (e.g., camera)]," ". . . this is an attractive [object]," ". . . this [object] is pleasing to see," ". . . this [object] is nice to see," and "...I like to look at this [object]." (Blijlevens et al., 2017) Respondents view and rate a range of images or products based on a web-based or face-to-face questionnaire. The measurement items used to construct the operationalization were adopted from previous relevant research; they have been validated in other previous literature. The questionnaire for this study is as follows, see Appendix A.

This study was comprised of three independent variables and 1 dependent variable. The independent variables are the three levels of UMA model. The three independent variables are the perceptual level (unity and variety), the cognitive level (typicality and novelty), and the social level (connectedness and autonomy). The dependent variable is participants preference. To choose a rich clothing product and a poor clothing product, by controlling the variables, the aesthetic preference of clothing style was analyzed with data. Each level corresponds to a hypothesis.

### **Data Analysis**

As an extension of the original Project UMA (Unified Model of Aesthetics) involving the universities of Cambridge, Delft, Swinburne, and Vienna, similar empirical methods will be used. These follow in the tradition of Fechner who revolutionised the study of aesthetics by using scientific method. The method will involve the creation of highly controlled designs (termed 'stimuli') that are used to test specific hypotheses on participants in surveys. The data will be analysed using the statistical procedures of Multi-Dimensional Scaling (MDS), GEE

(Generalized Estimating Equations), ANOVA (Analysis of Variance) and ICC (Inter-correlation coefficient). These will establish the extent to which the hypotheses are supported or refuted.

## **Discussion**

### *Summary of Results*

After previous empirical analysis, a rich set of results was obtained. The most important results are that unity and diversity, typicality and novelty, and connectedness and autonomy at the perceptual, cognitive and social levels in the UMA model, both aspects of each group, have a positive impact on aesthetic preferences, and maximizing both is the best. The aesthetic preference for artifacts is inseparable from the influence of these three factors. This is not only an aesthetic issue, but also an important theoretical basis for designers to design products.

Research shows that we share some basic aesthetic preferences. For example, aesthetically, we like symmetry, uniformity, typicality, and a certain amount of complexity. We also tend to like design products that look familiar. We will accept relatively diverse, novel and independent product designs within a safe scope. The analysis of aesthetic preferences of clothing products is more challenging because clothing products are different from other industrial design products and are more affected by social factors.

Research shows that there are certain differences in whether different types of products comply with "unity in diversity", the MAYA principle and "autonomous but connected". Recent research highlights that this difference may be related to product classification or that more precise testing studies are needed to take these differences into account.

### 5.2 Limitations and Future Research

The clothing products used in this study were not strictly differentiated by clothing gender classification. In fact, clothing design is divided into different categories such as men's clothing, women's clothing, and children's clothing. Therefore, future research can differentiate the aesthetic preferences of men's and women's clothing in more detail based on this study. In addition, there are many factors that influence clothing design. In addition to the visual aspect, the tactile aspect also has a certain impact on the aesthetic preference of clothing. More detailed research on tactile aspects can be conducted in the future.

### Implications for Theory and Practice

#### *Theoretical Implication*

The relationship between typicality and novelty has been discussed in many previous studies, but they mainly focused on testing products in the "poor" category. However, there is limited literature available for research on testing products in the "rich" category. One of the important results and significance of this study is that it helps to understand the role of the three levels in the UMA project in determining aesthetic preferences for fashion design products. Secondly, understanding the relationship between the three levels of UMA in determining aesthetic preferences and the overall impact on aesthetic preferences, whether they influence or inhibit each other, whether they are positively or negatively correlated, is a valuable and important development in the field of aesthetic response research. In addition, by combining the product classification model in the CM model, the relationship between different categories of clothing products and the UMA model is explored.

This study is important because it is the first to combine the CM model with the UMA model to test "poor" and "rich" clothing products at different levels of functional and aesthetic dimensions. This is a theoretically important contribution, first of all, because these three

levels of the UMA model have not been fully tested, which is a gap in the current research field. Secondly, there is no complete test of the three levels of the UMA model for poor and rich categories of clothing products.

Furthermore, it is important that this study brings the benefit of an important contribution to the body of knowledge, which is a proposed assessment method with an empirically validated scale that can predict the success or failure of a design concept in persuading and engaging potential consumers. This study is different from the research on abstract art aesthetics. It adopts scientific and empirical methods and uses a proven, reliable and generalizable scale to measure the aesthetic pleasure of design products. This is experimental aesthetics, but also the aesthetics of everyday life.

This study also bridges the gap of exploring different levels (perceptual, cognitive and social) in a new unexplored category (the have-nots of clothing products). Therefore, the research results can not only fill the gap in literature research, but also provide design suggestions for clothing practitioners.

