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Perceptual Richness and Aesthetic Sensibility in Traditional and Modern Product Designs

A Cross-Cultural Kansei Study using African Inspired Product Designs

Adelabu O. S. 1[1], Yamanaka T. 2[2]

[1] *Graduate School of Comprehensive Human Sciences, University of Tsukuba, Japan, femmylab@kansei.tsukuba.ac.jp*

[2] *Faculty of Art and Design, University of Tsukuba, Japan, tyam@geijutsu.tsukuba.ac.jp*

Abstract: Why do people tend to value an old product over a modern one? This study aims to explore cross-culturally, the conceptual basis of perceiving aesthetic values in product design characterized as being traditional and modern. To this end, a quasi-experiment was designed to evaluate the cognitive and affective richness in the aesthetic appreciation of both traditional and modern objects. For this experiment, 15 culturally inspired African products were pre-selected and classified into three categories, each class representing the different level of visibility of cultural elements in the sampled objects. 20 African subjects and 20 East-Asians including Japanese and Koreans studying at the University of Tsukuba participated in the survey test by doing a visual evaluation for the selected product samples using semantic differential and self-assessment manikin questionnaires. Having subjects from two distinct regional cultures provides a platform for cross-cultural comparison and discussion on the value perception style for typical traditional and modern products. The result outlines similarities and disparities of two cultural domains for the three product categories.

Keywords: Product design evaluation, Visual perception, Aesthetics, Kansei value, Cross-cultural study

1. INTRODUCTION

> *Handcraftsmanship, if it be alive, justifies itself at any time as an intimate expression of the spirit of man. Such work is an end in itself and not a means to an end. If, however, it ceases to serve a functional need, it runs the risk.* (Yanagi, 1989)

Humans, the world over, share a deep history in the development of artefacts which have today

become an inseparable component of everyday life, a totem of cultural identity and an important source of reference for the modern society. These artefacts stood as hallmark of civilization, cultural medium for aesthetic expression and socio-cultural interaction even within a local context. As the human history unfolds in layers of development and technological advancement, the making of objects of use has shaped lifestyle. Design culture in the twenty-first century is set to take a remarkable direction where materiality and technological innovation is not pursued as an end in itself but rather as a means towards the reinvigoration of meaningful value and quality experience into product, systems and services. With this in view, product framework is being redefined to transcend beyond functionality, ergonomics, and styles to enhancement of modern life while providing inspiration for meaningful and rich lifestyle. This true essence of a value-oriented design was encapsulated in the opening remark of the 2013 Good Design Award:

> *Though society may grow sophisticated, industries and economies may undergo dizzying changes, and remarkable technological advances may unfold, the wide-ranging designs that won this year's award, which emphasizes the beauty of relationships, the beauty of balance, and overall harmony, can give us a sense of the way design contributes to overall harmony and embodies the existential value of the whole as well as the beauty of beneficial relationships with the things in which that value is found.*

Design is an appealing process that creates inspiration that is engendered by empathy among human beings in our values and spirituality (Kenya, 2007). However, as much as design is a problem-solving tool used by the designers, the arising question is that what is it that matters now to address a rapidly growing and complex society, or perhaps, how humans could find a point of balance between materialism and essence, intricacy and simplicity, centrism or extremism, individualism or collectivism, tangibility or intangibility for the overall welfare of the ecology and humanity.

Culture is rooted in the values that pervade the historically derived ideas that form a particular tradition (Kluckhohn, 1951). These ideas and values create patterned ways of thinking, feeling and reacting, which constitute the distinctive character of a human group (Moalosi, Popovic, & Hickling-hudson, 2007). Essentially, it can be described as totality of all the knowledge and ideals shared by a society. It is dynamic and multilayered. The understanding of users' kansei (sensibility) over cultural diversity can be explored as a key factor in recognizing new gaps for designing culturally inspired products that transcend cross-cultural borders. Towards fostering creative economy in a global market, it is imperative for designers to gain a deeper understanding of users' culture and find ways to use culture as a potential resource in product development and innovation. The implication for this orientation in design approach will be a paradigm shift from creation of 'imposed product' to 'impactful product'. Hence, design outputs can be improved to harmoniously embody both tangible and intangible qualities that result into more beneficial user - artefact relationship. While the richness of cultural values can be used as a tool to inspire design for meaningful product experience, understanding the mechanism of perception with traditional and modern products might provide a new way to promote kansei values in product design and a drive towards seamless integration of users' in-depth psycho-physiological needs.

1.1. Theories of Perception and Aesthetics

Essentially, perception in humans describes the process whereby sensory stimulation is translated into organized experience, whether that is on a top-down or bottom-up basis. It is a process by which organisms interpret and organize sensation to produce a meaningful experience of the world. While sensation usually refers to the immediate, relatively unprocessed result of

stimulation of sensory receptors, perception, on the other hand, refers to one's ultimate experience of the world and typically involves further processing of sensory input.

According to the top-down theorists, perception begins from the top, focusing on expectancies, prior knowledge, and other higher-level cognitive processes and then work their way down to considering the sensory data such as perceptual stimulus. The kansei science provides models that support this view on perception. However, the bottom-up theorists has propounded that perception starts from the bottom and consider the perceived physical stimulus, the observable form or pattern, and work their way up to higher-level cognitive processes such as the organizing principles. James Gibson's theory of “direct perception” designates perception as bottom-up. According to Gibson's theory of direct perception, the information in our sensory receptors is enough to perceive anything. We thus perceive "directly" because we do not need any higher-level cognitive processes to mediate between our sensory experience and our perception (Sternberg, 1996). The Gestalt approach can be said to be a "bottom-up" theory as it starts from the bottom (the aspects of the stimuli that influence perception) and work its way up to higher-order cognitive processes. Gestalt psychology attempts to understand psychological phenomena by viewing them as organised and structured wholes rather than the sum of their constituent parts. The investigations in this subject crystallised into "the gestalt laws of perceptual organization which includes - law of proximity, law of similarity, law of symmetry, and law of closure.

