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Influence of layouts on visual impression: Comparing 12 flyer layout patterns

Yutaka Andoh[1*], Kengo Omura[2], Takano Kentaro[2], Kawamoto Koushi[2] and Tsutomu Fujinami[1]

[1]Department of Human Life Design, Japan Advanced Institute of Science and Technology, Japan.
[2]Research and Technology Group, Fuji Xerox, Japan.

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The purpose of this study was twofold. First, extent of the influence of flyer layouts on user impressions was investigated. Data were collected from 425 non-designers. The participants, consisting of eight groups of men and women between the ages of 20 and 50, were shown 60 flyers (12 layouts × five other design features) of a piano concert on a computer screen. The percentage of layout contribution to user impression, estimated by the ranges of category scores, was under 20%. This result indicates that layouts have a relatively small influence on impressions. Second, using dual scaling, layouts which had an influence on the variety of impressions was confirmed. The analysis produced X/Y dimensions where the first dimension (X-axis) indicated "formal-casual" and the second dimension (Y-axis) indicated "powerful-delicate." It was suggested that the degree of alignment enhanced a formal impression, while the degree of symmetry enhanced a powerful impression.

Key words: Layout, flyer, user impression, document design.

INTRODUCTION

Advertisements and sales promotions are generally designed, in taste, to complement (and sometimes promote or exaggerate) products, services, images, and concepts of events, which the target consumers appreciate, like corporate image, seasons, indication, and distribution environments. Mismatch in design and taste is known to lower brand evaluation and buying intention; wrong font choice, for example, can reduce the impact of a product's slogan (Kang and Choi, 2013). Thus, the taste control measures in advertising and sales promotion, also known as "impression management" and "impression control," are very important.

Many design guidebooks introduce various techniques for impression management and impression control. We are told which colors and fonts produce specific impressions, as well as given practical techniques in choosing and processing photographs and illustrations. On the other hand, in research, there are several studies on impression perception in various design elements including Kobayashi's (1987, 1992) reports on the effect of color on impression.

In addition, Mukai and Miyazaki (2016) reported on the relationship between letterform on package designs and impressions. Ikeda (2008) noted the relationship between European style fonts and impressions. Furthermore, ample studies have demonstrated the impact of the

*Corresponding author. E-mail: yutaka.andoh@me.com. Tel: +81 -90-1457-0029.

spaces between lines and letters (Nagaishi, 2003; Kotani et al., 2005). However, there are very few studies about the impact of layout on impressions. Miyazaki et al. (2001) studied the layout of the advertisement section in newspapers, but other types of media such as flyers have thus far not been studied. Though some studies on website layout have examined the attraction of layout on first impressions and the formative process of the preference impression (Tuch et al., 2012), those researchers did not investigate the correlation between layouts and impressions.

Teng et al. (2015) examined the factors that affect user impression and standard layouts in web learning systems. They stated that the three biggest factors were joy, excitement, and readability. In addition, the main types of layout were categorized under graphics, information, and graphics and information. However, though this research studied the correlation between layouts and impressions, it did not examine the content disposition layout.

On the other hand, some practical design guidebooks indicate the main types of layouts, and show the correlation between them and various impressions. Osaki (2010) categorized the standard layouts of posters and flyers into nine patterns: 1) Centering layout to dispose all elements along the centerline; 2) Axis layout to align the sequence of letters in one direction; 3) Axis separation layout to distribute elements on the right or left side of the axis; 4) Box layout to put letter elements into one box; 5) Grid layout to dispose elements along a square block; 6) Pattern layout to use the same figure repeatedly; 7) Movement layout to repeat a design element; 8) Radical layout to dispose elements radically, and 9) Random layout to dispose elements at random. He also pointed out the impression each layout effected; for example, the centering layout is the most stable layout pattern, and it communicates a classic and traditional atmosphere. However, this knowledge was summarized based on the designer's practical experience. Though these studies are useful, they only highlight the impression of the layouts effect. As Ikeda (2008) mentioned, since impression can be evaluated by font style, the indications of designers may not accord with impression evaluation results.

