The emergence of words from iterated vocal imitation

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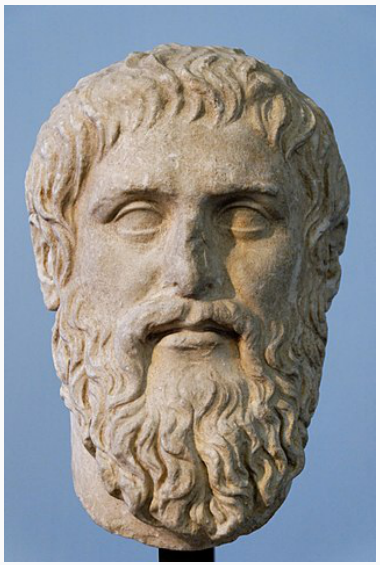
Are names for things natural or conventional?

Plato's *Cratylus*

Hermogenes: Conventional! Names like "man" and "horse" are arbitrary.

Cratylus: Natural! *anthrôpos* = "man" ∼ *anathrôn ha opôpe* = "one who reflects on what he has seen". (Some horse!)



What were the first words?

Socrates: *If we wished to designate that which is above and is light, we should raise our hands towards heaven in imitation; but if the things to be designated were below or heavy, we should extend our hands towards the ground. . .*

A name, then, it appears, is a vocal imitation of that which is imitated, and he who imitates with his voice names that which he imitates.

Hermogenes: *But Socrates,* ***what sort of an imitation is a name?***

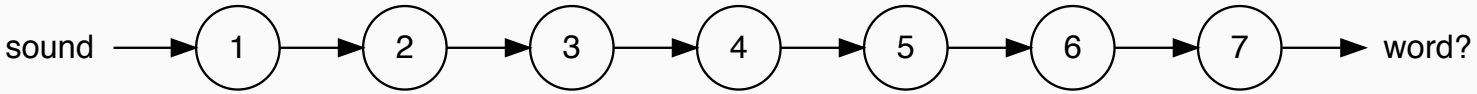
Central question

How do you get from an imitation **of** something to a name **for** something?

Vocal imitations are not words

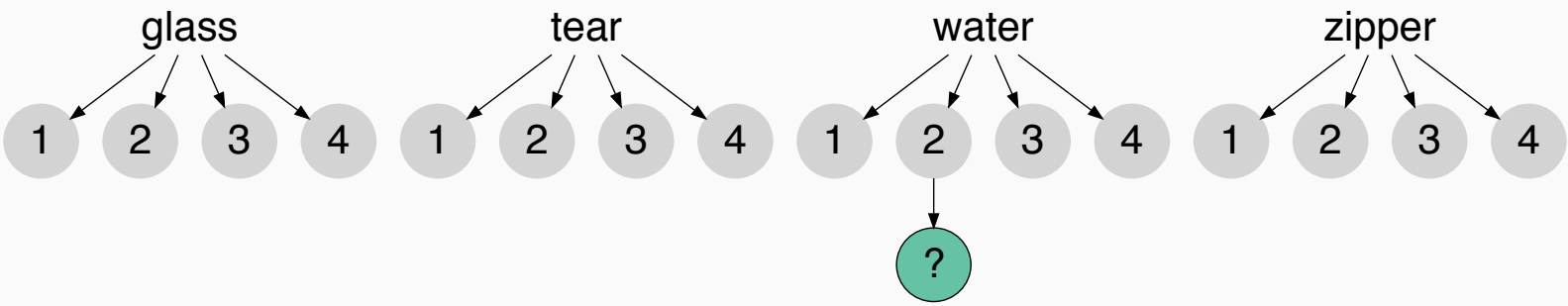
- Imitations are idiosyncratic, words are **stable**.
- Imitations are specific, words are **categorical**.

How do you turn an imitation into a word?

