

Introduction to special issue on Kansei Engineering in textiles and clothing

The definition of Kansei

Kansei is written “感性” (kāŭŋŋɕɛ) in Japanese using kanji, the adopted Chinese characters that are used in the Japanese writing system. The first character “感” consists of a bottom element “心” (meaning “heart”) and an upper element “咸” (indicating the pronunciation, “kan”), representing the idea of objects moving one’s mind. The second character “性” is composed of a left element “心” (meaning “heart”) and a right element “生” (indicating the pronunciation, “sei”), representing the idea of nature in the sense of the heart with which a person is born. Chinese and Korean use the same traditional Chinese characters to represent this word, but the Chinese pronunciation is “gǎnxìng” (in pinyin), and in Korean is “gam-seong.”

In classical Japanese literature, *kansei* was used to mean “emotion, feeling, impression, sensibility, or affectivity” (Sakamoto, 1996; Nagashima *et al.*, 2007). When western philosophy was introduced to Japan in the nineteenth century, *kansei* was used to translate the German word *Sinnlichkeit* in Kant, and the philosophical meaning was added to dictionaries. China and Korea imported the word *kansei* with that meaning. Today, the following meanings are listed in a Japanese dictionary (Shinmura, 2008):

- (1) the sensitivity of sensory organs that produce sensations and perceptions in response to external stimuli;
- (2) experiences that are aroused and controlled by the senses, including emotions, urges and desires associated with the senses;
- (3) both sensuous and sensual desire which should be controlled by reason and will; and
- (4) sensory recognition that becomes the material of thinking (recognition with understanding).

However, the meaning of *kansei* as it is used in engineering varies depending on the specialized field. Harada (1998) summarized the definition of *kansei* in those fields as follows:

- (1) subjective and inexplicable functions of humans;
- (2) cognitive expression by knowledge and experience in addition to innate nature;
- (3) the interaction between intuition and intellectual activity;
- (4) the ability to respond intuitively to features such as beauty and pleasure; and
- (5) function of a mind to create an image.

As with all languages, a word has multiple meanings. *Kansei* may be close to the meaning of Greek “ethos” and “aisthesis,” Baumgarten’s “aesthetica” (Yamanaka, 2013), Darwin’s “mental power,” and the “metaphysics” of Chinese and Greek classical philosophy. As an adjective, *Kansei* is sometimes paraphrased as “emotional” or “affective” by those who do not use the word *kansei*.

History of Kansei engineering

In 1986, Ken’ichi Yamamoto, the president of Mazda Motor Corporation, introduced a method of manufacturing associated with *kansei* in lectures at the University of Michigan (Nagasawa, 2002). The method was a development process that combined psychology and statistical analysis systematized by Mitsuo Nagamachi (1989, 1995). In TV commercials,



Mazda started to call engineering based on human feelings “Kansei engineering” (1990). This was the early concept of Kansei engineering, which is still being used effectively today for the development of various products.

In 1992, the “Information Science/Psychological Study of Kansei Information Processing” project was implemented as a priority research area by the Ministry of Education of Japan. In the project, research on information processing in *kansei*, which had not been studied scientifically until then, was carried out. After that, various academic societies carried out many scholarly studies on *kansei*. In 1993, the Science Council of Japan established the Kansei Engineering Subcommittee, which examined a framework for Kansei engineering.

Eventually, the *Japan Society of Kansei Engineering (JSKE)* was established on October 9, 1998. Publication of the English-language academic journal *Kansei Engineering International* (currently the *International Journal of Affective Engineering*) began, in addition to a Japanese journal, the *Transactions of Japan Society of Kansei Engineering*. The *JSKE* stated that Kansei engineering is a scholarly field that aims to contribute to society by discovering and utilizing the value of *kansei*. Today, Kansei engineering has spread to various fields and countries (Shiizuka, 2013; Watada *et al.*, 2014; Nagamachi, Lokman, 2010; Nagamachi, 2011).

