

# The cultural evolution of informative writing systems

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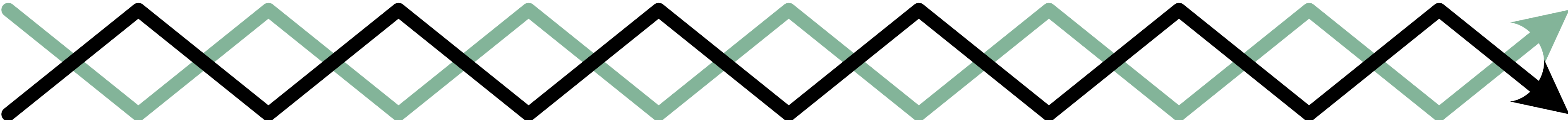


LEVERHULME  
TRUST \_\_\_\_\_

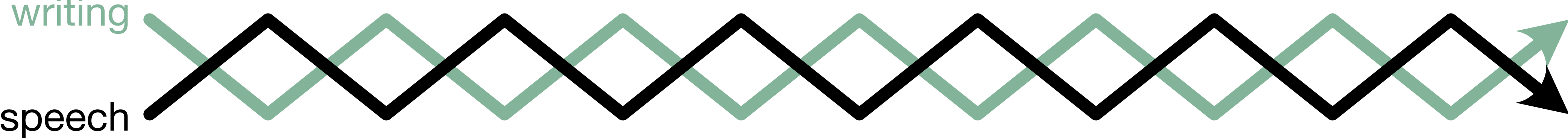
Writing usually tracks speech

writing

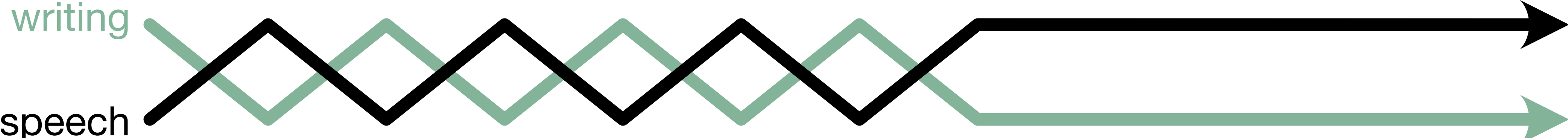
speech



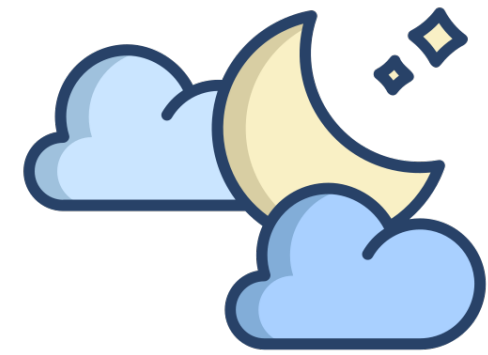
Writing usually tracks speech



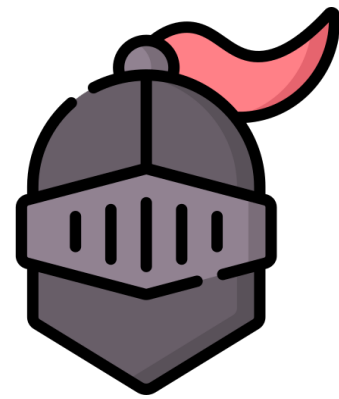
But speech and writing can become disentangled



