Sound symbolic interactions of cuteness and size in German long vowels

Dominic Schmitz
Heinrich Heine University Düsseldorf, Germany

When certain sounds combined with further sensory information become meaningful, one speaks of sound symbolism. One of the most well-researched types of sound symbolism is "size sound symbolism": Some speech sounds, e.g. /i/, are associated with smallness, while other speech sounds, e.g. /a/, are associated with bigness [1, 2]. While there is a rather large body of research concerned with size sound symbolism itself, there is lack of research connecting size to other dimensions of the visual domain. The present study aims to deliver first results to fill this research gap.

While the dimension of size was investigated in a multitude of studies on sound symbolism during the last decades [3, 4], another visual dimension was rarely considered: cuteness. Cuteness can be understood as a more complex form of simple geometric shape, as was investigated in previous research [5, 6]. Cuteness, especially from its biological perspective as comprised in the so-called "baby schema" [7], is a fundamental feature of human perception and correlates, among other things, with size [8]. Research on Japanese has shown that cuteness is also found as sensory information to be combined with speech sounds [9].

Taking into account both size and cuteness, the present study aimed at establishing a relation from "small" to "big" and from "not cute" to "cute" for long vowels of Standard German (i.e. /aː, ɛː, eː, iː, oː, øː, uː, yː/), providing further insight into the multimodal nature of sound symbolism.

Two online forced-choice tasks (pilot study with 21 participants; main study with 80 participants) were conducted using OpenSesame [10]. Disyllabic pseudowords were used as auditory stimuli, controlling for potentially confounding lexical [11] and contextual [12, 13] effects. In either syllable, stimuli's nuclei consisted of one of the vowels under investigation. The simplex onsets of the open syllables consisted of one consonant, i.e. /d, f, j, k/ or /r/. In total, 96 pseudowords were used, i.e. 12 per vowel. Images of phantasy creatures [14] were used as visual stimuli. In each trial, participants were shown five differently sized versions of a randomly chosen creature. The participants' task was to decide which image version matched the audio stimulus of a trial best. As cuteness judgements likely differ by participants, afterwards participants were again shown all creature images to judge them for their cuteness on a five point scale.

The size response then entered a generalised additive mixed model regression analysis as dependent variable. Cuteness judgments, vowel, onset consonant types and phonological neighbourhood density were introduced as independent variables, while participant ID and age were included as random effects. Overall, /aː/ was found to be bigger than all other vowels, while /iː, yː/ were found to be smallest. Cuteness judgements did not show a significant effect on their own. However, having vowel quality and cuteness judgements interact, it was found that the size of the open vowel /aː/ increased with cuteness, while the size of the close vowels /iː, yː/ further decreased. Results were consistent across both the pilot and the main study.

The present findings demonstrate that cuteness modifies the effect of size sound symbolism. With increasing cuteness, the vowel considered to be biggest is judged to be even bigger, while the vowels considered to be smallest are judged to be even smaller. It appears that sound symbolistic effects manifest in an intricate interaction when multiple visual dimensions are considered. The present findings contribute to the growing body of evidence for and the nature of sound symbolism and call for the incorporation of multiple dimensions into analyses.

References

[1] Tarte, R. D. (1982). The relationship between monosyllables and pure tones: An investigation of phonetic symbolism. *Journal of Verbal Learning and Verbal Behavior*. Academic Press 21(3). 352–360. https://doi.org/10.1016/S0022-5371.

[2] Knoeferle, K., Li, J., Maggioni, E., & Spence, C. (2017). What drives sound symbolism? Different acoustic cues underlie sound-size and sound-shape mappings. *Scientific Reports*. Springer US 7(1). 5562. https://doi.org/10.1038/s41598-017-05965-y.

[3] Berlin, B. (1995). Evidence for pervasive synesthetic sound symbolism in ethnozoological nomenclature. *Sound Symbolism*. Cambridge University Press 76–93. https://doi.org/10.1017/CBO9780511751806.006.

[4] Blasi, D. E., Wichmann, S., Hammarström, H., Stadler, P.F., & Christiansen, M. H. (2016). Sound-meaning association biases evidenced across thousands of languages. *Proceedings of the National Academy of Sciences of the United States of America*. National Academy of Sciences 113(39). 10818–10823. https://doi.org/10.1073/PNAS.1605782113.

[5] Westbury, C., Hollis, G., Sidhu, D. M., & Pexman, P. M. (2018). Weighing up the evidence for sound symbolism: Distributional properties predict cue strength. *Journal of Memory and Language*. Academic Press 99. 122–150. https://doi.org/10.1016/J.JML.2017.09.006.

[6] Bremner, A. J., Caparos, S., Davidoff, J., de Fockert, J., Linnell, K. J., & Spence, C. (2013). "Bouba" and "Kiki" in Namibia? A remote culture make similar shape–sound matches, but different shape–taste matches to Westerners. *Cognition*. Elsevier 126(2). 165–172. https://doi.org/10.1016/J.COGNITION.2012.09.007.

[7] Lehmann, V., Huis in't Veld, E. M. J., & Vingerhoets, A. J.J.M.. (2013). The human and animal baby schema effect: Correlates of individual differences. *Behavioural Processes*. Elsevier 94. 99–108. https://doi.org/10.1016/j.beproc.2013.01.001.

[8] Kringelbach, M. L., Stark, E. A., Catherine, A., Bornstein, M. H., & Stein, A. (2016). On Cuteness: Unlocking the Parental Brain and Beyond. *Trends in Cognitive Sciences* 20(7). 545–558. https://doi.org/10.1016/j.tics.2016.05.003.

[9] Kumagai, G. (2019). A sound-symbolic alternation to express cuteness and the orthographic Lyman's Law in Japanese. *Journal of Japanese Linguistics*. Walter de Gruyter GmbH 35(1). 39–74. https://doi.org/10.1515/JJL-2019-2004.

[10] Mathôt, S., Schreij, D., & Theeuwes, J. (2012). OpenSesame: An open-source, graphical experiment builder for the social sciences. *Behavior Research Methods*. Springer 44(2). 314–324. https://doi.org/10.3758/s13428-011-0168-7.

[11] Caselli, N. K., Caselli, M. K. & Cohen-Goldberg, A. M. (2016). Inflected words in production: Evidence for a morphologically rich lexicon. *Quarterly Journal of Experimental Psychology* 69(3). 432–454. https://doi.org/10.1080/17470218.2015.1054847.

[12] Klatt, D. H. (1976). Linguistic uses of segmental duration in English: Acoustic and perceptual evidence. *The Journal of the Acoustical Society of America* 59(5). 1208. https://doi.org/10.1121/1.380986.

[13] Wightman, C. W., Shattuck-Hufnagel, S., Ostendorf, M., & Price, P. J. (1992). Segmental durations in the cicinity of prosodic phrase boundaries. *Journal of the Acoustical Society of America* 91(3). 1707–1717. https://doi.org/10.1121/1.402450.

[14] van de Vijver, R., & Baer-Henney, D. (2014). Developing biases. *Frontiers in Psychology* 5. https://doi.org/10.3389/fpsyg.2014.00634.