TRIANGULATING SOUND SYMBOLISM: WHERE TO FIND IT AND HOW TO CREATE IT

Niklas Johansson*

*Corresponding Author: niklas.johansson@ling.lu.se
Centre for Languages and Literature, Lund University, Lund, Sweden

Sound symbolism is a universal component of language (Samarin 1978; Blasi et al. 2016), but it can also adapt to language-specific constraints such as phoneme inventories, since different languages often use various, albeit phonetically similar, types of sounds for the same sound symbolic association. It is thus natural to investigate the phenomenon from a bottom-up perspective without any initial assumptions other than that it is a universal, non-arbitrary and flexible association between sound and meaning. However, most previous cross-linguistic studies have been small in scope, and larger-scale studies (Wichmann et al. 2010; Blasi et al. 2016) have not captured many phonetic distinctions important for sound symbolism, e.g. voicing (Ohala 1994; Johansson 2017). Furthermore, experiments have usually focused on matching ready-made sound symbolic words to different stimuli (cf. Ramachandran & Hubbard 2001), rather than investigating how sound symbolic associations develop among language users. The present study attempts to amend these issues by focusing on how sound symbolism operates through a more thorough examination of the phonetic and semantic features involved, both cross-linguistically and experimentally.

First, 344 concepts with claimed universal tendencies (e.g. Swadesh 1971; Goddard and Wierzbicka 2002) were investigated in 245 language families and the phonemes of the linguistic forms were systematically grouped according to phonetically salient parameters to pinpoint the features responsible for each sound symbolic association. 178 statistically significant sound-meaning associations were found based on the standard scores calculated for the occurrence of each sound group in each concept, and their occurrence in all of six geographical macro-areas. In addition, these associations could in turn be correlated with at least 45 out of the 100 items of the regular Swadesh-list (Swadesh 1971), raising several questions about the validity of the list as a tool for establishing genetic relationships. Secondly, 42 macro-concepts were

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identified based on cooccurring shared semantic and phonetic features between the significant concepts. Most of these had basic descriptive functions (HARD, SMALL, DARK, UNEVEN, etc.), but also included deictic distinctions and kinship attributes. Furthermore, all identified macro-concepts were found to be grounded in one or several of four types of sound symbolism (cf. Dingemanse 2011; Carling & Johansson 2015): (a) in unimodal imitation, or *onomatopoeia*, based on auditory similarity; (b) in a more indirect and cross-modal type of imitation which is grounded in similarities between the referent and *vocal gestures*, in which the accompanying sounds are only secondarily associated with the meaning (e.g. ROUND and labial sounds which have visually round shapes); (c) in the *frequency code* (Ohala 1994), in which resemblance is based on relation with both indexical and iconic grounds; or in (d) an even weaker type of sound symbolism, based on pure circumstantial, indexical associations, e.g. the association between MOTHER, MILK, BREAST etc. and nasals, since those are the only sounds that infants are able to produce whilst breastfeeding.

Thirdly, four of the confirmed sound symbolic concepts were further investigated through iterated learning experiments (Kirby et al. 2015). Naïve participants were divided into five condition groups which contained ten chains of 15 participants each. They either received no information about the meaning of the word they were about to hear, or that it meant BIG, SMALL, ROUND or POINTY, which created a meaning-bias. The first participant in each chain was then audially presented with a phonetically diverse word and asked to repeat it. Thereafter, the recording of the repeated word was played for the next participant in the same chain. Significant increases of high frequency sounds and sounds produced using the hard palate in the SMALL- and POINTY-conditions, and labial and low frequency in the ROUND-condition, were found after 15 generations. These results further revealed that the continuous SIZE-domain was associated with pitch, while the dichotomous SHAPE-domain was associated with the use of separate tactile and visual vocal gestures.

These findings show considerable cross-linguistic sound symbolic effects on basic vocabulary regardless of language family, and that sound symbolism evidently still is an active part of language. They also illustrate how sound symbolism is based in the human perception of the body and its interaction with the surrounding world which is associated through several types of iconicity with different degrees of directness. Thus, it is likely that sound symbolism has originated as a bootstrapping mechanism (Imai & Kita 2014) and could have had an even more crucial communicative role in earlier stages of human language.

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