*Practical Implication*

Our findings provide guidance and insights for apparel industry practitioners and leaders to improve apparel product design solutions. The UMA model and the CM model aim to enable meaningful comparisons between aesthetic studies, which is beneficial to elucidating the relationship between aesthetic pleasure and its determinants. The research results can have practical significance for fashion designers to create beautiful clothing design products.

**Acknowledgements**

This study is part of the first author’s PhD thesis in the field of aesthetic preference at the Faculty of Design and Architecture, Universiti Putra Malaysia. The author would like to thank Dr. Faiz and Dr. Tai Lichen for their help in selecting the topic.

**Appendix A**

Table A1

*Measurement items. The questionnaire of UMA and CM model*



For Quantitative---7-point Likert scale

	1	2	3	4	5	6	7
This is a unified design.							
This design conveys variety.							
} Unity and Variety							
This is a typical design.							
This is a novel design.							
} Typicality and Novelty							
This product design makes me feel connected.							
This product design emphasizes my individuality.							
} Connectedness and Autonomy							
This design is pleasing to see.							
} Liking							

**References**

- Ainsworth, M. D. S. (1989). Attachments beyond infancy. *American Psychologist*, 44(4), 709–716. <https://doi.org/10.1037//0003-066x.44.4.709>
- Baumeister, R. F., & Leary, M. R. (1995). The Need to Belong: Desire for Interpersonal Attachments as a Fundamental Human Motivation. *Interpersonal Development*, 117(3), 497–529. <https://doi.org/10.4324/9781351153683-3>
- Belk, R. W. (1988). Possessions and the extended self. *Journal of Consumer Research*, 15(2), 139–168.
- Berghman, M., & Hekkert, P. (2017). Towards a unified model of aesthetic pleasure in design. *New Ideas in Psychology*, 47, 136–144. <https://doi.org/10.1016/j.newideapsych.2017.03.004>
- Blijlevens, J. (2015). “ Autonomous , yet connected ” : A social design principle explaining consumers ’ aesthetic appreciation of products. 2015 Academy of Marketing Conference-the Magic in Marketing, 7–9, 1–8.
- Blijlevens, J., & Hekkert, P. (2019). “ Autonomous , yet Connected ” : An esthetic principle explaining our appreciation of product designs. *Psychology& Marketing*, 36(5), 530–546. <https://doi.org/10.1002/mar.21195>
- Blijlevens, J., & Hekkert, P. P. M. (2014). Influence of Social Connectedness and Autonomy on Aesthetic Pleasure for Product Designs. *IAEA*, 95–99.
- Blijlevens, J., Thurgood, C., Hekkert, P., & Chen, L. (2017). The Aesthetic Pleasure in Design Scale : The development of a scale to measure aesthetic pleasure for designed artifacts . *The Aesthetic Pleasure in Design Scale : The Development of a Scale to Measure Aesthetic Pleasure for Designed Artifacts. Psychology of Aesthetics, Creativity, and the Arts*, 11(1), 86–98. <https://doi.org/10.1037/aca0000098>
- Brewer, M. B. (1991). The social self:On being the same and different at the same time.pdf. *Personality Ans Social Psychology Bulletin*, 17(5), 475–482.
- Carbon, C. (2010). The cycle of preference : Long-term dynamics of aesthetic appreciation. *Acta Psychologica*, 134(2), 233–244. <https://doi.org/10.1016/j.actpsy.2010.02.004>
- Ceballos, L. M., Hodges, N. N., & Watchravesringkan, K. (2019). The MAYA principle as applied to apparel products The effects of typicality and novelty on aesthetic preference. *Journal of Fashion Marketing and Management*, 23(4), 587–607. <https://doi.org/10.1108/JFMM-09-2018-0116>
- Clementine Thurgood, Paul Hekkert, J. B. (2003). The joint effect of typicality and novelty on aesthetic pleasure for product designs:Influences of Safety and Risk. 391–396. [https://opus.lib.uts.edu.au/bitstream/10453/36796/4/The joint effect of typicality and novelty on aesthetic pleasure for product designs.pdf](https://opus.lib.uts.edu.au/bitstream/10453/36796/4/The%20joint%20effect%20of%20typicality%20and%20novelty%20on%20aesthetic%20pleasure%20for%20product%20designs.pdf)
- Deci, E. L., & Ryan, R. M. (2000). The “what” and “why” of goal pursuits: Human needs and the self-determination of behavior. *Psychological Inquiry*, 11(4), 227–268. [https://doi.org/10.1207/S15327965PLI1104\\_01](https://doi.org/10.1207/S15327965PLI1104_01)
- Gallace, A., & Spence, C. (2011). To What Extent Do Gestalt Grouping Principles Influence Tactile Perception ? *137(4)*, 538–561. <https://doi.org/10.1037/a0022335>
- Hamilton, R. A. and W. D. (1981). The evolution of cooperation. *Scientist*, 211, 1390–1396. <https://doi.org/10.5433/2178-8189.2021v25n2p208>
- Hekkert, P. (2008). Product aesthetics. *Product Experience*, 259–285.
- Hekkert, P. (2014). Aesthetic responses to design : a battle of impulses. *The Cambridge Handbook of the Psychology of Aesthetics and the Arts*, February, 277–299. <https://doi.org/10.1017/CBO9781139207058.015>

