出國報告 (出國類別：國際會議)

參加 **18th International Conference on Human-Computer Interaction** (HCII 2016)學術研討會心得報告

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摘要

此次 18th International Conference on Human-Computer Interaction（HCI 2106)大會在加拿大多倫多舉辦，從 7 月 17 日至 7 月 22 日共六天。會議地點是 Westin Harbor Castle 飯店，正式會議之前一天 7 月 16 日下午 4:00 至 6:00 開始會議註冊。會議題目涵蓋所有 Human Computer Interaction 相關主題，包括人本人研究領域情感介面之設計。

本次參加 HCII 2016 主要目的有三個。首先是發表本人之國科會計畫研究成果。第二、HCII 2016 研討會是由 HCI 研究領域之重的學術活動，其論文皆被收錄於 ACM、EI 和 ISI 等重要資料庫，等同於論文出版。最後，就是希望能與同好前輩，能當面討論，增進見聞。此次活動，這三個目的皆有達到，增進所聞，不噓此行。

目次

本文

一、　目的

本次參加18th International Conference on Human-Computer Interaction (HCI 2106)的主要目的有三個。

首先因為本人之國科會計畫已執行完畢且有一些研究發現，所以想找個適當的場合發表本人最新的研究發現。所以第一個目的就是在於發表本人之國科會計畫研究成果，此次本人發表的論文主題屬人機互動計設領域，所以很適合參加。所以報名參加之，並前往發表。第二、HCII 2016 研討會是由 HCI 研究領域之重的學術活動，其論文皆被收錄於 ACM、EI 和 ISI 等重要資料庫，等同於論文出版，等同於論文出版，所以本人投稿於 HCII2016 等於是再增加一篇本人之學術著作。最後，就是希望能與同好前輩，能當面討論，增進見聞。而在會議過程中，本人與 Marcus 前輩，及其他學者，交流許多意見，收獲很多。

二、　過程

今年度，本人原本向科技部申請參加 12 月於香港所舉辦的 IEEM 2015 之研究討會。但，本人從 ACM digital library 索引了一些文章，品質不差，因此，一直認為 ACM 所收錄的研討會論文品質較佳，所以這些研討會的品質應是具有高水準的研討會。再加上，本年度科技部核訂給本人之出席國際會議的金額高達 9 萬，比歷年還要多出許多。由於差旅費較以往充足，所以本人

決定參與 ACM 收錄之研討會。於是，本人由 Google 的網站搜尋國際研討會，發現 HCI 2016 的研討會論文是為 ACM 所接受，因此，參加 ACM 所舉辦的研討會，放棄 IEEM 2105 之研討會。

此次 HCI 2106 大會在加拿大多倫多舉辦，從 7 月 17 日至 7 月 22 日共六天。會議地點是 Westin Harbor Castle 飯店，位於湖邊，風景幽美。會議前一天 7 月 16 日下午 4:00 至 6:00 開始會議註冊。

2-1 Tutorials Section

會議的第一天 7 月 17 日至 19 日共三天，主要活動是 Tutorials，每天的上、下午各一場，共有 21 場。上課內容涵蓋 HCI 相關之議題，包括單一設計主題，例如 wearable 設計；HCI 研究方法，例如 HCI 可用性問卷設計；以及創意方法，例如 Design Thinking。

2-2 keynote Speech

7 月 19 日有一場 keynote speech，由 Jennifer Preece 主講。題目是 Citizen Science:New Research Challenges for Human-Computer Interaction。此主題亦已刊登於 International Journal of Human-Computer Interaction，volume 32, Issue 8, 2016, page 585-612。

此一演講內容主要是認為市民的經驗應放入 HCI 研究之使用者經驗中。共含蓋 5 個 HCI 互動主題：社區、數據蒐集、技術、設計和 a call to save all species。她強調，HCI 專家、科學家和市民應一起合作，共同設計合於人民

