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（博士課程）
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論 文 要 旨

THESIS SUMMARY

系・コース： Department of, Graduate major in	機械 エンジニアリングデザイン	系 コース	申請学位（専攻分野）： Academic Degree Requested	博士 Doctor of	（ 工学 ）
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要旨（英文 800 語程度）
Thesis Summary（approx.800 English Words ）

Creativity plays important role for innovative product design, since the generation of 'creative' ideas is a starting point that majorly affect the direction of the product (Majaro, 1991). A fundamental creative process is analogical thinking: the transfer of an idea from one domain to another domain in order to generate a novel solution (Hey, Linsey, Agogino, & Wood, 2008), e.g. biological examples are being used as external stimuli for facilitating creativity (Keshwani, Lenau, Ahmed-Kristensen, & Chakrabarti, 2017). On the other hand, studies in cognitive science suggested that primary cognitive process (e.g. dream, imagination and fantasy) are the origin of creativity (Kris, 2000). For this reason, we believe that we can utilize concepts from imaginary world as inspirational sources for creativity, as it would enable wider associative thinking, and allow novel analogy between elements.

In this dissertation, we proposed 'magic effects' as a new domain for source of inspirations. Our goal is to create a design tool to support novice designers to generate creative product ideas which provide pleasurable user experiences (UX). As we expected that not only 'impossible' aspect of magic effects would be applied to product ideas, but also the 'wonder experiences' aspects from magic would lead to the design of products which provide pleasurable experiences similar to what people experience when watching magic tricks e.g. enchantment, enjoyment, and excitement (Lamont, 2017). To create the tool, there are three main steps of development: general content, representation of the content, and the usage guideline of the tool.

First, we developed the content by reviewing seven taxonomies of magic effects as described by professional magicians from 1924 to present, and re-categorizing them into a set of 15 magic effects as the overview of magical phenomenon as seen by spectators. 30 participants were asked to generated product ideas and were provided with the sketch and description of magic effects set as inspirations. Their generated ideas were evaluated for design creativity and UX. The findings showed that when exposed to the magic effects set, their product ideas were significantly better in terms of flexibility and originality as compared to the control condition. But there was no significant difference in overall UX scores.

Second, we investigated representations of the magic effects set with three levels of proximity from the stimuli to the design task: magic tricks (far), magical products (near), and technical clues for magic effects (intermediate). We also investigated the effects of dynamic stimuli as compared to the standard static version of stimuli as they are factors that impact creativity (Vasconcelos & Crilly, 2016). In total, six variations of the tool were created: "Magic cards, Magic Video cards", "Product cards, Product Lenticular cards, Product video cards" and "Technical cards". These tools were experimentally evaluated in multiple design sessions with a total of 90 participants. Our main findings were, all versions of the tools led to significantly higher originality, but lower feasibility of ideas as compared to the control condition, in which 'Technical cards' (the magic effects set with technical clues) was the most effective option on creativity and UX of ideas.

Third, in order to develop a usage guideline of the cards for novice designers, six professional designers were invited. The verbal protocol analysis revealed that the cards support the designers focus on expected behavior of products. On the other hand, we found no correlation between design process to originality and feasibility. This suggested that quality of ideas depends mostly on the content of thinking, rather than the thinking process itself. Finally, a guideline on how to use the magic-based cards effectively was developed based on the approaches conducted by professional designers.

To conclude, in this dissertation we defined three key elements that affects creativity and UX in product design: analogical thinking, fantasy (magic effects) and proximity from the stimuli to the design task. We anticipated that our findings would contribute new knowledge in design research and that our developed tool would be useful both for educational purposes and real-world design purposes.

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