

38.2 The Influences of Aesthetic Life Experience and Expertise on Aesthetic Judgement and Emotion in Mundane Arts

Yu-chu Yeh  and **Yueh-Yin Peng**

Abstract

Aesthetics has been regarded as a fundamental personal value. Most of the previous studies regarding aesthetic experience (AE) have focused on fine arts, rather than the everyday arts that are closely related to our everyday life. This study analysed the relationships among aesthetic life experience, expertise and different types of AE outcomes (aesthetic judgement and emotion) inspired by everyday designed products. The participants in this study were 115 college students, and an E-prime program that included 120 pictures of designed products were employed to measure aesthetic judgement (beautiful, ordinary, or ugly) and aesthetic emotion (fearful, disgusting, neutral, or pleasure). The results revealed three major phenomena. (1) Two major types of AE outcomes are perceiving beauty with positive emotion and perceiving ugliness with negative emotion. (2) Although there are similar patterns for how aesthetic life experience and expertise influence personal tastes regarding beauty and aesthetic emotion, abundant expertise in designed products contributes more in differentiating emotion when viewing the beautiful designed products. (3) The consensus of the evaluation of ugliness is stronger than when evaluating beauty. In addition, a model of AE with regard to everyday designed products was proposed. The findings of this study shed light on the cultivation of aesthetic abilities and product design that could be utilised in education.

Keywords

aesthetic experience, aesthetic judgement, emotion, expertise, life experience, designed product

Introduction

Aesthetics has been considered a fundamental personal value from the very beginning of personality research (Townsend & Sood 2012), and within scientific

research, is defined as the study of aesthetic experiences (AE) (Zangwill 2014). AE involves interactions among several cognitive and emotional processes, with the two most salient outcomes being aesthetic judgement and aesthetic emotion (Armstrong & Detweiler-Bedell 2008; Cinzia & Vittorio 2009; Leder 2013; Nadal & Skov 2013; Zeki *et al.* 2014). Studies of AE within the fine arts are well represented in the literature, but few studies have evaluated everyday arts, such as designed products that are commonly seen in everyday life (Liu *et al.* 2015). Design can be defined as the human desire to shape and change our environment in ways that serve our needs, and give meaning to our lives; it is one of the fundamentally human abilities that is critical for professional success and personal fulfilment in the twenty-first century (Pink 2005). Aesthetics directs evolutionary trends of design, and designed objects have critically shaped culture. The combination of aesthetics and design, otherwise referred to as 'design aesthetics', has had far-reaching effects on our lives (Adelabu & Yamanaka 2014).

Two measure outcomes of AE are aesthetic judgement and aesthetic emotion, but past models of AE seldom indicate the relationships between various degrees of aesthetic judgement and different types of emotion (e.g. Adelabu & Yamanaka 2014; Leder *et al.* 2004; Norman 2004). Aesthetic judgement and emotion is largely subjective (Yeh *et al.* 2015b; Zangwill 2014) and influenced by beliefs, or by orientations about objects (Cupchik *et al.* 2009; Nadal & Pearce 2011). Therefore, this study attempted to analyse the relationship between aesthetic judgement and emotion while viewing various designed products, as well as to investigate how aesthetic life experience and expertise in design can influence the AE outcomes with regard to everyday designed products. In this study, we consider AE to be the cognitive process of appreciating designed products in our experiment, whereas aesthetic life experience is defined as those cognitive processes that accumulate from everyday life.

Aesthetic experience in designed products

Famous models of aesthetics have suggested that AE includes two interactive processes, namely, aesthetic judgement and aesthetic emotion (Parsons 1987; Gjerde 2011; Leder *et al.* 2004). Supporting the close relationship between aesthetic judgement and aesthetic emotion, Parsons (1987) claimed that objective aesthetic judgement exists, though aesthetic judgement is often influenced by subjective emotion. More recent researchers, including Brattico & Pearce (2013), claimed that AE usually comes to full fruition by inducing emotion in the individual and by prompting an evaluative judgement. Other recent studies support this theory that emotion critically influences aesthetic responses (Bertamini *et al.* 2013; Okanoya 2013). Nadal & Skov (2013) suggested that aesthetic emotion might go beyond aesthetic pleasure *per se*, depending on the portrayal of the emotional content to which we relate. Accordingly, aesthetic judgement of beauty is the exhilarating and complex feeling that engenders understanding and valuing an object (Armstrong & Detweiler-Bedell 2008).

A recent study by Adelabu & Yamanaka (2014) proposed a definition of AE within the domain of design. They defined AE as an affective sensitivity element and an emotive cognitive process that occurs during the interpretation of product values. They further interpreted the processes of AE in product design based on Norman's (2004) notion of the three-layer theory of AE: superficial aesthetics, functional aesthetics and symbolic aesthetics. Superficial aesthetics involves the sensation of the tangible and intangible design elements of a product. Functional

(interactive) aesthetics results from the use of products that engage the user in a pleasurable way or when the operation of a product evokes a pleasurable experience. Finally, symbolic aesthetics materialises through meaningful associations with the product (Adelabu & Yamanaka 2014). The process of experiencing tangible elements in superficial and functional aesthetics during AE is disparate between designed products and the fine arts.

Aesthetic life experience, expertise and AE in designed products

Armstrong & Detweiler-Bedell (2008) argued that the experience of beauty goes beyond recapitulating something already represented in the mind; it reflects the prospect of understanding something novel and particularly meaningful. Moreover, they claimed that aesthetic pleasure includes the mild pleasure associated with familiar or easily categorised objects and the exhilaration associated with objects that challenge the mind's ability to understand them. These arguments suggest that AE is greatly influenced by personal experiences, and such arguments have been supported by many researchers. For example, Vessel *et al.* (2012) suggested that aesthetic responses to visual stimuli comprise multiple types of experiences, from sensation and perception to emotion and self-reflection. In other words, AE involves the integration of sensory and emotional reactions that are linked with their personal relevance. In addition, well-known AE models illustrate the influences of personal experience and expertise on aesthetic judgement or emotion. Gjerde (2011) claimed that aesthetic judgement comprises sensory perception, formal cognition and associational meaning and value. Leder *et al.* (2004) proposed that perception, explicit classification, implicit classification, cognitive mastering and evaluation are five stages of AE, and aesthetic judgement and emotions are two outcomes. Among these processes, the stage of explicit classification is greatly influenced by the individual's knowledge and experience, and familiarity increases liking during implicit processing. Parsons (1987) proposed that aesthetic judgement includes five stages: favoritism which involves pleasant emotion, beauty and realism, expressiveness, style, and form which is influenced by expertise and autonomy.