所用的 HCI 產品。

2-3 Parallel Sessions

Parallel sessions 是由 7 月 20 日至 22 日，含蓋主題包括

Human Interface and the Management of Information (HIMI 2016)
13th International Conference on Engineering Psychology and Cognitive Ergonomics (EPCE 2016)
10th International Conference on Universal Access in Human-Computer Interaction (UAHCI 2016)
8th International Conference on Virtual, Augmented and Mixed Reality (VAMR 2016)
8th International Conference on Cross-Cultural Design (CCD 2016)
8th International Conference on Social Computing and Social Media (SCSM 2016)
10th International Conference on Augmented Cognition (AC 2016)
7th International Conference on Digital Human Modeling and Applications in Health, Safety, Ergonomics and Risk Management (DHM 2016)
5th International Conference on Design, User Experience and Usability (DUXU 2016)
4th International Conference on Distributed, Ambient and Pervasive Interactions (DAPI 2016)
4th International Conference on Human Aspects of Information Security, Privacy and Trust (HAS 2016)
Third International Conference on HCI in Business, Government, and Organizations (HCIBGO 2016)
Third International Conference on Learning and Collaboration Technologies (LCT 2016)
Second International Conference on Human Aspects of IT for the Aged Population (ITAP 2016)

本人的發表主題是屬於 Design, User Experience and Usability 領域之 DUXU 2016 聯辦之研討會。此次研討會超過上千篇論文發表，議題函蓋 HCI 的所有議題，涵蓋層面完備。

本人是在 4 月 22 日下午 3:00 發表，表達題目是本人科技部補助計畫，論文名稱為" A Study of Attributes of Affective Quality Affecting Judgment of Beauty for Simple Graphic User Interfaces"。研討會會論文將全部收錄在 ISI 之論文集，為 ACM、ISI

和 EI 等資料庫收錄。國際會議的規模很大，每個時段只有 5 或 6 個發表會場，全場參與人員踴躍，討論熱烈，皆無冷場。本人發表時間為 30 分鐘，台下參與聽眾超過 20 人，各個都參與討論，提供正向意見和批判，使本人獲益良多。

本研討會的總篇輯 Marcus 也在本場次發表，在會上，他提出二個新的名稱 cuteness，表面上是一個新的概念，但實際上是將現在社群網路中最熱的可愛圖象收錄，分類而矣。

其它場次也有很多值得參與的內容。例如有學者將醫藥使用或復健的解說，不再以圖象表示，而是由動畫呈現。是一個不錯的構想。作者雖認為有記憶負荷的問題，但此一構想似乎是未來必走的方向。另外有人提出全面性的可用性和顧客經驗之檢測,認為UX不僅只是uasbility,還有及他效標應考慮。。

三、　心得與建議

3-1 心得

此次研討會的論文作者涵蓋東西方學者，日本學者不少。其中有不少之研究雖不成熟，但確給人有高度的啟發。例如，其中有一篇將醫藥使用或復健的解說，不再以圖象表示，而是由動畫呈現。雖然這篇論的成熟度不足，以致有使用性不佳的可能，但其最終給人們以動畫解說用藥的可能。

另一位是由伊索比亞的博士生發表的論文。認為手機介面設計應考慮文盲，因為他們國家的文盲人數很多。這也是一個值得深思的設計議題。

3-2 建議

大部份的研討會已逐漸成為學生論文發表的練習場，本研討會也有許多論文皆是博士生的想法，並參與發表。雖然愈來愈少的學者實質參加，也都是派學生發表。但本研討會則有大多數是由老師親自發表論與觀眾互動。能與教授級學者共同討論，獲益很多。所以，HCII 2016 是一個值得親自參與的國際會議。

附件

報告論文： A study of affective meanings predicting aesthetic preferences of interactive skins

A Study of Attributes of Affective Quality Affecting Judgment of Beauty for Simple Graphic User Interfaces

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Abstract. This article argues that aesthetic preference judgment might not depend on aesthetic prototypes, but on object's affective qualities. That is, when an object is presented, one perceives not only its feature organization, but also the perceived affective quality where it presents in some specific situations. Therefore, this study tries to find out the attributes of affective qualities which would be factors influencing user aesthetic preferences for system interfaces. Item analysis, Factor analysis and Regression analysis, were conducted to find the typical attributes of affective quality which could significantly explain the variances of aesthetic preferences. The results showed that six adjective terms of affective quality can be used to predict beauty: "Delicate", "Unique", "Robust", "Tight", "Fierce", "Mysterious", "Assertive" and "Traditional". The outcomes indicate that a delicate appearance of interactive skins is most important to design an aesthetic skin. The skin with the feelings of "Assertive", and "Robust" are well received. However, designers have to avoid design a skin with a tight feeling.