On the other hand, the term "aesthetics" today may broadly cover (1) the study of all the aesthetic phenomena, (2) the study of the perception of such phenomena, (3), the study of art or what is considered to be artistically worthwhile or notable or "good," as a specific expression of what is perceived as being aesthetic (Gracyk, 2003). While it appears that there are several theories on aesthetics with multifarious subjective interpretations, the subject was classified into two parts: the philosophy of art, and the philosophy of the aesthetic experience and character of objects (non-art phenomena) (Budd, 1998). The recurrent theme centers on the standard and theory of beauty, taste, pleasurable values appreciable through sensory, emotional or intellectual perception. In a neuro-psychological view, aesthetic experience touches on cognition and emotion; inciting our sense of judgment and influencing our behaviour. A fundamental definition that has fascinated this study was drawn from Koren (2010): *Aesthetics or the aesthetic is a cognitive mode in which you are aware of, and think about, the sensory and emotive qualities of phenomena and things.*

1.2. Theoretical Framework

Kansei has been described as a dynamic and advanced function of the brain that can be the source of emotion, inspiration, intuition, pleasure/displeasure, taste, curiosity, aesthetics and creativity [Yamanaka in (Beuttel, 2010)]. It is a fundamental tacit process of human mind which involves several emotional feelings such as sensation, perception, and cognition (Lévy & Yamanaka, 2009).

Aesthetics fills an important role in the evolutionary trend of design as the design of objects in-turn has taken a key position in shaping culture, and impacting lives in far-reaching ways. As designers get more aware of the emotive powers of design, the aesthetic quality of products is increasing becoming a pervasive factor in the design process and a promise that must be kept towards the user's satisfaction. Today, Kansei and aesthetics have become tangible concepts in the product design domain. Lee (2010) asserted that aesthetic differences and similarities among cultures are obviously one of the very important issues in cultural design.

In previous related study, Norman expounded on three-dimensional theory of emotional design namely *visceral*, *behavioural* and *reflective* (Norman, 2004). Hekkert (2006) also distinguished three

components or levels of product experience as aesthetic pleasure, attribution of meaning, and emotional response. Meanwhile, Lin (2007) presented a synthesized framework for studying cultural objects and further identified three layers and levels of cultural objects and design features as (1) the inner level (containing special content such as stories, emotions, and cultural features), (2) the mid-level (dealing with function, operational concerns, usability, and safety) and (3) the outer (covering color, texture, form, decoration, surface pattern, line quality, and detail). In this study, we hold the view that aesthetics is part of kansei experience which can be anchored on the cognition of perceptible qualities and emotions evoked through relationship between humans and artefacts within situated contexts either through immediate sensory perception or bodily interaction. Therefore, we construe aesthetic perception as a kansei factor and an emotive cognition in the construction of products' values. Hence, we proposed that this phenomenon traverses all layers of product experience in both intrinsic and extrinsic ways, with cultural distinctions. The three levels of aesthetic expressions in product design are defined here as surficial, functional and symbolic. (Adelabu & Yamanaka, 2014)

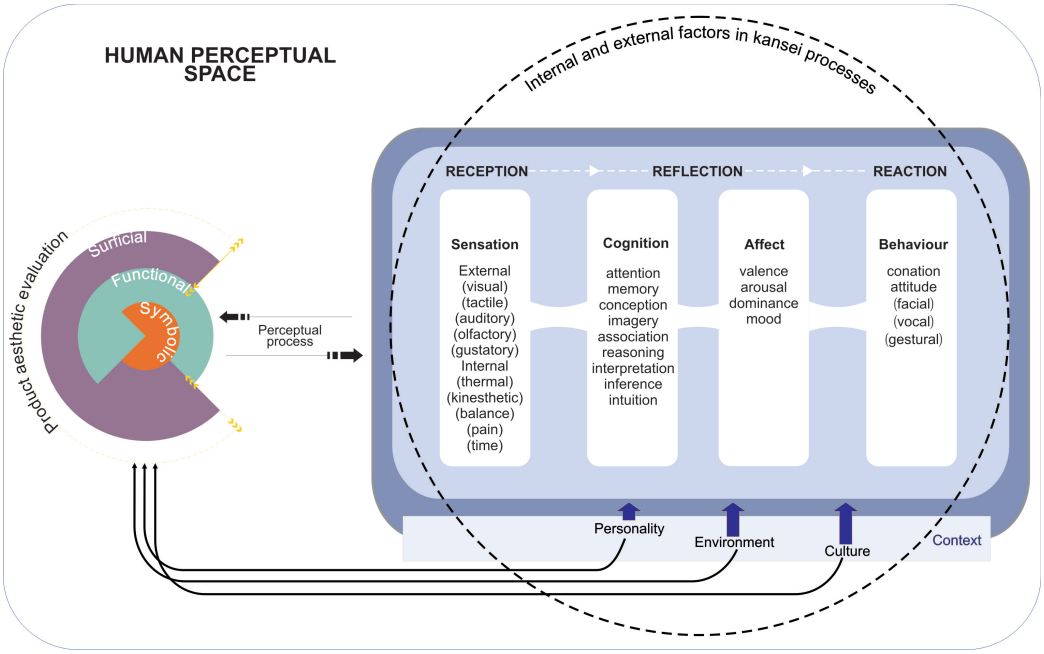

Figure 1: Perceptual space for aesthetic evaluation and kansei processes

This study at large is targeted at exploring cross-culturally, the richness of value perception and aesthetic experience – including a range of traditional and modern oriented product designs.

2. EXPERIMENT

2.1. Stimuli

The stimuli for the experiment is composed of 15 samples of product images pre-selected from a wide range of everyday products considered to be African inspired. These items were sorted and visually characterized into three main categories (traditional, semi-modern and modern) based on the level in typicality of tangible cultural qualities and design elements such as can be physically observed in the product form, surface treatments, material and level of technological sophistication (Figure 2).

