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Visualizing Cyber Personality

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ABSTRACT

E-brand personality is the brand personality of online products and services represented by websites. Amidst the competitive conditions of online markets, e-brand personality has been considered important for securing salient brand identity. However, despite the importance of e-brand personality, few studies have suggested how to establish it through the visual design of web sites. The main goal of this study is to examine and verify the relationship between e-brand personalities and the visual attributes in web pages. We have conducted three consecutive studies. First, we identified four major dimensions of e-brand personality on websites. Second, we explored and identified the relationships between e-brand personalities and visual-composition attributes. Third, we conducted a confirmatory study to verify the causal relationships between values identified in the second study. Thus, it was concluded that 'simplicity' and 'cohesion' affected 'bold' personality. 'Contrast,' 'density,' and 'regularity' influenced the 'analytical' personality. 'Contrast,' 'cohesion,' 'density' and 'regularity' affected the 'friendly' personality dimension. But no visual attribute significantly affected the 'sophisticated' personality dimension. Implications and limitations of the study are discussed at the end of this paper.

Keywords

e-brand personality, visual attributes, web design

1. INTRODUCTION

To survive keen competition, online corporations have evolved elaborate strategies for building unique and compelling websites. As the representative strategy, the strategy of building brand was applied to websites (Breakenridge, 2001; Keller, 2002). Brand-related strategies have been used effectively to make products or services unique in the real world (Breakenridge, 2001). In particular, the notion of 'brand personality' has been identified as the key factor contributing to the uniqueness of products or services and their increased popularity over others (Aaker, 1996; Aaker, 1997b; Plummer, 1985).

'Brand personality' is defined as the adapted aspects of human personalities that constitute individual differences. Studies of e-brand personalities have been conducted primarily in two areas: marketing and design. Marketing research has focused mainly on basic concepts (Aaker, 1996; Aaker, 1997a; Davis, 2000; Schmitt, Simonson and Marcus, 1995; Yeo, 2000) and dimensions (Aaker, 1997b; Kim, 2000), case studies (Breakenridge, 2001; Joachimsthaler, 1999), and cross-cultural influences (Aaker, 2001). Although many researchers have studied e-brands, they tend to focus on conceptual subjects dealing with basic properties such as the definition and construction of e-brand personalities (Aaker, 1997b; Keller, 2002). Generally, research results in marketing have presented solid and reliable concepts and constructions of e-brand personalities in a macroscopic view, but they do not give detailed guidance for building e-brand personalities, especially with regard to visual aspects. Therefore, it is not easy for e-brand strategists to directly apply the results.

In contrast, research in the design field has focused on examining and submitting the applications of visual elements for building e-brand personalities in a microscopic view (Bedford, 2003; Hwang, 2000; No and Lim, 1999; Susan Nelson, 2002; Yoon, 2002). However, most researchers have used their subjective experience rather than relying on scientific and objective analysis. If researchers in the design field present more reliable evidence using scientific methods, the results would be more persuasive. Therefore, our study was conducted for the purpose of complementing avenues of study in the marketing and design fields.

How does visual design manipulate effective e-brand personalities of web sites? To answer this main research question, we will propose visual guidelines that can be directly applied to e-brand strategies using verifiable scientific methods. To this

end, we analyzed e-brand personalities and visual characters along with the relationships of these two variables to web sites. In our study, visual characters were analyzed as a concept of ‘visual attributes,’ the characters of relational compositions based on visual elements such as ‘balance’ or ‘contrast’ (Lupton, 1999; Park, Choi and Kim, 2004). This concept is focused on the relationship of each visual element to the others; therefore, visual attributes are useful for analyzing the visual characters on entire web pages that users perceive at a glance (Park et al., 2004).

To complement the findings of our study and increase its scientific validity and reliability, we applied additional thorough exploratory and confirmatory methodologies. This study consists of three steps: preliminary, exploratory, and confirmatory. In the preliminary study, we defined e-brand personality dimensions by collecting, evaluating and analyzing personality adjectives. In the exploratory study for analyzing the effective visual attributes of e-brand personalities, we measured eleven visual attributes of fifty-two representative web pages and conducted a survey asking users to give their impressions of e-brand personalities in web pages; we then statistically analyzed the relation between visual attributes and e-brand personalities. Finally, in the confirmatory study conducted to verify the results of the exploratory study, we manipulated the survey materials based on significant visual attributes and ran an online survey for evaluating e-brand personalities. By statistically analyzing the survey data, we arrived at an empirical guideline for effectively designing e-brand personalities of web pages. Figure 1 shows the processes used throughout the study.