# Heterographic homophony



<night>

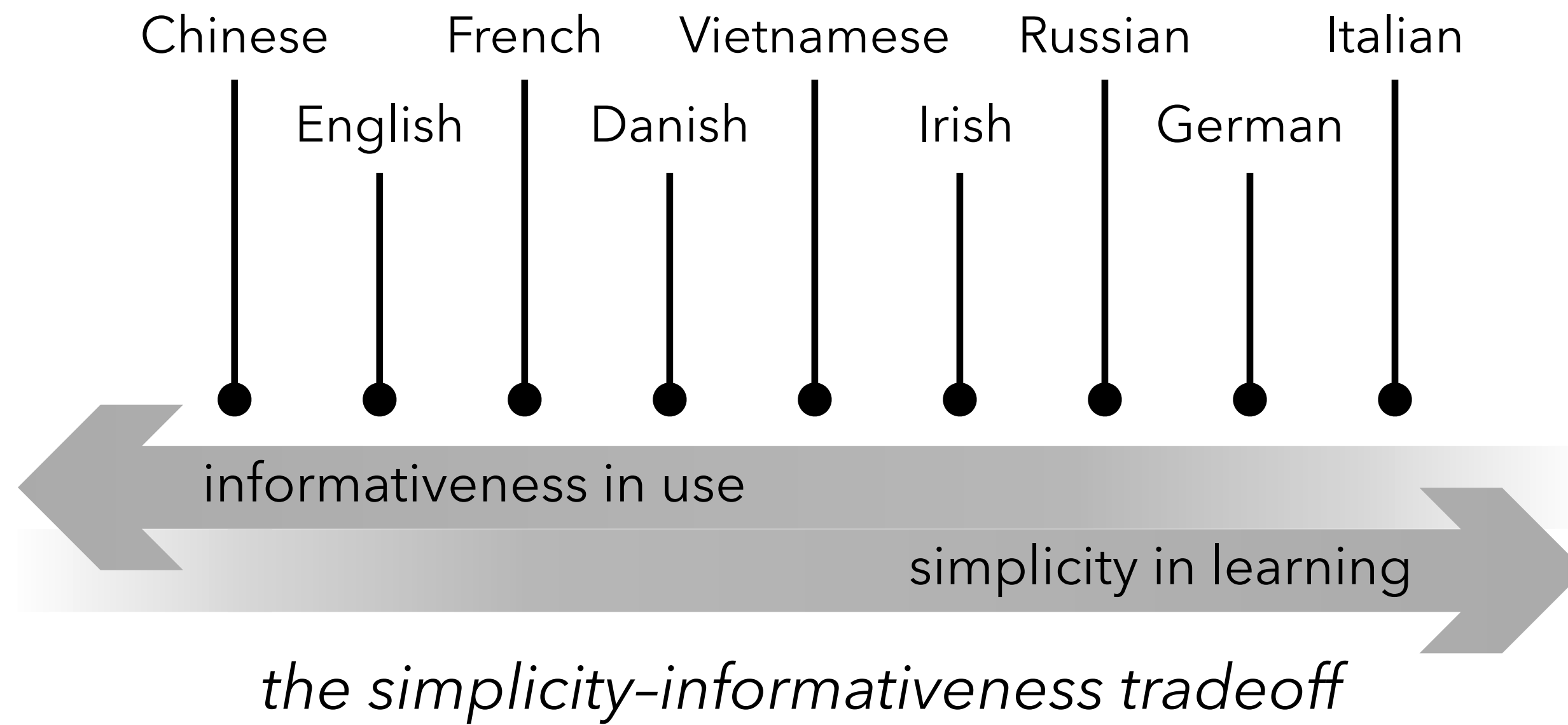


<knight>

# Heterographic homophony is informative



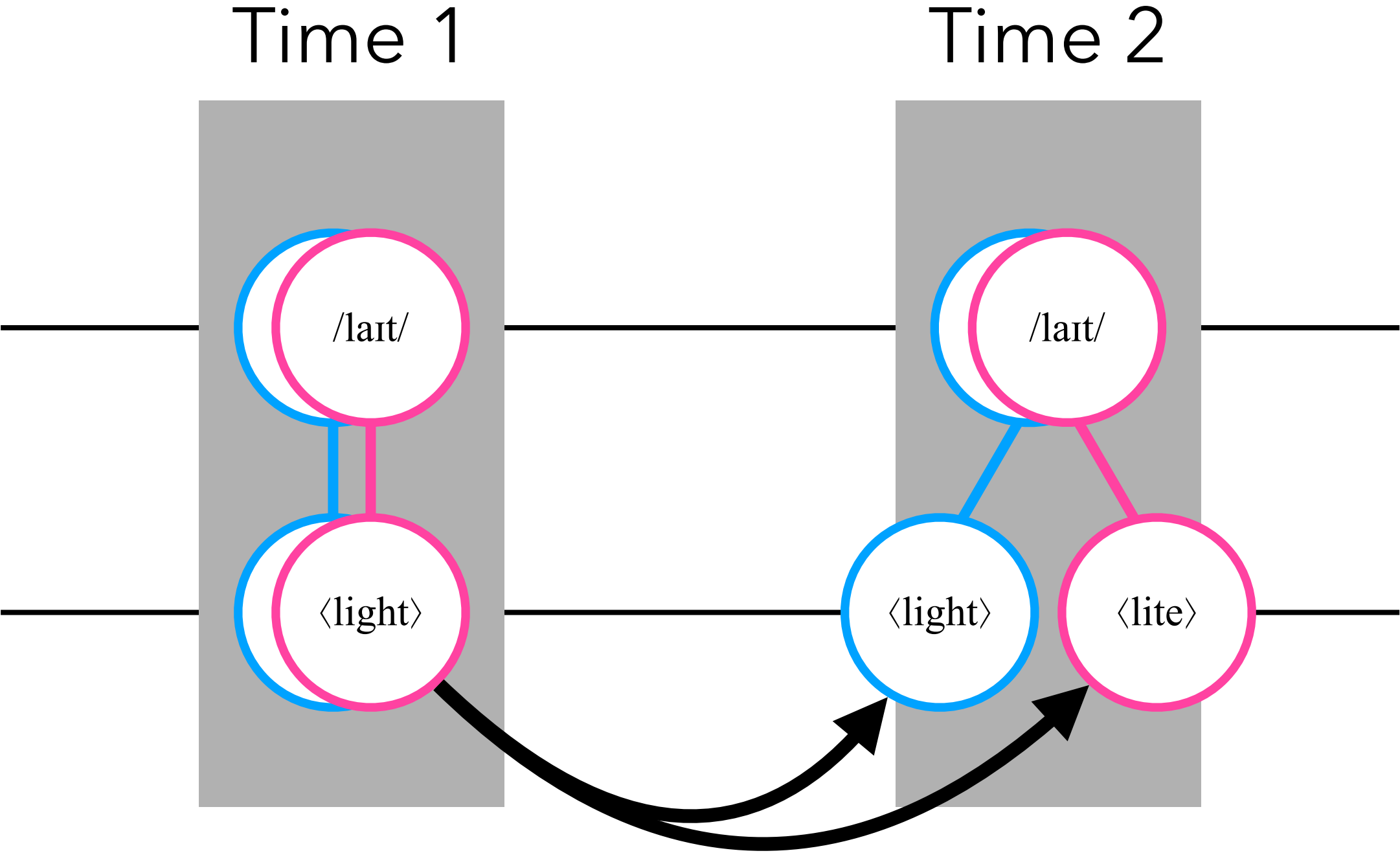
French	/sã/	⟨cent⟩ (hundred)	⟨sang⟩ (blood)	⟨sans⟩ (without)	⟨sens⟩ (feel)		
Danish	/vɛʔǰ/	⟨hver⟩ (every)	⟨vejr⟩ (weather)	⟨vær⟩ (be)	⟨værd⟩ (worth)		
Vietnamese	/zāw/	⟨dao⟩ (knife)	⟨giao⟩ (delivery)	⟨rao⟩ (advertise)			
German	/va:gn̩/	⟨Wagen⟩ (car)	⟨wagen⟩ (dare)				
Irish	/baʃti/	⟨bpáistí⟩ (children)	⟨báistí⟩ (rain)				
Russian	/prɪstʊpʲitʲ/	⟨приступить⟩ (start)	⟨преступить⟩ (transgress)				
Italian	/anno/	⟨hanno⟩ (have)	⟨anno⟩ (year)				
Chinese	/tán/	⟨糖⟩ (sugar)	⟨塘⟩ (embankment)	⟨澹⟩ (pond)	⟨搪⟩ (block)	⟨唐⟩ (Tang)	⟨堂⟩ (hall)