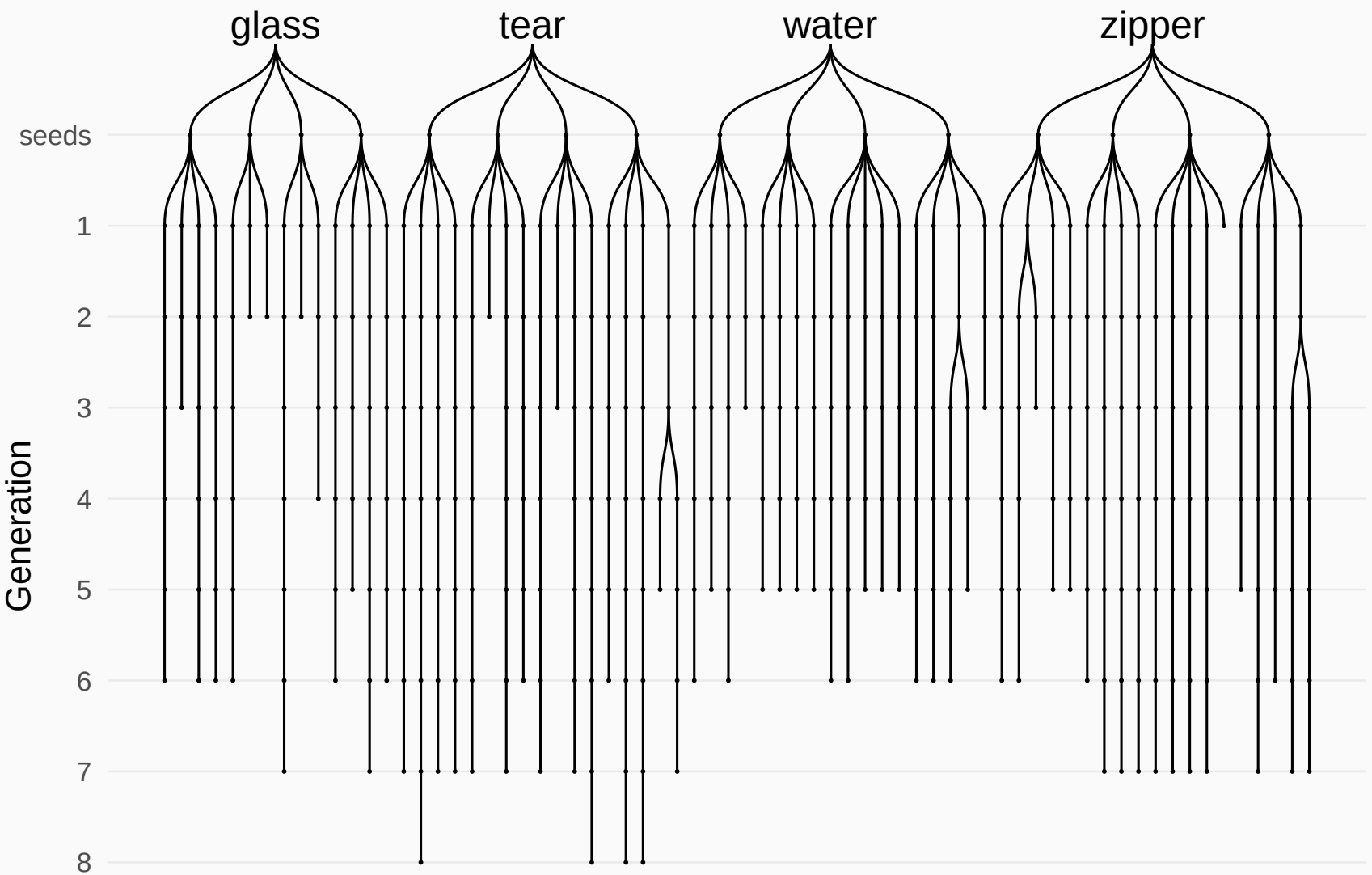


Interface for collecting vocal imitations

Categories of sounds used as seeds



The results of the transmission chain experiment

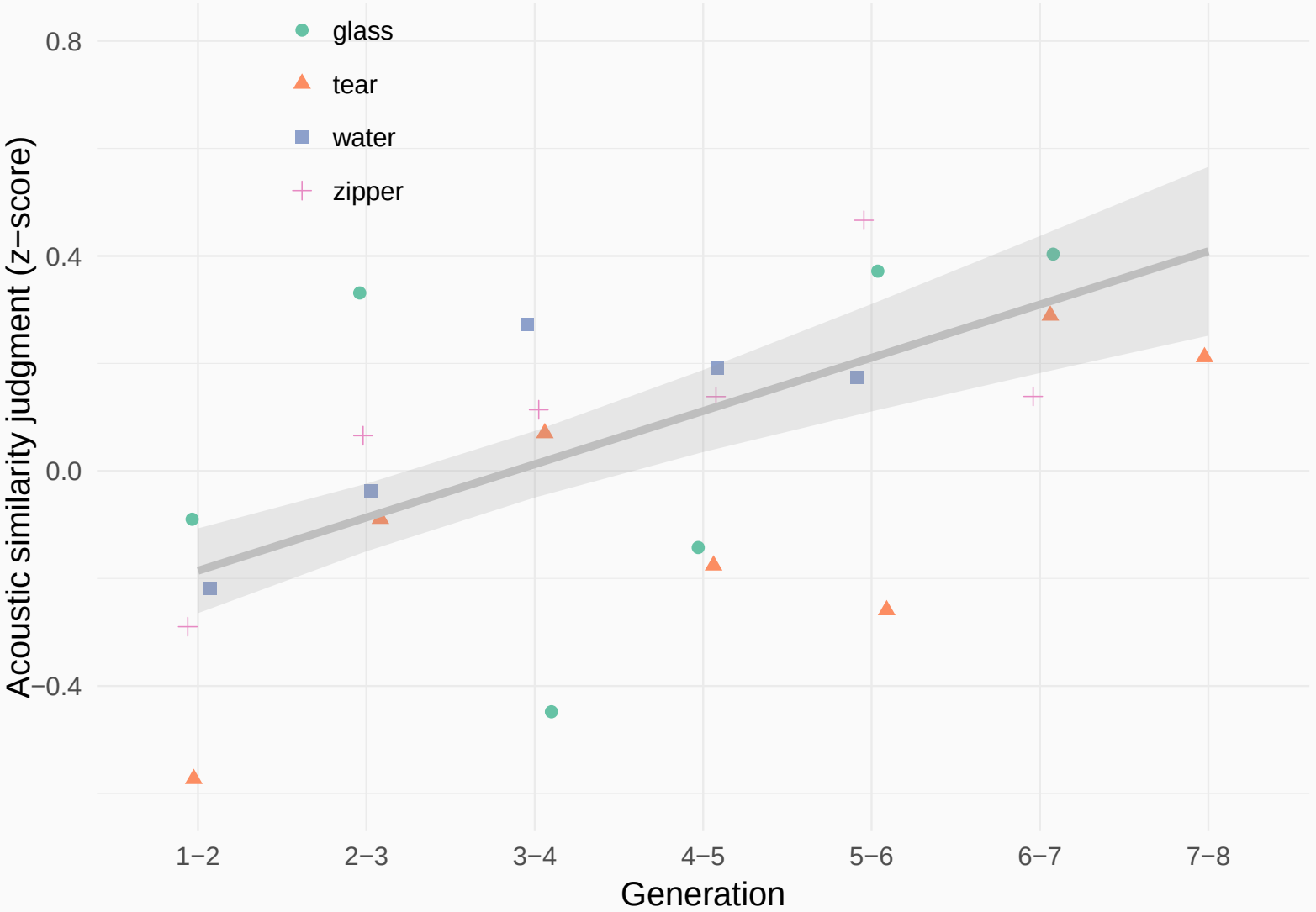


Research questions

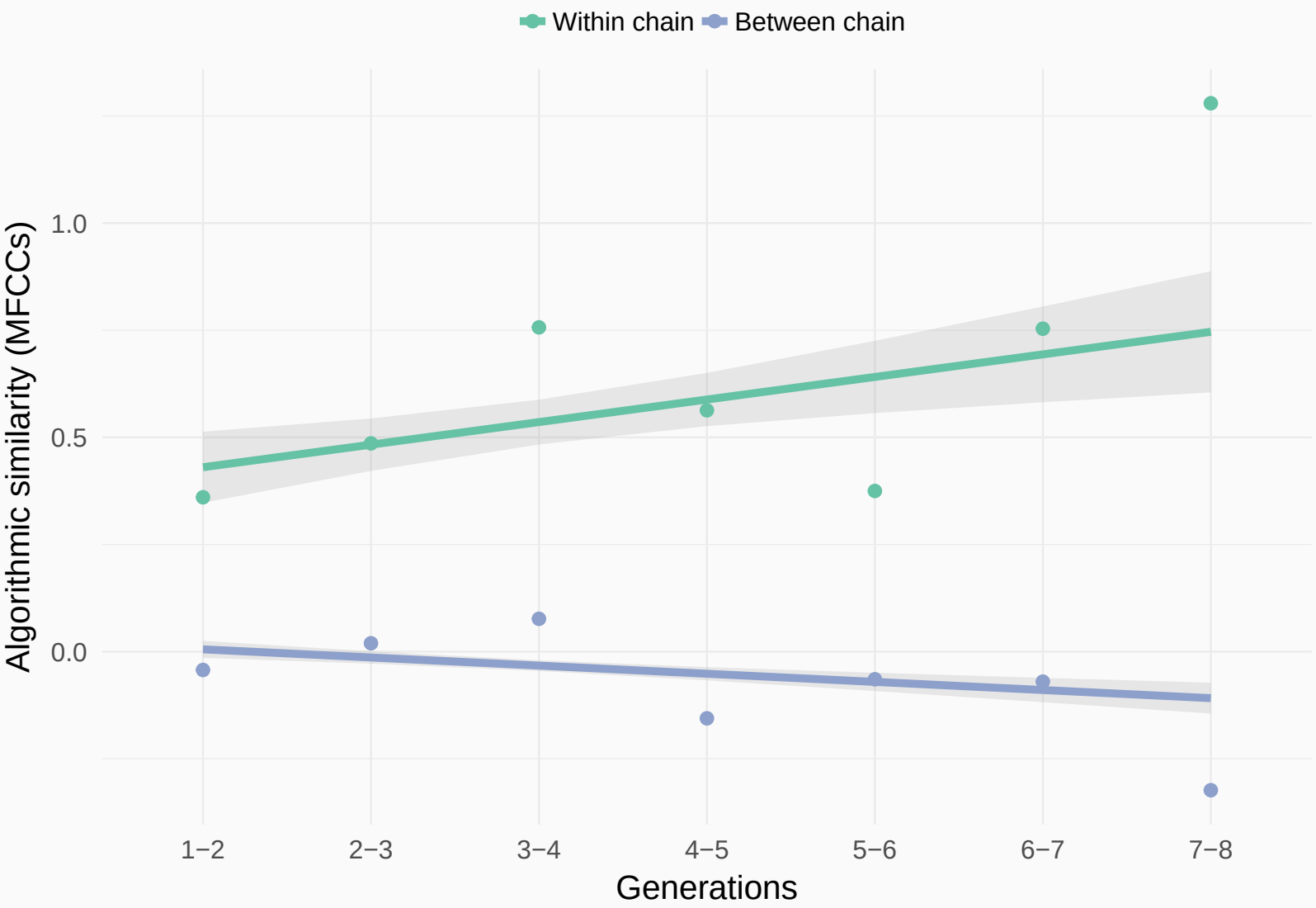
Do repeated imitations:

1. Stabilize on particular words?
2. Retain their resemblance to the seed sound?
3. Become more suitable as category labels?