Keywords: Affective quality · Aesthetic preferences · Simple skins

1 Introduction

1.1 Factors Affecting Aesthetic Preferences

Aesthetics, which refers to "beauty" in this study, pertains to a sense of what is beautiful and visually pleasing. Previous studies tried to find out factors which influenced human judgment of beauty. However, physical features, aesthetic prototypes and the arousal theory do not properly explain the factors that influence audience aesthetic preferences. An interface does not only include one attribute; on the contrary, it includes many attributes with varied levels. Huang et al. classified interface attributes into six categories [1]. They are "Form elements", "Form organization", "Interactive features", "Stylistic quality", "Feeling quality", and "Emotional quality" from low to high construct. The previous discussion of physical features, aesthetic prototypes and the arousal theory on aesthetic preferences focuses on the influences of "Form elements", "Form organization", "Interactive features", "Stylistic quality". However, when an object is presented, one perceives not only its form quality, but also the perceived affective quality even audiences do not know the content, or knowledge, of the object [2]. For example, one

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admired the beauty of a sunset scene not because of the knowledge of the scene, but the scene itself elicited an affective quality, "glory". Possibly jumping off the inherent frameworks of object configuration into knowledge of emotion involved might be a feasible way to find factors of aesthetic preferences. It is worth to explore if affective qualities of system interfaces would be factors influencing user aesthetic preferences.

Among these six levels of attributes, "affective quality" referred to object's attributes to arousing human feelings which can be expressed with affective terms, such as cute, vivacious, hard, soft … etc. Affective quality is a stimulus' ability to cause a change in core affect which is a neurophysiological state [3]. One feels an object is cute because it just causes him a cute feeling without any reasons. "Emotional quality" referred to object's attributes to arousing one's emotional responses. This kind of attributes is to describe human emotional responses, such as, sad, happy, exciting …, etc. The terms belonged to this attribute also includes affective adjectives which imply good or bad values, such as sad, scared, bored or excited. The terms belonged to this attribute could be arranged with two approaches: the discrete emotion approach, and the dimensional approach [4]. Compared with Norman's [5] three levels of emotional responses, "Form elements", "Form organization", and "Stylistic quality" would arouse visceral emotional responses; "Interactive features" would arouse behavioral responses. In addition, affective quality is the feeling description of both visceral and behavioral responses evoked from the object. Emotion quality is a kind of mood description reflecting from objects in a reflective level. Both affective quality and emotional quality influence emotional responses in the reflective level.

1.2 Varied Rating Consistency for Different Attribute Levels

As rated to describe the same object, the terms in lower level of constructs, i.e., attributes, such as, "clean," or" "symmetrical" belonged to form elements, are rated more consistent than those in higher construct (ex. Cute in affective quality category). The judgment of a low level product attribute (e.g. colorful) was clear and predictable for all audiences; however, the judgment of a high level product attribute (e.g. cheerful) was varied from different audiences. Besides, a low level attribute of a product might induce a high level affect. For example, the objects with "order" (form organization) feeling might arouse audience's feeling of legibility (interactive quality).

It was found that previous studies did not find the identical affective dimensions to predict aesthetic preferences after reviewing the articles related to affective dimensions. It is possibly that those studies mixed up all attributes in different levels and did not discriminate affective meanings from the other product attributes when searching for key affective dimensions. For example, Hsiao and Chen [6] extracted four fundamental dimensions in the affective responses: "trend factor", "emotion factor", "complexity factor" and the "potency factor" from 28 adjective pairs. However, the adjective pairs used in their study include Excited–calm, Elegant–not elegant, Avant garde–conservative, and Streamlined–rugged, belonged to the attributes of emotional quality, affective quality, stylistic quality and form elements, respectively. Besides, Lavie and Tractinsky [7] also found a two-dimensional structure for perceived aesthetics: classical and expressive aesthetics. The classical aesthetics refers to orderliness in design, including

descriptions such as “clean,” “pleasant,” “symmetrical” and “aesthetic”. The expressive aesthetics indicates designers’ creativity and originality, and can be described by “sophisticated,” “creative,” “uses special effects” and “fascinating.” “Clean,” “pleasant,” “symmetrical” are belonged to different attributes. Moreover, Kim and Moon [8] found that the emotion space is defined by seven dimensions including attractiveness, symmetry, sophistication, trustworthiness, awkwardness, elegance, and simplicity to evaluate immediate affective feelings about cyber-banking system interfaces. Obviously, their outcomes are not consistent because they mixed up all attributes in different levels. Therefore, this study will explore the affective dimensions only with the terms in affective quality, excluding the other levels of object attributes.