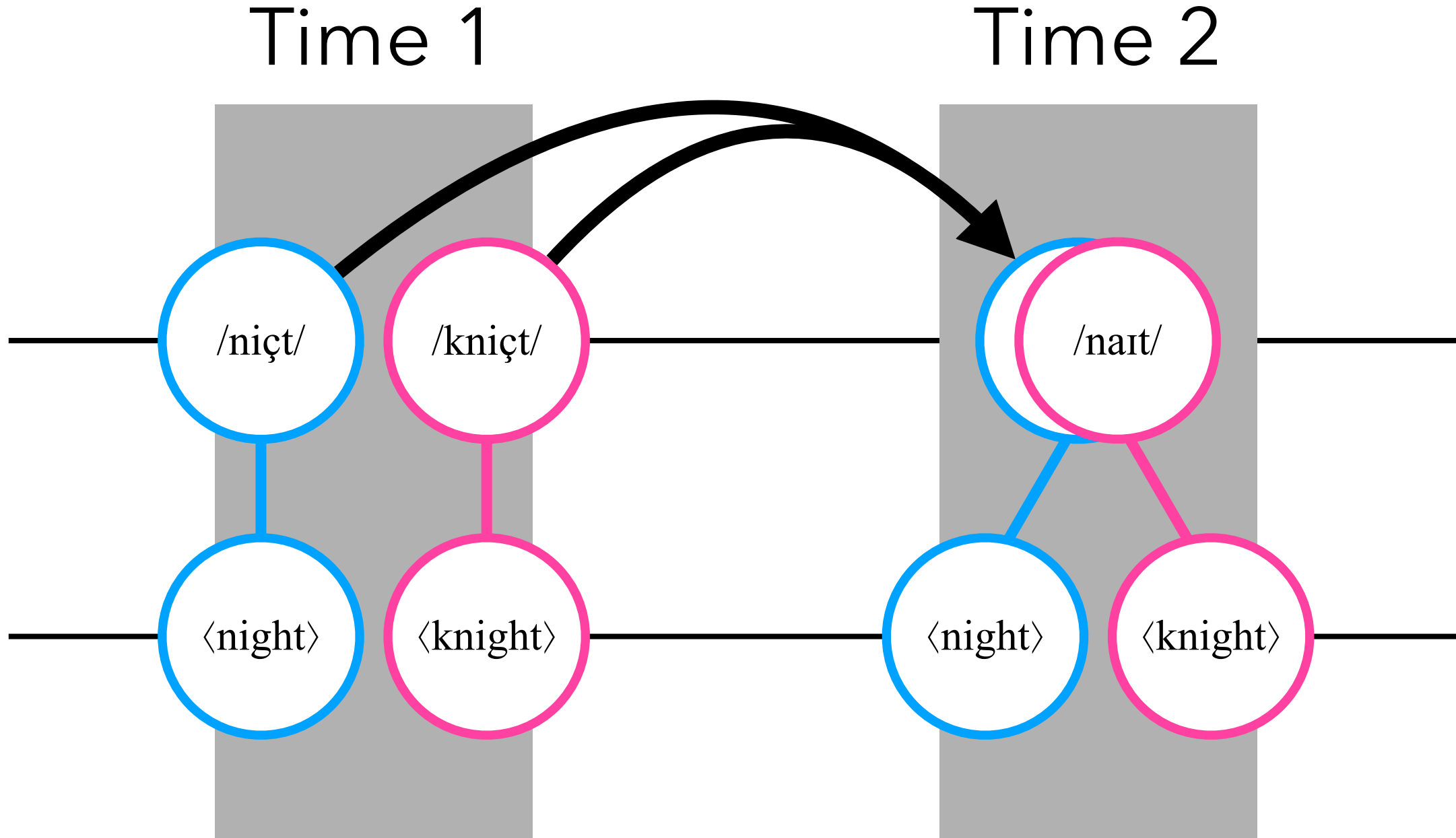
*Left to evolve freely, do writing systems  
sometimes forego some simplicity for  
the sake of informativeness?*