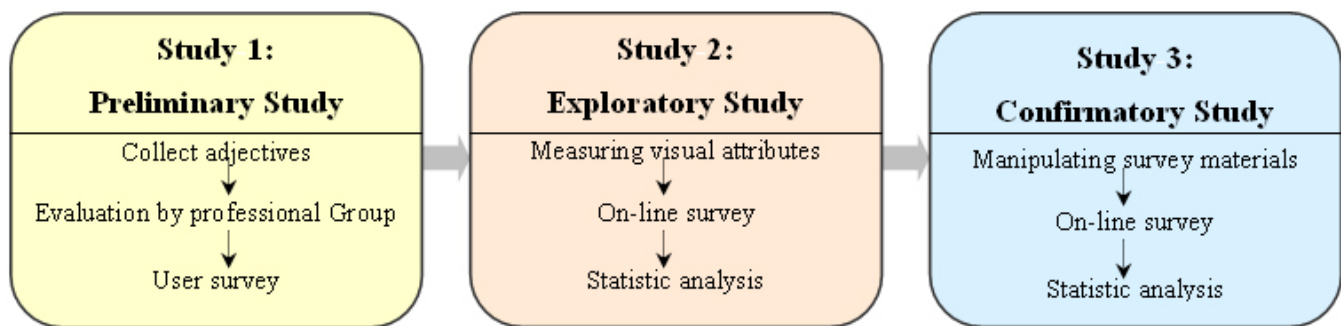


Figure 1. Study Processes

2. THEORETICAL BACKGROUND

2.1. Brand Personality

The adaptation of various aspects of human personality to ‘brand’ is defined as ‘brand personality’ (Aaker, 1996; Plummer, 1985). In other words, brand personality is “the set of human characteristics associated with a brand” (Aaker, 1996; Aaker, 1997b). Aaker (1996) did not only apply the inner characteristics of human personality to brand but also the outer ones such as age, sex, social or economic status. The uniqueness and continuation of personalities effectively makes brands different or unique (Aaker, 1996; Keller, 2002). Because other competitors cannot easily mimic or imitate it, brand uniqueness gives the holding company economic advantages over its competitors (Carpenter, 2000; Kim, 2001) and applying a brand personality is an effective and economical business strategy (Aaker, 1996; Hue, 2001; Keller, 1993).

Studies of brand personalities have focused on defining, measuring and constructing brand personality traits. Aaker (1997b) determined the nature of the dimensions of brand personality perceived by Americans.

Users perceive e-brand personality through all kinds of interactive components (Simonson and Schmitt, 1998). Schmitt (1999) suggested the concept of ‘style’ that includes unique characteristics and expressive methods. Specially, a visual style is one that projects a strong stimulus in users’ perceptions. In addition, Kleinbard (1978) found that visual images can be important factors in determining memory and recall mechanisms.

2.2. Visual Attributes

People tend to perceive objects as integrative and complete, not as individual (Arnheim, 1983; Koffka, 1955). We can assume users perceive a web page on the whole, including the relation among elements. Therefore we analyzed visual factors of web pages as 11 ‘visual attributes’ based on a wholly perceptual (Koffka, 1955; Schmitt, 1999).

Each of the visual attributes means the specific visual characteristics of an object’s composition, based on the relationship between the object and its characteristics (Bevlin, 1997; Kim, 1996; Lauer, 1985). Generally, designers and researchers mention terms such as balance, unity, movement, rhythm and contrast as visual attributes (Arnheim, 1983; Bevlin, 1997; D.C

L. Ngo, 2000). Although they may not agree on the name 'visual attribute' for each concept, the concepts of visual attribute they mentioned have common characteristics, which are compositional and focused on a relationship of elements (D.C L. Ngo, 2000; Kim, 1996).

Visual attributes are based on the Gestalt theory represented by Structuralism (Arnheim, 1983; Lupton, 1999). The term 'Gestalt' used by Ehrenfels in 1890 means 'shape' or 'form' in German, with Gestalt theory being summarized as one phrase: The whole is bigger than the sum of the whole (Arnheim, 1983; Koffka, 1955). This means 'whole' is not the simple sum of every element, but something that has a unique character due to the composition of elements. In other words, Gestalt psychologists believe the manner in which objects are constituted is more important than 'what they consist of' (Behrens, 1984; Ellis, 1938; Koffka, 1955).