- Hekkert, P., Snelders, D., & Wieringen, P. C. W. Van. (2003). 'Most advanced , yet acceptable ': Typicality and novelty as joint predictors of aesthetic preference in industrial design. *British Journal of Psychology*, 111–124.
- HEKKERT1, P. (2006). Design aesthetics: principles of pleasure in design. *Psychology Science*, 48(2), 157–172.
- Lina Maria Ceballos Ochoa. (2017). Examining the effects of typicality and novelty on aesthetic and positive emotions using the MAYA principle: the moderating role of usage situation (Issue December).
- Paulsen, M. T., Rognså, G. H., & Hersleth, M. (2015). Consumer perception of food–beverage pairings: The influence of unity in variety and balance. *International Journal of Gastronomy and Food Science*, 2(2), 83–92. <https://doi.org/10.1016/j.ijgfs.2014.12.003>
- Post, R. A. G., Blijlevens, J., & Hekkert, P. (2016). 'To preserve unity while almost allowing for chaos ': Testing the aesthetic principle of unity-in-variety in product design. *Acta Psychologica*, 163, 142–152. <https://doi.org/10.1016/j.actpsy.2015.11.013>
- Post, R., Nguyen, T., & Hekkert, P. (2017). Unity in Variety in website aesthetics: A systematic inquiry. *International Journal of Human Computer Studies*, 103(January), 48–62. <https://doi.org/10.1016/j.ijhcs.2017.02.003>
- Ragposttudelftnl, R. A. G. P. (2014). Aesthetic Appreciation of Tactile Unity - in - Variety in Product Designs. *Academic*, 358–360.
- Rips, L. J., Shoben, E. J., & Smith, E. E. (1973). Semantic distance and the verification of semantic relations. *Journal of Verbal Learning and Verbal Behavior*, 12(1), 1–20. [https://doi.org/10.1016/S0022-5371\(73\)80056-8](https://doi.org/10.1016/S0022-5371(73)80056-8)
- Rosch, E. (1975). *Cognitive representations of semantic categories.pdf*. *Journal of Experimental Psychology: General*, 104(3), 192–233.
- Rosch, E., & Mervis, C. B. (1975). Family resemblances: Studies in the internal structure of categories. *Cognitive Psychology*, 7(4), 573–605. [https://doi.org/10.1016/0010-0285\(75\)90024-9](https://doi.org/10.1016/0010-0285(75)90024-9)
- Snyder, C. R., & Fromkin, H. L. (1977). Abnormality as a positive characteristic: The development and validation of a scale measuring need for uniqueness. *Journal of Abnormal Psychology*, 86(5), 518–527. <https://doi.org/10.1037/0021-843X.86.5.518>
- Suhaimi, S. N. (2021). Investigating the Significance of Typicality and Novelty in the Aesthetic Preference of Industrial Products.
- Whitfield, T. W. A. (2000). Beyond Prototypicality: Toward a Categorical-Motivation Model of Aesthetics. *Empirical Studies of the Arts*, 18(1), 1–11. <https://doi.org/10.2190/km3a-g1nv-y5er-mr2v>
- WHITFIELD, T. W. A. (1983). Predicting preference for familiar, everyday objects: an experimental confrontation between two theories of aesthetic behaviour. *Journal of Environmental Psychology*, 3, 221–237.
- Whitfield, T. W. A., & Allan, I. W. (2005). Aesthetics as Pre-linguistic Knowledge : A Psychological Perspective. *Design Issues*, 21(1), 3–17.
- Yahaya, M. F. (2017). Investigating Typicality and Novelty through Visual and Tactile Stimuli. [https://researchbank.swinburne.edu.au/file/daaa042a-f94b-4d59-845b-dacbdb6fb349/1/mohd\\_yahaya\\_thesis.pdf](https://researchbank.swinburne.edu.au/file/daaa042a-f94b-4d59-845b-dacbdb6fb349/1/mohd_yahaya_thesis.pdf)