Findings from fMRI studies also suggest that life experience and expertise modulate the influences of brain functions during AE. It was found that the precuneus, which is associated with fitting new information into an established mental framework of prior knowledge, is associated with subjective aesthetic judgement (Yeh *et al.* 2015a). The precuneus also operates during episodic memory (Utevsky *et al.* 2014), which refers to the memory of autobiographical events that can be explicitly stated or conjured; it is the collection of past personal experiences that occurred at a particular time or place (Schacter *et al.* 2011). These observations suggest that AE may influence an individual's life experience and expertise.

Through the integration of past findings and theories (Adelabu & Yamanaka 2014; Gjerde 2011; Leder *et al.* 2004; Norman 2004; Yeh *et al.* 2015a), we propose a model of AE with regard to designed products that are commonly seen or used in everyday life, in which four cycled and interactive processes are identified (see Figure 1): (1) The superficial aesthetic: aesthetic perceptions involving physical characteristics, familiarity and typicality, as well as aesthetic analyses of complexity, and the process of making comparisons between stimuli and the established framework. (2) The symbolic aesthetic: the aesthetic association of meanings and values (including the practical values), integration of subjective preference and normative values, and the integration of an intrinsic coding system and associative coded expression. (3) The conceptual aesthetic: the conceptual evaluation of a product

with regard to its beauty and the emotion it inspires. Based on the interactions of aesthetic judgement and emotion, four major types of conceptual aesthetic outcomes can occur (beautiful, positive emotion; beautiful, negative emotion; ugly, positive emotion; ugly, negative emotion). Judgement of beauty eliciting positive emotion would most likely lead to wanting, or the desire to go through to the next stage. (4) The functional aesthetic: this happens during or after the actual use of an everyday designed product. After experiencing the use of the product, an aesthetic judgement and aesthetic emotion will reoccur. These thoughts and feelings are integrated into the individual's memory, knowledge system and their established framework of aesthetic experience, which forms one's aesthetic life experience and expertise in design, and further influences the next AE. Aesthetic life experience and expertise in design play important roles during AE, and influence the four processes of AE (see Figure 1); while aesthetic life experience may enhance open-mindedness and facilitate the preference of designed products, expertise in design may lead to a higher threshold of beauty and greater sensitivity toward appreciation of designed products.

The present study

Aesthetic experience in designed products includes four cycled processes: superficial, symbolic, conceptual and functional aesthetics (see Figure 1). We only measured aesthetic judgement and emotion at the third stage because of limitations in the experimental design of this study. These AE processes involve both the implicit and explicit processes that can be influenced by subjective experiences, and such subjective experiences mainly build upon aesthetic life experience and expertise in design. In addition, AE is culture-specific (Geertz 2001); a specific group or domain would involve specific experiences and knowledge of aesthetics. Notably, past models seldom indicate the relationships between various degrees of aesthetic judgement and different types of emotion (e.g. Adelabu & Yamanaka 2014; Leder *et al.* 2004; Norman 2004). In this study, we focused on a specific context (designed products) and a specific cultural group (college students) to investigate the relationships

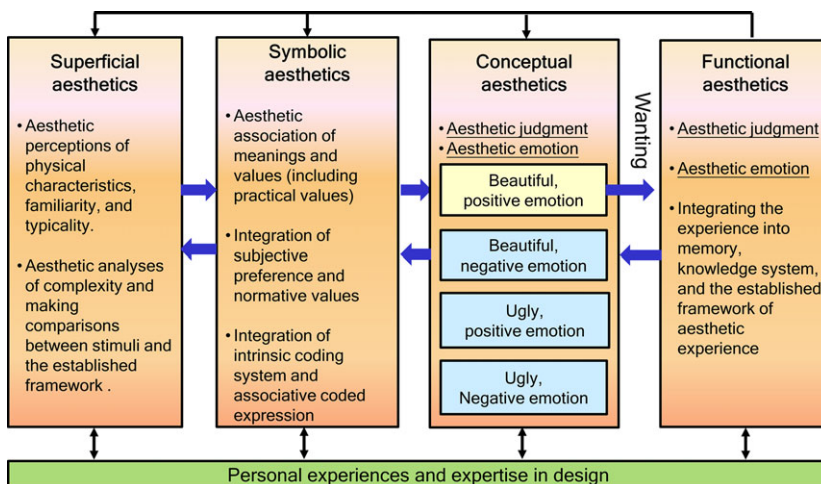


Figure 1

A proposed model of AE in everyday designed products.

between aesthetic judgement and aesthetic emotion and to identify how aesthetic life experience and expertise in design were associated with specific types of aesthetic judgement and emotion.

Although there could be different combinations of aesthetic judgement and emotion, we hypothesised that the most prevailing outcomes observed while appreciating designed products would be perceiving beauty with positive emotion and perceiving ugliness with negative emotion. Moreover, rich aesthetic life experience and expertise in design would contribute to the superficial aesthetics and the symbolic aesthetics, which further bring about positive AE outcomes. We also hypothesised that the influence of aesthetic life experience and expertise in design on AE outcomes would be different because rich expertise in design may lead to a different AE orientation and a higher threshold of beauty.

