

***Kansei* as a Function of Aesthetic Experience in Product Design**

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Abstract Following the current trend of modern product designs and developments, *kansei* and aesthetics are becoming inescapable concepts that must be considered in a user-centred design process. In this chapter, we make the assumption that aesthetic emotion is part of *kansei* feeling based on the cognition of sensori-emotional values evoked in interactions between humans and artefacts within situated contexts, either through immediate sensory perception or bodily interaction. Therefore, we construe aesthetic experience as a *kansei* element and an emotive cognition process in the construction of product values, and then propose that this phenomenon traverses all layers of product experience in both intrinsic and extrinsic ways, depending on the context, culture and environment. We project that the understanding of *kansei* as a denominator for aesthetic experience in design will foster value-based approach to the development of products that truly resonate and satisfy the users' cognitive and emotional sensibilities.

Keywords Aesthetic experience • Affect • Product design • *Kansei* • Kansei research

1 Introduction

Kansei is an advanced function of the brain that can be a source of emotion, inspiration, intuition, pleasure/displeasure, taste, curiosity, aesthetics and creation. [1]

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Aesthetics fills an important role in the evolutionary trend of design, as the design of objects has taken a key position in shaping culture, and impacting lives in far-reaching ways. As designers become more aware of the emotive powers of design than ever before, the aesthetic quality of products increasingly becomes a pervasive factor in the design process centred towards the users' satisfaction. With today's maximisation of product's function(s) and ergonomics, aesthetic quality is recognized as a pleasure-eliciting design attribute [2] which impress on the users' *kansei* (affective sensibility) through sensorial experience or interaction; forming an essence that strongly promotes products' value in a global culture. In this chapter, we hold the view that aesthetic perception is a fundamental part of the users' *kansei*, and this can be anchored on the cognition of sensori-emotional values evoked in interactions between humans and artefacts within situated contexts either through immediate sensory perception or bodily interaction. We elaborated on this by presenting various definitions of both concepts towards establishing a meaningful relationship.

Kansei has strong Japanese origins, with its foremost application in the engineering. Today, the field of *kansei* research is growing as a consilience of disciplines concerned with the understanding and interpretation of the state of the human mind and behaviour as an interactive function of the brain, neural system, artefacts and the environment. *Kansei*/affective engineering, *kansei* (information) science and *kansei* design research areas connect diverse fields in arts, design, engineering, neurosciences, psychology and so on, to create products, systems and environments that afford rich, meaningful experiences, thus enhancing the quality of life. *Kansei*/affective engineering evolved as an advanced industrial design method and a user-based product development process for fulfilling consumers' psychological feelings and product demands [3–5]. *Kansei* has been formally introduced as a Japanese approach to industrial design—the implication of *kansei* on *kansei* design [6]. In recent times, *kansei* studies have adopted cross-cultural approaches, while the frontier of the *kansei* research continues to expand to the international communities, as now seen in Europe. The research output from *kansei*-related studies has gained significant attention; Japan's national strategy noted the leading example of the practical research as “*Kansei* value creation” [7].

In the domain of product design and design experience, design aesthetics has been widely accepted and discussed as a crucial factor for eliciting pleasurable experience with designed objects or systems [e.g. 2, 8–12]. Until now, the subject of aesthetics as a cognitive and emotional-oriented phenomenon is allusively portrayed in previous product design-based *kansei* studies. Though *kansei*, in a broad sense cannot be limited to aesthetics, the aesthetic experiences with design objects within situated contexts have been adopted as an approach for understanding the nature of users' *kansei* [e.g. 13, 14]. Because the concept of design aesthetics stands as a more familiar construct to the international design communities, that most represents the emotive or appealing elements in design, interpreting this concept within the *kansei* study will provide more insight towards grasping the complex nature of the *kansei* itself. This is the primary goal of this chapter. Moreover, we draw inspiration from the foregoing studies of both concepts, sharing views from relevant fields of theories in order to flesh out an integrated perspective of aesthetics in product design and *kansei* which has emerged as an essential value in Japanese designs and research approach.