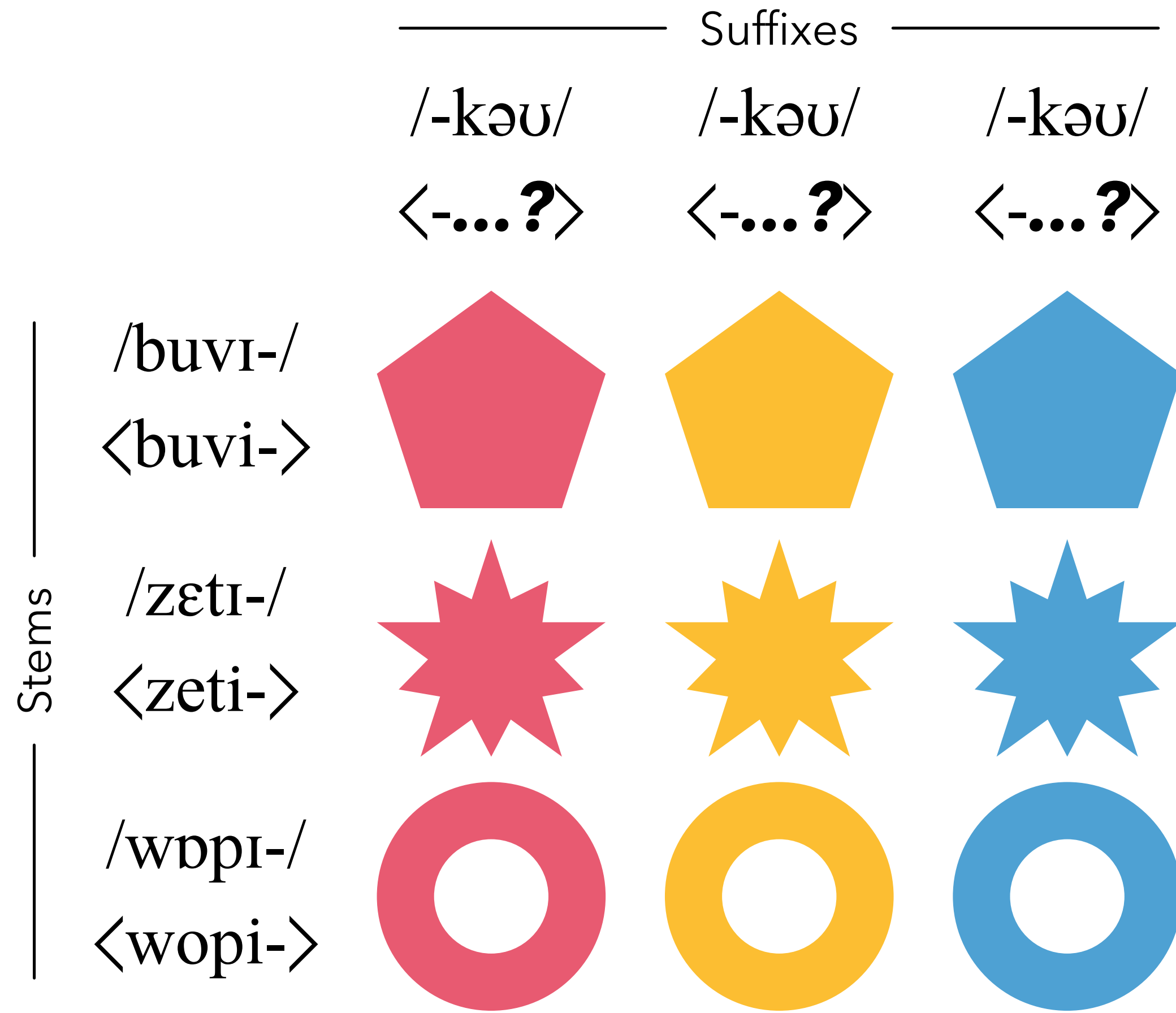
# Differentiation

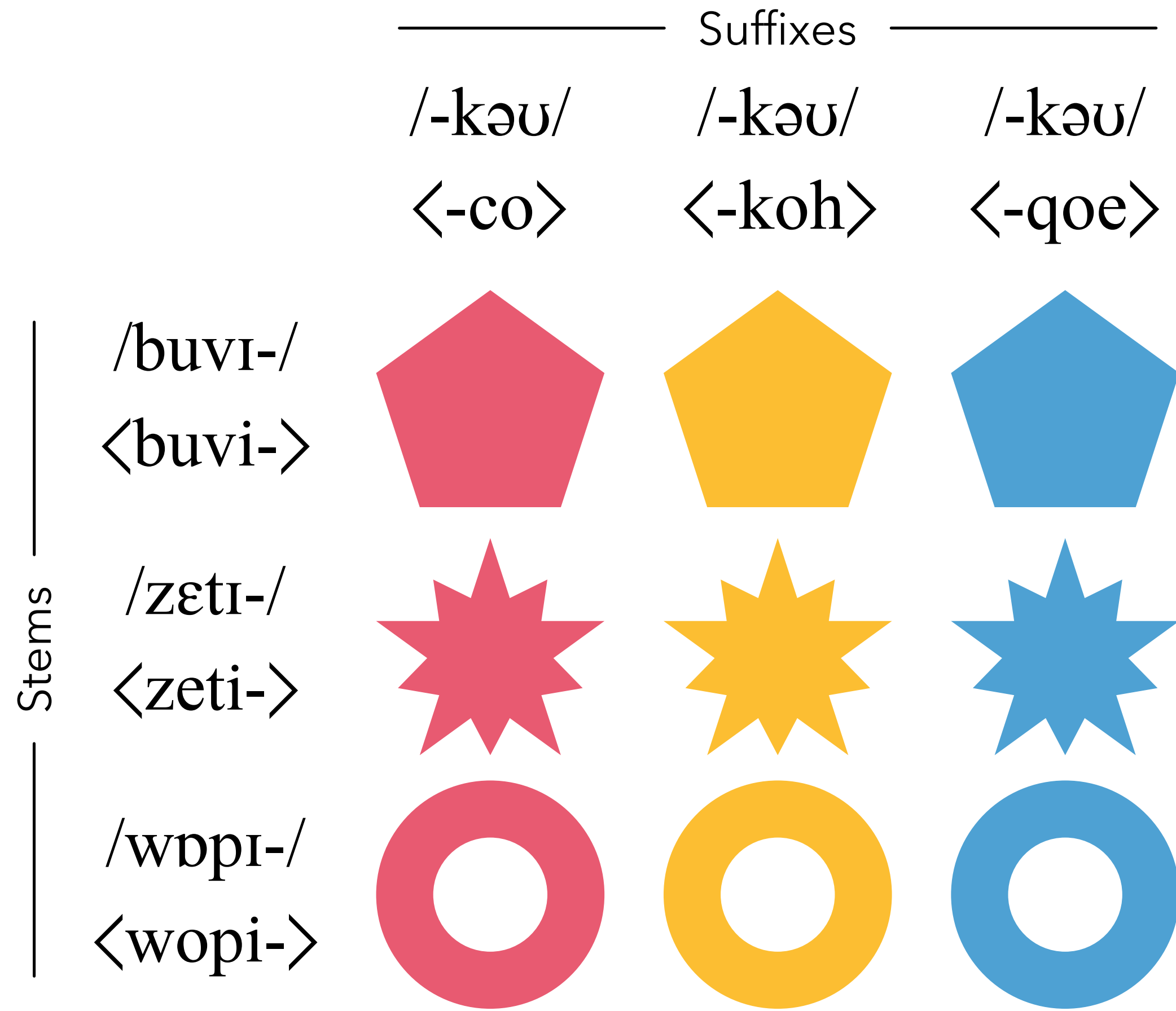


