Audiovisual association between consonants and colors in non-synesthetes

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Previous studies on synesthesia have suggested non-random association between sounds of linguistic units and colors (Asano & Yokosawa, 2011; 2012; Shin & Kim, 2014). The cross-modal association between speech sound and color has also been generalized to non-synesthetes based on results from color matching to auditorily presented vowels (Kim et al., VSS 2015; Mok et al., 2015; Moos et al., 2014). In the current study, we extended our previous work by examining the relationship between consonant sounds and colors. We employed 25 synthetic consonant-vowel (CV) sounds as stimuli generated by using Haskins laboratories articulatory synthesizer. In the stimulus set, the organ of constriction (lips, tongue tip, tongue body), constriction degree, glottal gestures, and velum gestures were parametrically manipulated with the vowel gesture fixed at its rest position. A total of 46 participants were tested with a modified version of the standardized color-matching procedure (Eagleman et al., 2007), in which they chose colors 6 times matching each auditorily presented CV sounds. No instruction was provided regarding the nature of the stimuli. The matched RGB values were converted into CIE xyY and Lab color coordinates for analysis. Despite the lack of participants' awareness of the consonantal nature of the auditory stimuli, CV sounds with the same glottal (e.g., /peh/, /teh/, /keh/) or the same velum (e.g., /me/, /ne/, /nge/) gestures tended to be associated with more similar colors than others indicated by closer distance on the CIE xyY color space. Furthermore, CV sounds sharing the glottal gestures synchronous with oral gestures were associated with more bluish colors whereas CV sounds sharing the velum gestures were associated with more yellowish colors than others, evidenced by a blue-yellow color axis (b*) of CIE Lab color space. These results suggest an intrinsic association between acoustic features of a subset of consonants and colors.