

Application of KANSEI engineering to evaluate the values of ambient scenting and sounds in the public library

Mai YANAGAWA^a Haruyuki YOSHINAGA^b Shigekazu ISHIHARA^b
Seiya ENOMOTO^c Hiroshi HOSOKAWA^d Toshikazu KATO^e

^a KANSEI PROJECTS COMMITTEE, Air Aroma Japan Pty Ltd.
Setagaya Business Square Hills 2, 4-10-3 Yoga Setagaya-ku 158-0097 Tokyo,
JAPAN, e-mail: mai.yanagawa@air-aroma.com

^b Faculty of Psychological Science, Hiroshima International University,
555-36 Kurosegakuendai Higashi-Hiroshima-shi 739-2695 Hiroshima,
JAPAN, e-mails:h-yoshina@hw.hirokoku-u.au.jp, i-shige@he.hirokoku-u.ac.jp

^c JVC Kenwood Victor Entertainment, Shibuya First Tower 1-2-20 Higashi Shibuya-ku
150-0011 Tokyo, JAPAN, e-mail: s_enomoto@ve.jvcmusic.co.jp

^d Toshokan Sogo Kenkyujo, 3-1-1 Otsuka Bunkyo-ku 112-0012 Tokyo, JAPAN,
e-mail: hosokawa@mxh.trc.co.jp

^e Dept. of Industrial and Systems Engineering, Chuo University,
1-13-27, Kasuga, Bunkyo-ku, 112-8551 Tokyo

ABSTRACT

Kansei Engineering is often used to evaluate the impressions of how users feel about the product, however, we can also apply it to evaluate something invisible and hard to quantify. The ambient scenting and the high-resolution sound in the indoor environment can add specific characters to result in increasing a comfort level for people in that space. In this research, we examined how we can apply Kansei Engineering to evaluate different types of ambient scenting and sound in endeavor to find out the best combinations to increase the comfort level of the public library. Our evaluation showed

that ‘the wave sound’ and ‘the winter fragrance’ are not suitable for the library and they would decrease the users’ the comfort level. We also attempted to identify the required components to make the comfortable library by evaluating 23 public libraries with Semantic Differential Method and Principal Component Analysis. The result showed that the elements like ‘new’ ‘spacious’ ‘refreshing’ and ‘inspiring’ are the core factors to make the comfortable libraries. Conversely, “silent” and “cold” are the principal factors to make the library uncomfortable. Our result suggests that if the silence of the library also creates the coldness in the atmosphere, even the quiet library could become uncomfortable.

1. INTRODUCTION

The Kansei evaluation sheet with 55 KANSEI words using the Semantic Differential Method was produced after semantically researching the words to imply the components to make comfortable and uncomfortable libraries. The Kansei evaluation sheet was used to conduct 2 experiments – The first experiment is to research on the required components for the comfortable library and the second experiment is to find out the best combination of the ambient scent and sound to increase the comfort level at Osaka Prefectural Central Library.

2. EXAMINATION OF THE COMPONENTS FOR THE COMFORTABLE LIBRARIES

Methodology

The evaluator visited 23 public libraries in Japan and rated the KANSEI evaluation sheet at each library. The evaluator is the qualified perfumer who has international experience for analyzing the indoor design and the matching ambient scenting. He also rated the comfort level of each library from 1 to 5 depending on the level of his desire for staying in the library for a longer period of time. The collected data was analyzed with Principal Component Analysis.

Result of the examination

The Principal Component Analysis calculates the set values for principal loading and principal score. The KANSEI MAPs of principal loading (KANSEI words) and principal score (samples) are superimposed in the Figure 1. The 1st principal components are shown as the horizontal axes and the 2nd principal components as the

vertical axes. For principal loading values, the words with largest values dominate the meaning of the principal components – The 1st principal components have ‘new’ and ‘spacious’ verses ‘old’ and ‘cramped’ in high values. Its core semantic meaning seems to be the newness and sizes of the library. The 2nd principal components shown as the vertical axes have ‘silent’ and ‘cold’ verses ‘friendly’ and ‘casual’. It’s core meaning seems to be relating to its auditory environment, i.e., whether the library is silent and it creates unfriendly and cold atmosphere.

