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# Synaesthetic-Translation Tool: Synaesthesia as an Interactive Material for Ideation

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**ABSTRACT**

While the subject of synaesthesia has inspired various practitioners and has been utilized as a design material in different formats, research has not so far presented a way to apply this captivating phenomenon as a source of design material in HCI. The purpose of this paper is to explore the translative property of synaesthesia and introduce a tangible way to use this intangible phenomenon

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**KEYWORDS**

Ideation Deck; Synaesthesia; Interaction Design; Provocation; Experience Translation; Mental Imagery

**Table 1: Example of different types of synaesthesia**

Grapheme → Colour  
 Time Unit → Colour  
 Sound → Colour  
 Smell → Shape  
 Personality → Colour  
 Touch → Colour  
 Sound → Touch  
 Vision → Taste  
 Taste → Colour  
 Personality → Smell  
 Taste → Sound  
 Smell → Touch  
 Sound → Kinetic  
 Vision → Temperature  
 Musical Note → Taste  
 Smell → Temperature  
 Temperature → Sound  
 Vision → Sound  
 Sound → Smell  
 Taste → Temperature  
 Grapheme → Texture  
 Music → Flavor  
 Smell → Colour  
 Voice → Colour  
 Shape → Sound  
 Colour → Taste

as an interactive design material source in HCI and design. This paper shares a card-based tool that enables practitioners to use the translative property of synaesthesia for the sake of ideation. It further introduces a potential area of where this tool may be utilized for exploring user experiences. This work has implications for the CHI community as it attempts to share a practical way of using the intangible property of synaesthesia to explore potential user experiences.

**1 INTRODUCTION**

Synaesthesia has long been a captivating source for a range of disciplines from psychology to fine art practice over the past 300 years [1, 2]. Its transcendental and intangible quality invites speculative thoughts and inspirations [1], yet research has not so far introduced a practical way of applying synaesthesia as a source of ideation material [3, 17]. This paper shares a way of using synaesthesia as an interactive design material that can provide a range of opportunities for ideations in design and HCI. By exploring different types of synaesthesia and its translative property, this research was able to create the synaesthetic-translation tool—a card-based ideation tool that enables people to use synaesthesia as a tangible interactive design material for exploring user experiences. This ideation tool facilitates playful ideas by providing unusual interactive possibilities. How can we use synaesthesia as a source of inspiration for exploring user experiences? Here we share an ideation deck that enables users to provoke ideas through the translative property of synaesthesia.

**2 SYNAESTHESIA****2.1 Synaesthesia as Inspiration Sources**

The word synaesthesia is derived from the Greek “syn”, which means union, and “aesthesia”, which means sensation; the two words together become synaesthesia, a “union of the sensation” [4]. The term is used to denote an unusual sensation and neurological condition, such as music that is not just heard but also tasted or even felt as a physical touch [5]. Table 1 shows examples of different types of synaesthesia—there are at least 88 different types of synaesthesia [6]. Synaesthetes can experience their particular photism in one of two ways: either as an associator synaesthete or a projector synaesthete. Associator synaesthetes are those who perceive their photism internally in their mind’s eye, whereas projector synaesthetes can see and screen their photism externally in the outside world as perceptual reality [7]. Many of these fascinating features and types of synaesthesia have inspired studies in different areas, including the field of music [2, 8], painting [9], disability studies [10], sensory substitution [11, 12] and memory associations [13]. However, the subject of synaesthesia has very few associations with design research and HCI [3], and we see there is something that practitioners and researchers could learn from synaesthesia that may help exploring user experience.