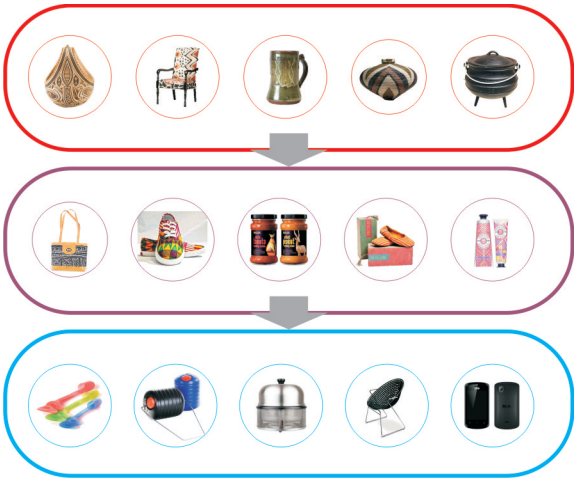

Figure 2: Selected product images classified under 3 categories (traditional, semi-modern and modern)

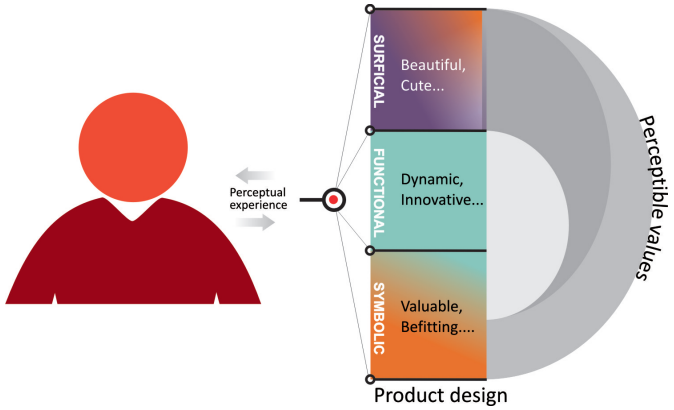

Figure 3: Semantic mapping for perceptible aesthetic values in product design

2.2. Participants

In this study, 20 African subjects (male=16, female=4) and 20 Asian subjects (male=17, female=3) who were non-design students at the University of Tsukuba between the age of 18 and 35 voluntarily participated in a product evaluation task for an average time of 30mins per subject. This African subjects include nationalities of Ghana (1), Kenya (2), Tunisia (2), Mozambique (1), Ivory Coast (1), Malawi (2), Angola (1), Senegal (1), Benin (1), Zimbabwe (1), Ethiopia (1), Eritrea (1), Nigeria (4), Guinea (1). The Asian subjects were mainly Japanese (16) and Korean (4).]

2.3. Procedure

The experimental test made use of a paper-and-pencil version of Semantic differential (SD) scale method proposed by (Osgood, Suci, & Tannenbaum, 1967) to investigate subject's aesthetic perceptions through product visual appearance. Alongside this, the Self-Assessment Manikin (SAM) scale developed by (Bradley & Lang, 1994) adopted to measure the progression of affective experience in the course of evaluating the three product categories. SD and SAM have been used effectively in Kansei research to measure perceptive and emotional responses in a variety of situations, including reactions to visual stimuli [Miyong & Seunghee (2007); Kim, Cho, Niki, & Yamanaka (2012); Sanabria Zepeda (2012)]

In the test questionnaire, the SD evaluation scale consists of selected contrasting adjective pairs (modern-traditional, beautiful – not beautiful, cute – not cute, fun to use – not fun to use, dynamic – static, innovative – not innovative, intuitive – not intuitive, valuable – not valuable, befitting – not befitting, and desirable – undesirable), listed on opposite ends of a bipolar 7-point scale. Appended to this lists is a 7-point Likert scale (1= Extremely, 7= Not at all), which includes rating for object familiarity and indigenousness (association with the design culture of the subjects).The adjective pairs for the Semantic differential scale were selected to reflect the 3 pre-defined levels of aesthetic perception in product design include a few pairs from each layer. Following are some examples for bipolar word connected to each of the layer (Figure 3).

1. Surficial aesthetic (beautiful – not beautiful, cute – not cute)
2. Functional aesthetic (dynamic – static, innovative – not innovative)
3. Symbolic aesthetic (valuable – not valuable, befitting – not befitting)

The SAM, which is a pictorial assessment scale, basically has 9-point rating scales for the affective dimensions of valence, arousal and dominance with 3 bi-polar words (happy – unhappy, calm – excited, dependent - independent). In order to show the differentials in change of emotional feeling in the progression of item evaluation, the SAM scale was presented to the subjects at a fixed interval from the start of their assessment and after the semantic evaluation of each of the item category.

Finally, the subjects are asked to freely respond to a 3 sets of an open-ended question.

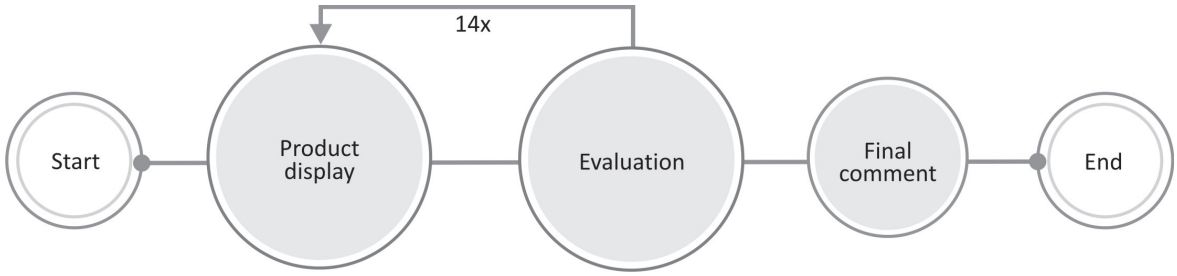

Figure 4: Procedure of experiment

3. ANALYSIS

In this paper, we only present different analytical results based on the evaluation of semantic differential scale of 10 bipolar adjective pairs that were rated along a 7-point scale. This also covers the evaluation results of the 7-point Likert scale which were integrated in the SD evaluation results. The semantic differential charts in Figure 5 below show the distribution of the average mean scores for the 15 items classified under 3 main categories (traditional, semi-modern and modern) as rated by the 2 regional cultures – African and East Asians. It is based on the comparative relationships of items values as visually perceived by the subjects.

