

## Size Sound Symbolism in Mothers' Speech to their Infants.

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**Keywords:** sound symbolism, infant-directed speech, language acquisition, iconicity

Six-month-olds infer object size based on pitch: high-pitched sounds map onto smaller objects and low-pitched sounds onto larger objects (Fernández-Prieto et al., 2015). The 'sound symbolism bootstrapping hypothesis' (Imai & Kita, 2014) proposes that this might support early understanding of correspondences between words and their meanings; by drawing on iconic pairings between prosodic/phonological cues in language and their corresponding referents (e.g. high pitch to represent smaller objects), infants can begin to develop their understanding of the association between words and their referents, first through iconic cases and later for more arbitrary associations.

For this to be useful in word learning, size-pitch associations must be present in the infant's input. In the present study, we analyse mother-child interactions to test whether sound symbolic cues for object size are encoded in mothers' infant-directed speech. Given that objects in a child's input aren't always congruent with their real-world size (e.g. a toy car is small, whereas a real car is big), we also consider whether violation of relative size expectation affects the likelihood of pitch-size encoding in mothers' speech (i.e. small tree next to a big fish [incongruent]; big cow next to a small spoon [congruent]), and whether this effect is more likely to occur when the size contrast is highlighted, e.g. when a small object is presented next to an identical larger object (strongly highlighted), as opposed to a pair of different-sized different objects (somewhat highlighted) or a randomly-placed selection of different-sized objects (not highlighted).

In our pre-registered study, 40 mother-infant dyads were recorded engaging in 3 tasks, varying in the extent to which the size contrast is highlighted (none/somewhat/strongly) and the real-world expectation of object sizes (congruent/incongruent). See Table 1. Vowel quality was controlled across object labels. The mean pitch of the vowel in the stressed syllable of each object label was extracted and analysed in Praat (Boersma & Weenink, 2021).

Data collection is complete and analysis is on-going. We consider mothers' pitch in relation to actual object size (big vs. small), and congruence with real-world size (congruent vs. incongruent). We test whether obviousness of the size contrast plays a role by analysing mothers' pitch in relation to task (1 vs. 2 vs. 3) and actual object size (big vs. small). If sound symbolic cues are available to infants in the input, we expect mothers to produce words for smaller items with a higher pitch, and larger items at a lower pitch. We expect this contrast to be most apparent in Task 3, where size contrast is strongly highlighted. We have no a priori expectations regarding the direction of the effect of congruence; it is unclear whether mothers will convey only object size in their pitch (i.e. all small items produced with a high pitch, regardless of item type), or whether information about the object's typical size will be encoded in the pitch (i.e. expected large items will be produced with a low pitch, independent of actual object size).

### References

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Table 1: Outline of 3 tasks

Task	Size contrast	Stimuli	Real-world expectation
1	Not highlighted (random presentation)	Poster, seemingly- randomly array of 16 objects varying in size. Contrasting pairs are adjacent in the array.	Contrasting pairs selected for congruence with real-world size, e.g. big fish and small tree (incongruent) or small spoon and big cow (congruent)
2	Somewhat highlighted (paired presentation, different objects)	Picture book, 2 objects presented side-by-side	Congruence with real-world size, e.g. big fish and small tree (incongruent) or small spoon and big cow (congruent)
3	Strongly highlighted (paired presentation, same objects)	Picture book, 2 objects presented side-by-side	Object pairs are identical except for size (test condition) or colour (control condition)