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**Figure 1: Translative property of synaesthesia—using grapheme colour synaesthesia as an example**



**Figure 2: Demonstrating the translative property of synaesthesia.**  
(<https://vimeo.com/263261003>)

## 2.2 Translative Property of Synaesthesia

One of the notable characteristics of synaesthesia is that it always translates one sensory experience to another sensory experience, regardless of the type of synaesthesia. This can be described as the translative property of synaesthesia. Fig. 1 shows grapheme-colour synaesthesia as the example of translative property where perception of numerals and letters is associated with the experience of colors—here, grapheme “A” induces an experience of the colour green. Fig. 2 is an artefact that enables people to experience tangibly the translative property of synaesthesia. The artefact imitates or mimics the translative property of synaesthesia by considering how weight and scale could be associated with each other. The tangible communications between the two can be observed through a transparent interface. The liquid between the two glass sheets immediately expands its surface according to the pressure it receives on the glass surface. The heavier the weight or pressure, the more the surface expands. This artefact was developed as an evocative object [14] to discuss and facilitate thoughts around the translative property of synaesthesia. The conversations around this property and artefact became inspirational sources for exploring research areas such as the idea of qualitative displays and interfaces [15] and data physicalisation [16]. In this context, we tried to find out whether there is any other palpable way to use this translative property of synaesthesia for the sake of ideation. What if odours can become a texture? What if pain can be translated into colours? What if personality can become a smell? How can these provoking elements be used for the ideation process through a tangible tool? We propose the synaesthetic-translation tool—an interactive ideation deck.

## 3 SYNAESTHETIC-TRANSLATION TOOL

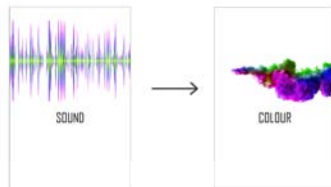
### 3.1 Developing the Tool

The synaesthetic-translation tool allows people to access and think through the translative property of synaesthesia. The tool was developed to create a tangible way to use translative property of synaesthesia for ideation process. To achieve this, we interviewed and collected stories from more than 50 different synaesthetes through the UK Synaesthesia Associations (UKSA) and synaesthesia mailing list. This process was to help us review and understand experiences of various types of synaesthesia in detail. Below are examples of articulated narratives by interviewed synaesthetes with three different types of synaesthesia.

- *Touch-smell synaesthesia*: “When the massage began, the base of my spine was suffused with a vibrant orange of Indian silk, and this sensation was accompanied by the smell of orange blossoms in a night time garden.”
- *Sound-shape synaesthesia*: “Occasionally, I listen to a certain type of music, and I caught a fleeting image of a glowing green ball inside a three-dimensional box made of gray smoke.”



**Figure 3: Synaesthetic-translation tool: initially developed 18 different cards—touch, vision, sound, speed, motion, weight, temperature, time units, colour, personalities, odours, taste, energy, graphemes, shape, anger, pain, and name.**



**Figure 4: Example of combination: sound to colour**

- *Lexical-gustatory synesthesia*: “Riding the underground is akin to travelling back in time, sampling once again all those wonderful flavours from childhood: Sherbet Flying Saucers, Milky Bars, Love Hearts, and Jam sandwiches. And long lost ones such as Aztec Bars, Opal Mints and Spaghetti Hoops.”

By valuing qualitative information from the synaesthetes, we learned that most synaesthesia embraces imaginary elements and scenes—like the three-dimensional box made of gray smoke. In order to articulate them as materials for ideation, a simple card-based tool was adopted to depict and deconstruct these imaginary elements. Fig. 3 is 18 different cards that depict these synaesthetic scenes, based on the collected stories from the synaesthetes. The 18 cards are not just depicting existing types of synaesthesia (Table 1). For example, concepts such as energy are not an existing form of synaesthesia; however, we used these elements in the cards as any form of synaesthesia related to the concept of vision could trigger the experience of seeing energy-like forms in their mind—like the fleeting image of a green glowing ball in one of the narratives.

This ideation deck was influenced by some previous works done by other researchers [18, 19, 20] in terms of deconstructing meanings and subjects, and creative decision making.