Method

Participants

Participants comprised of 115 undergraduate volunteers (15 males and 100 females) aged 18–35 ($M = 20.38$ years; $SD = 2.26$ years) recruited through advertisements on campus, coming from the college of liberal arts (7.0%), science (5.2%), law (4.3%), commerce (18.3%), foreign language and literature (14.8%), social science and education (40.9%) and others (8.6%). Written informed consent was obtained from all participants, and the study was approved by the Research Ethics Committee in the university where the data were collected. Approximately \$10.00 USD was awarded for participation.

Stimuli

One hundred and twenty pictures of everyday designed products were used as stimuli through E-prime in this study. The pictures were selected from Aesthetic Pictures of Everyday Designed Products (APEDP) based on a 6-point Likert type measurement (ranging from very ugly to very beautiful) completed by 401 college students (Yeh *et al.* 2015a). The APEDP, included three categories (beautiful, ordinary and ugly) comprised of 412 pictures collected from websites, books and international awards for creative products.

This study selected 40 pictures that had best discriminate validity from each of the aesthetic judgement groups (beautiful, ordinary and ugly) in the APEDP. The mean scores for the beautiful, ordinary, and ugly pictures were 4.877 ($SD = 0.146$), 3.876 ($SD = 0.200$) and 1.844 ($SD = 0.194$), respectively (Yeh *et al.* 2015a).

Instrumentation

The Inventory of Everyday Aesthetic Experience in Designed Products (IEAEDP) and the Inventory of Design Experience (IDE) (Yeh *et al.* 2015a) were employed in this study. Both inventories were 4-point Likert scales, and the response options ranged from 'never' to 'always'. The IEAEDP measured the participants' degree of aesthetic life experience with regard to their aesthetic perceptions and analyses, aesthetic judgement and emotion, and everyday-experience association when viewing designed products in daily life. The IEAEDP, developed based on theories of aesthetics (e.g. Gjerde 2011; Leder *et al.* 2004; Mastandrea *et al.* 2011; Townsend & Sood 2012), included three factors: aesthetic perceptions and analyses (12 items), aesthetic judgement and emotion (11 items), and everyday-experience

associations (3 items). Example test items are 'I can analyze the design styles of the product', 'Observing colorful products makes me happy', and 'Familiar products can provoke my memories of happiness'. The Cronbach's α coefficients were .946, .917, .893, and .749 for the IEAEDP and for the three factors, respectively. The correlation coefficients for the three factors were .436 to .558 $ps < .001$ (Yeh *et al.* 2015a).

The expertise related to product design was assessed by the IDE in this study. The IDE investigated the participants' degree of actual involvement in product design; a high score in the IDE represent abundant expertise in product design. Notably, all of the participants were not from a design college or department. With a Cronbach's α coefficient of .822, the IDE included seven items that were converged into one factor. The seven items are as follows: I have worked for product design in companies; I have used image-editing software (e.g. Photoshop) to design things; I have self-employed to charge cases in design; I have participated in creativity or design-related competitions; I have engaged in art-related activities (e.g. painting, photography and handicraft); I have read design-related books or magazines. An exploratory factor analysis indicated that 49.35% of the total variance was explained, with the factor loadings ranging from .613 to .805 (Yeh *et al.* 2015a).

Design and procedures

The experiment was conducted through E-prime (a commonly used software for behavioural experiments) in a computer laboratory. After filling out the consent form and required personal information, the participants were subjected to a brief introduction. The experiment in E-prime included three runs; in each run, the participants were first presented with the word 'ready'. Then, 40 trials were presented. In each of the trials, a stimulus with the rating question of aesthetic judgement (1 = very ugly, 2 = ugly, 3 = beautiful, 4 = very beautiful) was presented for 6 seconds, followed by a fixation cross with randomly jittered inter-trial intervals of 2, 4 or 6 seconds. Then, participants were requested to rate the aesthetic emotion (1 = fearful; 2 = disgusting; 3 = neutral; 4 = pleasant) (see Figure 2). The stimuli of the three categories of aesthetic judgement were randomly distributed in the three runs. With a 2-minute break between each run, the total duration of the experiment was approximately 48 minutes.

Results

Preliminary analyses

One-way Multivariate Analysis of Variance (MANOVA) was employed to examine whether the participants' gender and major of study had influences on their aesthetic judgement and emotion. We first used the scores of aesthetic judgements (ugly, ordinary and beautiful) as dependent variables to conducted MANOVAs. No gender or major effects on aesthetic judgement, Wilks' $\Lambda = .983$, $p = .601$, $\eta_p^2 = .107$ and Wilks' $\Lambda = .818$, $p = .427$, $\eta_p^2 = .065$, respectively.

We then used the scores of aesthetic emotion (fearful, disgusting, neutral and pleasant) in each category (ugly, ordinary or beautiful) of the stimuli as dependent variables to conduct MANOVAs. Similarly, no gender or major effects on aesthetic emotions in all the three categories of stimuli, Wilks' $\Lambda = .926$ to .971, $ps = .077$

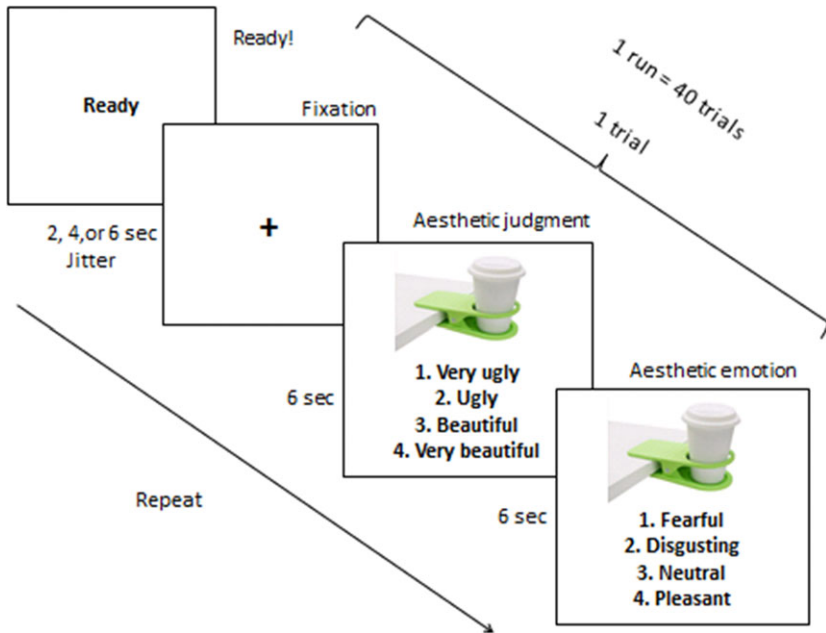


Figure 2
Procedures of the experiment.

to .353, $\eta_p^2 = .029$ to .074, and Wilks' $\Lambda = .849$ to .988, $ps = .478$ to .991, $\eta_p^2 = .027$ to .063, respectively.