1.3 Effects of Affective Quality and Emotional Quality on Aesthetics

Huang et al. [9] explored both effects of affective quality and emotional quality on aesthetic preferences of complicate skins by using path analysis. He found that all the attributes in emotional quality did not well predict interactive skin aesthetics, but the attributes in affective quality could predict skin aesthetics well by judging R-squares of their regression models. He found seven key attributes of feeling quality selected into the aesthetic predicted model, Delicate, Hi-tech, Formal, Fierce, Unique, Tight and Robust. The outcomes implied that skin appearances with the feelings of “Hi-tech”, “Formal”, “Fierce”, “Unique” and “Robust” were well received. A delicate appearance of interactive skins was most important to design an aesthetic skin, but the skins with a tight feeling were the worst. He also explained why emotional quality did not influence subject aesthetic preferences. He argued that one’s emotional feelings evoking from an objects would be translated into affective quality he felt, in light of the reflective level of emotional responses. For example, a dreadful skin might be deemed as a fun skin because subjects perceive the “fun” meaning of the dreadful skin and enjoyed its fun. That is, subjects received a fun feeling which belonged to affective quality, but no more than emotional quality. Therefore, this paper would only focus on effects of affective quality on aesthetic judgment; the other levels of attributes are excluded based on Huang’s findings.

1.4 Complexity vs. Simplicity Skins

Osgood [10] found that the E-P-A structures of affective meanings might be not existed when the rated objects were not “noun”. It implies that the affective structures would be identical when the rated objects are the same whoever the subjects are. Therefore, affective structures of complex skins might not be the same as those of simple one if different levels of complexity of interactive skins could not be deemed as the same “concept”. Therefore, it is worth to explore if different levels of complexity of interactive skins share the same affective structures. Huang et al. [9] had used complex skins selected from Windows media player to explore the affective structures of complex skins. This study will only focus on the findings of affective structures of simple skins. Besides, both affective structures will be compared to explore if they have the same structures.

1.5 Purpose

To sum up, the main purpose of this paper is to find the typical attributes of affective quality which could significantly predict aesthetic preference of skins. Before that it is necessary to find out the affective structures of simple skins of interactive interfaces. Besides, this paper also tried to explore the similarity of both affective structures to describe simple and complex skins, respectively.

2 Methods

Item analysis was performed to selection adjective terms which could be used to describe objects' attributes of affective quality firstly. Secondly, Factor analysis was used to find out affective structures from those adjective terms which could describe simple interactive skins. Finally, Regression analysis was conducted to find those affective structures could significantly predict aesthetic preferences of skins.

2.1 Item Analysis

Firstly, 628 feeling terms were written respectively on cards in Chinese and divided into five card groups. They were collected from resources including studies related to affective design in journals, catalogues, books and websites. Those adjectives not written in Chinese were translated into Traditional Chinese. Afterwards, five female teachers who have five year experiences at least in teaching Chinese in Junior High school arranged each one of card groups with kin diagram, respectively. Kin diagram refers to a diagram in which the terms with close conceptual affinity are put closely. Finally, those adjective terms were condensed into 296 adjective pairs.

Next, item analysis was used to discard the affective adjectives which cannot distinguish subject affects evoked from skins among 296 pairs. There are two steps to perform item analysis: semantic differential and screening with criteria.

Semantic Differential. Sixteen windows media player skins selected from Ms-office official website were rated with the 296 adjective pairs. Considering the reliability of subject ratings, the "independent" pair and "familiar" pair are replicated. Totally, 298 adjective pairs were used in the experiment. If the correlations between original pairs and replicated pairs are high, the reliability of subject ratings is high to accept the outcomes of the Semantic differential. Forty-six subjects rated the skins with a 7-point Likert scale. The test was programmed with Director 8.0 and performed on a 20" TFT LCD screen. There are 736 (46×16) rating scores, called Raters' opinions, for each adjective pair.

Criteria Screening. Six criteria were used to screen out the adjective pairs which cannot discriminate differences among skins according to the rating scores of semantic differential. First, the selection score of each adjective pair was added 1, respectively, when three criteria, Mean, Variance and skewness of each affective meaning are between 1 and -1, Variance $> 0.1.5$, or Skewness < 0.7, respectively. Next, Correlation of Internal

Consistency (CR) was performed. The 736 rating scores were arranged from low to high scores for each adjective pair, and divided into four groups. The group with the higher scores than other groups was called High Score Group (HSG); the group with the lower scores than other groups was called Low Score Group (LSG). The selection score of each adjective pair was added 1 when its rating scores of HSG significantly differed from those of LSG at a significant level, 0.01, which could discriminate Raters' opinions significantly. Besides, The selection score of each adjective pair was added 1 if their item-to-total-score correlations or factor loadings were larger than 0.3. Finally, the adjective pairs were selected if their selection scores were larger than 3. Consequently, 123 adjective pairs were remained. Furthermore, the previous five Chinese teachers were recruited again to pick up the adjective pairs belonged to the attributes of affective quality from the 123 adjective pairs. Finally, 75 adjective pairs were chosen.