The purpose of this study was first, to investigate the extent of influence flyer layouts had on user impressions. We hypothesized that layouts had a greater influence than colors. A considerable number of studies have been conducted on whether the influence of color or form is stronger in the aesthetic evaluation of figures (Nakano, 1972; Oyama et al., 1998; Sato and Oda, 2014). By conducting multiple regression analysis, Sato and Oda (2014) suggested that the standardization regression coefficient is stronger in form (0.79) than color (0.50). To consider layout as a kind of form, since layouts and forms are different concepts, we established the first hypothesis.

Second, we examined which layouts influenced certain impressions and conducted exploratory research to clarify the relationships between layouts and impressions.

METHODS

The participants were 425 non-designers (213 women and 212 men) between the ages of 20 and 50. They were all shown flyers of a piano concert that were presented in 12 layouts that were based on those from Osaki (2010) (L01: Centering vertically/ L02: Left aligned/ L03: Right aligned/ L04: Divided into left and right/ L05: Box/ L06: Grid/ L07: Radial/ L08: Pattern/ L09: Random/ L10: Vertical Title/ L11: Horizontal Title/ L12: All vertical) (Figure 1). If the stimulus is limited to only one color and font style, that can influence the estimation results. Thus, the stimulus consisted of 60 flyers with five color variations (including font style and photograph) in 12 layouts. The five color variations were discussed in a study on Kansei in documents (Qiu and Omura, 2016), which found five tastes (Wild/Pretty/Natural/Dandy/Elegant) through the analysis of Kansei words. The flyers were designed to reduce deviations between the impression of five Kansei words and the impression of them.

We will now explain the characteristics of our research method in this study. First, we collected the target samples by evaluating the sample group and dividing them into the different layout styles. However, to prevent producing an ambiguous result by inaccurately gauging the layout influence, we maintained consistency in terms of content and images across the 12 layouts.

The experiment was conducted as a web survey. The participants were shown 60 flyers on the computer screen randomly, and were asked to complete a 30 Kansei word questionnaire (Table 1) on a five-point scale for each flyer.

RESULTS

Formula and equation

This study used the quantification theory type I to analyze the degree of influence layout had on impression. The evaluated value of 30 Kansei words served as dependent variables, while the layout (12 types) and the non-layout variations (five types) served as independent variables.

The range ratio of the categorical score in the 30 Kansei word questionnaire was used as an index of the layouts' degree of influence. The range ratio was calculated by dividing the range of categorical scores in the layouts by the sum of the range of categorical scores in the layouts and the non-layout factors, and multiplying that by 100. Table 2 summarizes the range in the layouts and the non-layout factors. The top three Kansei words were liking (45.2%), pop (37.4%), and dynamic (34.2%). On the other hand, the bottom three Kansei words were spring-like (7.9%), pretty (10.5%), and summer-like (10.9%). The average score of all 30 Kansei words was 20.9%.

The five variations of the non-layout factors, which were used as stimuli, were modified into five Kansei words (Clear/Dandy/Feminine/Natural/Elegant), and their range ratios were examined as well (Figure 2). In the category score of the taste variations, each base color