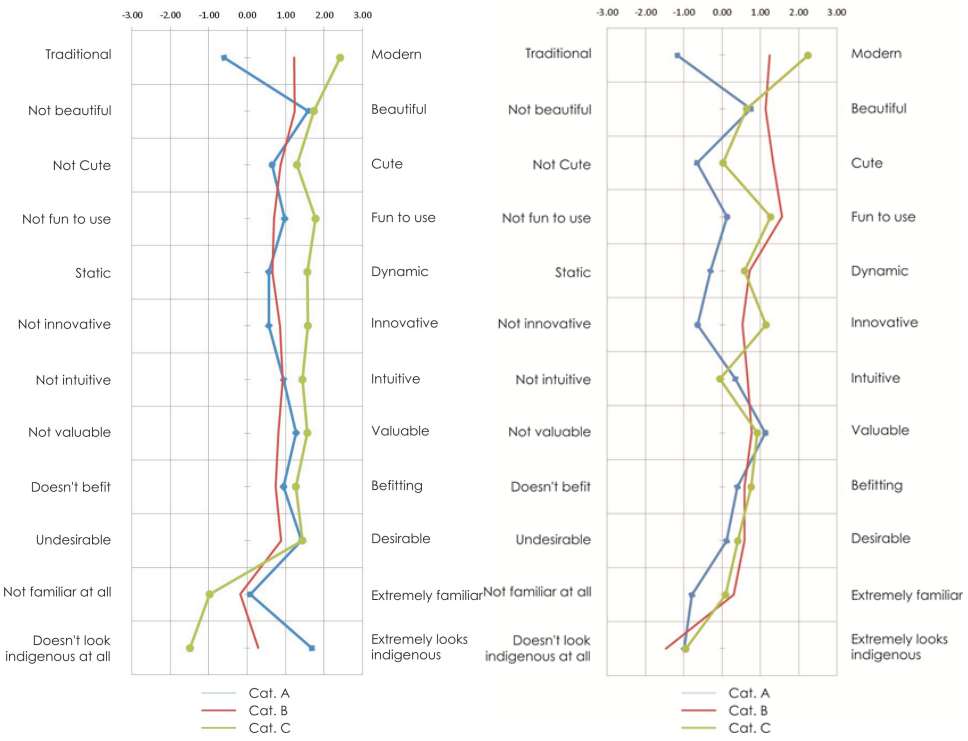

Figure 5: Semantic Differential Charts (Left chart shows rating by African respondents and on the right is rating by East-Asian respondents)

3.1. Analysis of Variances and Multiple Comparisons

To characterize the quality of perception between the two cultural regions (Africa and East Asia) based on the 3 pre-defined levels of items category (traditional-A, semi-modern-B and modern-C), the results of the SD evaluation was analysed with one-way ANOVA and Tukey post-hoc comparisons to further determine which of the groups differs from one another on the semantic scale. The items category constituted the independent groups while the semantic evaluations made up a list of dependent variables.

This table below shows the output of the ANOVA analysis and statistical difference between the group means based on responses obtained from African and Asian subjects.

Table 1: One-way ANOVA test for mean comparisons between product categories

Set of SD & Likert scales		Sum of Squares		F		Sig.	
modern-traditional	Between Groups	23.121	30.727	23.195	12.691	**.000**	**.001**
	Within Groups	5.981	14.527				
	Total	29.102	45.254				
beautiful – not beautiful	Between Groups	.630	.711	.832	.518	.459	.608
	Within Groups	4.543	8.235				
	Total	5.173	8.946				
cute – not cute	Between Groups	1.122	10.288	1.552	4.276	.252	**.040**
	Within Groups	4.340	14.436				
	Total	5.462	24.724				
fun to use – not fun to use	Between Groups	3.177	5.744	5.967	6.119	**.016**	**.015**
	Within Groups	3.195	5.633				
	Total	6.372	11.377				
dynamic – static	Between Groups	3.161	3.057	8.977	1.413	**.004**	.281
	Within Groups	2.113	12.981				
	Total	5.274	16.038				
innovative – not innovative	Between Groups	2.792	8.182	11.840	5.829	**.001**	**.017**

	Within Groups	1.415	8.422				
	Total	4.207	16.604				
intuitive – not intuitive	Between Groups	.840	1.374	2.656	2.097	.111	.166
	Within Groups	1.898	3.933				
	Total	2.738	5.307				
valuable – not valuable	Between Groups	1.460	.329	2.682	.382	.109	.691
	Within Groups	3.267	5.173				
	Total	4.727	5.502				
befitting – not befit	Between Groups	.692	.307	3.787	1.489	.053	.264
	Within Groups	1.097	1.237				
	Total	1.789	1.544				
desirable – undesirable	Between Groups	.937	.574	1.958	.588	.184	.571
	Within Groups	2.872	5.857				
	Total	3.809	6.431				
extremely familiar – not familiar at all	Between Groups	3.045	3.353	6.251	2.543	**.014**	.120
	Within Groups	2.923	7.910				
	Total	5.968	11.263				
Extremely looks indigenous – Doesn't looks indigenous at all	Between Groups	25.110	.822	14.002	.785	**.001**	.478
	Within Groups	10.760	6.283				
	Total	35.870	7.105				

Significance level alpha=0.05

African | East-Asian

Table 2: Post-hoc Test Result for the Perceptual Ratings of Product Categories by African and East-Asian subjects way ANOVA test for mean comparisons between product categories

