The Role of Awareness in Letter Identification for a Grapheme-color Synesthete

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What is synesthesia?

Synesthesia is a neurological condition that is characterized by individuals who experience specific kinds of stimuli in more than one sensory modality (Beeli, Esslen, & Jancke, 2007). Some synesthetes see letters and/or numbers as a specific color; others see colors when they hear music; some will taste sounds.

Cytowic (2002) states that five criteria must be met in order to be diagnosed with synesthesia:

- the experience is involuntary and automatic
- spatially extended
- consistent and generic
- memorable
- affect-laden

Introduction

This study tested a synesthete who sees letters and digits (graphemes) which happen to be associated with a particular color. This specific type of synesthesia is the most common form and is known as grapheme-color synesthesia, which is often experienced as color overlays that appear to be atop, or bound to, the visual presented graphemes (Smilek, Dixon, Cudahy, & Merikle, 2002).

The perceptual synesthetic colors are known as photisms. One controversial issue of grapheme-color synesthesia is the timing of photism induction. Exactly, how fast are synesthetic colors perceived? One theoretical viewpoint states that consciousness of a grapheme's identity may not always be necessary if specific time is available; in other words, photism induction comes before conscious awareness (Treisman, 2005). An opposing view supports the theory that photism induction does not happen before conscious awareness of the grapheme (Mattingley, Rich, Yelland, & Bradshaw, 2001).

Our experiment compares the timing of synesthetic perception and conscious awareness of graphemes in the periphery in a controlled time test and an untimed test. Results from studies by Smilek et al. (2002) and Ramachandran and Hubbard (2001) suggest that consciousness of the grapheme's shape is not always necessary for identification of the synesthetic color if ample time is provided.

Central Hypothesis

We hypothesize that a grapheme-color synesthete will be able to identify graphemes further in the periphery when given ample time through photism induction without conscious awareness of the graphemes' identities

Research Participant

A 16-year-old female grapheme-color synesthete (identified as participant Q) who attends high school in Massachusetts participated in this study. See Figure 1 to better understand the photisms she identifies with particular letters of the alphabet.

Methods

A case study involving a 16-year-old grapheme-color synesthete was presented a series of 20 separate letter trials.

A trial consisted of having the participant focus on a "+" placed on a computer screen. Then a black capital letter, horizontally aligned, was placed 12 inches out into the periphery.

In an untimed condition (10 trials), the participant was asked to identify the letter or name the color (photism). The letter would remain on the screen until a response was given.

If no identification could be made, the letter reappeared .75 inches closer to central vision. This was repeated until an accurate identification was given on consecutive trials.

In a timed condition (10 trials), the procedure was identical except for that the letters would only remain on the screen for 100 msec.

Bibliography and Recommended Readings

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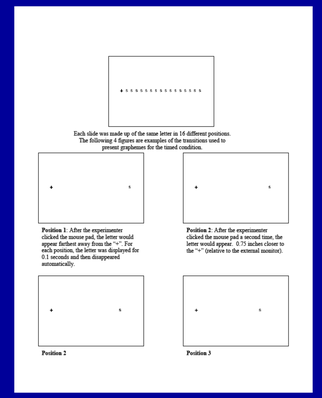
Figure 1



Results

It was hypothesized that participant Q would be able to identify graphemes further out into the periphery in the untimed condition better than the timed condition through a photism induction that could occur without conscious awareness of the graphemes' identities.

A correlated samples t-test comparing the distance that a correct identification of the grapheme could be made in both the timed (M = 7.88 inches) and untimed (M = 7.05 inches) trials was not found to be statistically significant, $t < 1$, $p > .05$.

Our prediction that the untimed condition would enable greater accuracy further into the periphery was not supported.

Discussion

Contrary to our prediction, this study supports the theory that photism induction does not happen prior to conscious awareness of the grapheme. Our results provide confirming evidence for those theories that emphasize that conscious awareness of the grapheme is a requirement for a synesthete to "see" its corresponding photism.

It should be mentioned that during the procedure, Participant Q made several qualitative statements that appeared to indicate that she had identified a photism prior to grapheme identification. However, this data is difficult to interpret since we can not rule out that the grapheme was actually seen.