Repeated imitations became more similar



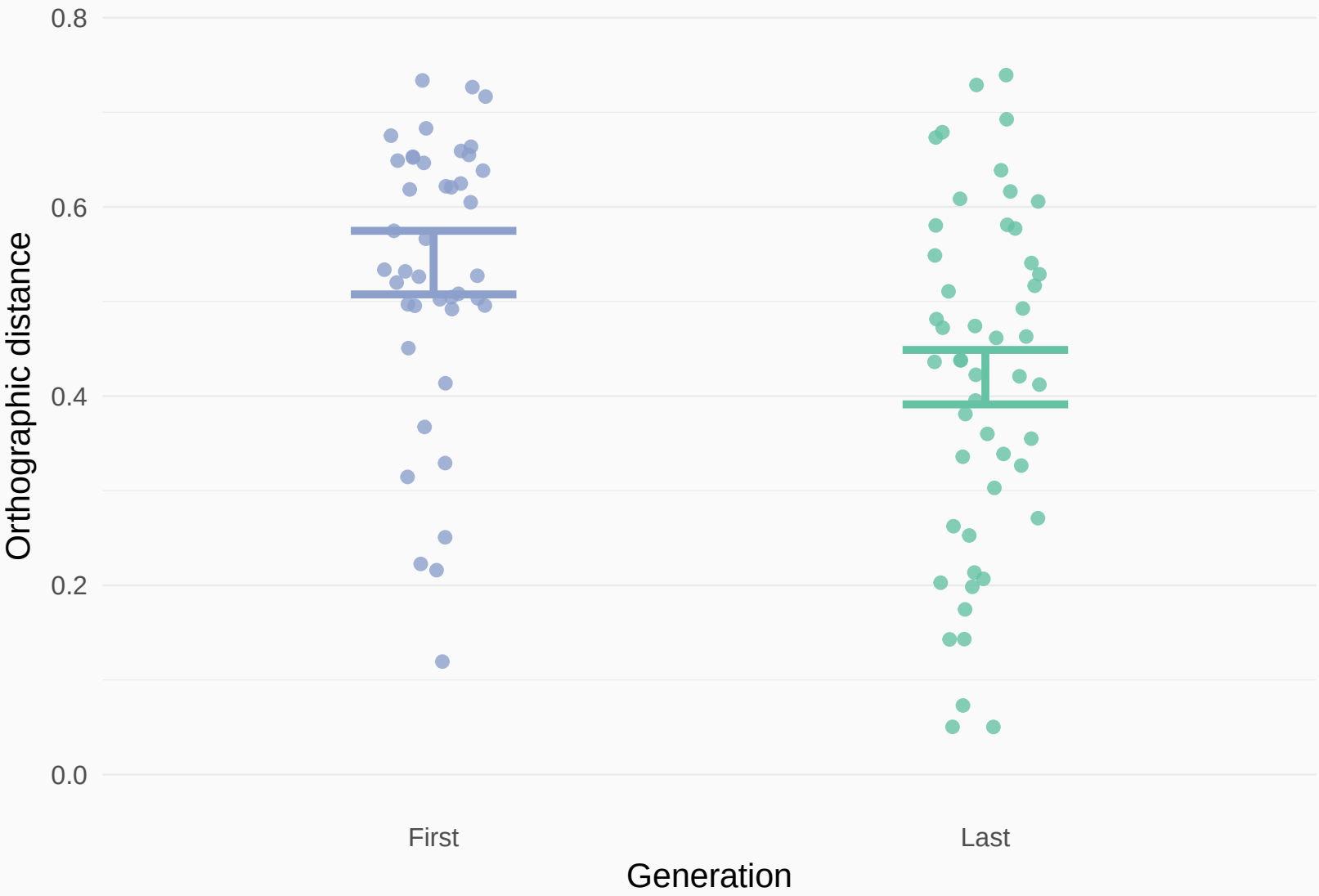
Similarity increased within, not between, chains



Example transcriptions

Category	Seed	First generation	Last generation
glass	1	tingtingting	deetdedededeet
glass	2	chirck	correcto
glass	3	dirrng	wayew
glass	4	boonk	baroke
tear	1	scheeept	cheecheea
tear	2	feeshefee	cheeoooo
tear	3	hhhweerrr	chhhhhhewwwe
tear	4	ccccchhhhyeaahh	shhhhh
water	1	boococucuwich	eeverlusha
water	2	chwoochwooochwooo	cheiopshpshcheiopsh
water	3	atoadelchoo	mowah
water	4	awakawush	galonggalong
zipper	1	euah	izoo
zipper	2	zoop	veeeep

Repeated imitations were transcribed more consistently

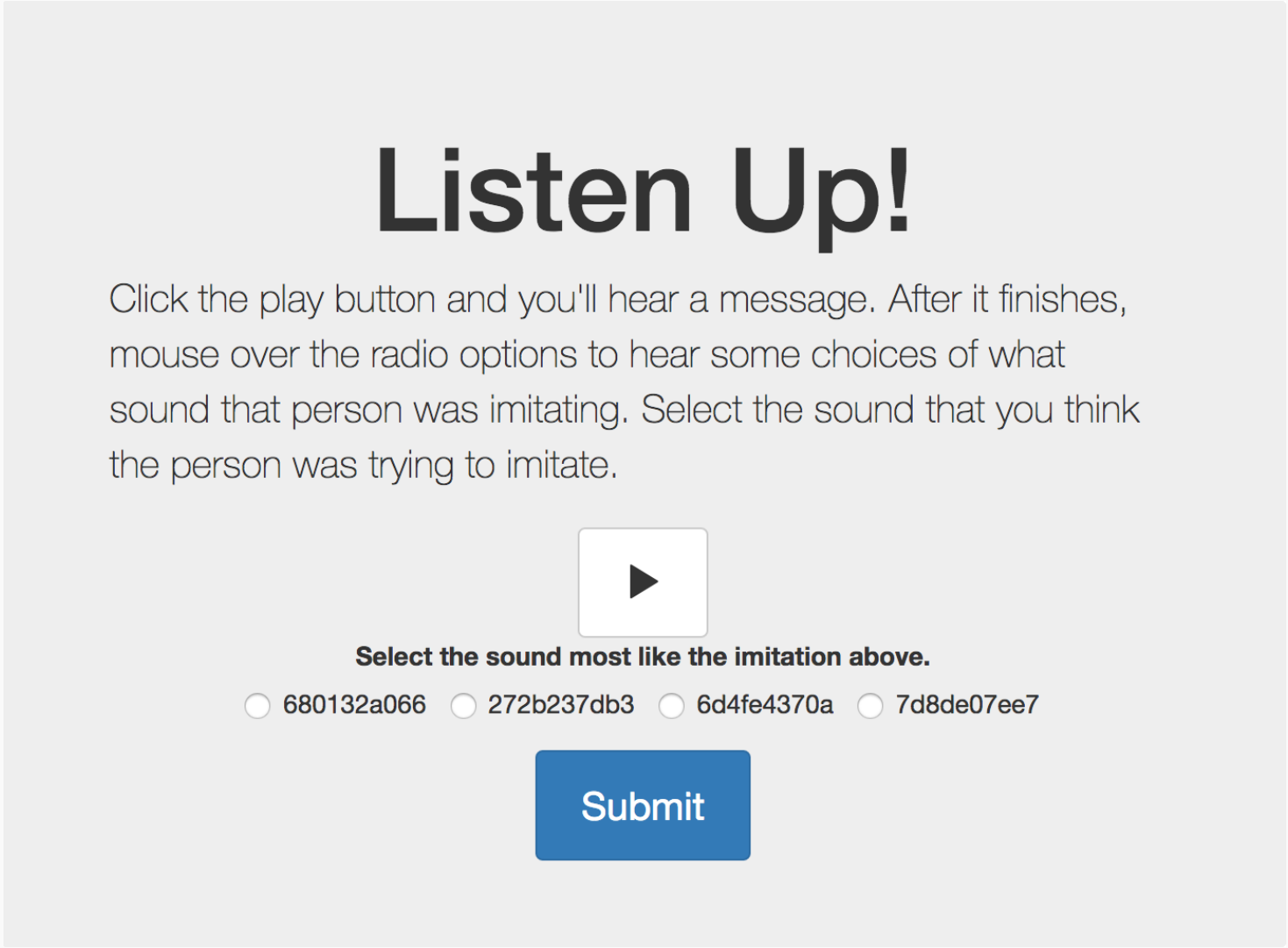


1. Do imitations stabilize on particular words?

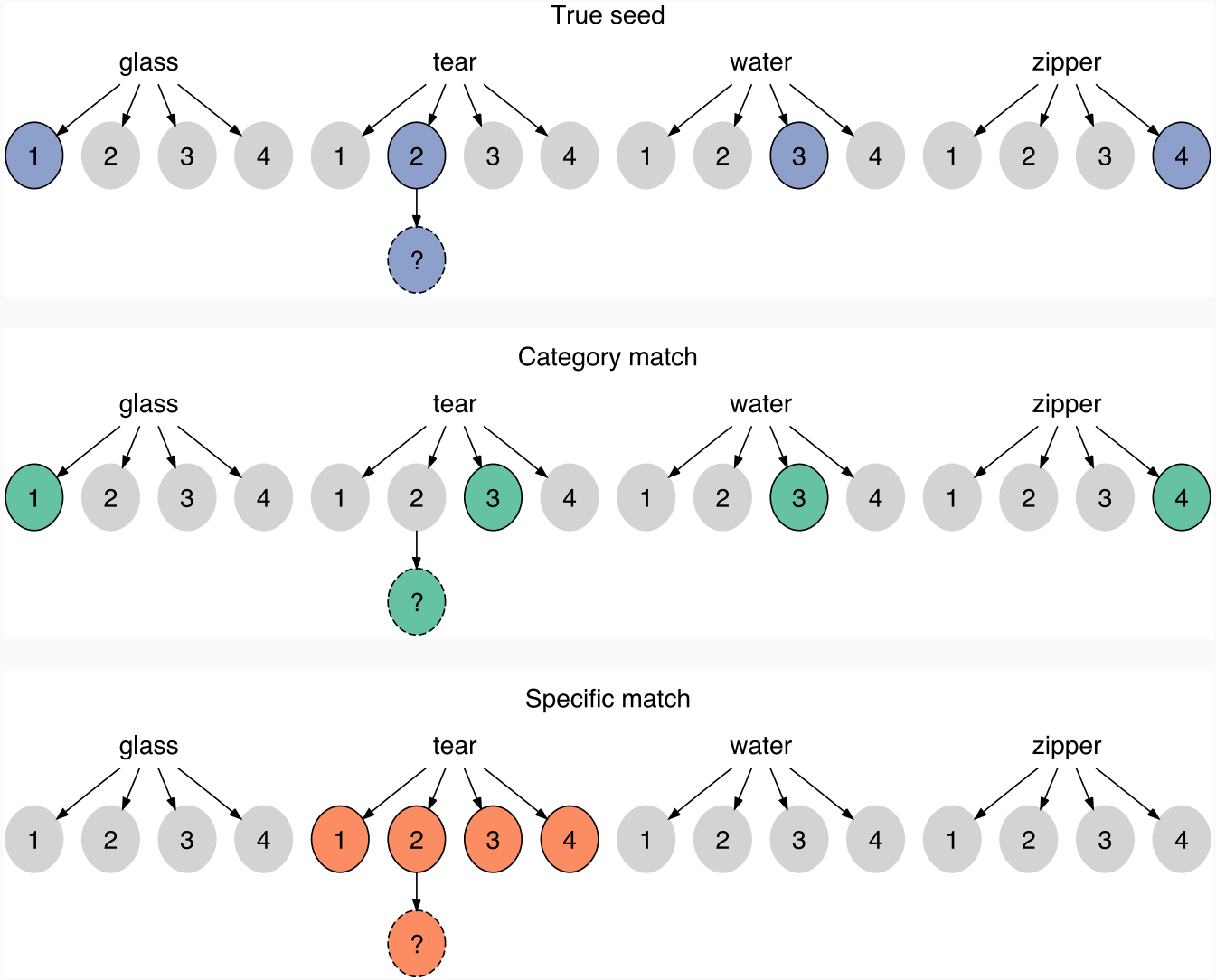
Yes. Repeating imitations makes them more similar to one another acoustically and orthographically.