2 Aesthetics: A Contextual Definition

In the field of theories, aesthetic(s) is an elusive phenomenon which seems to lack a defined disciplinary border or unified definition. The meaning is multilayered, subjective, culturally dependent and fluidic among fields of discipline [15–17]. In a diverse sense, the term “aesthetic” has been applied to designate a branch of philosophy, a feeling of pleasure, an experience, classicism in art, a judgment of taste, the capacity of perception, a value, an attitude, the theory of art, the doctrine of beauty, a state of the spirit, contemplative receptivity, an emotion, an intention, a way of life, the faculty of sensibility, a type of subjectivity, the merit of certain forms, the quality of an object or an act of expression [15, 17].

Today, the term “aesthetics” may broadly cover (1) the study of all the aesthetic phenomena, and (2) the study of art or what is considered to be artistically worthwhile or notable or “good”, as a specific expression of what is perceived as being aesthetic [18]. While it appears that there are several theories on aesthetics with multifarious subjective interpretations, the subject was classified into two parts: the philosophy of art and the philosophy of the aesthetic experience and character of objects (non-art phenomena) [19]. The recurrent theme addresses on the standard and theory of beauty, taste, pleasurable values appreciable through sensory, emotional or intellectual perception. From a neuro-psychological perspective, aesthetic experience touches on cognition and emotion; inciting our sense of judgment and influencing our behaviour. Nevertheless, a relevant definition that has been drawn to support this chapter defines aesthetics or the aesthetic *as a cognitive mode in which you are aware of, and think about, the sensory and emotive qualities of phenomena and things* [20].

2.1 Aesthetics as a Perceptual Experience in Design Artefacts

It is said that humans have an innate, sometimes sub-conscious, ability to perceive a wide range of qualities in objects [21]. This covers many specific cognitive adaptations for quickly assessing attractive and repulsive properties of the physical world and some of these adaptations are considered to be likely relevant to aesthetic judgments of artefacts [22]. See Fig. 1 for an adapted illustration on sensory and cognitive experience of an object of aesthetic interest [23].

This had been in part explained through the evolutionary theory [11, 22, 24]. The evolutionary perspective is that in the process of human adaptation, aesthetic responses must have provided a reproductive advantage or means to survive. It is formally presented: “Beauty is the moving experience associated with information processing by aesthetic judgment adaptations when they perceive information of evolutionary historical promise of high reproductive success” [25]. Whereas there are notions of a universal sensitivity to objects’ beauty or aesthetic cognition of design [11, 22, 26], the range of perception and degree of responsive behaviour might vary based on context, cultural formation or value system [11, 27]. Eighteenth-century philosophers such as David Hume