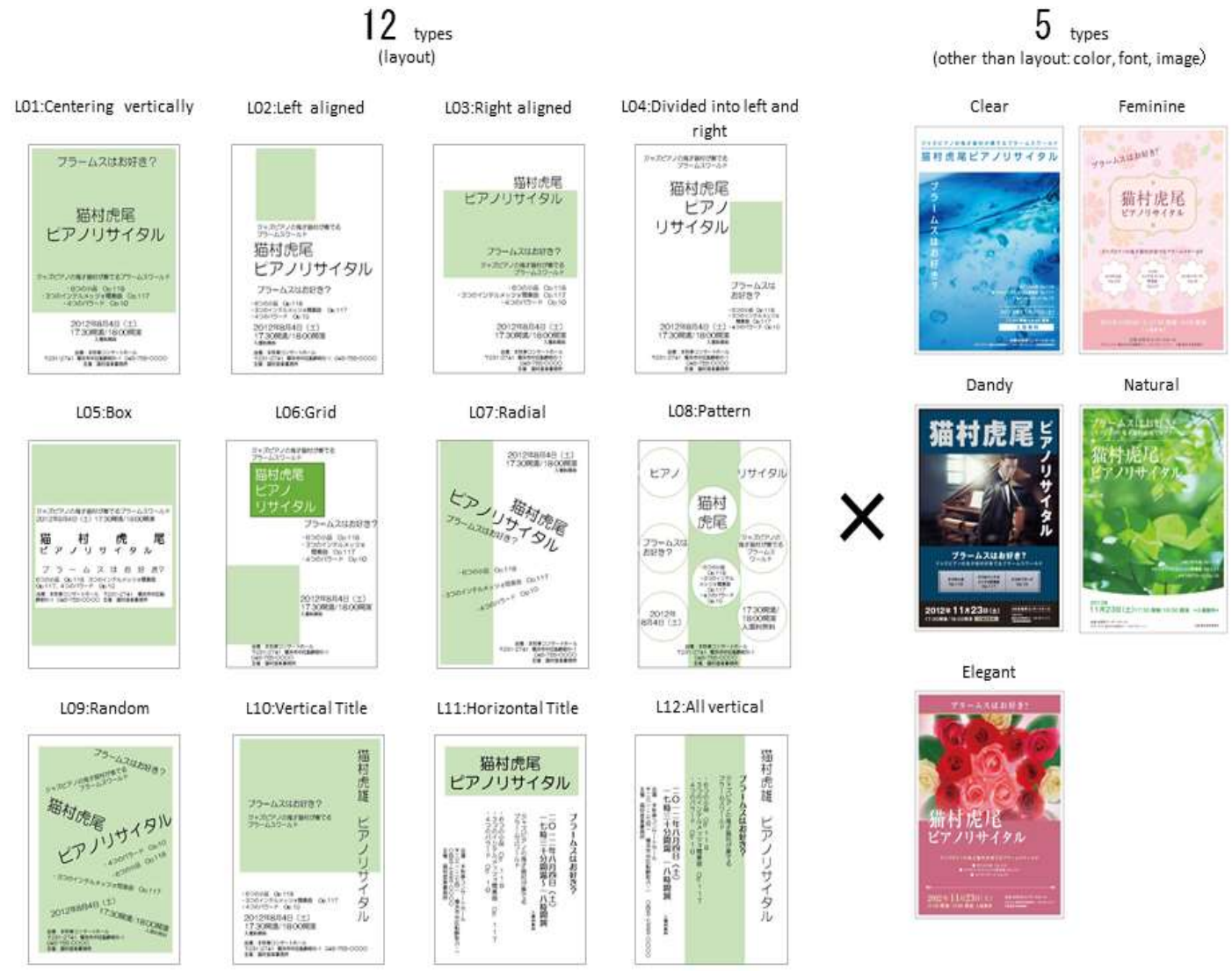


Figure 1. Constitution of the variation of the flyers.

that was selected to modify the target Kansei word (Clear = Light Blue/Dandy = Navy Blue/Elegant = Red Purple/Feminine = Pale Pink/Naturel = Green) was high, which indicated that the color variations were designed as intended. The mean of the range ratios of the five Kansei words was 16.3%, which was lower than the mean of all the 30 Kansei words combined, which was 20.9%.

The analysis revealed that the layout influence of Clear/Dandy/Elegant/Feminine/Natural was 16.3%, which was lower than the non-layout factors (colors, fonts, picture). These findings were contrary to our first hypothesis, which proposed that layouts have a greater influence than colors on impression. However, results revealed that the layout influence for liking was greater than other impressions. This reason will be discussed later.

