

GENERATION OF EMOTION SPACES BASED ON THE SYNESTHESIA PHENOMENON

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Abstract This paper describes an investigation of the generation of surrealistic spaces that aim to achieve a new communications environment in which people can mutually convey their thoughts, mental images, and emotions more effectively. Emotion spaces here can be compared with conceptual spaces in the analogy of “logos versus pathos.” Our focus was on the phenomenon of synesthesia, and the results shown are the tests of color image creation involving “tanka” (31-syllable Japanese poems), aiming at the generation of spaces where some emotions are reflected rather than concrete scenes imagined from word meanings. In addition, this paper proposes an application that judges the similarity of pieces of music, showing the possibility of making instant, subjective judgements without need for a performance.

INTRODUCTION

With the advance of telecommunication technologies that make it possible to store, process and transmit vast amounts of information, it has become widely acknowledged that novel schemes for communication in the multimedia era need to be established. In pursuing new schemes that facilitate mutual understanding beyond differences in place, time, language and culture, we are exploring basic technologies for both realistic multimedia and hyper-realistic environments to improve the sharing of thoughts and emotions between humans. The authors are progressing with research on a technology to create new communication environments and methods to overcome present communications limitations by applying virtual reality (VR). Our purpose is to allow people to mutually convey their thoughts, mental images, and emotions more effectively [1-5].

Human recognition and human communications are classified as being either logical or emotional, even if there exists some differences in degree. In this paper, we explain an investigation on the generation of emotion spaces focusing on the synesthesia phenomenon. Emotion spaces here are compared with conceptual spaces [4,5] in the analogy of “logos versus pathos.”

SYNESTHESIA PHENOMENON

Expressions involving the sense of sight are often used to express sounds, in what is called “colored hearing.” The painter Kandinsky (Wassily Kandinsky; 1866-1944) was said to possess unique abilities and

synesthesia [6]. He said that when he viewed some colors, the colors would also become audible. Moreover, the reverse was true, he could see some sounds as colors. In addition, the French poet Rimbaud (Arthur Rimbaud; 1854-1891) created a poem relating images (evoking vowels under the theme "Voyelles") to colors [7].

Synesthesia, which is a fusion of stimuli, involves reactions to a combination of senses [8]. One example of this is the phenomenon of hearing a sound and feeling a color, or "colored hearing." Yellow is usually assigned to the sound of a child's voice

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People possessing typical senses find it difficult to understand the phenomenon of synesthesia. The authors, who possess typical senses, are merely able to enjoy pictures as media while mixing their own past experiences generated by images from sight and acoustics from sounds. However, what kind of world do people with synesthesia perceive?

By imagining the world that people with synesthesia perceive, we investigated the generation of spaces. Since relationships are thought to be strong among colors, sounds, and feelings. We then tested color image creation from the Japanese "tanka" poems of Ogura Hyakunin Isshu^{*}. "Tanka" poems are taught in Japanese school for understanding emotions or passions from the contents and between lines. However, this test using tanka poems is not about the correspondence of simple sounds and colors, and it is not like the flashback of concrete scenes imagined from the meanings of the words in the poems. Our goal is to generate spaces to reflect the emotions we experience.

We generated emotion spaces from Japanese poems using the following steps.

Step 1:

A table was created beforehand of the corresponding relationships between phonemes and colors. For example, the vowel "i" was made to correspond to red, the vowel "a" was made to correspond to black, etc.

In addition, correspondences are made to differences in brightness for differences in the sounds of voiced consonants. Here, the correspondence relationships between phonemes and colors was determined by the senses of the authors themselves, because "there is no natural correspondence between colors and sounds" [9]. In the future, we hope to make references for the average correspondence relationships between colors and feelings.

* "Ogura Hyakunin Isshu" is an anthology of 100 poems by 100 different poets. The poems are all "tanka." A "tanka" consists of five lines with a total of 31 syllables in the syllabic pattern of 5-7-5-7-7. They originated in the thirteenth century.

Step 2:

The phonemes that compose 31-syllable Japanese poems were made to correspond to image elements, and a multidimensional image element array was constructed. In this case, the size of the multi-dimensional array was determined based on the total number of image elements.

We took a two-dimensional array so that the image became rectangular, i.e., a square matrix. The image elements corresponding to the phonemes according to the time series of the reading were colored in the direction from the upper left to the right in the two-dimensional array. Here, we used white when image elements emerged without color information. It happens if the total number of image elements is not the square count.

Step 3:

Next, various types of image processing (low-pass filtering, etc.) were carried out and displayed. As described above, the present displays were two-dimensional and no depth was generated.