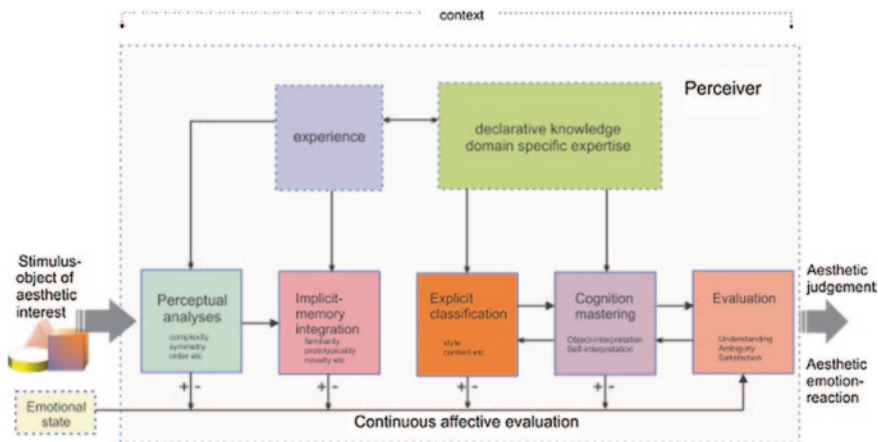


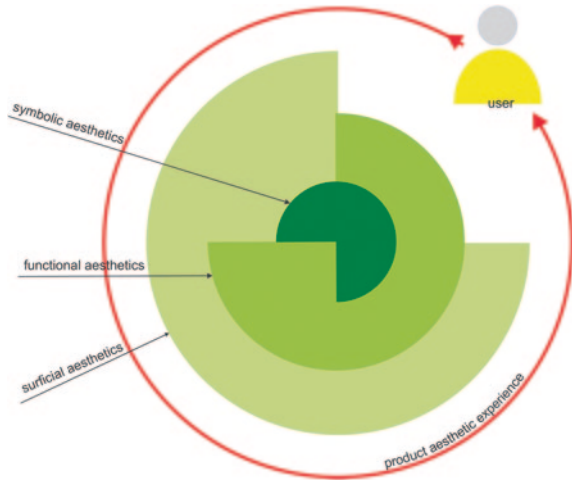
Fig. 1 A schematic representation of aesthetic experience (adapted from [23])

and Immanuel Kant engaged the fundamental question of the extent to which aesthetic quality is absolute and universal or dependent on context [18, 22]. Some principles have been asserted in an attempt to describe a general cause underpinning aesthetic pleasure in design. For instance, the Vitruvian design principles described in [12]; and the four principles of pleasure in design presented in [24], such as: maximum effect for minimum means, unity in variety, most advanced, yet acceptable and optimal match.

Aesthetics is one of the important fields of theories concerned with interactions involving human(s), artefact(s) and contexts. To fully appreciate the role of aesthetics in the product development process, the notion that design is only concerned with mere styling or empty beauty was refuted through the idea of “aesthetics of interaction”: “Beauty, and thus beauty in interaction, is an experiential and social given. It is not just a quality of an object. It is the way an object speaks to us, calls us, affords us, puts us into contact with others, is meaningful to us, shares its inner horizon with us. Thus considered, beauty emanates from our unity with the world. It is pre-reflective” [28].

From the cognitivist point of view, it has been commonly established that product aesthetics positively affects usability in a significant way. Following critical observation supported by experimental case studies [10, 26], it has been shown that beauty (aesthetics) promotes usability and fulfils an emotional role that product function alone cannot. Norman [26] illustrated this using the experiments carried out by two Japanese researchers, Kurosu and Kashimura [29]. Following Tractinsky’s [30] further research using the same experiment under more methodological controls but with other cultural subject—the Israelis; not only did he replicated the Japanese findings, but the results were even stronger in Israel than in Japan, contrary to his belief that beauty and function “were not expected to correlate”. The aesthetic experience model proposed for this study resonates with the Norman’s three-dimensional

Fig. 2 Layer of aesthetic experience in product design



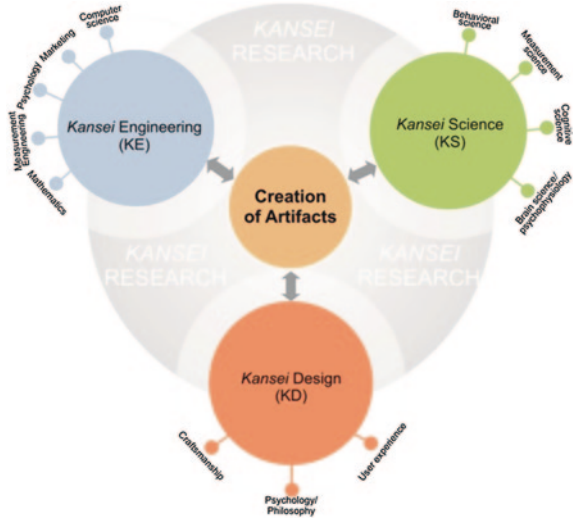
theory of emotional design (namely *visceral*, *behavioural* and *reflective*) and the analytical/pragmatic constructs of aesthetics [10, 31].

2.1.1 Reinterpreting Aesthetic Experience in Product Design

In our previous study [32], we proposed a holistic view of aesthetics using the three levels of experience as interconnected dimensions (cf. Fig. 2).

