Synesthetic Approach in the Design Process for Enhanced Creativity and Multisensory Experiences.

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Abstract: Synesthesia— involuntary cross-modal sensory associations—is in very close relationship with perception, creativity, and imagination. Since design appeals to senses and provides multisensory experiences to users, synesthesia can be developed as a multisensory design method and framework—a multisensory instrument—having the potential to change the perception of the practice and the embodiment of a design idea accordingly. It can prompt creativity and imagination as well as enhancing the user experience and interaction with the product. Within this perspective, this paper aims to suggest a new territory for design research by investigating the relationship among synesthesia, creativity, and perception in order to contextualize the association between synesthesia and design and presenting a few exemplary designs that are found inspirational within the context. Then, synesthetic approach as a design method and framework is proposed with the intention to utilize and provide unique and intersubjective experiences in the field of product design.

Keywords: product design, synesthesia, synesthetic approach, design method, design process

1. Introduction

Synesthesia has been a subject of research of various disciplines, including psychology, neuroscience, and the arts due to its exceptional potential for creativity. It is also worth exploring its unique properties and how they might contribute to design, which has been undergoing a dramatic change, in terms of the adopted perspectives and approaches, the intermingled phases of the design process, and the role of the designer. In the past, designers were adopting a more utilitarian perspective with a direct focus on the product itself. However, recent design practices are more dynamic and bring different disciplinary views together to establish a new territory in the design field. In that sense, designers’ intent is to seek and suggest new speculative inputs to improve the field through experimentation and application of new design methods, providing a limitless domain for creativity (Lee, 2014).
Synesthesia has been associated with the arts, e.g. literature, painting, poetry, and music, in a way that the outcome is the embodiment of the synesthetic experience of some kind. It has not been utilized in the field of product design yet; however, it may offer a vast amount of possibilities, opportunities, and modes of thought to the field, which are not only limited with more creative and innovative product outcomes, but also include new and challenging methods and strategies in design (Seargeant Richardson, 2010). Within this perspective, a new design research field and methodology may emerge in the intersection of synesthesia and design by establishing new interaction patterns, metaphors, and ways of design thinking, capable of enhancing creativity and multisensory experiences in the design process.

This paper aims to suggest a new territory for design research. The study begins with a literature research, exploring the relationships among synesthesia, creativity, and perception in order to contextualize the association between synesthesia and design, before presenting a few exemplary designs that are found inspirational within the context. In the light of these findings, synesthetic approach as a method and framework to be applied in the design process is proposed with the intention to provide as well as making use of unique, intersubjective experiences in the field of product design.

2. What is Synesthesia?

“I was born on January 31, 1979 – a Wednesday. I know it was a Wednesday, because the date is blue in my mind and Wednesdays are always blue, like the number 9 or the sound of loud voices arguing.” (Tammet, 2007, p.1)

Synesthesia is a natural form of virtual reality (Heyrman, 2005). Synesthesia is a neurological condition, in which one sensory stimuli causes different sensory physical experiences as a result of perceiving one or more different senses by cross-modal association, which is automatic, involuntary, and irrepressible (Harrison & Baron-Cohen, 1996; Cytowic, 2002). For instance, a synesthete, i.e. a person with synesthesia, may visualize sounds, smell words, taste colors, or touch tastes. These direct sensory associations and experiences are unique to the individual and often operate only in one direction, e.g. experiencing a tactile sensation by tasting food but not vice versa (Cytowic, 1993; Rogowska, 2011). Even though synesthesia is widely considered to be a congenital condition, there are also other studies providing an alternative view to this, arguing that individuals can be trained to develop synesthesia as well (Colizoli, Murre, & Rouw, 2012; Bor et al., 2014).

Based on a comprehensive research on the scientific literature of synesthesia and on the reports of synesthetes, Rogowska (2011) specifies the general characteristics of synesthesia:

1. Synesthetic experiences are involuntary reaction to a stimuli and although the person does not have any control over the experience, concentrating the attention on the stimuli may significantly influence the strength and consciousness of sensorial associations.
2. A sensory stimulus may induce simultaneous experiences in different modalities.
3. The occurrence of synesthesia and its perceptual nature are automatic.
4. Synesthetic experiences are constant on the intra-individual basis; i.e. particular sensory stimuli evoke identical experiences in an individual.
5. Synesthesia is individual and each synesthete develops individually unique sensations, different from that of others, to the same stimuli.