Gestalt theory is generally considered to be the psychology of perception (Arnheim, 1983). Gestalt psychologists have tried to find essential factors of visual perceptions from the relationship of objects such as 'composition' instead of 'individual characteristics' such as shape or color (Arnheim, 1988). They have asserted that the definite factors are in the compositions of visual elements instead of individual elements. In visual perception, 'composition' is defined as a way of laying out the elements which is affected by the attributes of each element. Therefore, although the attributes of visual elements may be the same, the visual composition people perceive would be different (Arnheim, 1988). Table 1 includes the definitions for each visual attribute while Figure 2 also shows each visual attribute when it is maximized.

Visual attributes	Definition
1.Balance	The distribution of optical weight shown in a whole picture(Behrens, 1984; Lauer, 1985; Ngo and Byrne, 2001)
2.Symmetry	The perfect balance around a vertical or horizontal pivot(Lauer, 1985; Ngo et al., 2001)
3.Movement	The moving of a viewer's eyes, generally from upper right to lower right in a picture(Dillon, 1992)
4.Rhythm	The stream of a regular order through a pattern of the same or similar objects(Lauer, 1985; Wong, 1987)
5.Contrast	The difference between attributes of elements(Bevlin, 1997)
6.Proportion	The ratio between the width and height of objects or between one object and another(Bevlin, 1997; Ngo et al., 2001)
7.Unity	The visual association of objects that deems them to be visually and physically one(Lauer, 1985)
8.Simplicity	The amount of clarity projected by a picture(Arnheim, 1983)
9.Density	The proportion between the size of background and the totality of the objects(Behrens, 1984; Koffka, 1955; Ngo et al., 2001)
10.Regularity	The regular amount of locations of objects(Ngo et al., 2001)
11.Cohesion	The similarity of ratios between width and height of objects(Ngo et al., 2001)

Table 1. Definitions of Visual Attributes

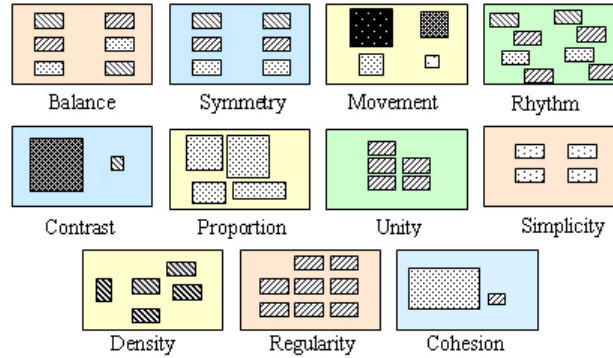


Figure 2. Maximization of Visual Attributes

In this study, visual attributes that can explain integrative and complete perceptions of users are employed as the basis for analyzing visual components. The result of using visual attributes can be easily understood and adapted to web pages by designers, because, generally, many designers have used terms such as balance, rhythm, unity and contrast to explain or evaluate their design works.

In addition, Gestalt psychologists assisted in arriving at the principle for visual organization. In a visual area that humans perceive, the psychologists defined the obvious area as ‘figure’ and the ambiguous area as ‘ground’ (Koffka, 1955). They insist that human perception tends to organize figures based on several visual attributes: the principles of proximity, similarity, continuity, and closure (Koffka 1955; Lupton 1999; Arnheim 1983).

Proximity means that elements that are close together are associated, and similarity means that elements which resemble each other, such as color, size, and texture, are associated (Koffka, 1955). Continuity is based on the idea that humans prefer to perceive continuance of contours rather than changes in direction (Koffka, 1955; Lupton, 1999). Based on the principle of closure, people tend to interpret elements as being ‘closed’ rather than ‘open’ (Ellis, 1938).

In this study, we organized all components of web pages based on the Gestalt principle for visual organization and then measured visual attributes of these components as numeric values.

3. STUDY 1: PRELIMINARY STUDY

The goal of the preliminary study was to identify the e-brand personality dimensions of websites (Aaker, 1997b).