The relationship between aesthetic judgement and aesthetic emotion

Based on the participants' ratings in this study, the mean scores for aesthetic judgement in the beautiful, ordinary and ugly pictures of the APEDP were 3.26 ($SD = 0.34$), 2.74 ($SD = 0.31$) and 1.45 ($SD = 0.39$), respectively. The results showed that the participants' subjective responses for the aesthetic judgement were consistent to the categories of aesthetic judgement in the APEDP; 87.79% of the beautiful stimuli in the APEDP were rated as beautiful or very beautiful and 94.10% of the ugly stimuli in the APEDP were rated as very ugly or ugly. These results reveal a great consensus among participants for the beautiful and ugly stimuli, especially for the ugly stimuli.

Moreover, 85.59% of the ugly pictures provoked fearful or disgusting emotion, 94.45% of the ordinary picture provoked neutral or pleasant emotion, and 73.20% of the beautiful pictures exclusively induced pleasant emotion (see Table 1). A Pearson Correlation analysis also showed that, in all three categories of pictures, the more beautiful a picture was judged, the more pleasure was reported ($r_s = .614$ to $.729$, $ps < .001$). The correlation was especially strong in the category of beautiful pictures.

The influence of aesthetic life experience and expertise in design on aesthetic judgement

The IEAEDP was employed to measure the participants' aesthetic life experience, and the IDE was employed to measure the participants' expertise pertaining to

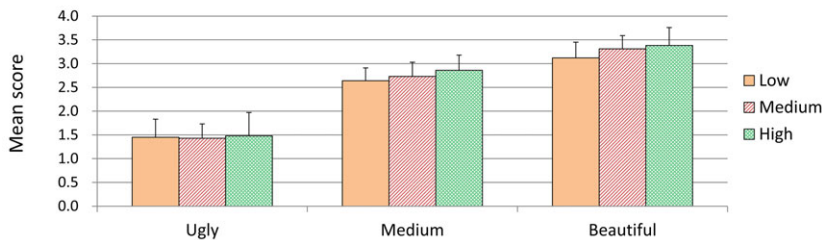
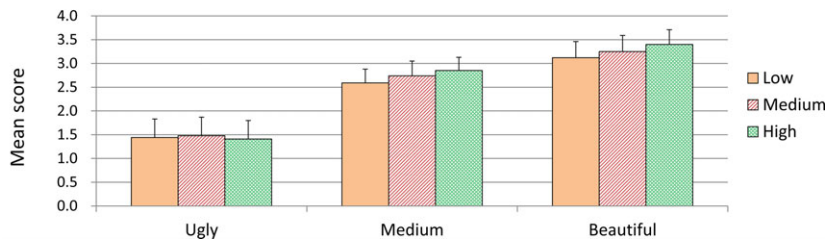
TABLE 1 Percentage of responses in aesthetic emotion of the APEDP

Categories of APEDP	Fearful	Disgusting	Neutral	Pleasant
Beautiful	1.82	0.96	24.01	73.20
Ordinary	1.73	3.82	47.76	46.69
Ugly	20.61	64.98	10.75	3.66

Note: Aesthetic judgement: 1 = Very Ugly, 2 = Ugly, 3 = Beautiful, 4 = Very beautiful.

product design. To examine the effects of aesthetic life experience and expertise in design on aesthetic judgement, we used the scores of aesthetic judgements (ugly, ordinary and beautiful) as dependent variables and conducted one-way MANOVA. In these analyses, the independent variable (IEAEDP or the IDE) as divided into the Low, the Medium and the High group by the cut-off points of the upper 33% and lower 33% of the scores. Figure 3(a) shows the *M*s and *SD*s for the groups with different aesthetic life experience in aesthetic judgement, and Figure 3(b) shows the *M*s and *SD*s for the groups with different expertise in design in aesthetic judgement.

The results showed significant group effects of aesthetic life experience on aesthetic judgement was significant, Wilks' $\Lambda = .872$, $p = .026$, $\eta_p^2 = .066$. There were significant group effects on the beautiful and ordinary pictures, $F(2, 108) = 5.678$, $\eta_p^2 = .097$, and $F(2, 108) = 4.907$, $\eta_p^2 = .085$, p s < .01, respectively; participants with a high or medium level of everyday aesthetic experience were more able to appreciate the beautiful and ordinary pictures than those with a low level

(a) *M*s and *SD*s of aesthetic judgment for groups with different levels of everyday life experience**(b)** *M*s and *SD*s of aesthetic judgment for groups with different levels of expertise**Figure 3**

*M*s and *SD*s of aesthetic judgement in the three categories of stimuli for groups with different aesthetic life experience and expertise in design.

of aesthetic life experience. No significant group effects on aesthetic judgement were found for the ugly pictures (see Table 2).