2.2 Factor Analysis

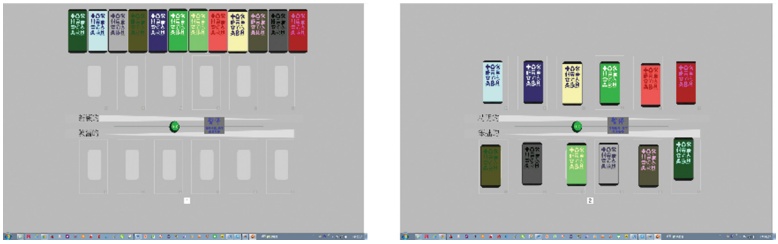
Factor analysis was used in this experiment to condense the 75 pairs into typical attributes of affective quality. Twelve simple mobile phone skins with different color combinations were used as interactive skins shown in Fig. 1. There are named as simple skins because the icons in the skins are presented only with varied both figure and background colors as compared to the skins of Windows Media Player.

Fig. 1. Twelve simple mobile phone skins with different color combinations (Color figure online)

These twelve icons and color combinations were selected from the experimental material of Huang [11] who evaluated 3306 color combinations with their rating consistency and aesthetic preference. Huang [11] believed that the best color combinations do not only get high aesthetic preference scores, but also have high rating consistency among subjects. The twelve interfaces includes those that have high, middle and low preference rating consistence with high and middle aesthetic rating respectively in his study. For example, in Fig. 1 HH01 and HH02 have a higher aesthetic score and the highest rating consistency.

43 undergraduate students were recruited and asked to perform ranking tests which were programmed with Director 8.0 for all adjective pairs shown in Fig. 2. If feeling the skin is closer to the adjective on the bottom, subjects dragged it into the gray block closer to left on the bottom row. The skins can be moved in or out the blocks with time, or

frequency, limited. For reducing fatigue effect, subjects spent three days to complete the rankings. Each day only performed 25 ranking tests.



(a) An initial rakning test page (b) Test page after finished

Fig. 2. The screens used in the experiment

The outcomes found that there were 8 factors which eigenvalue are larger than 1. They are “Delicate”, “Unique”, “Robust”, “Tight”, “Fierce”, “Mysterious”, “Assertive” and “Traditional”. The 8 factors can explain 63.81 % variance of the model. Huang et al. [9] found the 11 typical attributes of affect quality for complex skins: “delicate”, “unique”, “robust”, “Hi-tech”, “tight”, “saucy”, “fierce”, “mysterious”, “exaggerated”, “formal” and “pure”. Obviously, the number of attributes of affective quality for complex skins is more than that of simple skins. The outcome seems to suggest that complex skins could present more typical attributes than simple ones.

2.3 Regression Analysis

Regression analysis was to find out the typical affective meanings which could predict aesthetic preferences of simple skins. Like experiment 2, subjects performed ranking tasks programmed with Director 8.0. 12 simple skins in Fig. 2 were used again in this experiment; however, the adjective pairs as scales to rate simple skins were a “beauty-ugly” pair plus 8 typical attributes of affective quality from experiment 2.

43 undergraduate students performed ranking tasks which are the same as experiment 2 shown on computer screen. Believing that the feeling evoked from the skin is closer to the adjective on the top, subjects dragged the skin into the gray block closer to left on the top row. Likewise, if they believe their feelings evoked from the skin is closer to the adjective on the bottom, subjects dragged the skin into the block closer to left on the bottom row. The scores of the skins on the blocks from top left to top right are 12 to 7, respectively; from bottom left to bottom right are 1 to 6, respectively.

The scores of beautiful pair were regarded as the scores of aesthetic preferences of the skins. Moreover, aesthetic preference is as a dependent variable; the other adjective pairs are deemed as independent variables. Each model has an R-square to describe the variances of aesthetic preference explained by the terms in affective quality. The model with larger R-square than the other could be a better model to predict aesthetic preference.