Correlation between layouts and impressions

Before analyzing the correlation between the layouts and each impression, we conducted a cluster analysis to classify the layouts based on their similarity to the impressions. The dataset for the analysis was the evaluated score of the 30 Kansei words. The analysis was conducted by measuring the Euclidean distance and using Ward's method. Figure 3 displays the results of the dendrogram. The analysis identified three clusters (A. Symmetry cluster/ B. Asymmetry aligned cluster/ C. Random cluster) of the layouts and their characteristics (Table 3).

Influence of layout on impressions

To confirm which type of layouts influenced various

Table 1. 30 Kansei words.

S/N	Words
1	Pretty
2	Casual
3	Dynamic
4	Romantic
5	Mild
6	Feminine
7	Natural
8	Elegant
9	Gorgeous
10	Wild
11	Classic
12	Formal
13	Dandy
14	Chic
15	Fresh
16	Clear
17	Modern
18	Pop
19	Sporty
20	Relax
21	Urban
22	Mechanic
23	Intelligent
24	Eccentric
25	Mysterious
26	Spring-like
27	Summer-like
28	Autumn-like
29	Winter-like
30	Liking

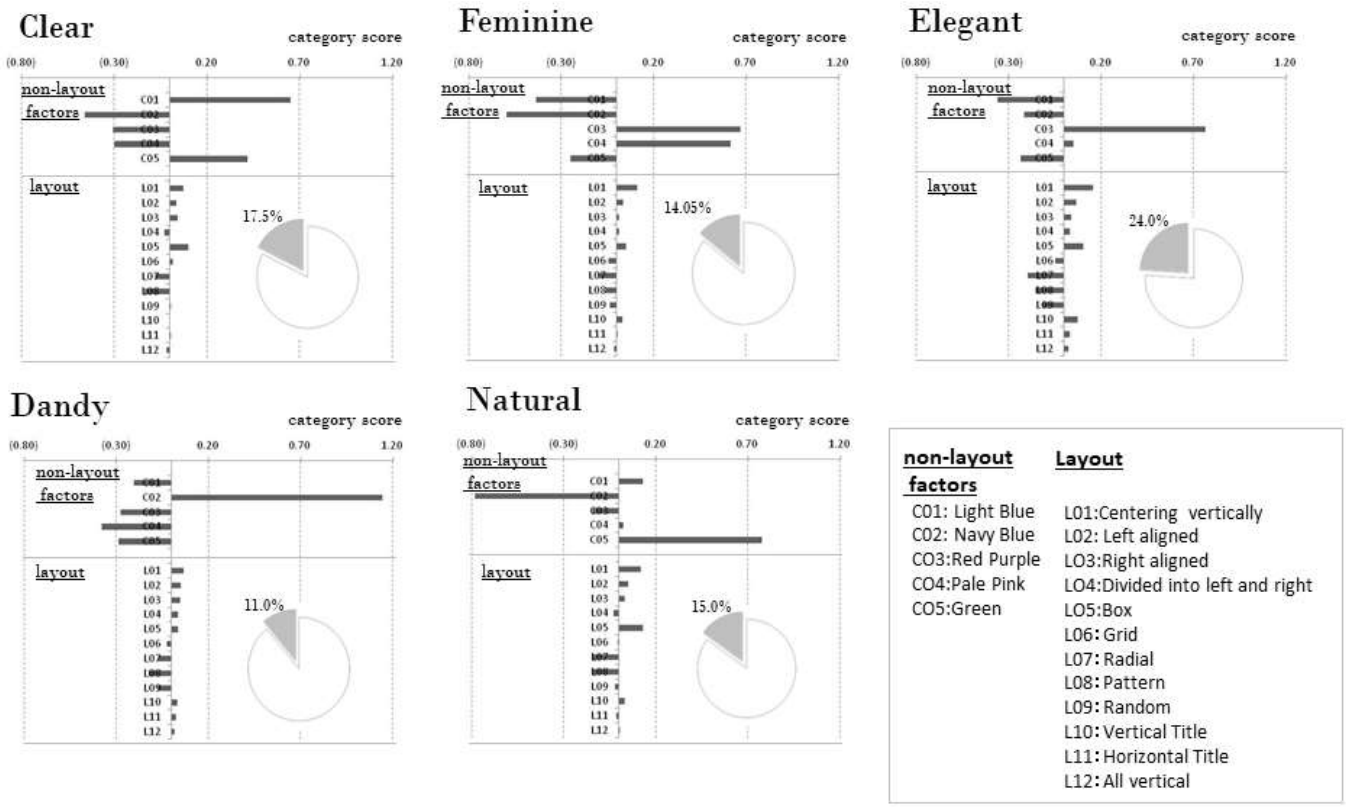
Table 2. Range ratio in Kansei words by quantification theory type I.