There are many forms and variations of sense association, which is stated to be at least 80, based on the research data collected from 1143 synesthetes (Day, 2016). Despite the facts that there are
limitless possibilities of synesthetic variations and some forms of synesthesia are more common than others, such as grapheme-color and sound-color, each synesthete’s experience is idiosyncratic as mentioned before. However, they can be divided into two main categories: (1) two-sensory (e.g. sound-vision) and (2) multisensory (e.g. time-space-emotion) (Day, 2005; Heyrman, 2005; Wang et al., 2012). Rogowska (2011) states that synesthesia has been under study since the 17th century and there a vast amount of publications related to synesthesia in various contexts and disciplines, including psychology, medicine, technical science, and various forms of art. The various kinds of synesthesia that appear in scientific literature basically fall into 11 categories, in regard to their differences in terms of the periods they occur in (age and permanence) and their prevalence, and 4 subcategories with a common feature of the “ability to create associations” (Rogowska, 2011, p.216):

6. Developmental synesthesia
7. Acquired synesthesia
8. Temporary synaesthesia
9. Associational synesthesia (artistic synesthesia, which can be roughly defined as the capability of creating distant associations by artists to be used in their art, falls into this subcategory)

3. Synesthesia and Creativity

Synesthesia played a significant role in the arts and science, especially at the end of the 19th century and the beginning of the 20th century, and “[t]he higher forms of synesthesia are associations generated by willful process, subordinated to free will, of a high level of discretion and originality, interceded by distinctive manner of using the language [and] they are abstract and symbolic” (Rogowska, 2011, p.216). In parallel to this, other research studies indicate a strong relationship between synesthesia and creativity as well (Ramachandran & Hubbard, 2001; Ward et al., 2008; Cytowic & Eagleman, 2009). Regarding the fact that the search for correspondences and complementarities between the senses is increased in intense creative processes, synesthesia is an important key to understand creativity, in terms of the cross-modal associations revealing precise aspects of human consciousness and the multidimensional unity of perception preceding meaning and medium preceding message (Heyrman, 2005). Therefore, we perceive the world and process the information through our senses. Galton (1883) is one of the first scientists, who described the experience of synesthetes, and states that:

“The only information that reaches us concerning outward events appears to pass through the avenue of our senses; and the more perceptive the senses are of difference, the larger is the field upon which our judgment and intelligence can act.” (Galton, 1883, p.27)

Cytowic & Eagleman (2009) highlights that creative people have higher tolerance for inconsistency, contradiction, and paradox than more literal-minded people, since they lack the ability to comprehend metaphors and the capacity to establish metaphoric connections. Metaphors take form of cross-sensory associations, e.g. “cool jazz”, “sharp cheese”, “sour note”, and “feeling blue”, and these synesthetic expressions are mostly obvious to both synesthetes and non-synesthetes (Ramachandran & Hubbard, 2001; van Campen, 2007). Therefore, even many non-synesthetes are intrinsically good at matching different sensory stimuli. For instance, different sensory dimensions such as shapes, size, lightness, loudness etc. can be easily associated among themselves through cross-sensory mapping, as in the example of associating the spiked shape with the word “kiki” and the blob with the word “bouba” or in the example of dance, during which the body corresponds to the rhythm kinetically and visually (Cytowic & Eagleman, 2009). Not only the synesthetic ability is
observed in the artistic creation of materialized forms of some kind, but even the human ability to interpret and create, requiring cross-wiring in the brain, is a form of synesthesia that any individual has (Cavallaro, 2013). Metaphors and creativity require abstract thinking and expression, which help us make sense of the given in the search of the ungiven. In that sense, anything that involves metaphors, including the development of language and the arts, starts with the sensory perception and perceptual similarities between the abstract and the concrete; and within this the sensuous world, it is only possible to understand the world through senses, which makes life a continuous synesthetic experience that is physical, real, and concrete, to a certain extent (Heyrman, 2005).