On the other hand, the results did show an overall significant group effect of expertise in design on aesthetic judgement, Wilks' $\Lambda = .906$, $p = .095$, $\eta_p^2 = .048$. However, there were significant group effects on the beautiful and ordinary pictures, $F(2, 113) = 4.333$, $\eta_p^2 = .015$, and $F(2, 113) = 4.769$, $\eta_p^2 = .010$, $ps < .05$ (see Table 2); participants with a high or medium level of design experience were more able to appreciate the beautiful and ordinary pictures than those with a low level of design experience. In addition, participants with a high level of expertise in design were more able to appreciate the beautiful pictures than those with a medium level of design expertise. However, no significant group effects on aesthetic judgement were found for the ugly pictures (see Table 2).

The influence of aesthetic life experience and expertise in design on aesthetic emotion

To examine the effects of aesthetic life experience and expertise in design on aesthetic emotion, we used the scores of aesthetic emotion (fearful, disgusting, neutral and pleasant) as dependent variables and conducted one-way MANOVA. In these analyses, the independent variable (IEAEDP or the IDE) was divided into the Low, the Medium and the High groups by the cut-off points of the upper 33% and lower 33% of the score. The frequency of each type of the emotion (fearful, disgusting, neutral or pleasant), rather than the composite mean scores of the emotion, was employed as the dependent variable.

Figure 4 shows the *M*s and *SD*s for the groups with different aesthetic life experience in aesthetic emotion. The results showed significant group effects of aesthetic life experience on aesthetic emotion, Wilks' $\Lambda = .842$, $p = .006$, $\eta_p^2 = .082$. There were significant group effects on aesthetic emotion for both "neutral" and "pleasant" in the Beautiful pictures, $F(2, 108) = 7.063$, $\eta_p^2 = .118$, and $F(2, 108) = 5.157$, $\eta_p^2 = .089$, $ps < .01$ (see Table 3); participants with a high level and

TABLE 2 Effects of aesthetic life experience and expertise in design on aesthetic judgement for the three categories of stimuli

Categories of APEDP	Type III SS	df	MS	F	Sig.	η_p^2	Scheffé
Aesthetic life experience							
Beautiful	1.252	2	.626	5.678**	.005	.097	H > L
Ordinary	.870	2	.435	4.907**	.009	.085	H > L
Ugly	.036	2	.018	.115	.891	.002	
Expertise in design							
Beautiful	.959	2	.480	4.333*	.015	.072	H > L, M
Ordinary	.852	2	.426	4.769**	.010	.079	H > L
Ugly	.098	2	.049	.321	.726	.006	

Note: L = Low score group; M = Medium score group; H: High score group.

** $p < .05$. ** $p < .01$.

a medium level of everyday aesthetic experience had stronger 'neutral' and 'pleasure' emotion than those with a low level of everyday aesthetic experience.

For the ordinary pictures, the results also showed significant group effects on aesthetic emotions of 'neutral' and 'pleasant', $F(2, 108) = 4.230$, $\eta_p^2 = .074$, and $F(2, 108) = 4.025$, $\eta_p^2 = .071$, $ps < .05$ (see Table 3); participants with a high level of everyday aesthetic experience had stronger 'neutral' and 'pleasant' emotion than those with a low level of everyday aesthetic experience. No significant group effects on aesthetic emotion were found for the Ugly pictures (see Table 3).

Figure 5 shows the M_s and SD_s for the groups with different expertise in design in aesthetic emotion. The results showed significant group effects of expertise in design on aesthetic emotion, Wilks' $\Lambda = .891$, $p = .027$, $\eta_p^2 = .056$. There were significant group effects on 'neutral' and 'pleasant' for the Beautiful pictures, $F(2, 113) = 4.996$, $p = .008$, $\eta_p^2 = .083$, and $F(2, 113) = 4.080$, $p = .020$, $\eta_p^2 = .068$ (see Table 4); participants with a high level and a medium level of expertise in design had stronger 'pleasant' emotion than those with a low level of expertise in design. However, participants with a low level of expertise in design had stronger 'neutral' emotion than those with a medium and a high level of expertise in design. In the categories of ordinary and ugly pictures, no significant group effects on aesthetic emotion were found (see Table 4).

Discussion

This study focused on how aesthetic life experience and expertise in design were associated with specific types of aesthetic judgement and emotion among college students. Aesthetic life experience refers to the involvement of aesthetic perceptions and analyses, aesthetic judgement and emotion, and everyday-experience association when seeing everyday designed products in daily life, whereas expertise referred to actual engagement in product design. Our results showed a great consensus among participants in the ratings of the stimuli, especially those for the beautiful and ugly stimuli. This supports the theory that universal beauty exists in both fine arts and everyday designed products (Jacobsen *et al.* 2006; Yeh *et al.*

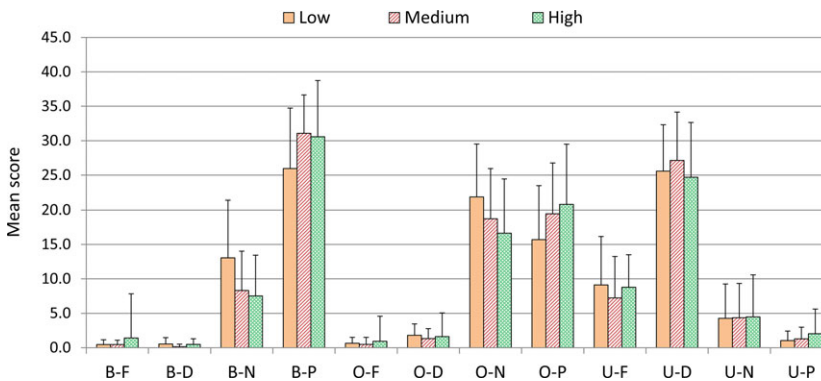


Figure 4

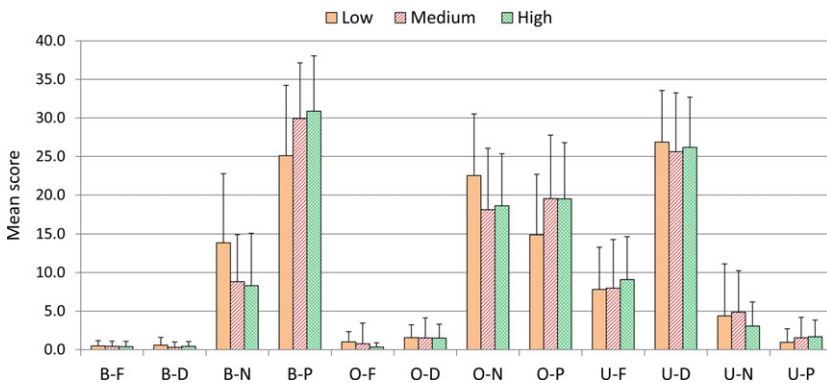
M_s and SD_s of aesthetic emotion for the three categories of stimuli for groups with different levels of aesthetic life experience.