	pretty	casual	dynamic	romantic	mild	feminine	natural	elegant	gorgeous	wild
layout	10.5%	24.2%	34.2%	23.7%	16.9%	14.0%	15.0%	24.0%	23.8%	14.1%
non-layout factors	89.5%	75.8%	65.8%	76.3%	83.1%	86.0%	85.0%	76.0%	76.2%	85.9%

	classic	formal	dandy	chic	fresh	clear	modern	pop	sporty	relax
layout	27.5%	27.2%	11.0%	19.6%	14.0%	17.5%	28.5%	37.4%	19.3%	18.0%
non-layout factors	72.5%	72.8%	89.0%	80.4%	86.0%	82.5%	71.5%	62.6%	80.7%	82.0%

	urban	mechanic	intelligent	eccentric	mysterious	spring-like	summer-like	autumn-like	winter-like	liking	All
layout	22.3%	23.5%	22.8%	20.9%	13.0%	7.9%	10.9%	24.5%	15.0%	45.2%	20.9%
non-layout factors	77.7%	76.5%	77.2%	79.1%	87.0%	92.1%	89.1%	75.5%	85.0%	54.8%	79.1%

impressions, we conducted a correspondent analysis and plotted a correspondence map by dual scaling (Figure 4). This analysis produced X and Y dimensions. In the first dimension (X-axis), pop and casual pinpointed a positive direction, while formal and classic pinpointed a negative direction. Consequently, we designated the X-axis as the “formal-casual axis.” In the second dimension (Y-axis), “dynamic” pinpointed a positive direction, while chic and



	5 Kansei words
layout	16.3%
non-layout factors	83.7%

Figure 2. Categorical score of five Kansei words by quantification theory type I.

autumn-like pinpointed a negative direction. Accordingly, we designated the Y-axis as the "powerful-delicate axis."

When focusing on the characteristics of each cluster, the correspondence map revealed that the "symmetry cluster" was located near the formal side in the X-axis and the powerful side in the Y-axis. This tendency was particularly strong for the "L01: Centering vertically layout."

The "asymmetry aligned cluster" was located in a formal area between "symmetry cluster" and "random cluster" on the X-axis, and in a delicate area on the Y-axis. "Asymmetry aligned cluster" differed from "symmetry cluster" in that it was located on the delicate side in the Y-axis. It was inferred that the difference in physical characteristics, such as position and arrangement, of the clusters caused the different impressions, and that this characteristic was the presence or lack of symmetry. It was assumed that symmetrical layouts created powerful impressions. On the other hand, "L04: Divided into left and right," which was the most delicate among the 12 layouts, distributed characters on the right and left side across the vertical axis. It was assumed that asymmetrical layouts created delicate impressions.

Unlike the others, the "random cluster" was located nearest the casual side in the X-axis. It was inferred that since the physical characteristics were free of a vertical or horizontal alignment, they made a casual impression. Studying the characteristics of each layout in this cluster in the Y-axis revealed that "L09: Random" was the most asymmetrical layout, while "L07: Radial" and "L08: Pattern" were symmetrized by oval figures or radical alignments. It was inferred that layouts that were more symmetrical created sensitive impressions.