4. Synesthetic Approach in the Design Process

In the literature, synesthesia studies deal with the issue as a perceptive phenomenon, metaphor, or artistic/non-artistic representation that has an intersubjective value (Riccò, 1999). Within the sensuous world, design is a model of unity of matter, form, and content, which appeals to different senses and provides a multisensory experience to users. It requires a synesthetic coherence, both in the process and the product, to be ensured by the designer, who is a “synesthetic orchestrator”, i.e. manipulator of senses by working with various stimuli in order to achieve a mutual congruence among them to induce our experience of the reality (Riccò, Belluscio, & Guerini, 2003; Heyrman, 2005). It necessitates the awareness that “[s]ynesthetic perception is the rule and, and we are unaware of it only because scientific knowledge shifts the center of gravity of experience, so that we have unlearnt how to see, hear, and generally speaking, feel, in order to deduce, from our bodily organization and from the world as the physicist conceives it, what we are to see, hear and feel” (Merleau-Ponty, 2002, p.266). Within this perspective, synesthesia has the potential to be developed further as a multisensory design method, allowing intersubjectivity in the design process in order to associate unrelated qualities through linking different sensory modalities with the imagination, flexibility, independence, and self-acceptance of the designer. Through this method, it might be possible to prompt creativity and inspire imagination as well as enhancing the interaction between the user and the product by providing users with unique sensory and emotional experiences (Wang et al., 2012).

The disciplines that deal with higher scientific tradition, e.g. studying either artefacts and objects as physical entities or the human being, mostly utilize well-defined and well-established research methods and procedures (Anceschi and Riccò, 2000). However, design research should integrate and make use of both perspectives with the aim of creating new ways and approaches, including not only physical, but also perceptive/cognitive congruencies, which requires a shift in the scientific model towards the pursuit of intersubjective values, replacing the pursuit of objectivity. Therefore, the exploration of the synesthetic approach in the design process should start from experimental and exploratory practices to formulate a theory.

4.1 Inspirational Multisensory Design Examples

Keeping the potential of synesthesia to make creative and unique contributions to design in mind, below are some examples that are found inspirational within the context of synesthesia and design, with brief explanations.

“Essence in Space” by Chang Hee Lee

This project (Figure 1) establishes a synesthetic connection between music and fragrances in order to create a unique perfume of Mozart’s Turkish March, Bach’s Moonlight Sonata, and Chopin’s Fantasy-Impromptu. The designer identifies the links between the fragrance classification and musical
notation and each musical note releases a droplet of perfume by pressing the key on an adapted keyboard (“Essence in Space”, n.d.).

Figure 1. Essence in Space.

“REIFY” by Allison Wood and Kei Gowda

This project (Figure 2 and 3) is developed as technological version of synesthesia and transforms music into 3D-printed sculptures (“REIFY - Music you can hear, see and hold”, n.d.). They work in collaboration with musicians in order to visualize the interpretations of their music and produce the sculptures, “totems”, which are encoded with the song, by 3D-printing. While listening the song, the totems are turned into augmented reality animation through a mobile app.
Figure 2. REIFY - 1.

Figure 3. REIFY - 2.
“Lickestra” by Emilie Baltz, Carla Diana, and Arone Dyer

This project (Figure 4) is a musical licking performance, presented through four conductive ice cream cones, producing different sounds by licking (“Lickestra”, n.d.). Flaherty (2014) states that Diana emphasizes despite the playfulness of the performance, it is a serious design thinking effort towards the tongue-based expression, which they find powerful to combine it with different senses in the pursuit of sensory experiences to be used interactive consumer products as well, through experimenting with overstimulation and underutilized senses in this project.

Figure 4. Lickestra.

4.2 Synesthesia as a Multisensory Design Method and Framework

The aim of proposing synesthesia as a multisensory design method is to open up new ways of interpreting traditional and recent design methods along with the emerging fields and practices in design research and the evolving design process. Within this context, the field of product design is an area of creative skills and expression. Regarding the perceptual, metaphorical, and representational aspects of synesthesia, it can be applied to any phases of the design process, especially the initial phases, research, ideation, and representation.