- *Surficial aesthetics*—In first contact, the appearance of product unconsciously intrudes upon the senses of a user. However, the sensation of the image only transpires as far as the observer is interested in sustaining his/her attention on the object. The external parts of a product which is the platform that exhibit tangible design elements such as shape, form, colour, texture, smell, sound and other physical quantities that can be detected and received via the sensory interfaces. Also the representation of the intangible design elements such as style, contrast, symmetry, harmony, rhythm is also received from the product appearance. The ease of processing all these sensed elements based on factors such as complexity, prototypicality and familiarity could influence the level of attention or shift beyond the receptive field for further mental processing.
- *Functional (interactive) aesthetics*—When the use of products engages the user in a pleasurable way, aesthetics becomes a function. Likewise when the operation of a product or system evokes pleasurable experience which makes to improve the use and performance of a product, this could be relayed to as the functional dimension of aesthetics.
- *Symbolic aesthetics*—Pleasure evolves in reflecting meaningful association with the product. This is a level of aesthetic experience where consciousness, emotion and other cognitive functions are fully engaged. This aspect of products

Fig. 3 Main disciplines in the field of *kansei* research (namely *kansei* engineering, *kansei* science and *kansei* design) related with the design of artefact



possesses intangible qualities that touch on users’ self-image, taste, preference, memory and so on. This aspect is highly subjective, personal and susceptible to variability through experience, culture, education and personality.

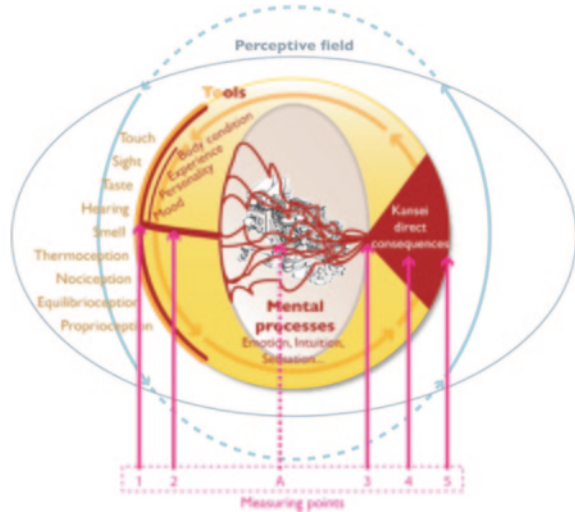
In product design, aesthetics is a strong factor for product development in a highly competitive market. Also, there is a need for cultural understanding in product development in order to promote wider acceptance in aesthetic appreciation.

3 Kansei: Definitions Based on Previous Studies

The ambiguous nature of *kansei* is owed to the diverse definitions proposed through previous studies. Some of the definitions relevant to this study will be presented to basically describe *kansei*, *kansei* science, *kansei* design and the *kansei* affective engineering (cf. Fig. 3).

Mitsuo Nagamachi, founder of the concept of *kansei* engineering, defines *kansei* as “a mental state where knowledge, emotion and sentiment are harmonized” [33]. As defined by Harada [34], *kansei* is “a terminology which unifies concepts such as sensitivity, sense, sensibility, feeling, aesthetics, emotion, affection and intuition.” *Kansei* thus describes a fundamental tacit process of the human mind which involves several emotional feeling such as sensation, perception and cognition [35]. In [36] and [37], *kansei* was buttressed as a mental function, and more precisely as being a higher function of the brain. Three aspects of *kansei* were proposed as follows:

Fig. 4 A comprehensive view on *kansei* as proposed by Lévy and Yamanaka [36]



Kansei process that gathers mental functions related to emotions, sensitivity, feelings, experience, memory, and intuition, i.e. sensory-quality-related functions including interactions between them.

Kansei means are all the senses and probably other internal factors (such as personality, mood, experience...and so on)

Kansei as the fruit of kansei process (i.e. of these function processes and of their interactions). It appears to be a unified perception providing a qualitative meaning and values of one direct environment. *Kansei result* is a synthesis of sensory qualities (cf. Fig. 4).

A recent definition of *kansei* by Yamanaka et al. [38] suggested that the term *kansei* consists of two compounds: (1) a “situation of astonishment and mind” and (2) “mind and life” (which they also describe as “sensibility and the German term *Sinnlichkeit*”). They pointed out that the concept of *kansei* in the view of “the sensing ability” incorporates the “process of understanding”. *Kansei*, they suggest, shifts the direction of understanding into the description of perception (悟性-gosei in Japanese or *Verstand* in German) that leads to decision.