To sum up, the results suggested that aligned layouts enhance formal impressions, while symmetrical layouts enhance powerful impressions.

DISCUSSION

"Liking" is used as a Kansei word, and is also frequently

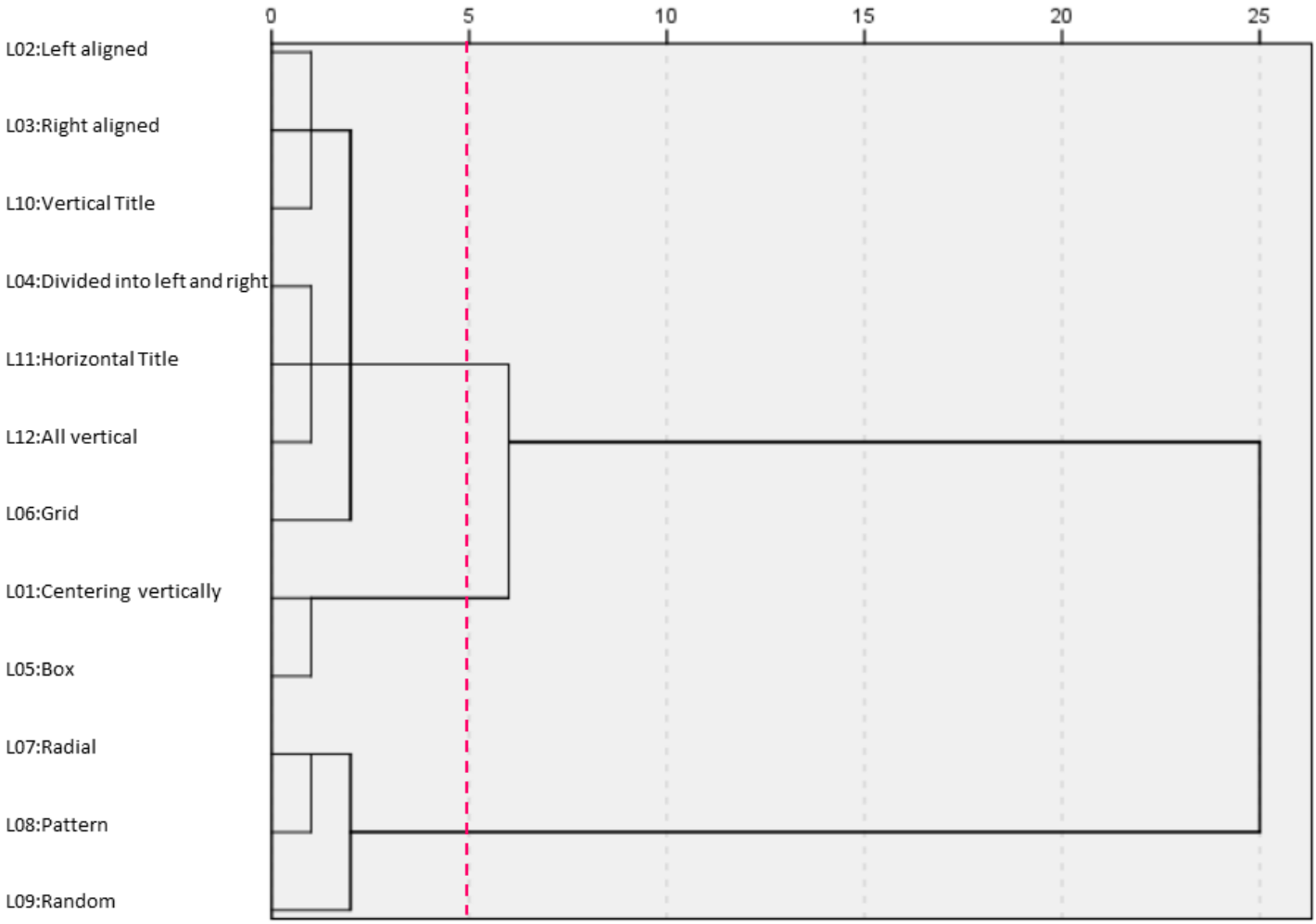


Figure 3. Dendrogram of the layouts in a cluster analysis.