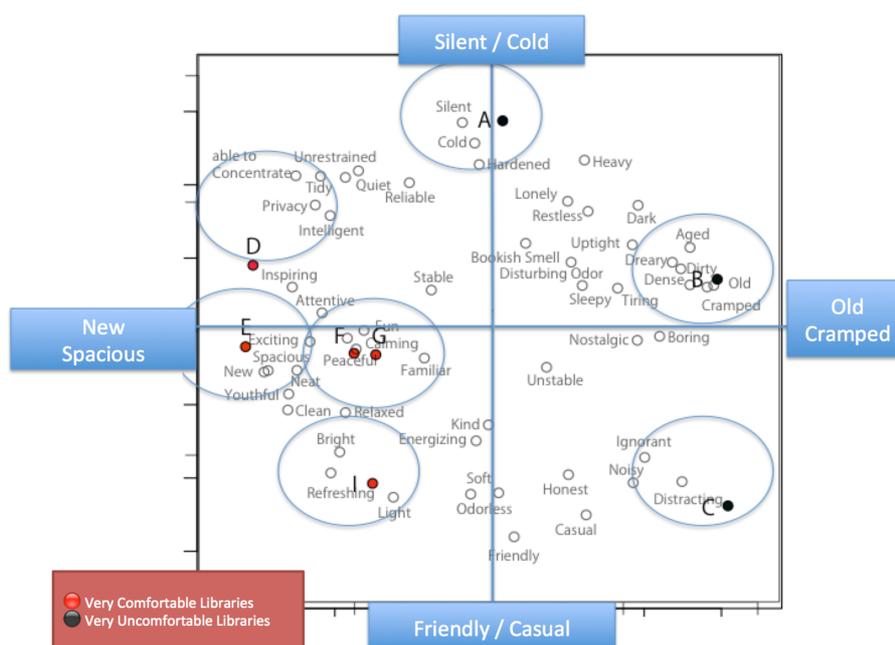


Figure 1. KANSEI MAP of comfortable and uncomfortable libraries

The principal score values, which are from the evaluation of samples are also plotted in Figure 1. The red dots labeled D, E, F, G and I are the libraries rated as “very comfortable” by the evaluator. All these libraries are positioned on the left side of the horizontal axes to be ‘new’ and ‘spacious’. The additional components such as ‘refreshing’ and ‘bright’ are the features for the library I, and ‘inspiring’ for the library D. These words are all argued to be the necessary components for the comfortable libraries.

On the other hand, the black dots labeled A, B and C in Figure 1 are rated “very uncomfortable” by the evaluator. The library A seems to be ‘silent’ and ‘cold’, the library B is ‘old’ and ‘cramped’, and Library C is ‘noisy’ and ‘distracting’. All these

components can be argued to make the uncomfortable indoor environment in the public community libraries.

3. EXAMINATION FOR SELECTING THE BEST MATCHING FRAGRANCE AND SOUND AT OSAKA PREFECTURAL CENTRAL LIBRARY

Methodology

The same KANSEI evaluation sheet was used to evaluate the fragrances and the sounds in endeavor to find the best matching combinations of the ambient scent and sound to increase the comfort level at Osaka Prefectural Central Library. Three professional evaluators analyzed 10 different types of sounds and the combinations of 4 different fragrances with the high-resolution ‘Forest’ sound.

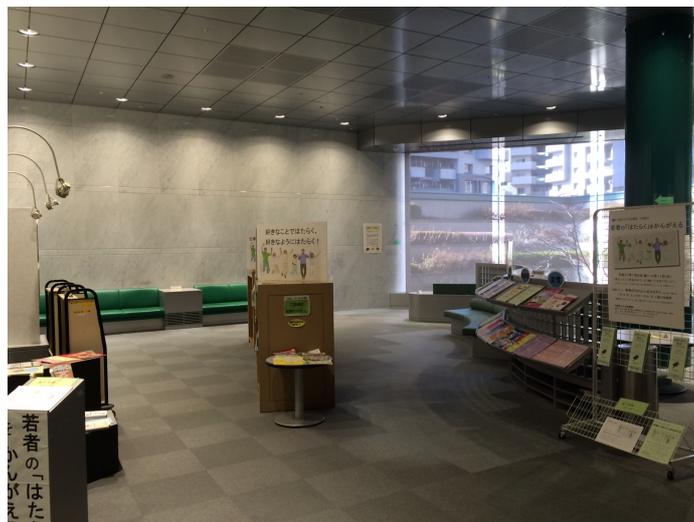


Figure 2. Osaka Prefectural Central Library

The high-resolution sound system, ‘KooNe’ by Victor Entertainment creates enriched sound quality in the indoor space. The several internal researches at Victor Entertainment suggest that the high-resolution sounds help people relax especially by aiding them to slow down the sympathetic nerve activities. Three types of nature sounds, 1) forest (Forest), 2) the water flow in the river (River) and 3) the wave sounds at the beach (Waves) and also one sound sample each for Jazz and Classic were evaluated both with high-resolution system and through the radio cassette player.