Category A	**Category B**	**Category C**
Modern – Traditional		
-.600$_{a}$ [-1.735, .535]	**1.220 $_{b}$ [.329, 2.111]**	**2.420$_{c}$ [1.946, 2.894]**
-1.160 $_{a}$ [-2.921, .601]	1.250 $_{bc}$ [-.037, 2.537]	2.250 $_{bc}$ [1.332, 3.168]
Beautiful – Not beautiful		
1.580 $_{abc}$ [.770, 2.390]	1.240 $_{abc}$ [.605, 1.875]	1.730 $_{abc}$ [.899, 2.561]
.750 $_{abc}$ [.022, 1.479]	1.140 $_{abc}$ [.291, 1.990]	.630 $_{abc}$ [-.756, 2.016]
Cute – Not Cute		
.640 $_{abc}$ [-.056, 1.336]	.870 $_{abc}$ [.153, 1.587]	1.300 $_{abc}$ [.4787, 2.121]
-.654 $_{ac}$ [-1.542, .234]	**1.340 $_{b}$ [.213, 2.467]**	.020 $_{abc}$ [-1.852, 1.892]
Fun to use – Not fun to use		
.960 $_{abc}$ [.408, 1.513]	.700 $_{ab}$ [-.011, 1.411]	**1.780 $_{c}$ [1.131, 2.429]**
.130 $_{ac}$ [-.773, 1.033]	**1.570 $_{b}$ [1.068, 2.072]**	1.260 $_{abc}$ [.209, 2.311]
Dynamic – Static		
.550 $_{ab}$ [.2157 .8843]	.650 $_{ab}$ [.069, 1.231]	**1.570 $_{c}$ [.966, 2.175]**
-.300 $_{abc}$ [-1.9052, 1.3052]	.720 $_{abc}$ [-.133, 1.573]	.580 $_{abc}$ [-.724, 1.884]
Innovative – Not innovative		
.550 $_{ab}$ [.059, 1.041]	.860 $_{ab}$ [.327, 1.393]	**1.580 $_{c}$ [1.437, 1.723]**
-.640 $_{ab}$ [-2.044, .764]	.530 $_{abc}$ [-.323, 1.383]	**1.140 $_{c}$ [.400, 1.880]**
Intuitive – Not intuitive		
.930 $_{abc}$ [.357, 1.503]	.926 $_{abc}$ [.491, 1.361]	1.430 $_{abc}$ [.968, 1.892]
.340 $_{abc}$ [-.507, 1.187]	.670 $_{abc}$ [.053, 1.287]	-.070 $_{abc}$ [-.7161, .5761]
Valuable – Not valuable		
1.260 $_{abc}$ [.814, 1.706]	.810 $_{abc}$ [-1.735, .535]	1.570 $_{abc}$ [-1.735, .535]
1.260 $_{abc}$ [.814, 1.706]	.810 $_{abc}$ [-1.735, .535]	1.570 $_{abc}$ [-1.735, .535]
Befitting – not befitting		
.930 $_{abc}$ [.672, 1.188]	.740 $_{ab}$ [.4045, 1.076]	**1.2600 $_{c}$ [.766, 1.754]**
1.130 $_{abc}$ [.361, 1.899]	.770 $_{abc}$ [.428, 1.112]	.9100 $_{abc}$ [-.224, 2.044]
Desirable – Undesirable		
1.410 $_{abc}$ [.713, 2.107]	.890 $_{abc}$ [.414, 1.366]	1.430 $_{abc}$ [.802, 2.058]
.114 $_{abc}$ [-.217, .445]	.590 $_{abc}$ [.098, 1.082]	.400 $_{abc}$ [-.981, 1.781]
Extremely familiar – Not familiar at all		
.078 $_{ab}$ [-.412, .568]	-.172 $_{abc}$ [-.520, .176]	**-.978 $_{c}$ [-1.853, -.103]**

-.788 $_{abc}$ [-1.5433, -.0327]	.310 $_{abc}$ [-.4659, 1.0859]	.080 $_{abc}$ [-1.290, 1.450]
Extremely looks indigenous – Doesn't looks indigenous at all		
1.680 $_{ab}$ [.646, 2.714]	.284$_{ab}$ [-1.145, 1.713]	**-1.482$_{c}$ [-2.500, -.464]**
-.978 $_{abc}$ [-2.169, .213]	-1.460 $_{abc}$ [-2.290, -.630]	-.950 $_{abc}$ [-1.511, -.390]
	African	East-Asian

Note. Evaluations in bipolar adjectives "modern-traditional", "beautiful – not beautiful", "cute – not cute", "fun to use – not fun to use", "dynamic – static", "innovative – not innovative", "intuitive – not intuitive", "valuable – not valuable", "befitting – not befitting", and "desirable – undesirable" were made on a 7-point semantic scales and the rating on familiarity and association of product with design related to African culture was done on a 7-point Likert scale (1= Extremely, 7= Not at all). The contents of the evaluation sheets were presented in English to the African subjects, Japanese for Japanese subjects and Korean for Korean subjects. Means that do not share subscripts differ at $p < .05$ in the Tukey honestly significant difference comparison. Numbers in brackets are 95% confidence intervals of the means.

For the African response, the mean comparisons for the evaluation of product categories A to C according to one-way ANOVA result presented in table above shows significant differences in the perceptual rating of "modern-traditional" F (2, 12) = 23.195, p = .000, "fun to use – not fun to use" F (2, 12) = 5.967, p = .016, "dynamic – static" F (2, 12) = 8.977, p = .004, innovative – not innovative" F (2, 12) = 11.840, p = .001, "Extremely familiar – Not familiar at all" F (2, 12) = 6.251, p = .014 and "Extremely looks African – Doesn't looks African at all" F (2, 12) = 14.002, p = .001. Considering the evaluation for other descriptive variables, there was no significant difference between groups.

For the East-Asian response, the mean comparisons for the evaluation of product categories A to C according to one-way ANOVA also shows significant differences in the perceptual rating of "modern-traditional" F (2, 12) = 23.195, p = .001, "cute – not cute" F (2, 12) = 4.276, p = . 040, "fun to use – not fun to use" F (2, 12) = 6.119, p =. 015, and "innovative – not innovative" F (2, 12) = 6.119, p = .017. There was no significant difference for other descriptive variables.