Table 3. Three clusters and their description of the 12 layouts.

Name of cluster	Name of Layout	Description
A. Symmetry cluster	L01: Centering vertically/ L05: Box	Cluster where the main contents are aligned along the vertical centerline.
B. Asymmetry aligned cluster	L02: Left aligned/ L03: Right aligned/ L04: Divided into left and right/ L06: Grid/ L10: Vertical Title/ L11: Horizontal Title/ L12: All vertical	Cluster where main contents are aligned from a certain point in the vertical or horizontal line except for the vertical centerline.
C. Random cluster	L07: Radial/ L08: Pattern/ L09: Random	Cluster where main contents are not aligned in the vertical or horizontal line.

used in general indices. It is a concept that implies value judgment. On the contrary, the 29 other words do not include value judgment. For instance, the “powerful” impression in a layout implies a personal preference, but “powerful” itself is not a value that implies good or bad. Hence, “liking” is a different index from the others. Several models in impression formation have been considered, some of which sequentially move from an impression formation to a value judgment (Cho and Kim, 2014). This study revealed that the influence of “liking” on layouts is different from the others, and the formation of “liking” has an independent process. The possibility that

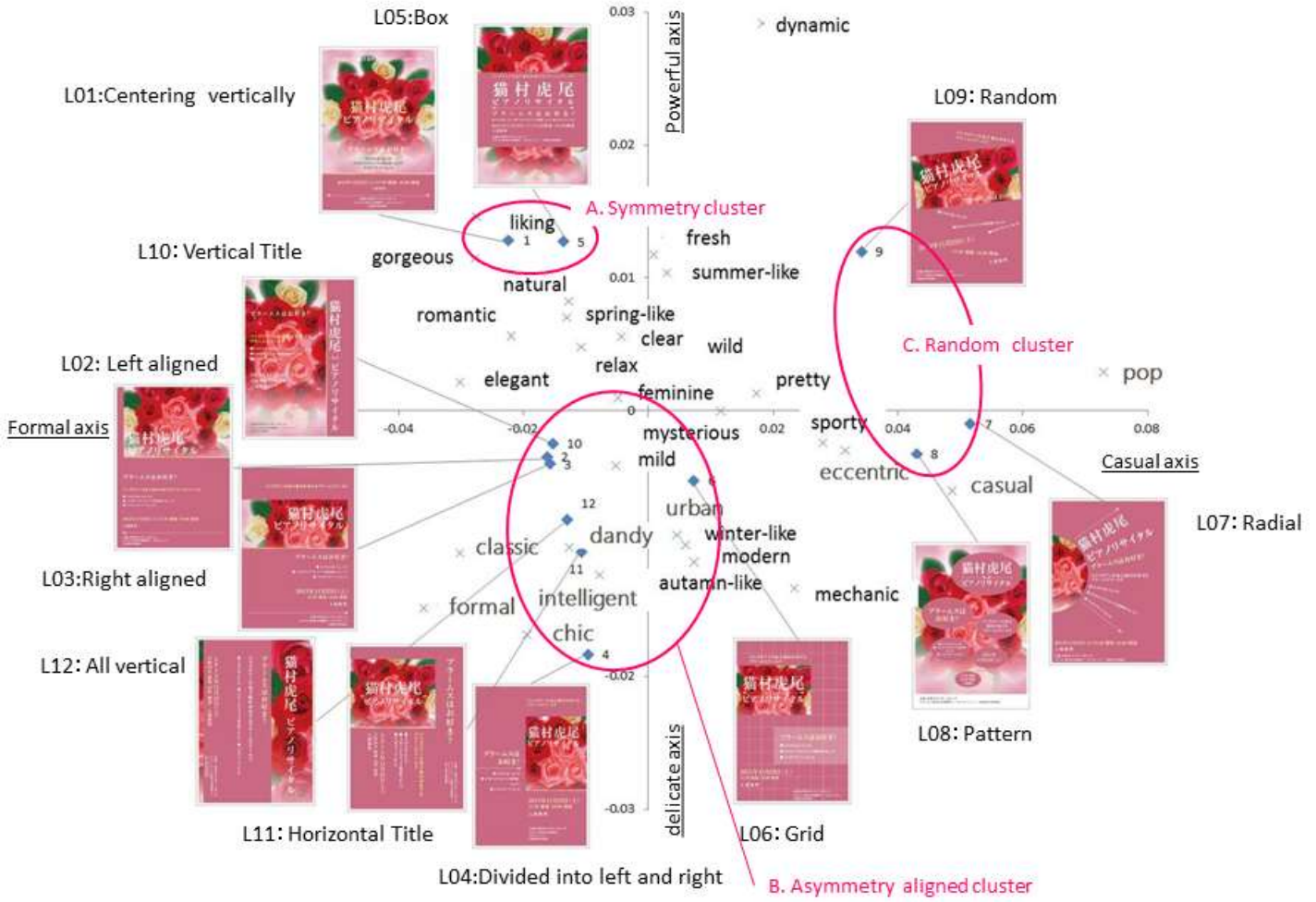


Figure 4. Correspondence map of layout patterns and Kansei words by dual scaling.

layout impression as a stand-alone unit is not recognized was proposed, but in terms of evaluation, with “liking” as a general index, the recognition of layout is made together with other design elements such as color and font. Though this hypothesis was not revealed in this study, it is worthy of future research.

Here we will discuss the Y-axis previously mentioned. The correspondent map suggested that “L01: Centering vertically” and “L09: Random” were powerful to the same degree. However, it is difficult to understand how they were assumed to be symmetrized to the same degree. Comparing “symmetry cluster” with “asymmetry aligned cluster” in the Y-axis, the degree of symmetry enhanced a delicate impression. Similarly, comparing the layouts in “random cluster,” the degree of symmetry enhanced a delicate impression. However, when comparing “symmetry cluster” and “asymmetry aligned cluster” with “random cluster,” it is difficult to apply the idea of symmetry. We suggest that two different modes need to be exercised if a layout has a vertical or horizontal alignment. Nevertheless, that requires that the physical characteristics of the layouts be separated and examined in detail, which is problem that needs further examination in the future.