But what are they stabilizing on?

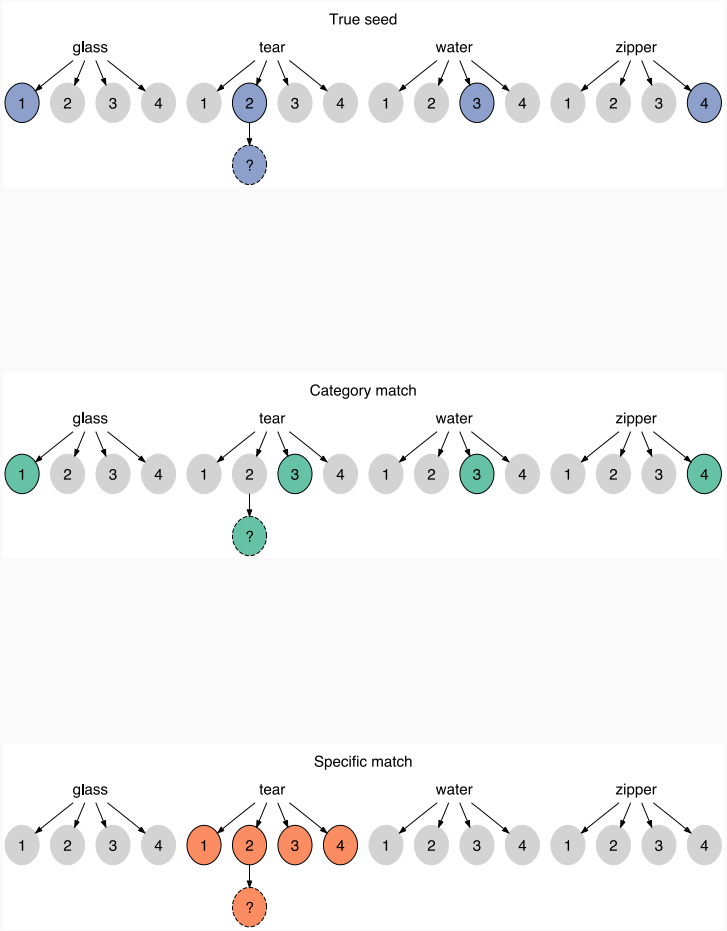
Interface for matching imitations to seed sounds

