

Shaping Colours: How Cursive Letterforms Influence Grapheme-Colour Associations in Russian Speakers

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A consistent finding in the grapheme-colour synesthesia literature is that in both synaesthetes and in non-synaesthetes (when forced to choose colours for letters), *similarly shaped letters tend to evoke similar colours*. This research has focused exclusively on print letters, but during the developmental window in which synaesthetic associations are known to stabilise, Russian children *read* print letters, but learn to *write* exclusively in cursive. This asymmetry offers a unique opportunity to explore the effect of sensorimotor versus visual influences on grapheme-colour associations. In the present study, we test whether synaesthetic colour associations for Russian letters are influenced more strongly by shape features of their cursive versus print letterforms.

We tested two predictions about the influence of letter shape on synaesthetic colour in Russian. First, we predicted that visual features of cursive letterforms would influence synaesthetic colour associations even after controlling for visual features of print letterforms. Second, we predicted that synaesthetes, whose associations “lock in” during childhood (when writing in cursive is common), would show a stronger influence of cursive letterforms than non-synaesthetes. Russian speakers (N = 111; 61 synaesthetes) selected colours for each letter of the Russian alphabet using a CIELuv colour picker. Visual similarity for print and for cursive letterforms was measured using a neural network model of vision that was previously shown to predict human similarity judgements. Colour similarity was determined by comparing the colours chosen for each letter using a colourpicker.

Our results support both hypotheses: visual features of cursive letterforms influence synesthetic colour associations (even after controlling for visual features of print letterforms), and this effect is stronger in synesthetes than in non-synesthetes. Taken together, our results are consistent with a multistage, multimodal model in which visual, conceptual, and motoric representations interact during letter processing. In particular, the finding that cursive writing — an embodied motor activity — shapes grapheme colour associations underscores the potential importance of early handwriting practices in reading acquisition. More broadly, the results highlight cultural and developmental aspects of synaesthesia: the letterforms synaesthetes learned as children are reflected in their inner perceptual worlds in adulthood.