

A Zipfian effect in heraldry?

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George K. Zipf's name is linked to two phenomena: the power law distribution of word frequencies («Zipf's law»), and the correlation that he observed between word length and word frequencies - that we call «Zipf's correlation» (Zipf, 1949). This correlation has recently been refined by Piantadosi and colleagues (2006), showing that the relationship between a word's frequency and its length is mediated through its informativeness. The current research is conceived as an attempt to document a graphic equivalent of Zipf's correlation for heraldic motifs (the specific figurative or abstract figures composing coats of arms), which have been extensively documented by several authors throughout Europe, from the Middle Ages on. One reason to expect such a correlation is that an image's graphic complexity is similar in certain respects to a word's length: more complex images take longer to process and contain more information. Following Zipf's correlation, are, in our case, popular images simpler?

Graphic complexity is operationalized in two ways, similarly to Tamariz & Kirby (2015), with both algorithmic and perimetric measures of complexity, and applied to a standardized collection of thousands of drawings, all from the same hand. In doing so, we import experimental methods and apply them to historical materials. Algorithmic (descriptive) complexity is the smallest possible file size for a given image. Perimetric complexity is a ratio of inked surface and perimetric length, and has been shown to correlate with ease of processing (Pelli et al., 2006). Our frequency data -the number of coats of arms a given motif appears on- comes from two corpuses. The first one was constituted by us from secondary sources (mainly Renesse, 1894) and a second one based on Clemensen (2017), covering respectively 462 motifs and 344 motifs. While simpler motifs were to some extent more frequent in the Clemensen dataset, we observed a correlation in the opposite direction (more frequent motifs were also more complex) in our other dataset.

References

- Clemmensen, S. (2017) *Armorial.dk: A Medieval Armorial Database*. <http://www.armorial.dk/>, accessed March 14, 2017.
- Pelli, D. G., Burns, C. W., Farell, B., & Moore-Page, D. C. (2006). Feature detection and letter identification. *Vision Research*, 46(28), 4646–4674.
- Piantadosi, Steven T., Harry Tily, and Edward Gibson (2011)'Word Lengths Are Optimized for Efficient Communication', *Proceedings of the National Academy of Sciences*, 108, 3526–29.
- Renesse, T. de (1894) *Dictionnaire Des Figures Héraldiques*. Bruxelles: Oscar Schepens.
- Tamariz, M., & Kirby, S. (2015). Culture: copying, compression, and conventionality. *Cognitive science*, 39(1), 171-183.
- Zipf, G. K. (1949). *Human behavior and the principle of least effort: An introduction to human ecology*.