During the first stage of Study 1, basic personality adjectives were collected from psychology, design and marketing sources. Two hundred and four adjectives were collected from the personality model in psychology sources (John, 1990; McCrae and Costa, 1989; Norman, 1963; Piedmont, McCrae and Costa, 1991). These were the same adjectives collected by Aaker (1997a). Thirty emotional adjectives were added from Kim’s study (2003). Also, we conducted a survey in order to add more personality adjectives derived from free associations. Sixty-two participants in their twenties and thirties were asked what associated personality traits came to mind when they viewed homepages. Six hundred and forty-five personality adjectives were collected from this survey. After eliminating repeated personality adjectives, a total of seven hundred and forty-seven basic personality adjectives were collected.

In the second stage, a professional group evaluated the seven hundred and forty-seven adjectives. They evaluated the relevance of these adjectives in relation to e-brand personality. First, they set criteria for deleting or transforming personality adjectives. Inappropriate and multivocal adjectives were deleted. When two words with similar meanings, such as ‘close’ and ‘familiar’, were listed, one was deleted based on the frequency of its use. In regard of transforming adjectives, phrases with qualified subjective views, such as ‘seems sloppy,’ were reduced to more objective views, such as ‘sloppy.’ Finally, one hundred and forty-seven personality adjectives were selected by the professional group.

In the third stage, we conducted a survey to define personality dimensions. Four hundred and seventeen users participated in the survey; three hundred and ninety-nine of them were in their twenties. Each subject was asked to choose one website that came to mind and describe the e-brand personalities of the website they had chosen. Questions consisted of 147 adjectives set up as seven-point Likert scales. For analyzing the similarity of meaning between adjectives, we conducted hierarchical cluster analysis. Exploratory factor analysis was also conducted using Varimax rotation. Where two words had similar meanings through Dendrogram, the one with a lower factor loading score was deleted. Adjectives consisting of one factor

were also deleted. Finally, 3~4 adjectives having high factor loading remained with each factor. We defined four e-brand personality factors and nineteen personality adjectives. Table 2 shows the result of the exploratory factor analysis

Personality dimension	Adjectives	F1	F2	F3	F4
Bold	Gaudy	0.80			
	Sex-appealing	0.79			
	Frivolous	0.75			
	Arbitrary	0.66			
	Bold	0.65			
	Show-offish	0.55			
Analytical	Analytical		0.78		
	Objective		0.70		
	Accurate		0.68		
	Popular		0.62		
	Realistic		0.53		
Friendly	Ingenuous			0.81	
	Warm			0.79	
	Gentle			0.66	
	Friendly			0.65	
Sophisticated	Sophisticated				0.72
	Free				0.67
	Luxury				0.67
	Futuristic				0.61
% of Variance		29.63	13.37	8.87	6.56
Cumulative %		36.19	49.56	58.43	6.56
Eigenvalues		5.63	2.54	1.69	1.25
Cronbach Alpha		0.82	0.77	0.77	0.742

Table 2. The result of EFA

4. STUDY 2: EXPLORATORY STUDY

In the second study, we conducted an exploratory study to analyze the relation between e-brand personality factors and visual attributes.

4.1. Measurement of Visual Attributes

We measured and circulated eleven visual attributes from fifty-two web pages, the home pages of personal sites. These fifty-two homepages were produced in experimental circumstances by incumbent web designers so they differed visually and elicited thirteen emotional dimensions with the same content (Kim et al., 2003).

First, we defined 'objects' from these fifty-two home pages, which means basic units consisting of visual attributes and the actual units users perceive. Objects were determined by Gestalt principles of visual organization, including 'figure and ground,' 'the principle of proximity,' 'the principle of continuity' and 'the principle of similarity' (Ellis, 1938; Koffka, 1955). At first, we divided all fifty-two home page components into backgrounds and figures (Arnheim, 1983; Behrens, 1984; Ellis, 1938; Koffka, 1955). The areas not having specificity were defined as 'background' and all the components except the background were defined as 'figure'. Then all figure were organized into clusters according to the principles for visual organization (Arnheim, 1983; Bevin, 1997; Ellis, 1938; Koffka, 1955; Lupton, 1999), and we defined clusters as 'objects.'

For example, most menus in web pages were organized as single objects based on ‘the principle of similarity’ because each element in a menu had similar shape and color. We obtained 1,572 objects from the fifty-two homepages. Figure 3 shows one of the home pages and the object version of the same page.