Note: B: beautiful; O: ordinary; U: ugly. F: fearful; D: disgusting; N: neutral; P: pleasant.

TABLE 3 Effects of aesthetic life experience on aesthetic emotion for the three categories of stimuli

Emotion	Type III SS	df	MS	F	Sig.	η_p^2	Scheffé
Beautiful							
Fearful	21.370	2	10.685	.841	.434	.016	
Disgusting	3.308	2	1.654	2.997	.054	.054	
Neutral	649.319	2	324.660	7.063***	.001	.118	M, H > L
Pleasant	591.609	2	295.804	5.157**	.007	.089	M, H > L
Ordinary							
Fearful	3.707	2	1.853	.401	.671	.008	
Disgusting	4.366	2	2.183	.418	.660	.008	
Neutral	483.091	2	241.545	4.230*	.017	.074	H > L
Pleasant	501.907	2	250.954	4.025*	.021	.071	H > L
Ugly							
Fearful	76.435	2	38.217	1.047	.354	.019	
Disgusting	109.954	2	54.977	1.056	.351	.020	
Neutral	.807	2	.404	.014	.986	.000	
Pleasant	18.747	2	9.374	1.696	.188	.031	

* $p < .05$. ** $p < .01$. *** $p < .001$.

**Figure 5**

Ms and SDs for aesthetic emotion in the three categories of pictures for groups with different levels of expertise in design.

Note: B: beautiful; M: ordinary; U: ugly. F: fearful; D: disgusting; N: neutral; P: pleasant.

2015a; Zangwill 2014) and sensing is a normatively founded process (Okanoia 2013). These findings suggest that college students' aesthetic ability can be cultivated through the appreciation of designed products in daily life, rather than just through the appreciation of fine arts that are difficult for laypersons.

TABLE 4 Effects of expertise in design on aesthetic emotion in the three categories of stimuli

Emotion	Type III SS	df	MS	F	Sig.	η_p^2	Scheffé
Beautiful							
Fearful	.072	2	.036	.080	.923	.001	
Disgusting	1.238	2	.619	1.112	.332	.020	
Neutral	470.651	2	235.326	4.996**	.008	.083	L > M, H
Pleasant	469.138	2	234.569	4.080*	.020	.068	M, H > L
Ordinary							
Fearful	6.159	2	3.080	.695	.501	.012	
Disgusting	.064	2	.032	.006	.994	.000	
Neutral	305.753	2	152.876	2.635	.076	.045	
Pleasant	366.031	2	183.015	2.928	.058	.050	
Ugly							
Fearful	38.451	2	19.225	.540	.584	.010	
Disgusting	32.238	2	16.119	.313	.732	.006	
Neutral	2.995	2	1.497	.055	.947	.001	
Pleasant	10.968	2	5.484	.973	.381	.017	

* $p < .05$. ** $p < .01$. *** $p < .001$.

An interesting finding in this study was that the participants had greater consensus in the judgement of ugliness than that of beauty. Moreover, the judgement of ugliness was strongly correlated with the feelings of fear and disgust. These findings suggest that aesthetic judgement and aesthetic emotion are interactive (Armstrong & Detweiler-Bedell 2008; Brattico & Pearce 2013; Zeki *et al.* 2014), and that feelings of ugliness, fear and disgust may be biologically based. In addition, the findings support the claim that aesthetic judgements are both subjective and normative; the subjectivity is derived from varied personal experiences, whereas the normativity is developed from the human cognitive capacity and the universal rules underlying beauty (Yeh *et al.* 2015a).

Subjective tastes in beauty were also found in this study, as evidenced by the individual differences in aesthetic judgement and aesthetic emotion. Brain studies have concluded that the processes of AE are influenced by the mechanisms of memory retrieval, attentional control, emotional regulation and adaptive response (Cupchik *et al.* 2009; Yeh *et al.* 2015a), and these mechanisms are greatly influenced by aesthetic life experience and expertise in design.

With regard to aesthetic judgement, the findings suggest that there are similar patterns of how aesthetic life experience and expertise in design influence the tastes in beauty, but participants with a high level of expertise seem to be more able to appreciate the beautiful designed products. These findings support that aesthetic life experience and expertise influence aesthetic preference and

judgement (Kirk *et al.* 2009; Leder *et al.* 2004; Nadal & Skov 2013; Vessel *et al.* 2012), and that expertise contributes to the classification of stimuli during AE (Leder *et al.* 2014). Notably, no differences were found in the ratings of ugly pictures among participants with varied levels of aesthetic life experience and expertise. These results suggest the existence of normative or universal ugliness. With regard to aesthetic emotion, similar patterns were found for how everyday aesthetic experience and expertise influence the positive emotion of pleasure; participants with an above-average level of everyday aesthetic experience and expertise reported more pleasant emotion when viewing the beautiful pictures. However, only participants with an above-average level of expertise reported less neutral emotion when viewing the beautiful pictures, suggesting experts are more able to distinguish their emotions.