4 Reconciling Aesthetics with Kansei

As established in [37], the term *kansei* evolved in Japanese literature as early as the seventeenth century when it was reflected in the written poetic work of Yoshida (Nanshoku masukagami) in 1687. Later during the Meiji era (1868–1912), the

term became characterized as an academic term through the study of Amane Nishi in philosophy and psychology at Leiden University (1962–1875) in the Netherlands. In this period, Nishi studied Baumgarten’s work on Aesthetics, from which he acquired some key terms into Japanese linguistic interpretation. Among these were the following words coupled with their interpretations: know (知-shi), act (行-gyuo), feel (感-kan), intellect (智-chi), will (意-i), sensibility (思-shi), true (真-shin), good (善-zen) and beauty (美-bi). Remarkably, the word *kansei* (感性) which was lexicographically coined from the *kanjusei* (感受性) to denote “sensitivity”, “sensibility” or “the faculty of feeling” (感-kan denoting “feeling” and 性-sei denoting human “faculty”). Subsequently, the term *kansei* was further buttressed in the Japanese translation of Kant’s Critique of the pure reason done by Teiyu Amano (1930). In this work, the German term “Sinnlichkeit” (defined by Kant as the faculty of intuitions, perception and mental imagery) was translated into “Kansei”. Other notable works contributing to the understanding of *kansei* was said to be done by Kitaro Nishida, known as one of the most influential philosophers in modern Japan.

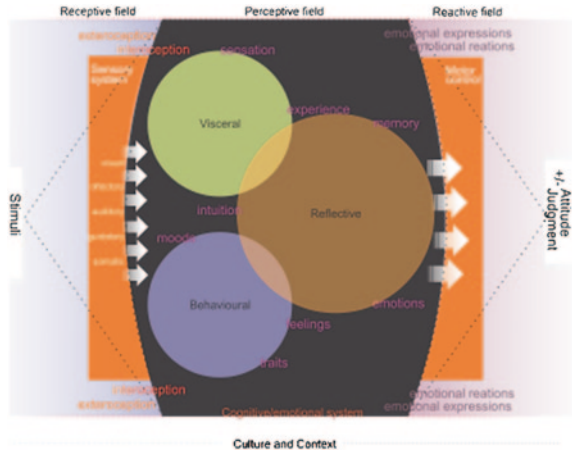
The modern renaissance of *kansei* eventually led to the development of a productive research discipline and an industrial technique based on *kansei*: the *kansei/affective engineering* [5]. However, the current trend suggests that *kansei* has become matured enough to be considered as an important concept in Japan and hence the applicability to design as a Japanese approach of industrial design. Following striking innovations and market successes claimed through the application of *kansei* in engineering, *kansei* was considered a key element in the Japanese modern design culture and beyond. Since the 1970s, the impact of *kansei* in Japan has persisted through the promotion of *kansei* value in design products, marking a paradigm shift from an industrial age of mass production to mass customization.

As the importance of the sensorial content of objects continues to grow, the pervasiveness and significance of aesthetics as a factor in human-product experience cannot be underestimated in attempt to understand the nature of human *kansei*. *Kansei*, described as a holistic and contextual sensory-mental model for human being, shapes aesthetic experience as it relates to the physiological and psychological aspects of product design. Senses, perception, mental processes and behaviours are all considered in the model to encounter (understand) human being in the perceptive field [5, 8].

Even though the phenomenology of “aesthetics” still appears elusive in the field of art and design theories, its interrelatedness with *kansei* can be established. Aesthetic perception in design artefacts is anchored by an individual *kansei* (i.e. subjective sense of value for a certain artefact, environment or situation through various sensory modalities such as sight, hearing, touch, smell, taste, balance including the intuitive perception and reaction to external stimuli) [39] (cf. Fig. 5).

Since *kansei* study is becoming more relevant to design applications today, design artefacts are considered to evoke feelings which can be characterized to understand the human mind processes. Significantly, the aesthetic qualities of products have been used in *kansei* studies which seek to quantify the people’s

Fig. 5 Aesthetic experience incorporating *kansei* process, means and result (psycho-physiological space)



perceptions of artefacts. The perceptions of aesthetics in these products are evaluated as subjective response which covers *kansei* means, its process and result.

