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Sound symbolism facilitates early verb learning

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ABSTRACT

Some words are sound-symbolic in that they involve a non-arbitrary relationship between sound and meaning. Here, we report that 25-month-old children are sensitive to cross-linguistically valid sound-symbolic matches in the domain of action and that this sound symbolism facilitates verb learning in young children. We constructed a set of novel sound-symbolic verbs whose sounds were judged to match certain actions better than others, as confirmed by adult Japanese- as well as English speakers, and by 2- and 3-year-old Japanese-speaking children. These sound-symbolic verbs, together with other novel non-sound-symbolic verbs, were used in a verb learning task with 3-year-old Japanese children. In line with the previous literature, 3-year-olds could not generalize the meaning of novel non-sound-symbolic verbs on the basis of the sameness of action. However, 3-year-olds could correctly generalize the meaning of novel sound-symbolic verbs. These results suggest that iconic scaffolding by means of sound symbolism plays an important role in early verb learning.

1. Introduction

Since the time of Saussure, the arbitrary relationship between the sound of a word and its meaning has been held as an important principle of language (e.g., de Saussure, 1916/1983; Newmeyer, 1993). In mainstream linguistics, sound symbolism, in which the sound and meaning of words are systematically related, is considered to be a marginal phenomenon in language. For example, Newmeyer (1993) says that "the number of pictorial, imitative, or onomatopoetic non-derived words in any language is vanishingly small (p. 758)".

Such a statement, however, turns out to be too strong when one looks beyond Indo-European languages. Many languages of the world have a large grammatically defined word class in which sound symbolism is clear. For example, in Japanese, mimetics (*giongo/gitaigo*) include not only onomatopoeias for animal sounds (such as *nyaa* for cats) but also words referring to events and states in which sound is not essential. Sound symbolism in mimetics in Japanese can be illustrated in the words referring to motion events shown in Table 1. The combination of 'g'/'k' and 'r' often represents rotation as seen in (a)–(d). The voiced initial consonant is associated with larger mass and the voiceless initial consonant is associated with smaller mass, as seen in (a)–(f). Any of the forms in (a)–(f) can be reduplicated to indicate that the event took place repeatedly, as illustrated in (g). (See Hamano, 1998; Kita, 1997; Kita, 2001, for more detailed accounts, including description of the grammatical properties which characterize this class.) In Japanese, mimetics can also refer to tactile, visual, and emotional experiences: e.g., *nurunuru* 'being slimy', *pika* 'a flash of light', and *sowasowa* 'being restless'. Mimetics constitute a large open class of words, and new words can be easily created: one mid-sized dictionary of mimetics lists 1700 entries (Atoda & Hoshino, 1995). These words are frequently used

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Table 1
Sound symbolism in Japanese mimetics

Mimetics	Meaning
(a) goro	'a heavy object rolling'
(b) koro	'a light object rolling'
(c) guru	'a heavy object rotating around an axis'
(d) kuru	'a light object rotating around an axis'
(e) bota	'think/much liquid hitting a solid surface'
(f) pota	'thin/little liquid hitting a solid surface'
(g) potapota	'thin/little liquid hitting a solid surface repeatedly'

in everyday conversation and newspaper articles, as well as in various forms of verbal arts from comic books to novels and poems.

Japanese is by no means an exception among languages of the world. Many languages of the world have a similar grammatical class of words with clear sound symbolism (for an overview, see Hinton, Nichols, & Ohala, 1994; Nuckrolls, 1999; Voeltz & Kilian-Hatz, 2001), including most sub-Saharan African languages (called "ideophones"; see Childs, 1994, for a review), and many of the South East Asian languages (called "expressives"; Diffloth, 1972; Diffloth, 1979; Enfield, 2005; Watson, 2001) and East Asian languages (for Korean see Lee, 1992; for Chinese dialects, see Bodomo, 2006; Mok, 2001). Sound-symbolic word classes are also found in some (non-Indo-European) languages in southern India (Emeneau, 1969), Australian Aboriginal languages (Alpher, 1994; McGregor, 2001; Schultze-Berndt, 2001), and indigenous languages in South America (Nuckolls, 1996). In Europe, Basque (Ibaretxe Antñano, 2006) as well as Finish and Estonian (Mikone, 2001) (all non-Indo-European languages) have an extensive sound-symbolic word class. Similar to Japanese mimetics, sound-symbolic words in these languages also express information from various perceptual modalities and affective states, as well as the temporal structure of events (see, e.g., Childs, 1994; Ibaretxe Antñano, 2006; Mikone, 2001; Nuckrolls, 1999).