Overall, the results of this study reflect that rich aesthetic life experiences and expertise in design contribute to associating beautifully designed products with positive emotion, which may further result in a pleasant appreciation of the products. These findings lend support to our argument in the proposed model that the judgement of beauty with positive emotion during the process of conceptual aesthetics would most likely bring about the desire of wanting and lead an individual to go through the functional aesthetic process. With today's maximisation of products' functions and ergonomics, aesthetic quality has been regarded as a pleasure-eliciting design attribute (Adelabu & Yamanaka 2014). Enriching aesthetic life experience and expertise in design to enhance the appreciation toward everyday arts should help facilitate college students' abilities for aesthetic judgement, and further cultivate their competences in product design.

Finally, although there are four potential types of AE outcomes (observing beauty with positive emotion, observing beauty with negative emotion, observing ugliness with positive emotion, and observing ugliness with negative emotion) (Yeh *et al.* 2015a), the strong correlation between beauty and positive emotion, as well as that between ugliness and negative emotion, suggest that two major types of AE outcomes are perceiving beauty with positive emotions, and perceiving ugly with negative emotion. Aesthetic judgement is often influenced by subjective emotion (Parsons 1987). Products that are designed to bring about 'the impression of beauty, but with negative emotion' may remain a great challenge.

Conclusions

In general, the hypotheses proposed in this study are supported. The results revealed three major phenomena. First, beauty and the emotion of pleasure are highly correlated, and two major AE outcomes are perceiving beauty with positive emotion and perceiving ugliness with negative emotion. Second, although there are similar patterns for how aesthetic life experience and expertise in design influence the tastes of beauty and aesthetic emotion during the appreciation of everyday designed products, abundant expertise in design contributes more in differentiating emotion when viewing the beautiful designed products. Finally, the consensus of the evaluation of ugliness is stronger than that of beauty. This study contributes to the understanding of how everyday life experience and expertise influence different types of aesthetic judgement and emotion with regard to everyday designed products.

Moreover, since past AE studies seldom focus on the everyday arts that are frequently practised in our daily life, a four-stage AE model with regard to everyday designed products was proposed, with the intention of providing a framework for related instruction and training. As design has become critical for professional success and personal fulfilment in the twenty-first century, cultivation of aesthetic awareness and designing ability of college students can simply start from the appreciation of everyday designed products. The proposed model, as well as the findings of this study, shed light on potential practices for advancement of college students' aesthetic understanding and designing ability.

Limitations and suggestions

Although the majority of participants in this study were females enrolled in a variety of educational departments, there were no group differences on aesthetic judgement or emotion among these groups. Therefore, the results of this study can provide references for related research and educational training for college students.

AE is common in everyday life; cultivating aesthetic abilities can be achieved by enhancing awareness in aesthetic judgement, as well as by provoking positive emotional associations toward designed commodities through enriching aesthetic life experience and expertise in design. Specifically, educators or researchers aiming to improve college students' aesthetic understanding or design ability, can start by emphasizing the practices of aesthetic perceptions and analyses of everyday designed products (the superficial aesthetic stage). Then, facilitate aesthetic associations and integration of meanings and values (the symbolic aesthetic stage). After that, critical evaluation of aesthetic judgement and emotion should be encouraged (the conceptual aesthetic stage). Finally, self-reflection and discussion on the actual experience of using everyday designed products can be encouraged to bring about a more thoughtful and self-aware aesthetic judgment and emotion (the functional aesthetic stage).

Moreover, as designers have become more appreciative of the emotional powers of design, the aesthetic quality of products has, inevitably, become an essential component of designed products. Therefore, a product design may lead consumers from 'liking' to 'wanting', if it can become associated with important episodic memories, or deeply touch their hearts with pleasant emotion. For example, by advertising a product with a childhood memory, a touching story or music that provokes positive emotion. The ability to design such attractive products is certainly related to a designer's broad personal experience and abundant expertise.

Finally, although this study identified the relationships between specific types of aesthetic judgement and emotion, as well as how aesthetic life experience and expertise in design influenced these specific AE components, we did not investigate how these personal traits modulate the aesthetic judgement and emotion at each AE stage. Further studies can investigate the interactive relationships between personal traits and specific AE processes.

Acknowledgement

This study was supported by the Ministry of Science and Technology in Taiwan, R.O.C. (Contract Nos. NSC 101-2420-H-004-014-MY2, and MOST 103-2511-S-004-002-MY3).

Yu-chu Yeh is the Distinguished Professor of the Institute of Teacher Education in the College of Education, as well as a research fellow of the Research Center for Mind, Brain & Learning at the National Chengchi University, Taiwan. Her research interests include the instruction of creativity and critical thinking, e-learning, game-based learning, educational psychology and neurocognitive psychology. In the recent decade she has focused on integrating concepts from different domains (educational psychology, e-learning, computer science, positive psychology, cognitive psychology and cognitive neuroscience) to explore the cognitive processes of creativity and to develop innovative instructional models for critical and creative thinking. More recently, she has also tried to use eye tracking and fMRI techniques to explore the underlying neural mechanisms of aesthetic experiences and creativity. Contact address: Institute of Teacher Education in the College of Education, National Chengchi University, No. 64, Sec. 2, ZhiNan Rd, Wensham District, Taipei City 11605, Taiwan. Email: ycye@nccu.edu.tw

Yueh-Yin Peng is the Assistant Professor of the Department of Health Psychology at Chang Jung Christian University, Taiwan. Her research interests include creative thinking, educational psychology and positive psychology. Recently, she has focused on increasing students' learning motivation. Contact: Chang Jung Christian University Department of Health Psychology, No. 1, Changda Rd, Gueiren District, Tainan City 71101, Taiwan. Email: yuehyin@mail.cjcu.edu.tw