Moreover, to identify differences in-between groups with multiple comparisons, the Tukey honestly significant difference (HSD) test was also applied. It is to be noted that the post-hoc result for "modern - traditional" scale was found to differ significantly across the three groups at p< .05 in the case of the African subjects - A (M = -.600, 95% CI [-1.735, .535]), B (M = 1.220, 95% CI [.329, 2.111], p=.004), and C (M =2.420, 95% CI [1.946, 2.894], p= .048). In the result obtained from the East Asian subjects, the "modern - traditional" scale differed significantly for category A when compared to both categories B and C, though, the comparison between category B and C do not show a significant difference. This result has reasonably validated the reliability of the products classification prior to the experiment showing that it also aligned with the perception of the respondents irrespective of the region. An exception was only noted for item 2 under product category A, which showed that it was perceived to be modern than traditional by the African subjects. Also for the East Asian subjects, we found a consistency in mean difference though it was much higher in the evaluation result. For other ratings in the multiple comparisons between the three product groups based on the post-hoc tests, the results are shown in table above.

3.2. Analysis of Principal Factors and Semantic Relationships

In order to explore the correspondence and reduction of semantic variables, a Principal components analysis was applied to the SD result. Here we analyzed the data for the following explanatory variable set: beautiful – not beautiful, cute – not cute, fun to use – not fun to use,

dynamic – static, innovative – not innovative, intuitive – not intuitive, valuable – not valuable, befitting – not befitting, and desirable – undesirable. Barlett's test of sphericity was significant, thus the hypothesis that the inter-correlation matrix involving these eight variables is an identity matrix is rejected. Thus from the perspective of Bartlett's test, factor analysis is feasible. The KMO scores for the data set were significant to also support factor analysis. This test was also carried to confirm the principal factors which account for most of the variance in the analyzed variables. Also, it was considered to determine whether the variables chosen are sufficiently representative of the construct of perceptual value and selection of more appropriate adjective sets to create our measurement scale in future study.

Table 3: Factor loadings after Varimax rotation

Variables	D1	D2	D3
beautiful – not beautiful	0.223	**0.711**	0.655
cute – not cute	0.515	0.231	**0.788**
fun to use – not fun to use	**0.749**	0.227	0.459
dynamic – static	**0.864**	0.449	0.134
innovative – not innovative	**0.877**	0.194	0.272
intuitive – not intuitive	**0.805**	0.272	0.318
valuable – not valuable	0.426	**0.871**	0.131
befitting – not befitting	0.628	**0.726**	0.010
desirable – undesirable	0.144	**0.899**	0.381
Eigenvalue	6.483	1.124	0.663
Variability %	40.393	33.540	17.957
KMO	0.684		

Variables	D1	D2	D3
beautiful – not beautiful	0.433	0.584	0.514
cute – not cute	**0.839**	-0.057	0.271
fun to use – not fun to use	**0.882**	0.375	0.107
dynamic – static	**0.804**	-0.345	0.238
innovative – not innovative	**0.829**	0.318	0.063
intuitive – not intuitive	0.310	0.025	**0.907**
valuable – not valuable	-0.256	**0.789**	0.348
befitting – not befitting	0.194	**0.872**	-0.231
desirable – undesirable	0.125	**0.891**	0.076
Eigenvalue	4.070	2.448	0.994
Variability %	35.764	32.025	15.679
KMO	0.669		

African | East-Asian

In the of African evaluation, component D1, “fun to use – not fun to use”, “dynamic – static”, “innovative – not innovative”, and “intuitive – not intuitive” (hereafter referred to as the “Technical value”) were associated with the technical aspects/functional or engineering quality of the product items. For component D2, “valuable – not valuable”, “befitting – not befitting”, and “desirable – undesirable”, were associated with the symbolic or worth value of the product items including a reflection of the variable “beautiful – not beautiful”. Component D3 was also considered though the eigenvalue is less than 1 because we want to establish the effects of other variable which interplay in the holistic valuation of product design aesthetics. In this dimension, the variable “cute – not cute” showed an associative connection with beauty of the product form.

Whereas for the East Asian evaluation, component D1, “cute – not cute”, “ fun to use – not fun to use”, “dynamic – static”, and “innovative – not innovative” were associated with the technical but in addition to the playful aspect or quality of the product items. For component D2, valuable – not valuable”, “befitting – not befitting”, and “desirable – undesirable”, were associated with the symbolic or worth value of the product items. Here also, component D3 was also considered though

the eigenvalue is slightly less than 1 to establish the effects of the variable “intuitive – not intuitive” which shows an association of the ease of recognizing the items. This also includes some reflection of the variable “beautiful – not beautiful” for components D2 and D3.

Furthermore, components were graphically displayed on an orthogonal map to investigate the semantic relationships that existed between the characteristics of product items as perceptually evaluated by both African and East-Asian subjects (Figure 6).

