Title
Rewiring color categories: The neural consequences of language contact

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Abstract
Through a combination of fieldwork, computational modeling, behavioral and neurophysiological (EEG) experimentation, we establish a neural precursor of the acquisition of lexical color categories.
The first study reports our field research on the color systems of Galician and Spanish, two geographically contiguous and historically related languages. Our aim here was to explore similarities and differences in the way speakers of these languages set boundaries between color categories in the green-yellow-brown and blue ranges. We provide preliminary evidence that regional color meanings can co-exist in neighboring and connected populations. In a series of computer simulations and laboratory experiments, we recreated a minimal language contact scenario, in which speakers of different languages, with possibly different color systems, must coordinate and communicate by means of basic color terms used as signals.
In the second study, participants learned during two consecutive days an artificial color system by playing as receivers in a signaling game with a computer. In a series of computer simulations, we show that the artificial color system is learnable by agents endowed with minimal cognition and limited memory. The stimuli consisted of an array of 5 Munsell colors that varied along the *hue* dimension from brown to green, with the most ambiguous color occupying the *middle* position in the array. At the end of day two, the EEG was recorded while participants were shown color-term (CT) and term-color (TC) stimulus sequences that were either learned, as part of the artificial color system, or incongruent. We found similar evoked responses to color terms in CT sequences and to colors in TC sequences, with larger late negative ERPs in incongruent than in learned trials. This EEG evidence for category-level color representations was supported by two independent color discrimination studies. ERP effects were largest for the more ambiguous colors, suggesting the strongest neural changes in the brain occur at the boundary of two color categories.
The second experiment was identical to the first, with the exception that color stimuli were different. Here, the five colors varied in *lightness* within the blue hue with an ambiguous blue/black color as the *terminal* color in the array. We obtained larger late negative ERPs, very similar to those observed in the first experiment, in incongruent than in learned trials in CT sequences for the most ambiguous color in the array. Our results indicate that these ERP effects may reflect the effort of rewiring the native color categorization of participants into the artificial color system they have learned.

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