3 Results and Discussions

The Regression model shows that the six typical attributes of affective quality can significantly predict skin aesthetic preferences shown on Table 1. They are "Delicate", "Unique", "Robust", "Tight", "Fierce", "Mysterious", "Assertive" and "Traditional". The adjusted R-square is 0.474. The Collinearity diagnoses also show that the tolerances of "Delicate" (0.860), "Unique" (0.775), "Tight" (0.673), "Mysterious" (0.805), "Assertive" (0.891), and "Robust" (0.766) are close to 1. It indicates that these attributes of affective quality do not depend linearly on each other. That is, the estimate of the regression model is more stability.

Table 1. Regression model of simple interfaces

Variables	Un-standardized		Standardized	t	Sig	Tolerance
	B-estimate	Standard error	Beta			
Constant	5.338	.565		9.446	.000	
Delicate	.418	.040	.418	10.457	.000	.860
Unique	−.115	.042	−.115	−2.736	.007	.775
Tight	−.248	.045	−.248	−5.492	.000	.673
Mysterious	−.177	.041	−.177	−4.280	.000	.805
Assertive	.225	.039	.225	5.727	.000	.891
Robust	.153	.042	.153	3.623	.000	.766
Fierce	−.077	.042	−.077	−1.826	.069	.772

Besides, "Delicate" (β-weight = 0.418) is the most important attributes of affective quality to influence aesthetic preference. The second important feeling term is "Assertive" (β-weight = 0.225). However, "Tight" has a negative β-weight (−0.248). The outcomes indicate that a delicate appearance of interactive skins is most important to design an aesthetic skin and that the skin appearances with the feelings of "Assertive", and "Robust" are well received. However, designers have to avoid design a skin with a tight feeling.

Huang et al. [9] found the 7 typical attributes of affect quality for complex skins. This study finds 6 typical attributes of affect quality for simple skins. Both path diagrams of attributes predicting aesthetic references are shown in Fig. 3. Four attributes can significantly predict aesthetic preferences for both simple and complex skins: "delicate", "unique", "tight", and "robust". These evidences showed that the skins should present more intensity of delicate feelings, but not tight feelings for creating aesthetic appearances for both complex and simple skins.

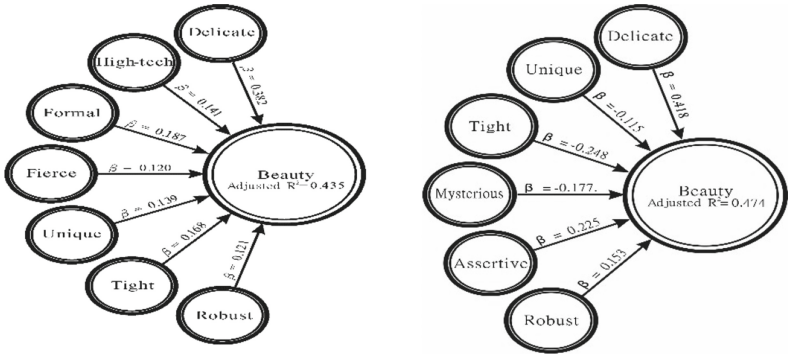


Fig. 3. Both path diagrams of attributes predicting aesthetic references

The similarity of both Regression analysis models of aesthetic prediction for complex skins and simple skins were calculated as below:

$$\left[\left(\frac{4}{7}\right)+\left(\frac{4}{6}\right)\right]\div 2 = 61.90\,\%$$

The score of similarity (61.90 %) for both models is moderate. It indicates that the affective structures of both complex and simple skins are not entirely identical.

The outcomes show that the number of attributes for complex skins is more than for simple skins. The reason might be that subject's affective responses to both skins are different. For experiment tasks of complex skins, subjects had to operate the skins to play music before they rated the skins. However, for experiment tasks of simple skins, subjects only looked at the skins and judged their affective quality. In other words, the responses of subjects to complex skins involved two affective levels: visceral responses and behavioral responses in light of Norman's views of affective responses [5]. However, their responses to simplex skins only involved visceral affective responses. Therefore, the outcomes show that only four attributes of affective quality could affect aesthetic preferences for both complex skins and simple skins. This outcome seems to imply that factors affecting aesthetic preferences would be varied when affective responses are in different levels (i.e. visceral responses and behavioral responses). However, four attributes would commonly affect skin aesthetic preferences whether subjects' responses are in visceral or behavioral levels. These four attributes are "Delicate", "unique", "tight", and "robust". It suggests that these four attributes might have to be satisfied in skin design.

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