For the ambient scents, Air Aroma professionally blended original fragrances to express four seasons - spring, summer, autumn and winter as shown in Table 1.

Table 1. The blends for the seasonal fragrances

Spring	Summer	Autumn	Winter
Orange Sweet	Lemon	Orange	Pine
Tulip	Lime	Grapefruit	Clove
Apple blossom	Eucalyptus	Rosewood	Fir Needle
Lily	Spearmint	Petitgrain	Cinnamon
Geranium	Peppermint	Ylan Ylan	White Cypress
White Musk	Fir Needle		Rosewood
	Cedarwood		Hiba

The evaluators rated the KANSEI evaluation sheets by looking at the images of Osaka Prefectural Central Library. The collected data was analyzed with Principal Component Analysis.

Verbalized values added by high-resolution nature sounds

We investigated the KANSEI words, which were improved by the introduction of three of the high-resolution nature sounds, ‘Forest’, ‘Forest and River’, and ‘Waves’, in comparison to the visual evaluation without sound. As shown in the below table 1, the positive words such as ‘new’, ‘friendly’, ‘sentimental’, ‘familiar’, and ‘gentle’ are further improved with KooNe’s sounds. The values for the negative words such as ‘old’, ‘dirty’ and ‘boring’ were decreasing, which indicates that these specific negative features of the library were also improved with KooNe’s sounds.

Table 2. KANSEI words improved with KooNe’s nature sounds

KANSEI words			No Sound	KooNe high resolution sounds		
	5⇔1		Osaka Pref Library	Forest,River	Forest	Waves
Old	⇔	Not old	4	2.33	2.67	3
New	⇔	Not new	2	3	2.67	2.67
Dirty	⇔	Not dirty	2	1.67	1.67	1.67
Friendly	⇔	Not Friendly	3	3.67	3.33	3.33
Nostalgic	⇔	Not nostalgic	2	3	3.33	3.33
Familiar	⇔	Not Familiar	3	3.67	4.33	3.33
Gentle	⇔	Not gentle	3	3.67	4	4
Boring	⇔	Not boring	3	2	2.67	2.67

Verbalized values added by ambient scenting

As shown in Table 3 below, the use of seasonal fragrances also seems to improve the negative words such as ‘old’ and ‘dirty’. It can be argued that the introduction of the

ambient scenting and high-resolution nature sounds can add cleaner impressions and make the library look newer than what it is. As the result of the first examination discussed earlier, the element of ‘newness’ is one of the principal components to make the comfortable libraries. This result strongly supports the argument that the olfactory and auditory stimuli can positively influence the visual information if the right fragrance and sound are selected for the library.

Table 3: KANSEI words improved with seasonal ambient scenting

	5⇔1		Osaka Pref Library	Spring	Summer	Autumn	Winter
Old	⇔	Not old	4	3.5	2.5	3.75	3.5
Dirty	⇔	Not dirty	2	1.5	1.25	1.75	1.5
Ignorant	⇔	Not ignorant	2	1	1.5	1.25	1
Lonely	⇔	Not lonely	3	1.25	1	1.5	2.75
Distracting	⇔	Not disracting	2	1	1.5	1.5	1.25
Restless	⇔	Not restless	3	1.25	1.25	2	1.75
Sleepy	⇔	Not sleepy	3	1.5	1.5	2	1.25
Flaky	⇔	Not flaky	2	1	1.25	1	1
Boring	⇔	Not bornig	3	1.5	1.25	1.5	1.75
Tiring	⇔	Not tiring	2	1.75	1	1	1.5

The fragrances also improved the negative emotional words such as ‘lonely’, ‘sleepy’ and ‘tiring’. In comparison to the words improved by KooNe’s nature sounds, the fragrances tend to add more emotions and characters into the library to support people’s moods.

Evaluating the sounds in the library

The Principal Component Analysis of the rating of 10 different sounds delivered two sets of values - principal loading and principal score. The KANSEI maps for principal loading values and principal score values are created and superimposed in Figure 3. KooNe’s ‘Forest’ seems to add more ‘refreshing and ‘inspiring’ qualities than any other sounds. The richer sound quality through the high-resolution system achieved higher improvement than the ‘Forest’ sound through the radio cassette player.

The sound of ‘Waves’, however, resulted in shifted to more ‘restless’ and ‘unstable’ direction even with the high-resolution system. This suggests that the sound of ‘Waves’ may not be suitable in the library environment regardless of its sound quality. The Classic music also creates negative atmospheres including ‘heavy’ and ‘dreary’ and the Jazz shifted to the negative direction such as ‘noisy’. These results suggest that the