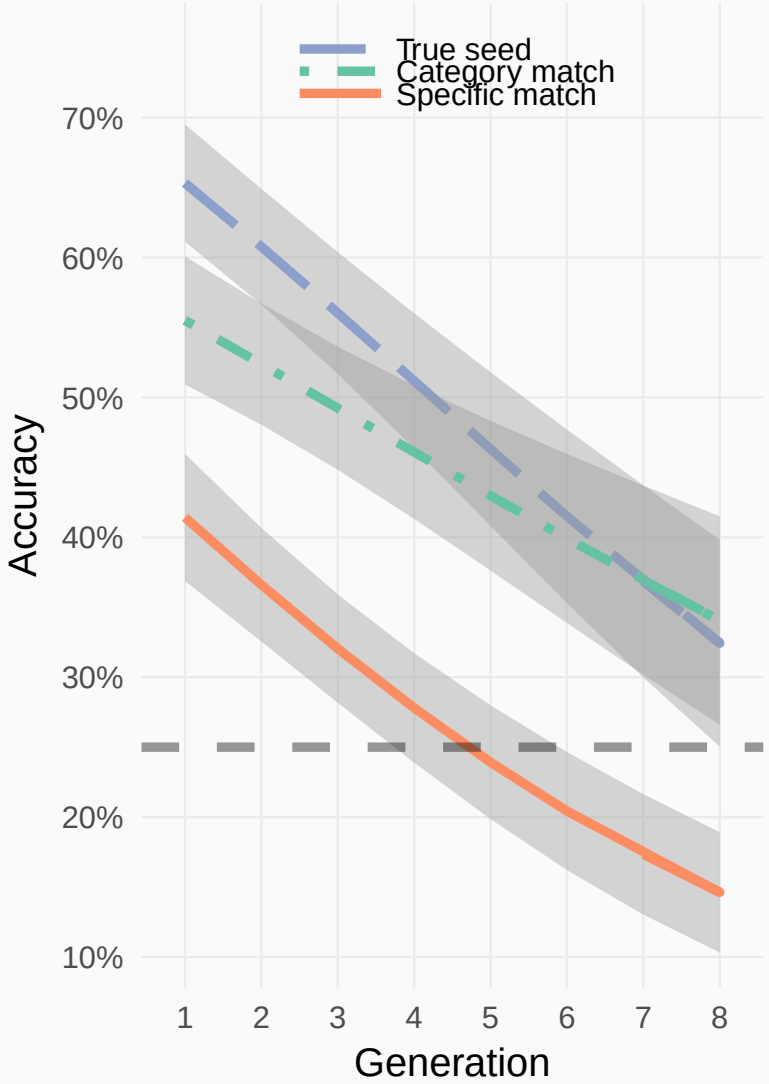


Types of matching questions

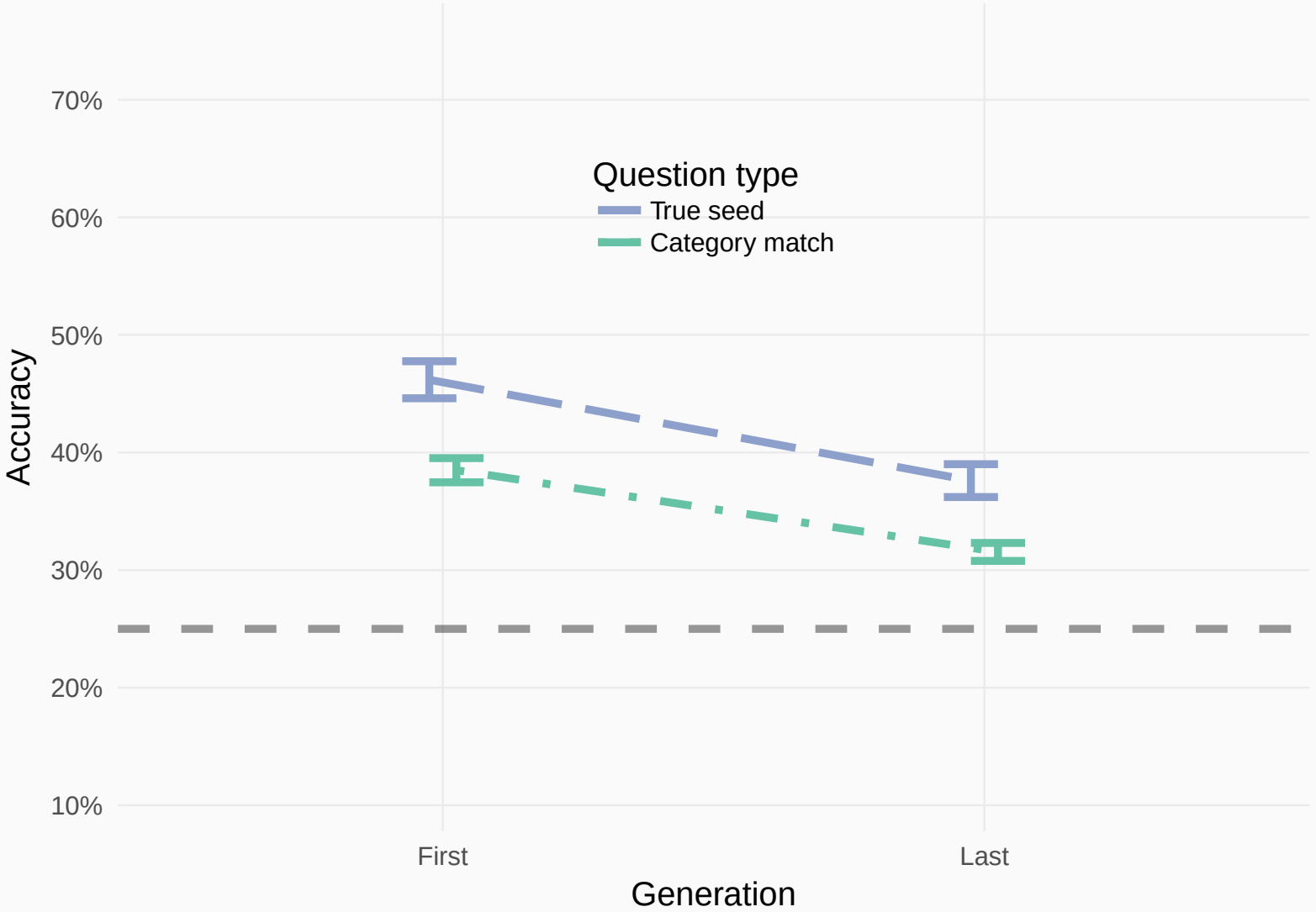


Category information was the most resilient to decay





Transcriptions can retain category informations



2. Do imitations retain a resemblance to the seed sound?

Yes (at least for 8 generations with 4 categories).

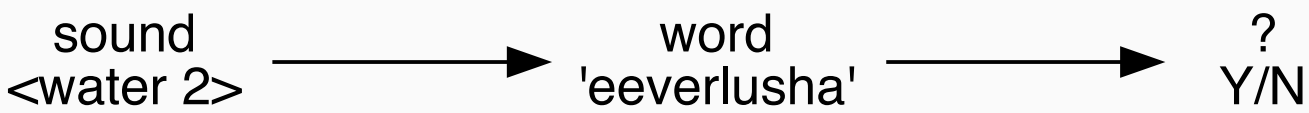
What are the consequences of repeating imitations for learners?

Selecting words to use as category labels

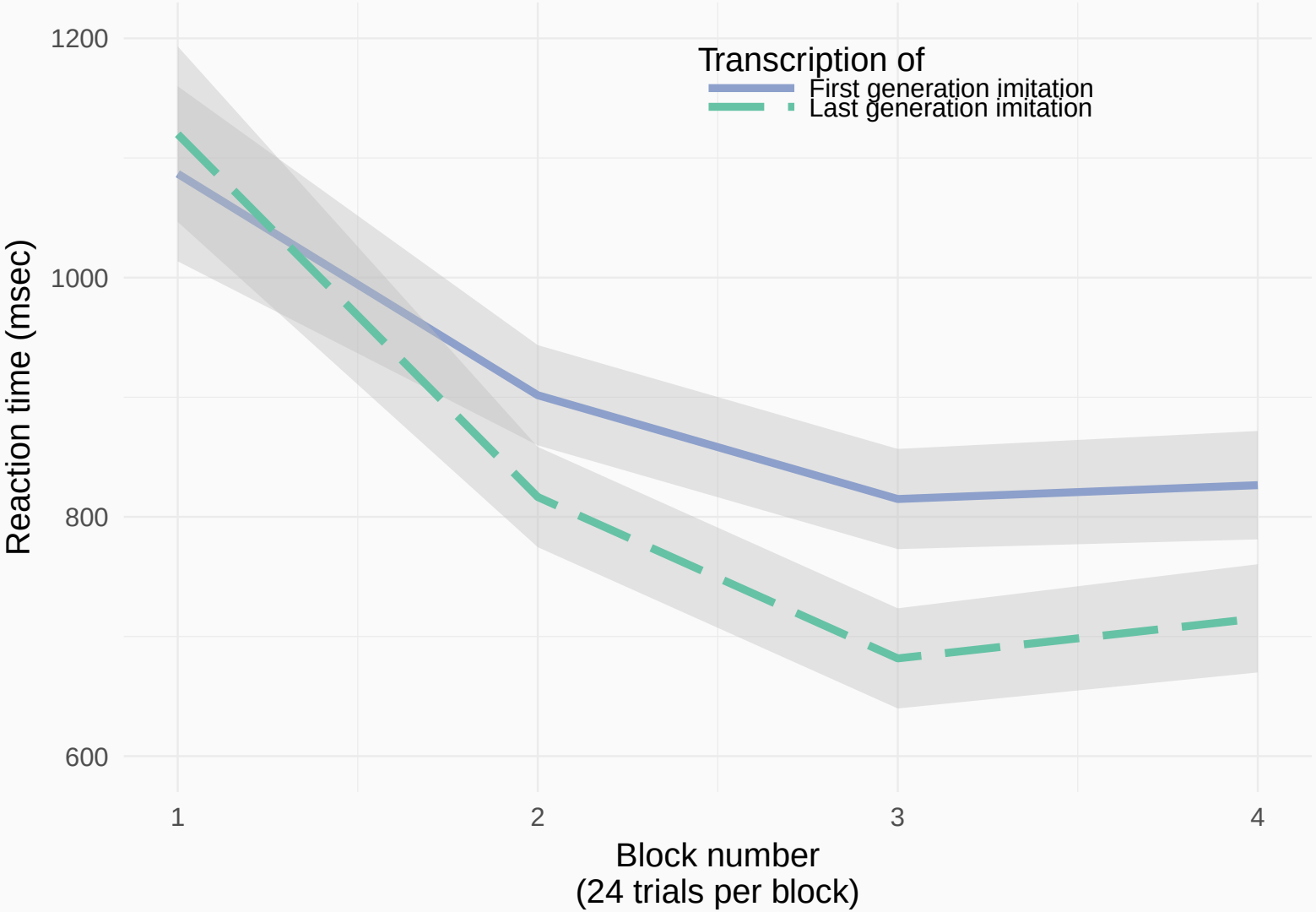
- Filtered for length and number of unique characters.
- Equated based on overall matching accuracy.
- Selected **a subset** (56) for testing.