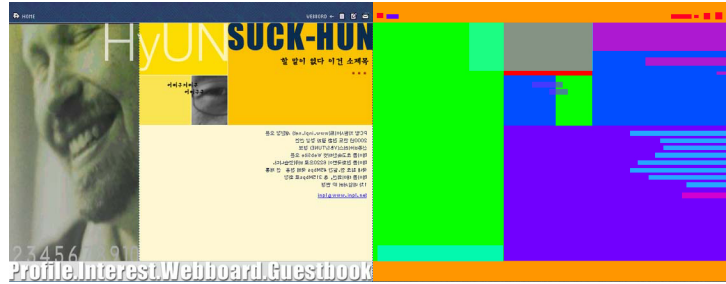


Figure 3. Sample Homepage (Left) and Objects Version of the Sample pages (Right)

Second, we calculated the numerical values of eleven visual attributes (mentioned in section 2.2. Visual Attributes) using the algorithms submitted by Park (2004). These eleven visual attributes are affected by the consistency, variation, regularity or irregularity of the numeric values of color, size, and location of objects. Therefore, we measured values of color, size, and location of 1,572 objects using PhotoShop 7.0 (Kim, 1996). Finally, we obtained the eleven numerical values of visual attributes for each of the fifty-two home pages. Table 3 presents the eleven numerical values of visual attributes for the home page showed in Figure3.

Visual Attributes	Numerical Values
Balance	0.351
Symmetry	0.49
Movement	0.00
Contrast	0.48
Unity	0.33
Proportion	0.92
Simplicity	0.05
Density	-171.01
Regularity	0.50
Rhythm	0.18
Cohesion	0.70

Table 3. Numerical Values of Visual Attributes

4.2. Survey and Analysis

In order to analyze the relationship between e-brand personality and visual attributes, we conducted a survey of one hundred and ninety-seven undergraduate students who were asked how they interpreted the personalities of the fifty-two home pages.

First, we conducted a factor analysis to confirm e-brand personality dimensions that had been defined in the preliminary study with the survey data. The results of the analysis showed that personality dimensions were identical with the preliminary study results.

After that, step-by-step multiple regression analysis was conducted for each of the four personality dimensions. The dependent variables were the factor scores of the four personality dimensions in the survey, and the independent variables for each personality dimension were eleven of the visual attributes.

4.2. Result

Table 4 shows the results of the regression analysis. According to Table 4, simplicity relates negatively and cohesion relates positively with the ‘bold’ personality dimension. Density, simplicity and contrast relate positively to the ‘analytical’

personality. And the ‘friendly’ personality dimension relates negatively to contrast, density, regularity and cohesion. Finally, the ‘sophisticated’ personality dimension has a positive relationship with ‘regularity’ and ‘balance.’

Personality dimensions		Standardized Coefficients Beta	t	Sig.	Adjusted R Square	F
P1:Bold	(Constant)		-4.054	0.000	0.345	9.790(p<0.05)
	Simplicity	-0.340	-2.971	0.005		
	Cohesion	0.484	4.228	0.000		
P2:Analytical	(Constant)		-5.194	0.000	0.440	12.296 (p<0.05)
	Contrast	0.443	3.988	0.000		
	Simplicity	0.359	3.241	0.002		
	Density	0.302	2.708	0.009		
P3:Friendly	(Constant)		4.323	0.000	0.370	6.874(p<0.05)
	Contrast	-0.307	-2.640	0.011		
	Density	-0.268	-2.305	0.026		
	Regularity	-0.351	-3.009	0.004		
	Cohesion	-0.455	-3.830	0.000		
P4:Sophisticated	(Constant)		-3.214	0.002	0.321	6.919(p<0.05)
	Balance	0.524	3.516	0.001		
	Regularity	0.388	3.264	0.002		
Regression equations	Bold=-0.34*simplicity+0.484*cohesion Analytical=0.443*contrast+0.302*density+0.359*simplicity Friendly=-0.307*contrast+-0.268*density+-0.351*regularity+-0.455*cohesion Sophisticated=0.542*balance+0.388*regularity					

Table 4. The Result of Regression Analysis

5. STUDY 3: CONFIRMATORY STUDY

Based on the result of Study 2, we conducted a confirmatory study to verify the relation between four e-brand personality dimensions and significant visual attributes.

5.1 Survey Materials

Four types of web site stimuli to be used for a survey were graphically manipulated based on four regression equations from the result of Study 2: Type1(S1) targeted the ‘bold’ personality, Type2(S2) targeted the ‘analytical’ personality, Type3(S3) targeted ‘friendly’ personality, and Type4(S4) targeted the ‘sophisticated’ personality.