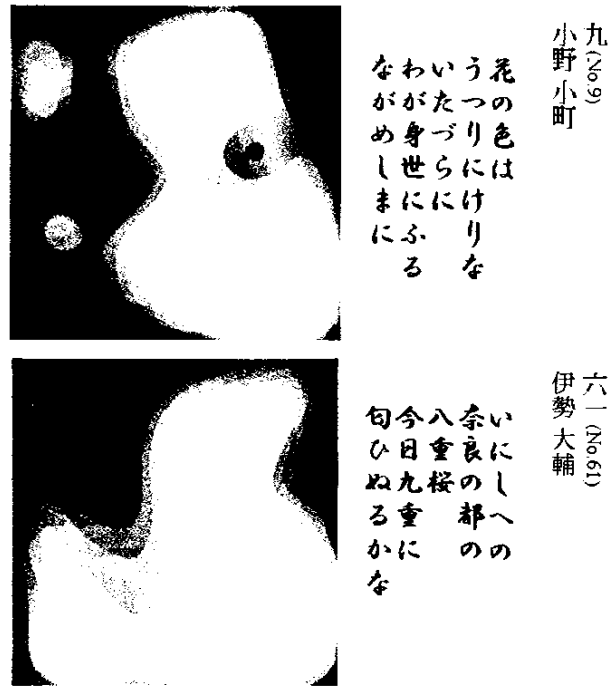


Figure 1: Example of color image creation from the Japanese "tanka" poems of Ogura Hyakunin Isshu.

No. 9 poem by Lady Ono no Komachi, No. 61 by Lady Ise no Osuke.

In Fig. 1, results are shown from carrying out the above-mentioned color image creation processing to the “tanka” poems of two poets from the Ogura Hyakunin Isshu. (The figures may be printed monochromatically, so the color variations are emphasized.)

This same method of connecting words to emotion spaces can be applied to music. Color images can easily be made to correspond to musical notes. For example, if a quarter musical note is the shortest musical note in a musical score, it can be made to correspond to image elements as the shortest part of the score. Fig. 2 shows comparative pictures converted from two musical scores that have become topics of dispute recently in Japan because of the similarity of the music. Even if there are differences in the scores, it is common for pieces of music to resemble each other. Any judgment on similarity therefore depends on human judgment. As the scores in Fig. 2 are short pieces, the resemblance between pieces can only be understood by viewing their scores. With color images, however, the comparative ability is high, and even people who cannot read complex musical scores are able to feel the similarities. Fig. 2 shows how it is possible to instantly judge similarities between pieces of music without the need for a performance.

CONCLUSION

In this paper, we explained our investigation on the generation of surrealistic spaces for a new human communications environment.

We performed color correspondence with phoneme units involving “tanka”. We are also considering investigating on color correspondence with word units (such as seasonal words) and the reflection of the pecu-

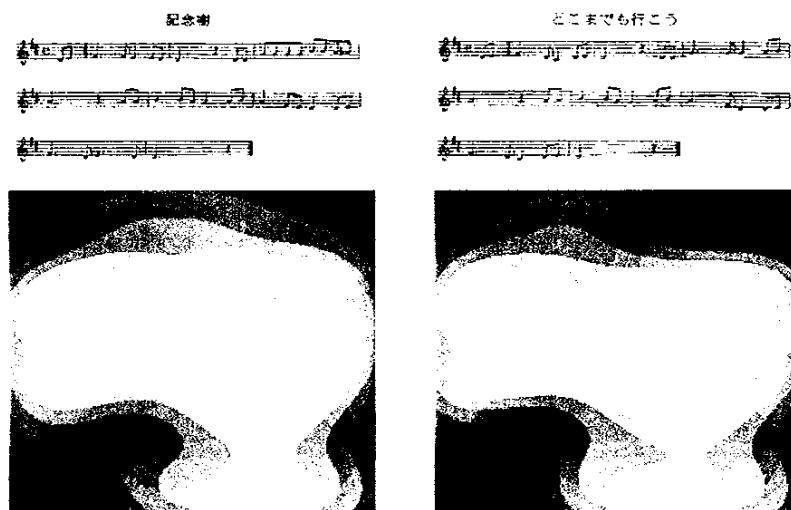


Figure 2: Example of an application comparing the similarity of musical pieces.

liarities of songbooks or poet in order to focus on the similarity of the method of expression.

Incidentally, a technique that can create spaces based on pictures and enter these spaces, has been proposed [10]. We also plan to consider our experiences in our world of emotions involving "tanka" for a walk within pictures [11,12].

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