Augmenting Basic Colour Terms in English

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We are able to see millions of different colours, for practical purposes and everyday communication however we tend to organize them into a smaller set of colour categories and give them simple names such as red or light blue. Colour names are used to signify regions of colour space with empirical significance, and have been found to play an important role in long-term memory and to enhance recognition (Davidoff 1991, Gegenfurtner & Rieger 2000). Colour naming research is an interdisciplinary area that brings colour science together with psychology, anthropology, neurobiology, semiotics, linguistics and computer science.

Most languages have an indefinitely large number of names to describe colours. Like all words, they are subject to fashion and can change their meanings over time. Yet there always exists a small number of basic colour terms that are learned in early childhood and remain constant throughout life. This paper explores quantitatively the notion of basicness, using a large pool of data from an online multilingual colour naming experiment (Mylonas & MacDonald 2010). The data have been analysed in terms of frequency of word usage, gender differences in frequency, consistency of responses, response time, volume of colour space, and inter-experimental agreement.

In this study, *lilac* and *turquoise* occupied the 12th and 13th index positions of most frequent monolexical colour terms, after the classical basic colour terms of Berlin and Kay (1969/1999) in English. The separation from the last ranked basic terms; *grey, black* and *orange* was not significant, but there was a much larger difference from the following non-basic term *magenta.* In terms of frequency *turquoise* was ranked 7th while *lilac* was ranked 9th, whereas in terms of speed of responses, *lilac* was ranked 18th and *turquoise* 30th. Analysis of the different spellings of *turquoise* revealed that a large number of observers had difficulties to spell it correctly. *Lilac* was the 4th most consistent colour term in our data while *turquoise* 10th. In the Munsell Renotation Dataset situated in the sRGB gamut, *lilac* and *turquoise* covered the 13th and 11th largest volumes respectively; similar to the Radial sampling of the OSA space, where *lilac* had the 11th and *turquoise* 10th largest volumes. Consensus was expressed as the inter-experimental agreement between two online experiments (Moroney 2003), and *lilac* was positioned in the 13th and *turquoise* in the 15th using the CIEDE2000 formula, while for hue angle differences (Δh) *lilac* was found in the 10th and *turquoise* in the 15th position. Comparing frequency of occurrence between genders *lilac* was the 5th most frequent for females and 17th for males while *turquoise* was the 8th most frequent term for females and 9th for males.

All measures exhibited a similar pattern of no advantage of the opponent basic colour terms of Herring (1892/1964) over derived basic terms (Kay & McDaniel 1978). The question remains open whether colour categories are formed under the influence of some perceptual mechanisms on language, or whether language influences thought and cognitive processes.

Our aim is to augment the number of words accepted as basic colour terms in English. This would be useful for improving the precision of colour naming in colorimetric colour spaces for applications ranging from online catalogue shopping to artificial intelligence. Our future plans include the extension of the research into multiple languages, comparing the responses of observers in many cultures.

References

Berlin, B., & Kay, P. (1969/1999). *Basic Color Terms: Their Universality and Evolution (David Hume Series)*. Berkeley, CA: Cambridge University Press.

Davidoff, J. (1991). *Cognition Through Color*. MIT Press.

Gegenfurtner, K., & Rieger, J. (2000). Sensory and cognitive contributions of color to the recognition of natural scenes. *Current Biology*, *10*(13), 805–808.

Hering, Edward (1892). Outlines of a theory of light sense. Translated from German by Leo Hurvich and Dorothea Jameson (1964). Cambndge: Harvard University Press.

Kay, P., & McDaniel, C. K. (1978). The Linguistic Significance of the Meanings of Basic Color Terms. *Language*, *54*(3), 610–646. doi:10.2307/412789

Moroney, N. (2003). Unconstrained web-based color naming experiment. *Color Imaging VIII: Processing, Hardcopy, and Applications. Proc. SPIE*, *5008*, 36–46.

Mylonas, Dimitris, and Lindsay W. MacDonald. (2010). Online Colour Naming Experiment Using Munsell Colour Samples. *Proceedings of the 4th European Conference on Colour in Graphics, Imaging and Vision (CGIV)*, 27–32.