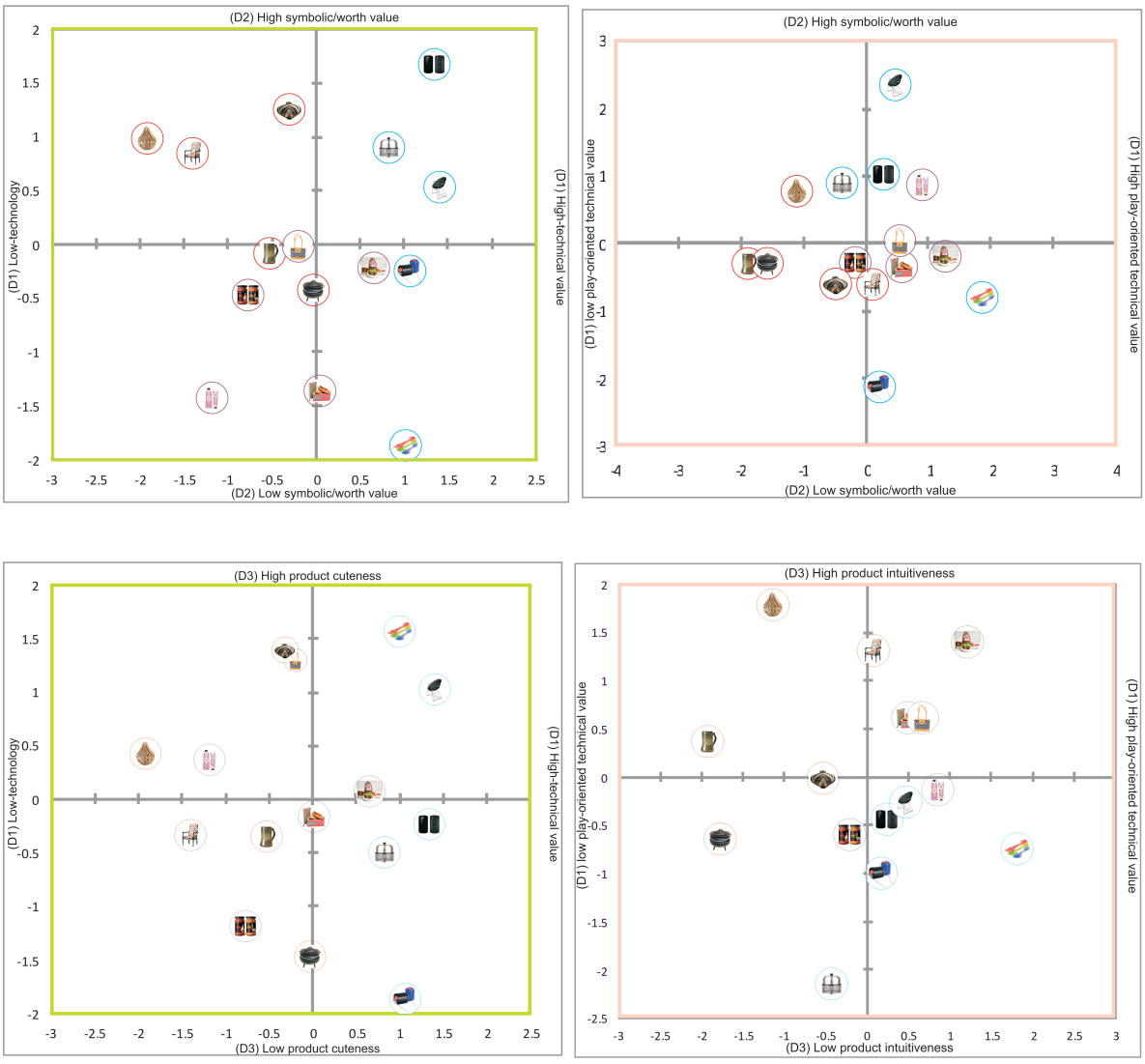

Figure 6: Semantic relation map – PCA score plots for African (left) and East-Asia (right) products evaluation

4. DISCUSSION AND CONCLUSION

Hypothetically, we expected a significant difference in the perception of modernity across the three product categories and this was almost completely proved with two regional groups of culture. In the case of the evaluation on attached value, there was no significant difference across groups. However, we could confirm in the comparison of mean ratings that products in category A (traditional class) were valued more than the products in category B (semi-modern class) and less than when compared with evaluation obtained for product categories C (modern class). This means that the effect of physically expressing visual cultural elements in modern products may not

guarantee proportionate increase in the sense of their value when compared to the real traditional products. Remarkably, the evaluation result for Africans in perceiving products relatedness to African design culture, we found no significant difference between product categories A and B, but both in turn when compared with category C indicate statistical significance in difference of product perception as not been African oriented at all at $p < .05$. Here, we found it interesting to observe a persistent tendency to the notion that advanced industrial products cannot be made in Africa. Despite growing design possibilities achievable through technology transfer and product development through co-creation and collaborative approaches, African users might not see the appearance of modern products as progress in this regard. More so, in our foremost study towards the kansei evaluation of African product design, we noted that in the new age of design, an African country such as South Africa, which is a highly industrialized country in Southern Africa with much Western influence, started exploring a way of grafting the African identity onto Western European technology towards a new synthesis. It is also noteworthy that the country has served as the design origin for almost all the product items grouped under category C except for the smartphone. The wave of design breakthrough is believed to be spreading across the continent as we can see in the case of the VMK smartphone purported to be the first African designed smartphone developed by a Congolese entrepreneur Verone Mankou, but manufactured in China.

Some differences in the aesthetic perception of product samples were observed between the African and East Asian when we referred to the outcome of the Principal Component Analysis. Despite having similar tendency in the characterization of products based on the evaluation carried out using the variables provided, we found that there variation in the aspect of product attributes being focused on. For instance, component D1 for African evaluation focused more on the technological value of the product items whereas for the East Asian evaluation, we discovered a subtle tendency of placing more consideration for playful dimension of product technology. Furthermore, our consideration to include D3 as one of the principal factors further shows that while a cuteness of product may interest an African user relatively to other qualities; an East Asian user may prefer to base his consideration on the intuitiveness of the product. Alternatively, the unfamiliarity of the product samples being more related to Africa design culture might also be a contributing reason to why the East Asian subjects has considered the product intuitiveness important in the process of recognizing the product.