A simple category learning experiment

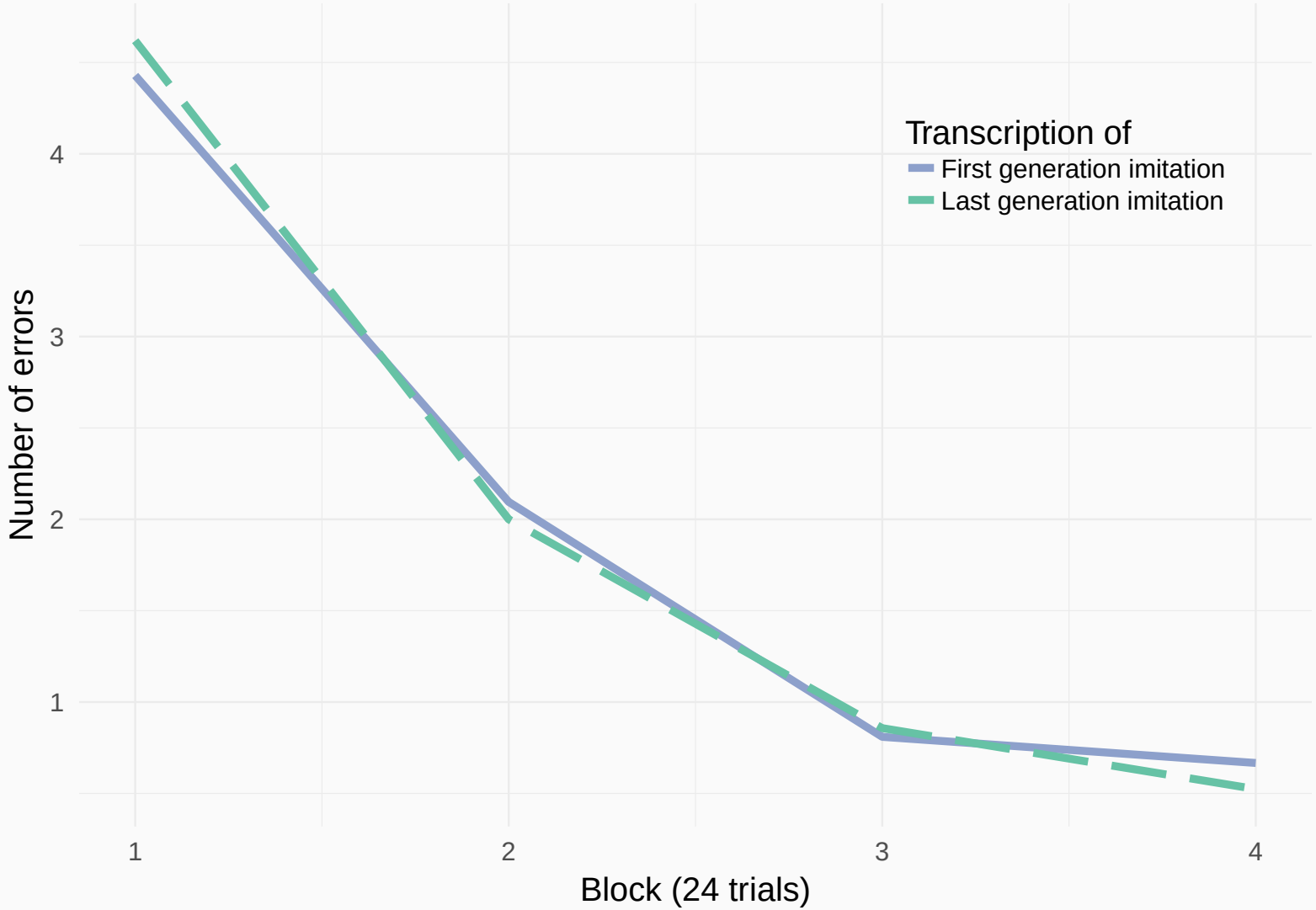
- Learned to associate 4 novel labels with 4 categories of sounds.
- Categorized 16 sounds total, 4 per block of trials.
- Trial-and-error learning procedure.



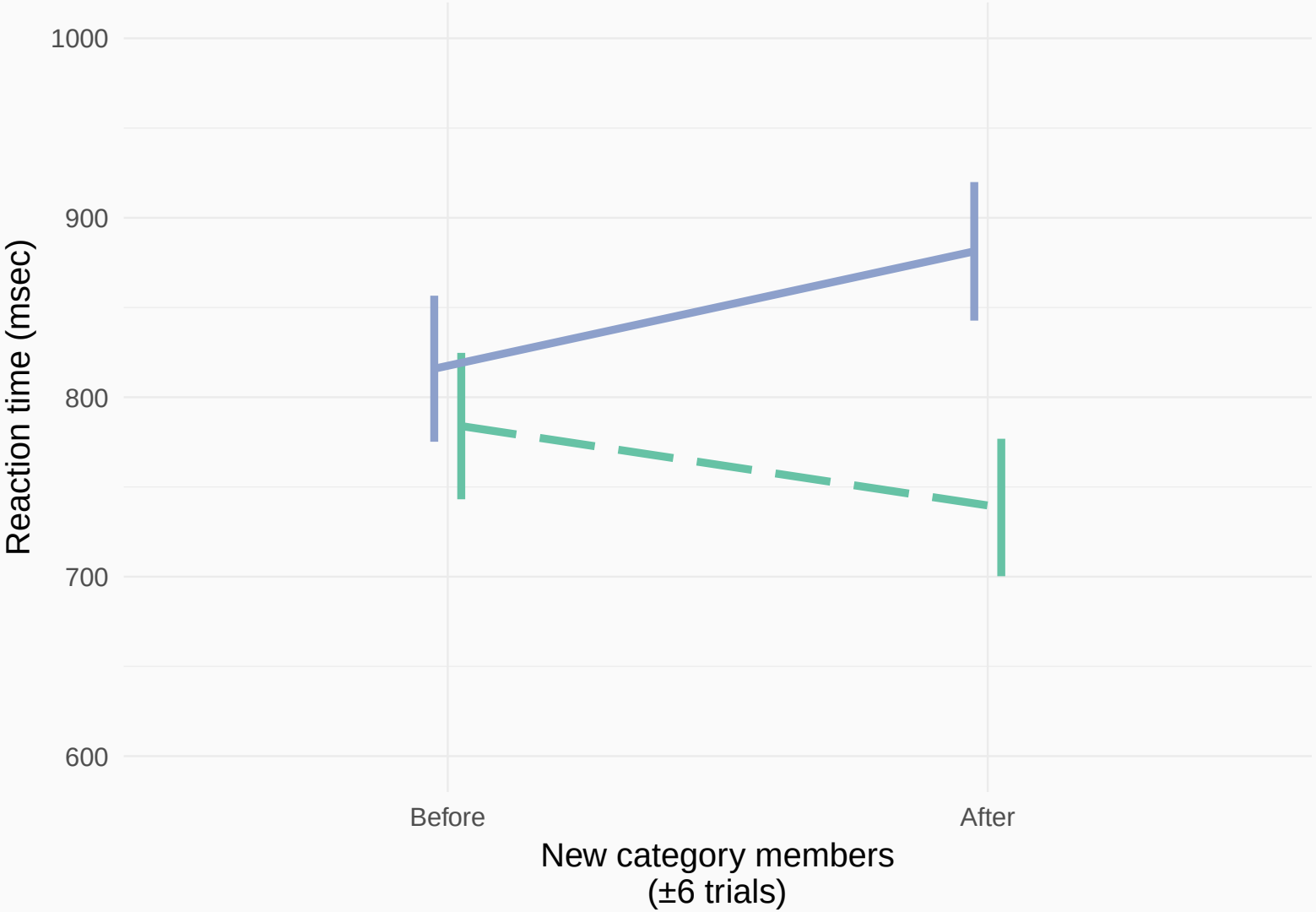
Later generation labels yielded faster responses



No difference in accuracy for novel labels



Later generation labels were generalized more quickly



The emergence of words from iterated vocal imitation

Repeating imitations makes them more wordlike.

1. Later generation imitations were more similar to one another, and easier to transcribe.
2. Some evidence that repeating imitations retains category information, and also makes them easier to learn.

Who was right, Hermogenes or Cratylus? **Both**, naturally formed "names" can become more conventional through unguided processes.

Thanks!