First, S1, which is related to the ‘bold’ personality, was controlled by simplicity and cohesion. We added as many objects of different color and size as possible, with irregular locations for decreasing simplicity, and similar ratios of widths and heights of objects for increasing cohesion.

Second, S2 was used to represent the ‘analytical’ personality. To control contrast, density, and simplicity that have a significant relationship with ‘analytical’ personality, we increased the contrast of colors and sizes of objects, as well as the contrast of the size of backgrounds and total objects, and decreased the number of objects.

Third, we produced S3 to represent the ‘friendly’ personality. To control contrast, density, regularity, and cohesion, we focused on decreasing the contrast of the objects’ sizes and colors, with varying ratios of widths and heights. We also

ensured that the total size of the objects was larger than the size of the background and that the locations of objects were random and irregular.

Fourth, S4 was used to represent a relatively higher ‘sophisticated’ personality contrasting with S1, S2, and S3. We tried to make balance and regularity as high as possible. The equal contribution of location, size, and color of objects controlled balance, and the consistent location of objects controlled regularity.

Then, for the purposes of verification, we calculated the numerical values of target personalities for each stimulus. Where the target personalities were lower than that of other stimuli, we adjusted the visual attributes and measured target personality repeatedly. Finally, we completed four types of stimuli that represent the target personality. After the four types of design were completed, each design was produced with four contents of web site; search, game, match-mate, and photo site. Figure 4 consists of the final designs of game pages.

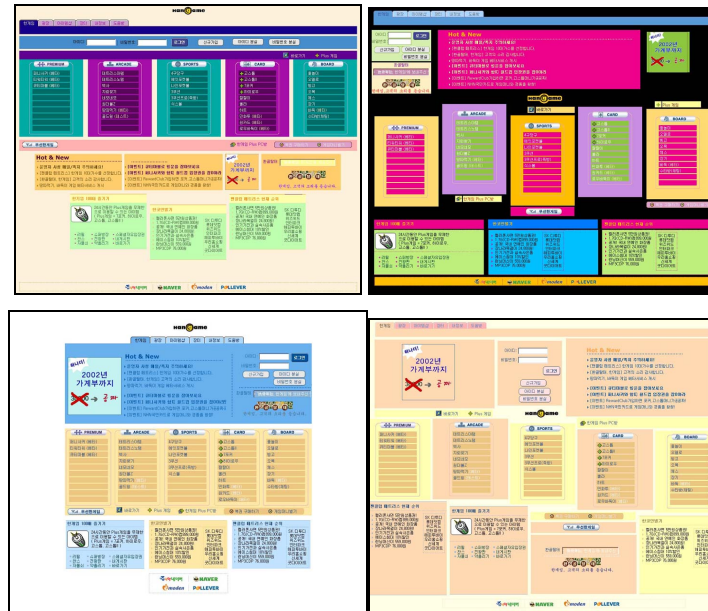


Figure 1. Final Designs of S1(upper-right), S2(upper-left), S3(lower-left) and S4(lower-right)

Table 5 shows the numerical values of significant visual attributes and target personality of each stimulus. All targeted personality dimensions of each of intended stimuli are higher than those of other stimuli. For example, in ‘bold’ personality, S1 manipulated for expressing ‘bold’ personality shows higher numerical values of ‘bold’ personality(0.325) than those of S4(0.319), S3(0.314) and S2(0.188). In the case of the ‘friendly’ personality, numerical values of all stimuli are negative because the maximum value of the ‘friendly’ personality is 0.00, and the minimum value is -1.381.

Target personality (TP)	Stimulus	Significant visual attributes			Numerical value of TP	Maximum	Minimum
Bold		Simplicity	Cohesion			0.484	-0.340
	S1	0.046	0.704		0.325		
	S4	0.067	0.706		0.319		
	S3	0.065	0.695		0.314		
	S2	0.462	0.712		0.188		
Analytical		Contrast	Density	Simplicity		1.104	0.00
	S2	0.610	0.923	0.462	0.715		
	S1	0.696	0.881	0.046	0.591		
	S4	0.696	0.739	0.067	0.555		