Practical contribution

This study has two practical contributions. First, this research quantitatively shows the effects of features of the layout style, which had thus far only been qualitatively defined. By quantitatively examining the influence on impressions of each layout style, it is possible to comprehend the order and similarities between layout styles. As a result, it is possible to select a target layout style based on design constraints. For example, when designing a formal impression for serial flyers, we can select the most formal layout style, “L01: Centering vertically”; if, however, that style was recently used, we could select the second most formal option, “L10: Vertical

Title." This research can thus become a powerful tool when deciding which layout should be selected to obtain a specific impression.

Second, this research can contribute to technology that creates documents. Much research has been devoted to systems for creating documents such as posters (Miyazaki and Hagiwara, 1997; Obata and Hagiwara, 2000; Hotta and Hagiwara, 2005; Sugo and Hagiwara, 2014) which is thought to be very important to include emotional elements in such systems. For example, the work presented by Chi et al. (2007) is an early attempt to combine Kansei Engineering and Ontology Technology, and it verified that Ontology performs well for annotating and archiving photo databases. In addition, Qui (2016) built an ontology-based domain model and established an automatic design system for name cards. The quality of system outputs was verified by evaluation experiments. In this way, several models that examined emotional impressions are taken into account for document creating systems. The data obtained by measuring the relationships between design and emotion can thus contribute to the design of document creation programs. In this research, we clarified corresponding relationships between layouts and impressions. We believe that the results of this research can contribute to layout design in document creation systems.

CONFLICT OF INTERESTS

The authors have not declared any conflict of interests.

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