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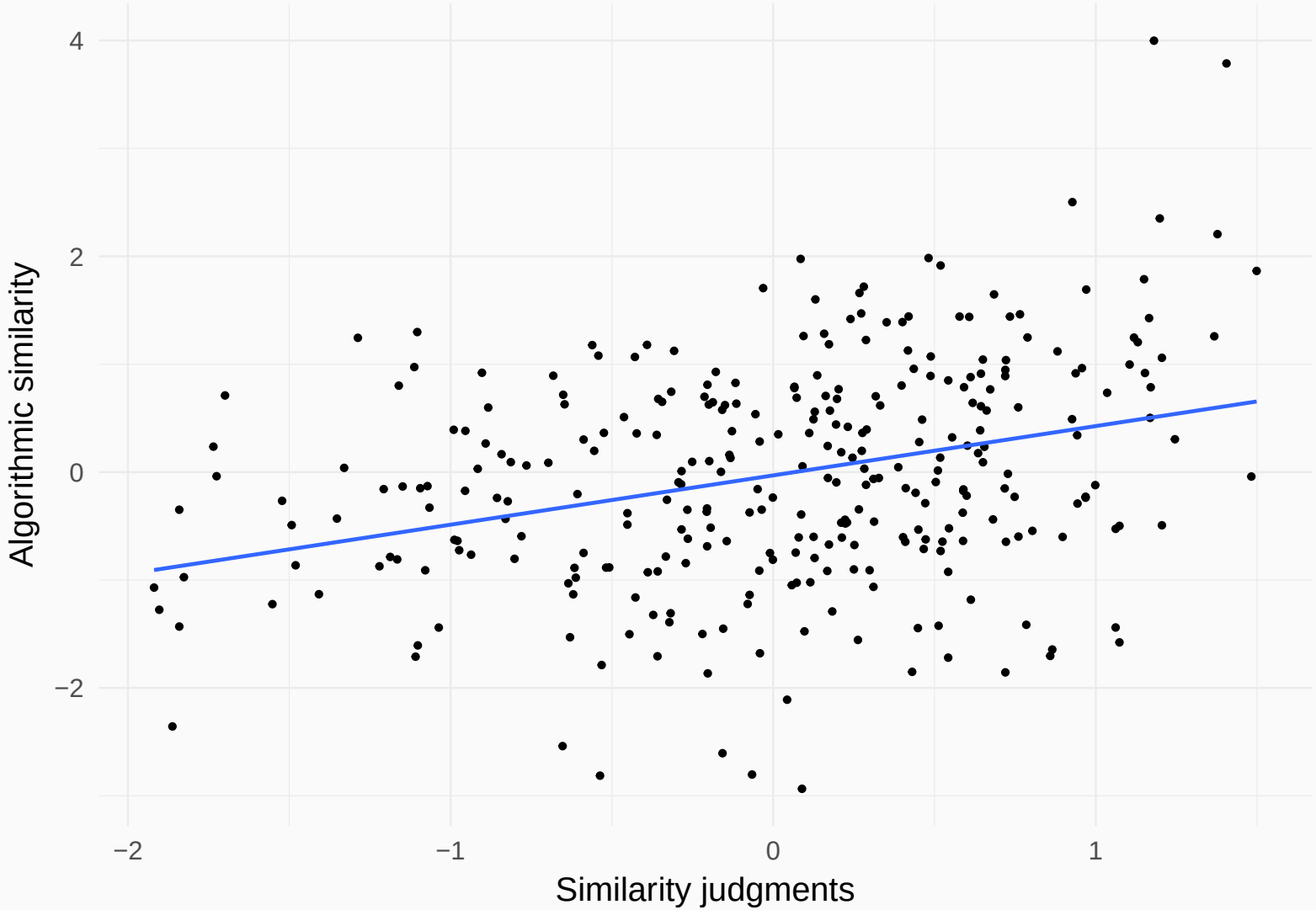
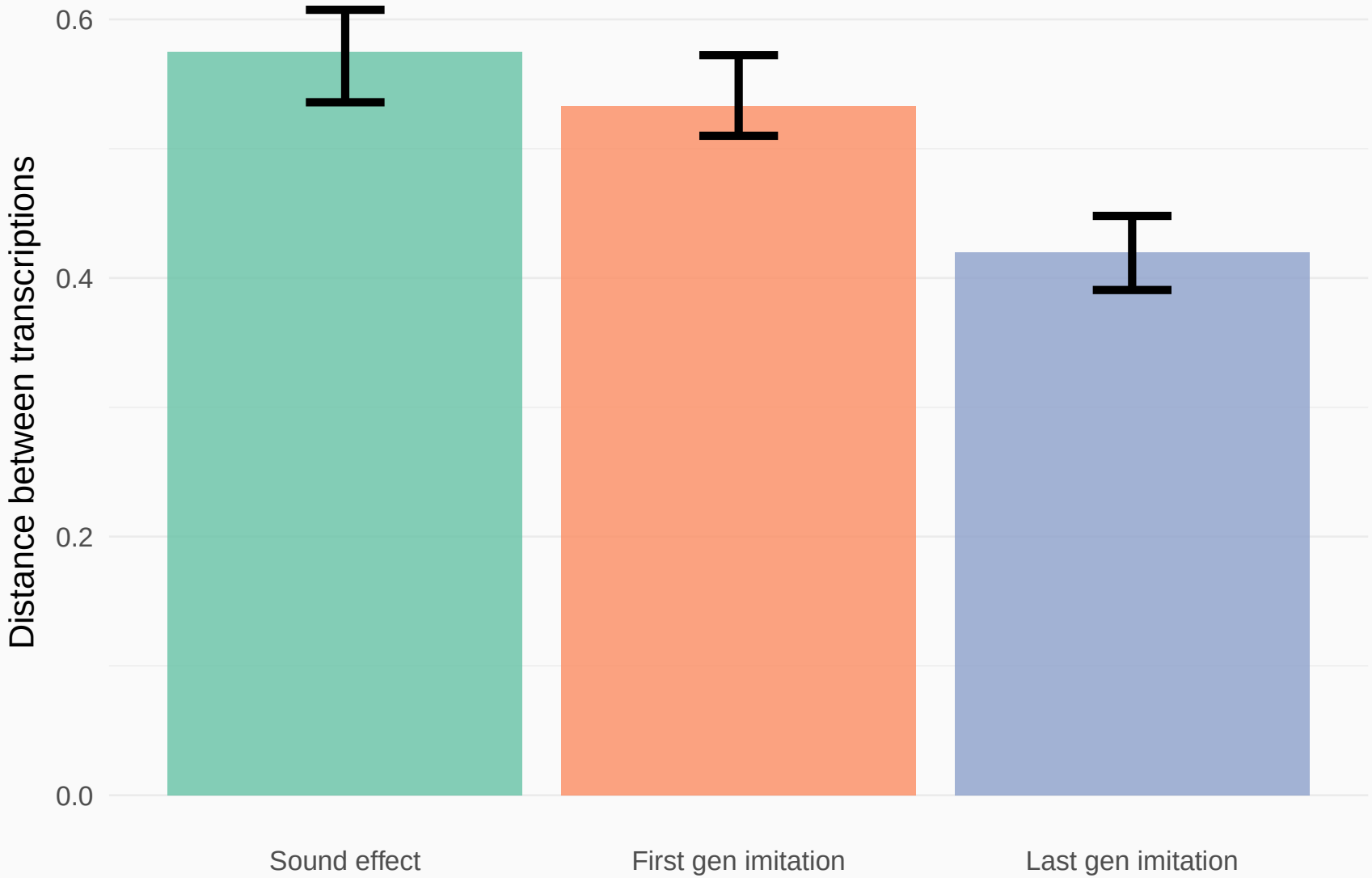
github.com/lupyanlab/creating-words

osf.io/3navm

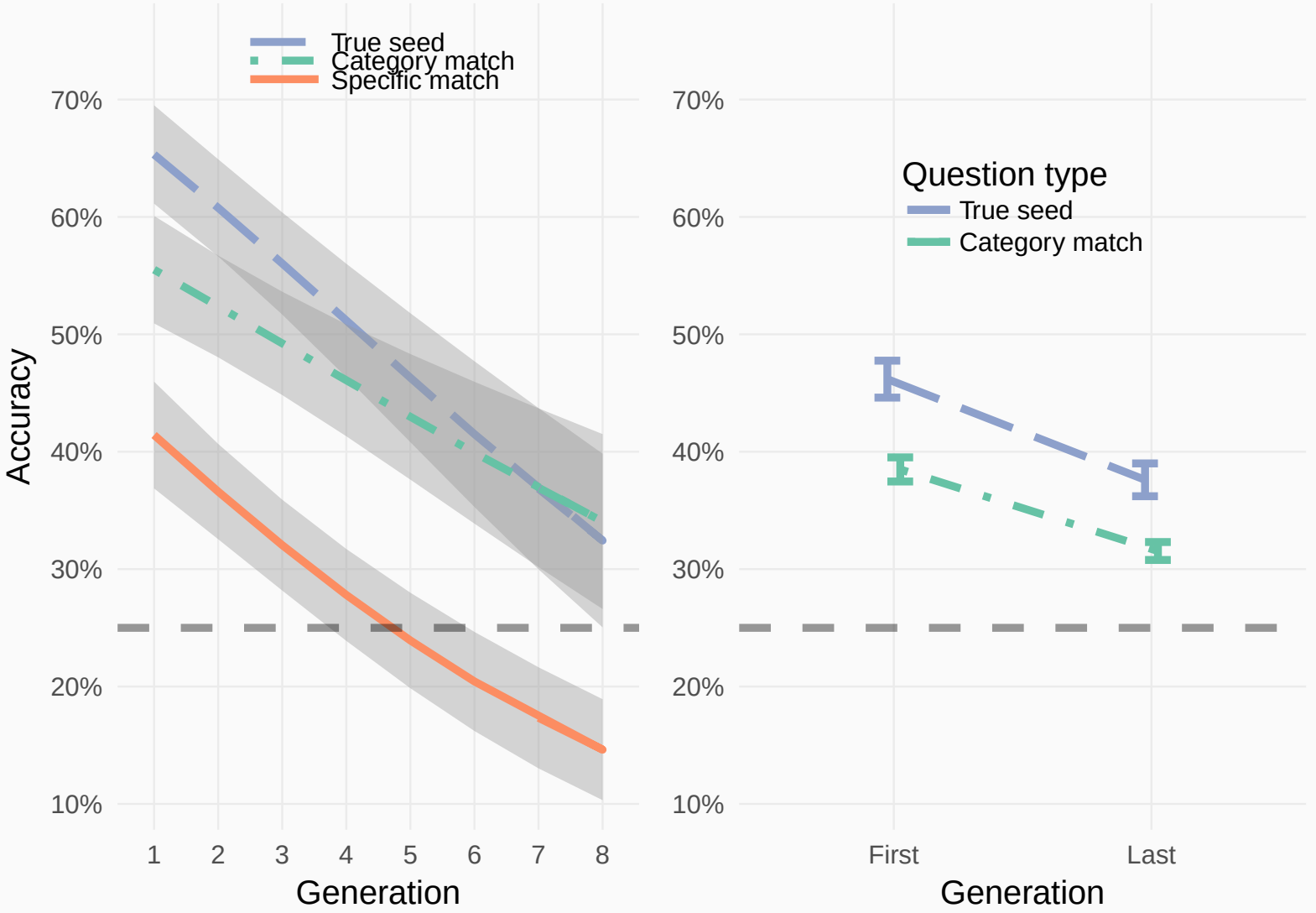
Correlation between subjective and objective similarity



