The Relationship Between Categorical Colour Perception and Shift Towards Prototype

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Discrimination among stimuli is affected by systematic biases in detecting the precise properties of stimuli. These biases include: central tendency (Hollingworth, 1910); shift towards prototype (STP; Huttenlocher et al., 2000); and category truncation (Huttenlocher, 2007). These biases could underlie perceptual warping (Harnad, 1987) evidenced in categorical perception (CP): better discrimination of stimuli from different categories than stimuli from the same category. However, Pilling et al., (2003), using a same-different discrimination task, found clear evidence of both central tendency and categorical perception, but argued that the two were independent. Here, based on reanalysis of Özgen and Davies's learning experiments and a matching to sample memory task, we report evidence that STP could be the basis of newly learned CP. In Experiment 1, subjects practised a successive same-different task on stimuli differing in hue or lightness, where the average of the stimuli and the category prototype(s) coincided. There was clear evidence of bias towards the coincident point. In subsequent experiments, subjects learned to divide either blue or green into two new categories, with the new boundary at the category prototype. After training, in discrimination tests using a successive same-different task, the average of the test stimuli again coincided with the blue or green prototype, and untrained subjects showed the same bias towards the centre as in Experiment 1. Trained subjects showed enhanced discrimination across the new boundary (CP), but also showed bias in the opposite direction from the test-stimuli average. This change in direction of bias could be due to bias towards newly abstracted prototypes. In the matching-to-sample task, stimuli ranged from yellow to purple with the average at the blue-green boundary. Judgements showed both a bias towards prototypes, and a bias towards the centre of the test range. The relationship among the various perceptual biases and CP will be discussed.