	S3	0.722	0.328	0.065	0.442		
Friendly		Contrast	Cohesion	Density	Regularity		0.00
	S3	0.722	0.695	0.328	0.301	-0.731	
	S4	0.696	0.706	0.739	0.466	-0.896	
	S1	0.696	0.704	0.881	0.399	-0.910	
	S2	0.610	0.712	0.923	0.542	-0.949	
Sophisticated		Regularity		Balance			0.93
	S4	0.466		0.753		0.589	
	S3	0.301		0.821		0.561	
	S1	0.399		0.731		0.551	
	S2	0.542		0.000		0.210	

Table 5. The Numerical Value of Stimuli

5.2. Survey Procedure

An on-line survey was conducted for empirically verifying the target personalities of stimuli. A total of seven hundred and forty users, seventy per cent male and thirty per cent female who were all in their twenties and thirties, participated in an on-line survey. They were asked how they felt about e-brand personalities in relation to one of the stimuli.

5.3. Data Analysis

Data analysis was conducted in two stages. First, a confirmatory factor analysis was conducted for testing reliability and validity of personality dimensions. Secondly, Analysis of Variance Between Groups (ANOVA) was conducted using ‘contrast’ in order to analyze the causality of e-brand personalities and visual attributes.

Table 6 presents the results of confirmatory factor analysis. These results show that nineteen personality adjectives converge into four personality dimensions. This indicates that the fit of this model is acceptable and the reliabilities of Cronbach Alpha are well above 0.7. Consequently, the four e-brand personality dimensions have appropriate convergent validity and goodness of fit.

Factors	Adjectives	Fator1	Fator2	Fator3	Fator4
P1	Bold	Show-offish	16.16**		
		Arbitrary	9.72**		
		Sex-appealing	28.91**		
		Gaudy	30.82**		
		Frivolous	15.86**		
		Bold	27.15**		
P2	Analytical	Objective		11.38**	
		Popular		17.42**	
		Analytical		16.65**	
		Accurate		18.91**	
		Realistic		21.04**	
P3	Friendly	Ingenuous			14.11**
		Warm			18.65**
		Gentle			20.59**
		Friendly			22.84**

P4	Sophisticated		Luxury					21.38**
			Futuristic					21.62**
			Sophisticated					25.61**
			Free					15.50**
Cronbach Alpha			0.79	0.81	0.77	0.72		
Model	2	df	GFI	AGFI	NFI	NNFI	RMR	RMSEA
	163.43	56	0.98	0.92	0.99	0.98	0.05	0.051

Table 6. The Result of CFA

(**p<.01)

The results presented in Table 7 show us that discriminant validity is appropriate. The diagonal numbers that indicate AVE in Table 7 are over 0.5 and above the other numbers, which indicates a correlation between factors. Therefore, we can generally conclude that personality dimensions have conceptual distance, verifying appropriate discriminant validity.

	Bold(F1)	Analytical(F2)	Friendly(F3)	Sophisticated(F4)
Bold(F1)	0.73			
Analytical(F2)	-0.15	0.72		
Friendly(F3)	0.63	0.29	0.75	
Sophisticated(F4)	0.54	0.26	0.64	0.66

Table 7. The Result of Discriminant Validity

Finally, we conducted ANOVA using contrast test techniques for each of the personality dimensions. We compared the mean of a target personality for each stimulus. The mean implies how people feel about e-brand personalities through stimuli. For example, we compared the mean of the 'sophisticated' personality dimension of S1 with those of S2, S3, and S4, because S1 was manipulated for presenting the 'sophisticated' personality. In the same way, each of the stimuli was evaluated regardless of whether target personalities were converted or not.

5.4. Result

Table 8 shows the results of a contrast test for each personality dimension. The first column of Table 8 shows the personality dimensions; the second column presents the means of personality according to stimuli(S1, S2, S3, S4); and the other columns show the results of contrast testing.

Personality Dimensions	Mean				Value of Contrast	df	Sig. (2-tailed)
	S1	S2	S3	S4			
Bold	2.84	2.57	2.71	2.70	0.529	650.000	0.032
Analytical	3.53	3.79	3.74	3.44	0.655	355.032	0.009
Friendly	3.53	3.65	3.68	3.28	0.576	650.000	0.040
Sophisticated	2.89	2.96	3.14	2.78	-0.631	650.000	0.028

Table 8. The Result of Contrast Test (ANOVA)

The means of the 'bold' personality of S1(2.84), the 'analytical' personality of S2(3.68) and the 'friendly' personality of S3(3.68) are higher than those of other stimuli. But the mean of the 'sophisticated' personality dimension of S4(0.78) is lower than those of the other stimuli. We statistically verified the significance of difference between the means of target stimuli and others. According to the results of the contrast test, the Values of Contrast are 0.529(bold), 0.655(analytical), 0.576(friendly), and -0.63(Sophisticated), and these are all significant statistically ($p<0.05$).

