

Cross modal association between colours and vowels in a tone language

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Previous studies have shown that there is a strong association between certain vowels and colours in both synesthetic and non-synesthetic populations. For example, the open vowel /a/ is associated with red; the front vowel /i/ is associated with yellow or green. Moreover, studies also showed that high pitch sounds are associated with light colours while low pitch sounds are associated with dark colours. Nevertheless, the vowel-colour and pitch-colour associations were investigated separately. It is unclear whether vowel quality or pitch has a stronger effect on colour association. Our study investigates the cross-modal mapping between colour and both vowel quality and pitch using a tone language Cantonese in which pitch differences are intrinsically coded with vowel qualities. All possible combinations of seven Cantonese monophthongs (/i y ε œ a ɔ u/) with and without onset consonants and two lexical tones (T1 [55] and T4 [21]) produced by a female voice were used as the speech stimuli. 40 non-synesthetic native Cantonese speakers were asked to map the speech stimuli with the eleven basic colours as specified by Berlin and Kay (1969): red, yellow, green, blue, brown, purple, pink, orange, black, white and grey. Preliminary results from 10 speakers not only show similar associations identified by earlier studies (/a/ with red, /i/ with yellow/green), but also an association between rounded vowels and blue/grey. Furthermore, regardless of vowel quality, there is a tendency of vowels in a high tone to be associated with white and vowels in a low tone to be associated with black/dark colours. The effects of pitch seem to be more robust than vowel quality. These observed patterns are more pronounced for vowels with no onset consonants. Our results suggest that the cross-modal mapping between colour and speech sound is affected by linguistic factors. In addition to Cantonese speakers, extra data from 30 non-synesthetic native Mandarin speakers are being collected to see if these preliminary results can be extended to other tone-language speakers in general.

Berlin, B. & Kay, P. (1969). *Basic Color Terms: Their Universality and Evolution*. Berkeley: University of California Press.