Quantifying sound-graphic systematicity and application on multiple phonographs

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Abstract

Do letter-shapes predict in any way the canonical sounds they represent? Does the letter a in any sense visually predict its canonical pronunciation //? We extended existing quantitative approaches to measuring systematicity between phonology and semantics. We quantified all pairwise visual distances between letters, using Hausdorff distance. We took the corresponding canonical pronunciations of the letters and quantified all pairwise distances between their feature-level representations, using edit distance and Euclidean distance. We defined letter-sound systematicity as a correlation between these two lists of distances. We confirmed Korean as the gold standard for letter-sound systematicity; it was designed in the 15C to have exactly this characteristic. We found small but significant correlations in Arabic, Cyrillic, English, Finnish, Greek and Hebrew orthographies, with Courier New giving the most consistent correlations. Pitmans English shorthand and the Shavian shorthand alphabet also showed robust systematicity, and baseline fictitious orthographies showed no systematicity, validating our approach.