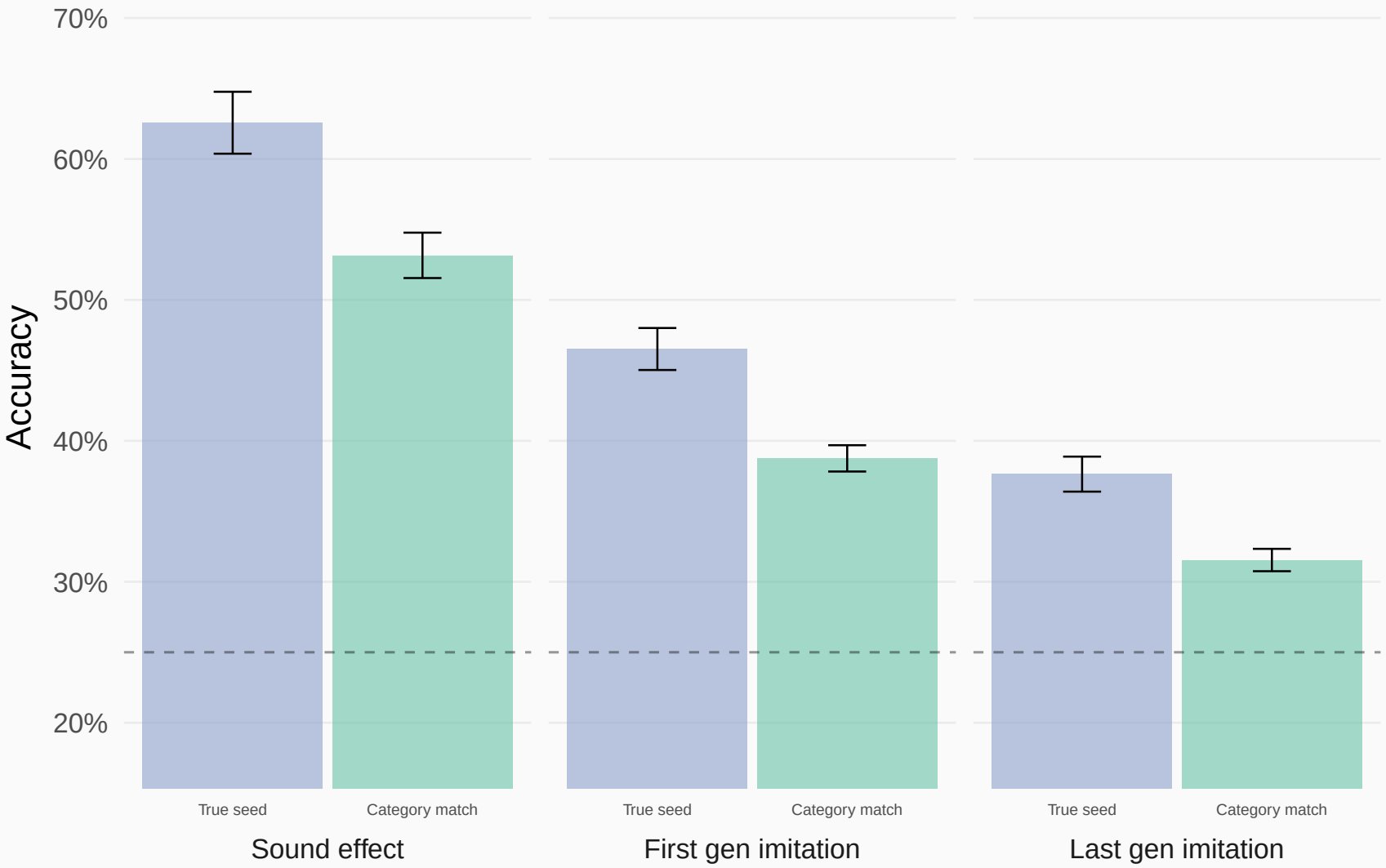
Transcriptions of seeds were the least consistent



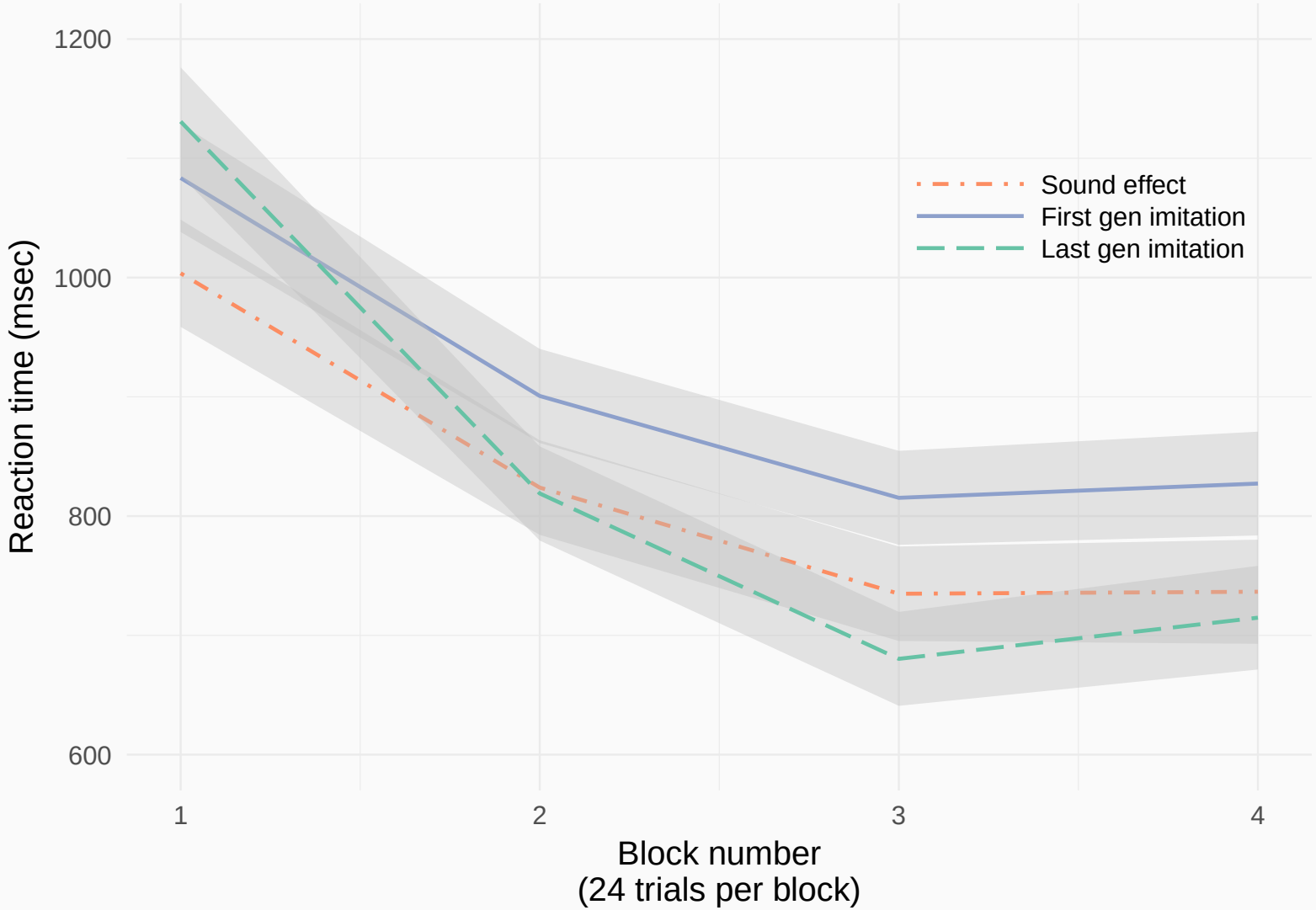
Match accuracies for imitations and transcriptions



Transcriptions of seed sounds were matched very accurately



Transcriptions of seed sounds ???



Onomatopoeic words are found across languages

Figure 1: By James Chapman.