The *JSKE* has held the Kansei Engineering and Emotional Research Conference (KEER) almost every two years since 2007. Conferences have been held in Sapporo and Osaka, Japan; at the Paris Institute of Technology, France; Linköping University, Sweden; Leeds University, UK; and Penghu, Taiwan. In other countries, the Korean Society for Emotion and Sensibility (KOSES), the Taiwan Institute of Kansei (TIK), the European Kansei Group and the Malaysia Association of Kansei Engineering (MAKE) were established. The Kansei engineering-related international conferences International Symposium on Affective Science and Engineering (ISASE), International Conference on Biometrics and Kansei Engineering (ICBAKE), International Conference on Affective and Pleasurable Design (AHFE) and International Conference on Emotion and Sensibility (ICES) have also been held.

Kansei engineering in clothing science and technology

Textile and clothing researchers have long studied *kansei*-related issues. In the textile field, Peirce (1930) investigated the physical quantities associated with the hand in order to explore the criteria for determining quality in the fabric trade. However, human evaluation remained unquantified. In Japan, research on the fabric hand has been active since the 1960s; Kawabata developed measurement devices for mechanical properties of fabrics and linked the mechanical properties with the results of sensory evaluation by hand using multivariate analysis (Kawabata, 1975, 1980). In the 1990s, many new synthetic fiber fabrics called *Shingosen* were developed in Japan. These created a *kansei* value with new tactile sensations (Okamoto and Kajiwara, 1997). The effects of color and pattern are also a *kansei* issue. Research on optical illusions and color psychology is also being conducted from a *kansei* perspective.

The main purpose of clothing is body protection and body decoration/modification; comfort and beauty are both goals of clothing. Comfort research is conducted on geometrical and mechanical fit (Fan *et al.*, 2004), thermal comfort, and comfort touch with skin (Lyman and Norman, 1970; Li, 2001). These are also related to Kansei, but are relatively straightforward to evaluate by temperature and pressure. However, the human body varies anthropometrically and physiologically by individual, and there are a huge variety of fabrics and clothes, so it is still difficult to adapt clothing to each person.

Artists have long sought the universal beauty of the human body. The impressionists insisted on the beauty of a variety of human body types. Clothing does not exist by itself; the figure of the person wearing the clothes adds to their value (Otani *et al.*, 2014). Today, the leading fashion designers take into account a variety of types of beauty in the wearer’s appearance and body, as well as in clothes. In the relationship between clothes and the

human body, beauty is a matter of fit. However, because of the differences in individual preferences, this is difficult to study. Fortunately, *kansei* of people is not completely independent of each other and there are groups of people who have common *kansei*. Statistical processing and machine learning will be effective in finding *kansei* of these groups. Wrinkles and drapes are not only subjects of mechanics and quality studies also of Kansei engineering. However, the pursuit of a single principle of personal modification to find beauty that suits each individual has not yet been successful, although research has been done on design principles such as proportions (Brockman, 1965).

Shimizu states that the application of Kansei engineering to apparel is just one of the many potential applications of the method to improving the lifestyle and enjoyment of individuals throughout society (Shimizu *et al.*, 2004). There is currently an increasing number of Kansei engineering studies, even if they are not always clearly described as such.

The clothing industry supports a great variety of products. Mass production has efficiently provided abundant clothing for mankind, but the problem now is that clothes are disposed of after a short period of use or even without having been used. Today, much effort is being put into sustainability in the garment industry (Muthu, 2015). If clothing sustainability can be achieved in people's lives, this will contribute to global sustainability. The life of each piece of clothing is based on Kansei. Policies based on Kansei will build a sustainable society more effectively.

Conclusion

While once clothes were made at home, today good clothing is supplied cheaply thanks to industrialization. However, each person's satisfaction on clothing in various situations has not been achieved. Satisfaction is judged based on Kansei. Clothing is a product in which there are great differences in levels of satisfaction from one individual to another. It will become increasingly important to consider Kansei in both industry and consumer life. In this special issue, I hope that readers will have an opportunity to learn about the objects and methods of Kansei Engineering and that research in this area will become more active.

It is a great pleasure to publish a special issue on Kansei Engineering in the *International Journal of Clothing Science and Technology*. Thanks to Professor Shigeru Inui for editing.

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