Thus, although ideophones or mimetics as a large grammatically defined word class are "conspicuously absent" (Nuckrolls, 1999) in Indo-European languages, they are not at all rare in languages of the world. The words in these classes refer to concepts that are similar to Japanese mimetics. Furthermore, in these languages, sound-symbolic words are not limited to whimsical use to and by children. They are indispensable in adult language, especially in oral expression, but also in written language such as in novels and poetry.

Even in Indo-European languages such as English, there is clear sound symbolism in words such as *squeeze*, *squirt*, *squint*, *bump*, *thump*, and *plump* (e.g., Firth, 1935/1957), though such words do not form a distinct grammatically defined class. Systematic relations between certain phonemes and meanings have also been pointed out. For example, roughly half of the common English words starting with '*gl-*' imply something visual, as in *glance*, *glare*, *gleam*, and *glimmer* (Bloomfield, 1933/1984; Bolinger, 1950). Thus, the literature suggests that the principle of arbitrary relationship between the sound of a word and its meaning is not as absolute as Saussure had proposed.

1.1. Psychological evidence for sound symbolism

Starting with Köhler (1929), there has been a body of empirical work which demonstrates the psychological reality of sound symbolism. Köhler found that when presented with a curvy round shape and a spiky angular shape, one has the intuition that *baluma* is a better name for the former and *takete* is a better name for the latter (see also Ramachandran & Hubbard, 2001; Westbury, 2004). Sapir (1929) also demonstrated that English speakers associate novel words containing the vowel /i/ with smallness more frequently than words containing /a/. This phenomenon has been described as magnitude sound symbolism.

More recently, empirical evidence for sound symbolism has been extended in two important directions. Maurer, Pathman, and Mondloch (2006) replicated Köhler's (1929) findings with 2.5-year-old English-speaking children and demonstrated that children as young as 2.5-years-old are sensitive to sound symbolism in matching novel words and novel shapes. Specifically, in a forced-choice task in which 2.5-year-olds were asked to select the object (out of two) that was referred to by a novel word, the children matched rounder shapes to words containing the vowels [ah] or [u] (e.g., *bamu*) and pointed shapes to words containing the vowels [i], [ej], or [^] (e.g., *kuh-tay*), just as adults did in Köhler's experiment. Westbury (2004) extended Köhler's findings using implicit interference in a lexical decision task, using English-speaking adults. He visually presented non-words containing either stop consonants (e.g., 'kide') or continuants (e.g., 'lole') inside a spiky shape or curvy shape. The participants were slower to reject non-words when there was a sound-symbolic match between the non-word and the figure in which it appeared (i.e., non-words with stop consonants in a spiky figure, and non-words with continuants in a curvy figure). In other words, the sound-symbolic match made the non-words look more like real words. These studies thus indicate that sound-symbolic matching between the sound of a word and its meaning (shape) occurs on-line and automatically, and that the sensitivity to matches between sound and shape is found early in childhood.

1.2. Universality of sound symbolism

There is also evidence that certain aspects of sound symbolism are universal. The magnitude sound symbolism mentioned above was also found in Chinese and Thai speakers (Huang, Pratoomraj, & Johnson, 1969). Köhler's (1929) sound symbolism for curvy round shapes vs. spiky angular shapes was found in speakers of Kitongwe in their middle to late childhood (aged 8- to 14-year-old) living in a remote part of Tanzania, who had little contact with Europeans (Davis, 1961). It has also been shown that people can correctly match antonym pairs such as *good–bad, strong–weak,* and *fast–slow* in foreign languages they do not know to the semantically equivalent pairs of words in their native language, using the sounds of the words alone to guess the meaning (e.g., Brown, Black, & Horowitz, 1955; Klank, Huang, & Johnson, 1971).