In essence, this study has demonstrated that the impression users get through perceiving products visually can be far-reaching in determining the value they place on them. (Crilly, Moultrie, & Clarkson, 2004) rightly noted that the visual appearance of products is a critical determinant of consumer response and product success. To a large extent, the elegance (surface aesthetics), functionality (functional aesthetics) and social significance (symbolic aesthetics) of products as perceived through visual information influences the evaluative judgments and frequently centre on the satisfaction of consumer wants and desires, rather than their needs. Today, there is an over-emphasis on production of high-tech industrial products made of synthetic materials that are seen as superior in quality over locally crafted products that have sustained everyday living from time immemorial. It is a popular opinion that one of the biggest challenges of local design is recognition and acceptance by the local and even international users. As most countries are now emphasizing and developing their creative industries (small medium and micro enterprises), this orientation is expected to change. However, in order for local design industry to thrive in a global market, there has to be a drive to achieving a holistic balance and seamless integration of aesthetic values throughout the tangible and intangible aspects of product design. The semantic and emotional evaluation of the products is thought not only to be exuded by the product visceral

composition but much more inextricably connected to their impact on lifestyle and socio-cultural practices. Since product designs are seen as a tool of cross-cultural understanding, the growing need to have better understanding of cross-cultural perception will not only have a far-reaching effect for the global market, but also will play an important role in engendering untapped potentials for globalization of local product designs.

In our future study, we anticipate for further exploration into cross-cultural understanding of the mechanism of perceptual richness and aesthetic sensibility in traditional and modern product designs using common products inspired by an East-Asian culture.

4.1. Acknowledgement and Reference section

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References

Adelabu, O. S., & Yamanaka, T. (2014). Kansei as a function of aesthetic perception in product design. In J. Watada (Eds.), Industrial applications of affective engineering (pp. 83-95). Switzerland: Springer International Publishing.

Beuttel, B. (2010). Kansei research and design. Tsukuba: Kansei Information Laboratory, University of Tsukuba.

Bradley, M., & Lang, P. J. (1994). Measuring emotion: the self-assessment semantic differential manikin and the semantic differential. Journal of Behavioural Therapy and Experimental Psychiatry, 25(1), 49-59.

Budd, M. (1998). Aesthetics. Retrieved from http://www.rep.routledge.com/article/M046.

Chen, L. L. (in press). Contradictory semantics for kansei design. In T. Yamanaka & O. S. Adelabu (Eds.), Kansei and Design: Without Borders. Tsukuba: Kansei Information Laboratory, University of Tsukuba.

Crilly, N., Moultrie, J., & Clarkson, P. (2004). Seeing things: consumer response to the visual domain in product design. Design Studies, 25(6), 547-577.

Gracyk, T. (2003). Hume's aesthetics. Retrieved October 1, 2013, from http://plato.stanford.edu/entries/hume-aesthetics/.

Hekkert, P. (2006). Design aesthetics: principles of pleasure in design. Psychology Science, 48(2). Retrieved October 1, 2013, from http://www.pabst-publishers.de/psychology-science/2-2006/06_Hekkert.pdf.

Hung, W. K., & Chen, L. L. (2012). Effects of novelty and its dimensions on aesthetic preference in product design. International Journal of Design, 6(2), 81-90.

Kenya, H. (2007). Designing Design. Tokyo: Lars Müller Publishers.

Kim, S. K., Cho, Y. I., Niki, K., & Yamanaka, T. (2012). Effect of information assimilation on product evaluation. Proceedings of DESIGN 2012, the International Design Conference. Dubrovnik, Croatia.

Kluckhohn, C. (1951). Values and value orientations in the theory of action. In T. Parsons & E. A. Shils (Eds.), Toward a general theory of action (pp. 388–433). Cambridge, MA: Harvard University Press.

Koren, L. (2010). Which “aesthetics” do you mean? Ten definitions. California: Imperfect Publishing.

Lee, K. (2010). Culture, Interface Design, and Design Methods for Mobile Devices. In A. Marcus, et al. (Eds.), Mobile TV: Customizing Content and Experience, Human-Computer Interaction Series (pp. 27–66).

Lévy, P., & Yamanaka, T. (2009). Kansei studies description and mapping through kansei study keywords. Kansei Engineering International Journal, 8 (2), 179–185. Retrieved October 1, 2013, from http://pie.kansei.tsukuba.ac.jp/epierrot/?p=142.

Lin, R. (2007). Transforming Taiwan aboriginal cultural features into modern product design. International Journal of Design, 1(2), 45–53. Retrieved October 1, 2013, from http://www.ijdesign.org/ojs/index.php/IJDesign/article/viewFile/46/18.

Miyong, L., & Seunghee, L. (2007). Kansei evaluation of the product design using visual images – focus on the impression of product appearance abstract : In Proceedings of the International Association of Societies of Design Research (pp. 1–12). Hong Kong.

Moalosi, R., Popovic, V., & Hickling-hudson, A. (2007). Product analysis based on botswana ’ s postcolonial socio-cultural perspective. International Journal of Design, 1(2), 35–43. Retrieved October 1, 2013, from http://www.ijdesign.org/ojs/index.php/IJDesign/article/view/10/24.

Norman, D. A. (2004). Emotional design: why we love (or hate) everyday things. New York, NY: Basic Books.

Osgood, C. E., Suci, G. J., & Tannenbaum, P. (1967). The measurement of Meaning. Illinois: University of Illinois Press.

Sanabria Zepeda, J. C. (2012). The role of familiarity and creativity in the generation of affective responses to advertising: proposal and evaluation of a pairing-congruity method (Doctoral dissertation, University of Tsukuba). Retrieved from http://hdl.handle.net/2241/117587.

Sternberg, R. J. (1996). Cognitive Psychology. New York, NY: Harcourt Brace College Publishers.

Yanagi, M. (1989). The unknown craftsman: a Japanese insight into beauty. Tokyo: Kodansha International.

BIOGRAPHY

Adelabu Oluwafemi Samuel is a doctoral student under the Graduate School of Comprehensive Human Sciences, University of Tsukuba, Japan. His current study investigates on perceptual richness in product design aesthetics through an explorative cross-cultural kansei study approach.

Yamanaka Toshimasa is a Professor in the Faculty of Art and Design and in the Doctoral Program in Kansei, Behavioral and Brain Sciences at the University of Tsukuba (since 2005). He is the current President of the Japan Society for the Science of Design (JSSD) and a Board member of the International of the Societies of Design Research (IASDR). He is also a board member of the Japan Society of Kansei Engineering (JSKE).