Synesthesia, is a multisensory instrument in the design process and the synesthetic approach changes the perception of the practice and the embodiment of a design idea accordingly. It is beneficial to reconsider the aesthetic, functional, quality, and emotional aspects of a product. By adopting the synesthetic approach in the design process, various sensorial characteristics of a product achieve the potential of an unlimited number of possibilities of associations and unity through more perceptual and receptive ways. This holistic point-of-view enables a flexible, creative, and metaphorical, yet systematic pursuit of sensorial coherences.
4.3 Suggested Framework and the Application Steps of the Method

This method transforms the two-dimensional matrix method into a multi-layered and multi-dimensional circular – cylindrical – model in order to increase the number of sensory interpretations and ideas. The main idea is to divide the product at issue into its various components, analyze, and reassemble them in a “synesthetic” way, incorporating cross-modal sensory associations for unique multisensory experiences (Figure 5).

This method is suggested to consist of 6 steps in application:

**Step 1. Deconstruction:** The product is conceptually deconstructed first into its sensory components, and then to other physical/perceptual components depending on the content and context, through brainstorming, mind-mapping etc. for analysis.

**Step 2. Identification:** The keywords/sensory adjectives are identified for each sensory component, through brainstorming etc., in order to be used for cross-sensory associations.

**Step 3. Placement:** The keywords/sensory adjectives are placed onto the multi-layered cylindrical model in order to be used for sense-based ideation.

**Step 4. Ideation and Representation:** The layers of keywords/sensory adjectives constituting the cylinder are turned to be matched for ideation. Each set of keywords/sensory adjectives is elaborated through the utilization of ideation and representation mediums in order to generate materialized forms of the set of layers.

**Step 5. Reconstruction:** The materialized forms of the layers of the cylinders of different components are cross-matched on a sensory basis to reconstruct the conceptual product, through 2D and 3D mediums.

**Step 6. Finalization:** The concept is finalized in 2D and 3D forms for further development.

During the application of the method, real-time sensory experiences might also be beneficial to be provided to enhance imagination and creativity by actual sensory stimuli (experienced form of the keywords/sensory adjectives identified in Step 2) to be transformed into a materialized form.

Following these steps, innumerable number of creative design ideas incorporating multisensory experiences might be generated and materialized. The focus on the cross-modal sensory associations might accelerate the speed of the design process as well.

5. Conclusion

Synesthesia helps understanding more elusive aspects of human thought and perception, e.g. metaphor and creativity. It offers a new territory and new mode of thinking in design research, with its potential abstract and concrete contributions to the field, as a cross-sensory approach in the design process, evoking imagination and creative design ideas. This covers all aspects of a product;
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Synesthetic Approach in the Design Process for Enhanced Creativity and Multisensory Experiences. aesthetic, functional, quality, and emotional. The further improvement of this approach might be beneficial for more creative, innovative, and effective design processes and more successful sensorial products. Design, by its nature, appeals to our senses, which makes any kind of interaction and experience with a product unique and subject to further interpretation. Through this, each step in the design process and each product incorporates the intersubjective narration of its designer as well as of its own to be perceived and interpreted by the user and stimulate various different sensations. This narration, built by the designer’s sensory associations, is to be grasped, decoded, and rebuilt by the user through his/her own senses, creating unique and individual meanings and emotions.

In this study, a 6-step synesthetic method is proposed in order to be applied in the initial phases of the design process, following a related literature research and inspirational examples. Even though the practical application of the proposed method is not in the scope of this study, experimenting it in practice is of great importance for further development. Along with the improvement of the method, generative tools should be developed and applied in a series of experimental projects to gain designers’ and users’ insights into the synesthetic approach. It is crucial to gain as many insights as possible, since the subject at issue is very subjective and a vast amount data is needed to formulate a theory over the intersection of synesthesia and design.

Considering the possible domains in design research to adopt a synesthetic approach and the potential contributions of its application as a multisensory method in practice, it is hoped that this study will initiate new discussions and inspire researchers to investigate this field of research further, with the aim of stimulating new challenges in design research.

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