**Abstract**

"Kansei" means sensitivity, sensibility, and intuition in Japanese. By denition, kansei is complex and vague. In addition, every person has individual kansei; hence, kansei is extremely varied. This diversity makes it difficult to handle kansei information in informatics. This study investigates methods for expressing kansei information using the characteristics of graphic design. In many cases, graphic design can facilitate communication. However, people who do not have sufficient graphic design knowledge and skills cannot fully utilize this attribute. To solve the problem, a graphic design support method for dealing with each graphic design element is required. In addition, investigation of suitable textual information for expressing kansei information is also required. Recently, Japanese onomatopoeias have attracted attention from various research fields as a helpful information medium. A positive feature of onomatopoeias is the ability to express complex and vague meanings in a short word. Previous studies have reported some practical utilization of onomatopoeias in sport coaching, education, and medical interviews. This study focuses on onomatopoeias because they are useful media to express complex and vague information such as kansei information. Given the above considerations in relations to kansei, this study set the following two aims: Aim 1) to construct graphic design support methods and Aim 2) to investigate the effectiveness of onomatopoeias.

Achievement of these two aims will provide support for utilization of graphic design elements. Aim 1 is to help people to utilize some graphic design elements easily. This study focuses on three commonly-used graphic design elements, fonts, layouts, and colors, and proposes the three graphic design support methods. These methods adopt an interactive evolutionary computation (IEC) framework. IEC makes it possible to suggest some graphic design elements using human evaluations. Hence, IEC-based methods are suitable for achieving the main purpose of this study that is to express kansei information. In addition, IEC can be applied to visual similarity, which is a general recognition of shapes and colors. It is expected that IEC based on visual similarity will be effective for constructing each of three graphic design support methods. Aim 2 is to investigate the effectiveness of onomatopoeias. This study has two analysis targets: utilization of onomatopoeias meaning human emotions, and relationship between fonts and onomatopoeia. Through these two analyses, this study attempts to clarify the effectiveness of onomatopoeias for expressing kansei information in relation to textual information.

This study makes the following two contributions to kansei study and knowledge science.

1. Kansei study: The proposed graphic design support methods consider human evaluations. In an attempt to incorporate human evaluations in each method, each method defined visual similarity for each graphic design element. The defined visual similarities take human perceptions into account. Several experimental results showed good performance by using the proposed graphic design support methods. Therefore, it is expected that the combination of physiological and psychological approaches will improve kansei research; in particular kansei search studies.
2. Knowledge science: The proposed graphic design support methods will provide a learning opportunity for fonts and color. Learning is significant for knowledge creation; therefore, the proposed methods will contribute to knowledge creation for graphic design. In addition, the outcome of this study enables to facilitate kansei communication by the effect of graphic design. The expression of kansei information is also significant study approach for human communications; hence, it is expected that the outcome of this study will contribute knowledge science.

Kansei study and knowledge science are strongly related to people. Therefore, it is expected that this study will contribute to research related to human behavior and activities. Visual information abounds in various media, and if people can communicate their kansei easily via all media, people will be able to understand each other more intuitively and deeply.

**Keywords**:
Kansei Representation, Graphic Design, Evolutionary Computation, Visual Similarity, Onomatopoeia