Though, aesthetics in design can evoke human affect, the cultural influences can make it unexplainable in a broad sense. According to Salem et al. [40], *kansei* nature within the context idea of aesthetics has been defined, explained and explored in many ways. Usually, aesthetics is associated with the concept of beauty, the canon of beauty or its experience. In one sense, it is the measurement of beauty which is associated with pleasure. Beauty needs not and should not, within this context, be limited to visual beauty. It is an attribute that could be sensed and perceived. That is why aesthetics is also defined as subjective assessment of the beauty of an experience.

4.1 Implications for Aesthetic Design Through Kansei Study

Kansei and aesthetics pervade a major role in the modern trend of design and inspirational source for creativity [14, 41]. Both concepts thrive in the fields of design and possess qualities that can be multi-dimensionally described and measured with respect to emotion, perception, cognition, subjective response and appreciation. In recent times, the theme of aesthetics has been indirectly reinforced by a growing number of *kansei* studies. Coupled with an adoption of cross-cultural approach, a new vista for understanding the multifaceted nature of *kansei* is being opened up. Attempts to study *kansei* have been done by stimulating the sensory modalities to evoke emotional (perceptual and behavioural) interaction between artefacts and human within a contextual space. Design researchers also tend to be aware of the issue of cultural diversity towards understanding the *kansei* process. This is reflected by the myriad of studies targeted at exploring cultural

distinctions in the designers'/users' creativity, perception and interaction with design products or systems (e.g., [32, 42–45]).

Kansei information and design science laboratory at the University of Tsukuba aimed towards understanding mind functions through experimental work and *kansei* design practices. A wide range of interacting disciplines including design, psychology, cognitive science, brain and neurological sciences conjoin not only about understanding *kansei* as brain and neural functions but also on how to measure the state of mind and the sensory qualities of entities. The study of aesthetic responses to a product stimuli in pre-conditioned settings has been adopted as psycho-physiological means in *kansei* research. Aesthetic perception through *kansei* study can also be a source of inspiration for creativity even though this was not the target in the research carried out by and reported in [1].

Indeed, *kansei* design has an interdisciplinary nature, which evolves progressively towards a trans-disciplinary domain, becoming a field of application related to *kansei* science and aesthetics psychology as both are important dimensions in the field of human factors research and practice. In the development of user products, the knowledge of inclination in perception can be utilized effectively in considering the design process. Sensitivity to design qualities will be a way to understand the process of designing for the senses as a means of providing products with new values. Also, the understanding of product cognition beyond cultural borders will spur a new way of understanding *kansei* and approach in the design process. An exploration of this area could open up more design potentials for the developed and developing world.

5 Conclusions

In today's field of product design, *kansei* and aesthetics have served as an inspirational source for creativity and promoting the differentiation of products in the global marketplace. Numerous product design studies have concerned themselves with the subject of aesthetic-based and emotion-related design factors. Moreover, the findings from on-going experimental studies on these phenomena reflect on how perception, influenced by culture, can determine the user valuations of design products and environments.

Products thrive only when they align with the user values, attitudes and behaviours, even if they result in changes to those values and behaviours. As designers become more aware of the responsibility that design must bear in the twenty-first century, the form and content of user-centred products or systems now demand an integration of the perceptions and wishes of the prospective users of the product (i.e. the consumers' *kansei*). Part of this expectation is the awareness of not only users' satisfaction but also an elicitation of values that promotes a sustainable consumption. This is reflected in the Japanese aesthetics. Not only are technical and objective demands important, but aesthetic, emotional and other experiential factors are highly desired, some of which are hard or impossible to express objectively [14]. The task of

design practice now lies in the need to balance objective and subjective properties, functional technology and emotional expressiveness, and information and inspiration.

As the study of *kansei* takes on a cross-cultural approach, there is new insight into the dynamic nature of aesthetic perception in product design. Culture-driven *kansei* research can provide a platform for new knowledge and ways of thinking that will help to address emerging design issues and inspire more creative steps towards product innovation. The onset of new issues can be a considerable factor to design for a real world through a culturally sensitive *kansei* design approach.

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