

Modelling colour-naming space with fuzzy sets

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Anthropological and linguistic approaches have proposed a limited set of eleven universal colour categories (names) which are present in most evolved languages. In this work we present a mathematical formulation of fuzzy sets to model the colour-name assignment task. In our model, the CIE Lab colour space is divided into eleven basic categories with a Triple Sigmoid used as the basis of fuzzy sets. The overall position of the categories was first approximated by fitting the proposed model to previous psychophysical data using an iterative gradient method. To further adjust the parameters of the model, psychophysical stimuli were created (in the CIE Lab space) from pairs of isoluminant colours belonging to different neighbouring categories and the colours in between. These were presented on a calibrated CRT monitor (14-bit x 3 precision) and observers indicated whether the colours belong to a given category or another one in a Yes/No discrimination paradigm. Our results show that this modeling technique, adjusted to psychophysical data, can provide a working model for segmentation of the colour space into naming categories.

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