

THE FIDELITY OF ITERATED VOCAL IMITATION

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How do spoken words come into existence? Some words at least appear to originate from imitating environmental sounds (Dingemanse, 2012). Presumably, over time and repetition, these imitations become increasingly word-like, as they take on phonological and syntactic properties of their language, becoming less faithful to their original source (Perlman, Dale, & Lupyman, 2015). Yet, this process is not easily observed, and theories of precisely how it happens are largely speculative.

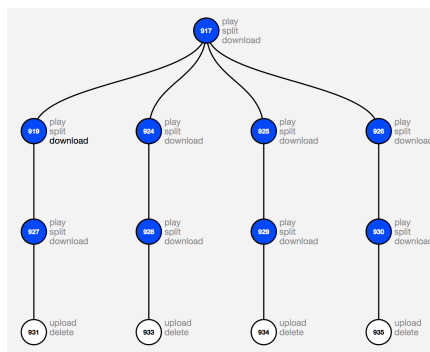


Fig 1. An ongoing vocal imitation game with four parallel chains leading from the same seed message. The recordings can be inspected as the data are collected.

To study spoken word formation, we conducted a series of iterative vocal imitation experiments using a web-based application modeled after the game of “telephone.” The game begins with an experimenter setting initial (seed) sounds. Participants listen to each sound and produce an imitation of it that is recorded through their computer microphone. These recordings are passed on to the next participant who imitates the imitation, and so on. We then use match-

to-sample tasks to measure how accurately imitations can be matched to their source. Here we report preliminary findings about the degree of fidelity in vocal imitations over generations. For how many generations are participants able to maintain an imitation that can be traced back to its original source?

To answer this question we recorded people's imitations of several environmental sounds from different categories (a car horn, a telephone ring, a friction sound (ripping paper), and a water sound). New participants were then recruited and asked to guess the source of the imitation given the original (target) sound and several non-target sounds (the other seed sounds used in the experiment). Overall accuracy was relatively high, $M = 53\%$ (chance = 25%), $z = 5.4$, $p < 0.0001$, and surprisingly was not found to decrease significantly over the 11 generations of imitations, $z = -0.77$, $p = 0.44$.

We next increased the difficulty for both imitators and guessers by starting the chains with seed sounds from within the same category (e.g., four different water sounds). Accuracy was above chance after the first generation, $z = 2.2$, $p =$

0.03, but declined somewhat for subsequent generations, $z = -1.6$, $p = 0.09$.

In sum, we report a method of collecting high fidelity vocal imitations online, finding that vocal imitations can preserve correspondences with the original environmental stimulus for at least twelve generations. We are now examining: (1) vocal imitation over a larger range of stimuli under various conditions with the goal of quantifying how repeated imitation can drive vocalizations to become more word-like, as well as to understand the consequences of this transitional (2) the precise ways in which the signals are changing over time. Are the signals indeed becoming more word-like, and if so, what impact do such transitions from analogue imitation to discrete word form have on the ability of the listener to infer the communicative intentions of the speaker?

References

- Dingemanse, M. (2012). Advances in the cross-linguistic study of ideophones. *Language and Linguistics Compass*, 6, 654-672.
- Perlman, M., Dale, R., Lupyan, G. (2015). Iconicity can ground the creation of vocal symbols. *Royal Society Open Science*, 2: 150152.

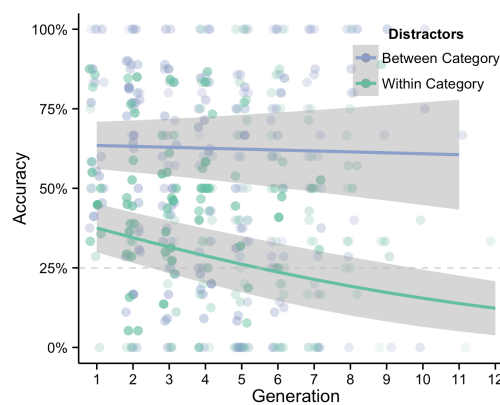


Fig 2. Accuracy in selecting the source of a vocal imitation among three distractors. Distractors were either from different categories or from the same category.