References

- Adelabu, O. S. & Yamanaka, T.** (2014) Kansei as a function of aesthetic experience in product design, in J. Watada, H. Shiizuka & K. Lee [Eds] *Industrial Applications of Affective Engineering*. Switzerland: Springer International, pp. 83–95.
- Armstrong, T. & Detweiler-Bedell, B.** (2008) Beauty as an emotion: the exhilarating prospect of mastering a challenging world, *Review of General Psychology*, Vol. 12, No. 4, pp. 305–29.
- Bertamini, M., Makin, A. & Rampone, G.** (2013) Implicit association of symmetry with positive valence, high arousal and simplicity, *i-Perception*, Vol. 4, No. 5, pp. 317–27.
- Brattico, E. & Pearce, M.** (2013) The neuroaesthetics of music, *Psychology of Aesthetics, Creativity, and the Arts*, Vol. 7, No. 1, pp. 48–61.
- Cinzia, D. D. & Vittorio, G.** (2009) Neuroaesthetics: a review, *Current Opinion in Neurobiology*, Vol. 19, No. 6, pp. 682–7.
- Cupchik, G. C., Vartanian, O., Crawley, A. & Mikulis, D. J.** (2009) Viewing artworks: contributions of cognitive control and perceptual facilitation to aesthetic experience, *Brain and Cognition*, Vol. 70, No. 1, pp. 84–91.
- Geertz, C.** (2001) *Available Light: Anthropological Reflections on Philosophical Topics*. Princeton, NJ: Princeton University Press.
- Gjerde, M.** (2011) Visual evaluation of urban streetscapes: how do public preferences reconcile with those held by experts?, *Urban Design International*, Vol. 16, No. 3, pp. 153–61.
- Jacobsen, T., Schubotz, R. I., Höfel, L. & Cramon, D. Y. V.** (2006) Brain correlates of aesthetic judgment of beauty, *NeuroImage*, Vol. 29, No. 1, pp. 276–85.
- Kirk, U., Skov, M., Hulme, O., Christensen, M. S. & Zeki, S.** (2009) Modulation of aesthetic value by semantic context: an fMRI study, *NeuroImage*, Vol. 44, No. 3, pp. 1125–32.
- Leder, H.** (2013) Next steps in neuroaesthetics: which processes and processing stages to study? *Psychology of*

- Aesthetics, Creativity, and the Arts*, Vol. 7, No. 1, pp. 2–37.
- Leder, H., Belke, B., Oeberst, A. & Augustin, D.** (2004) A model of aesthetic appreciation and aesthetic judgments, *British Journal of Psychology*, Vol. 95, No. 4, pp. 489–508.
- Leder, H., Gerger, G., Brieber, D. & Schwarz, N.** (2014) What makes an art expert? Emotion and evaluation in art appreciation, *Cognitive Emotion*, Vol. 28, No. 6, pp. 1137–47.
- Liu, J., Lughofer, E & Zeng, X.** (2015) Could linear model bridge the gap between low-level statistical features and aesthetic emotions of visual textures? *Neurocomputing*, Vol. 168, Issue C, pp. 947–60.
- Mastandrea, S., Bartoli, G. & Carrus, G.** (2011) The automatic aesthetic evaluation of different art and architectural styles, *Psychology of Aesthetics, Creativity, and the Arts*, Vol. 5, No. 2, pp. 126–34.
- Nadal, M. & Pearce, M. T.** (2011) The Copenhagen neuroaesthetics conference: prospects and pitfalls for an emerging field, *Brain and Cognition*, Vol. 76, No. 1, pp. 172–83.
- Nadal, M. & Skov, M.** (2013) Introduction to the special issue: toward an interdisciplinary neuroaesthetics, *Psychology of Aesthetics, Creativity, and the Arts*, Vol. 7, No. 1, pp. 1–12.
- Norman, D. A.** (2004) *Emotional Design: Why We Love (or Hate) Everyday Things*. New York: Basic Books.
- Okanoya, K.** (2013) Learning, epigenetics, and computation: An extension on Fitch's proposal: Comment on 'Toward a computational framework for cognitive biology: Unifying approaches from cognitive neuroscience and comparative cognition' by W. Tecumseh Fitch, *Physics of Life Reviews*, Vol. 11, No. 3, pp. 389–90.
- Parsons, M. J.** (1987) *How We Understand Art: A Cognitive Developmental Account of Aesthetic Experience*. New York: Cambridge University Press.
- Pink, D. H.** (2005) *A Whole New Mind Moving from the Information Age to the Conceptual Age*. New York: Riverhead Books.
- Schacter, D. L., Gilbert, D. T. & Wegner, D. M.** (2011) *Psychology*, 2nd edn. New York: Worth.
- Townsend, C. & Sood, S.** (2012) Self-affirmation through the choice of highly aesthetic products, *Journal of Consumer Research*, Vol. 39, No. 2, pp. 415–28.
- Utevsky, A. V., Smith, D. V. & Huettel, S. A.** (2014) Precuneus is a functional core of the default-mode network, *Journal of Neuroscience*, Vol. 34, No. 3, pp. 932–40.
- Vessel, E. A., Starr, G. G. & Rubin, N.** (2012) The brain on art: intense aesthetic experience activates the default mode network, *Frontiers in Human Neuroscience*, Vol. 6, No. 66. <https://doi.org/10.3389/fnhum.2012.00066>
- Yeh, Y., Lai, S. H. & Lee, J. Y.** (2015a) The development of 'Inventory for College Students' Everyday Aesthetic Experience in Designed Products', *Journal of Design Research*, Vol. 8, pp. 64–80.
- Yeh, Y., Lin, C. W., Hsu, W. C., Kuo, W. J. & Chan, Y. C.** (2015b) Associated and dissociated neural substrates of aesthetic judgment and aesthetic emotion during the appreciation of everyday designed products, *Neuropsychologia*, Vol. 73, pp. 151–60.
- Zangwill, N.** (2014) Aesthetic judgment, in E. N. Zalta [Ed.] *The Stanford Encyclopedia of Philosophy*, Summer 2014 edn (online). Available at: http://plato.stanford.edu/arc_hives/sum2014/entries/aesthetic-judgment/
- Zeki, S., Romaya, J. P., Benincasa, D. M. T. & Atiyah, M. F.** (2014) The experience of mathematical beauty and its neural correlates, *Frontiers in Human Neuroscience*, Vol. 8, No. 68, pp. 1–12.