6. CONCLUSION AND DISCUSSION

The main goal of this research is to provide exploratory and confirmatory analyses of the relationship between e-brand personalities and visual attributes of web sites and to offer effective guidelines for embodying e-brand personality.

In the preliminary study, four e-brand personality dimensions, 'bold'(F1), 'analytical'(F2), 'friendly'(F3), and 'sophisticated'(F4), were defined. In the exploratory study, we measured numeric values of eleven visual attributes through fifty-two representative web pages, and then we conducted a survey asking users how they feel about the personality of these fifty-two web pages. From the results of regression analysis with visual attributes and survey data, it was determined that 'bold' personality correlates to simplicity and cohesion; 'analytical' personality relates to contrast, density and simplicity; 'friendly' personality relates to contrast, cohesion, density, and regularity; and 'sophisticated' personality relates to regularity and balance. The third confirmatory study was conducted to prove the results of the exploratory study. Four types of web sites (S1,S2,S3,S4) were manipulated as survey materials based on the results of the exploratory study. We conducted a survey to determine how people perceive e-brand personality from survey materials. In the results, it was clear that users strongly felt 'bold,' 'analytical,' and 'friendly' personality dimensions were expressed by each of the manipulated stimuli (S1,S2,S3). But users detected a relatively weak 'sophisticated' personality from the target stimulus (S4).

Why can the stimulus for projecting 'sophisticated' personality not be translated into strong 'sophisticated' personality to the user? The first reason may lie in the nature of the stimuli. The numerical value of the 'sophisticated' personality of S4 was 0.589. On the other hand, the numerical value of the 'sophisticated' personality of S3 was 0.561. This constitutes a slight difference. Another reason may be found in the personality dimensions themselves. 'Sophisticated' and 'friendly' personality dimensions have convergent validity theoretically, but considering the correlation of 'sophisticated' and 'friendly' personality dimensions (0.64) and the AVE of 'sophisticated' personality(0.66), the difference may not be great enough.

This study has several limitations. Although we distinguished the numeric values of target personality dimensions among stimuli in the confirmatory study, they need to be in striking contrast. Each stimulus should simultaneously express the maximum of one targeted personality dimension and the minimum of other personality dimensions. In addition, the stimuli in the confirmatory study differ from actual web sites. In addition, other aspects, such as usability or aesthetic factors, couldn't be considered because we focused on the control of personality dimensions. In any further study, stimuli need to be manipulated more practically.

As another limitation, the fifty-two representative home pages used in the exploratory study were produced under experimental circumstances. The limited design of these home pages may cause movement, rhythm, unity and proportion to be less significant in any of the personality dimensions. Therefore, in the next study, we will use existing web pages with various designs as stimuli.

In spite of these limitations, however, this study has several important implications for the marketing and design fields.

First, while most of the studies in the marketing area focus on conceptual topics, this study empirically suggests specific guidelines for visually embodying e-brand personality.

Second, this research has significance in terms of methodology in design. While most studies from the design field do not have sufficient scientific validity, our research shows a high degree of validity and reliability through the employment of multilateral methodology. After confirming the validity and reliability of the personality dimensions, we conducted an exploratory study to analyze the correlation between e-brand personality and visual attributes. We then conducted a confirmatory study to verify the results of the previous study. Finally, the results of this study are persuasive to audiences due to its use of the scientific method.

Third, through applying the results of this study to their works, designers can effectively embody e-brand personalities express their preferences and creativity at the same time. Attempts to analyze and numerically measure design materials may result in decreased designer creativity through the use of standardized guidelines, but because visual attributes have the potential for various expressions at an elemental level, designers can express their creativity using different combinations of visual elements such as color, size, and location. For example, although two web pages have the same numeric value of balance, the actual web pages can differ because the combination of colors, sizes, and shapes may be expressed differently. Therefore, the possibilities for different expressions provide guidance for embodying e-brand personality while still allowing room for designer creativity.

Because of these implications, this study will be theoretically and practically helpful to those within both the marketing and design fields.

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