### 3.2 Using the Tool

The ideation deck can be used to explore potential user experiences by combining one card to another. For example, combining the sound card with the colour card (Fig. 4) means sound can be translated to colour or vice versa. Combining the pain card to the weight card means pain can become a form of weight. This interactive component of combining cards provides the opportunity to speculate on different potential user experiences. In total, the initial 18 cards allow users to conceive experience relevant concepts through 289 different combinations.

We have held 3 workshops—2 groups and 1 individual workshop—using two tasks in order to understand the usefulness of the ideation deck with a total of 10 participants. The tasks for the participants were as follows.

1. *Robot X*—Robot X does not have the ability to perform any function or to recognise anything. Provide any abilities to Robot X and create your own robot. Think about possible scenarios of how people could interact with this robot. You are free to create any kind of robot, so it could be something like a vacuum cleaning bot, scary bot, musician bot, security bot, dumb bot etc.
2. *Surprising Gift*—You are going to a friend’s upcoming birthday gathering. Design any gift or present that may surprise your friend. (You are free to choose any medium you want, so it could be something like a product, art, graphic, souvenir, toy, furniture, technology, performance, instrument, apps etc.)

Participants have created various ideas based on the given tasks using the ideation deck. These ideas include a lightly weighted ping-pong looking ball that creates a very loud sound, like a heavy



**Figure 5: Demonstrating a realised idea from a workshop—a prototype vending machine that dispenses a smell of ramen. (<https://vimeo.com/308564887>)**

object, when it is dropped—a participant combined the weight card and sound card in the second task; a robot that experiences pain instead of the patients—a participant combined the pain card and motion card in the first task; a machine that dispenses a smell of ramen (Japanese noodle) (Fig. 5), which is designed to recall a friend’s delightful memory in Japan—a participant combined the touch card and odour card in the second task.

## 4 RESULTS AND DISCUSSION

### 4.1 How Was It useful?

One of the agreed aspects by nine-tenths of the participants was that the cards provided all kinds of different possibilities to create unusual combinations that they would not normally conceive. Participants commented that the unexpected combinations allowed them to come up with playful ideas and unusual interaction methods—such as the ping-pong ball and the ramen machine. Although there were only 18 cards, the combining feature of the tool provided great interactivity and accessibility to the participants and made the workshops more engaging. Each card was also used as a metaphor to induce relevant ideas during the workshops.

### 4.2 Future Studies

The translative property of synaesthesia can potentially be explored further in relation to the subjects of data visualisation, sonification and sensory substitution, as they involve the study of the representation of data, phenomenon and experience.

The synaesthetic-translation deck can develop further cards—simply increasing the number of cards from 18 to 35 would provide more than 1000 different combinations, which would greatly facilitate the process of finding various interaction methods for potential user experience.

A workshop specifically related to toys could be held as the tool encouraged the generation of playful ideas through various unexpected combinations, and this would allow researchers and practitioners to better understand the relationship between unexpected elements and playfulness.

## 5 CONCLUSIONS

By exploring different types of synaesthesia and its translative property via communicating with different synaesthetes, this paper introduced a tangible way of using synaesthesia as inspirational sources for idea generation. The synaesthetic-translation tool is a simple yet rich ideation deck that helps to explore and understand various user experiences. While many disciplines have been inspired by intriguing characteristics of synaesthesia, there was no palpable way of applying synaesthesia as a source of inspirational material [3, 17]. Therefore, this qualitative study can be meaningful for those researchers and practitioners who are interested in potential applications of synaesthesia. Unlike other ideation decks [19, 20], the synaesthetic-translation tool specifically focuses on a particular aspect of human experience—synaesthesia—and attempts to use imaginaries to discover unusual interactive

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possibilities. Considering a large body of HCI research is related to user interactions, we think this type of ideation deck could support finding and designing novel interactions within the context of HCI. We wish to learn by sharing our interest in creativity, synaesthesia and user experience to the CHI community.

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