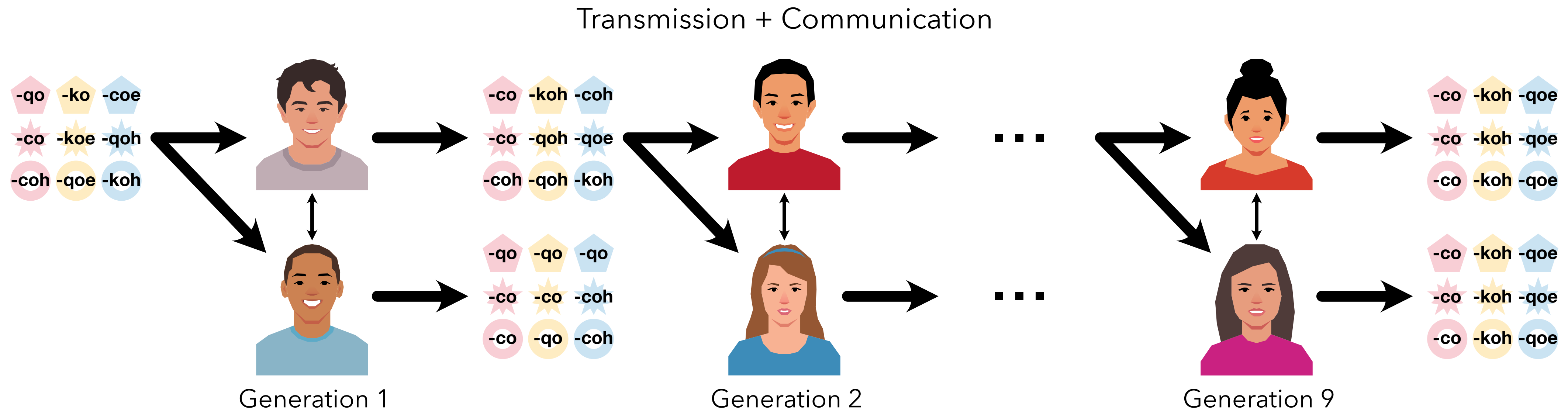
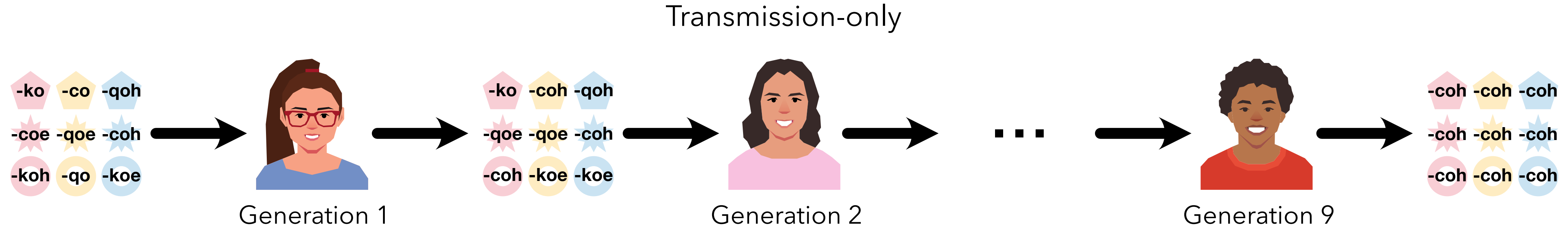
# Conservation



*Experiment 1:  
Differentiation*







Transmission-only

Transmission + Communication

0 1 2 3 4 5 6 7 8 9

0 1 2 3 4 5 6 7 8 9

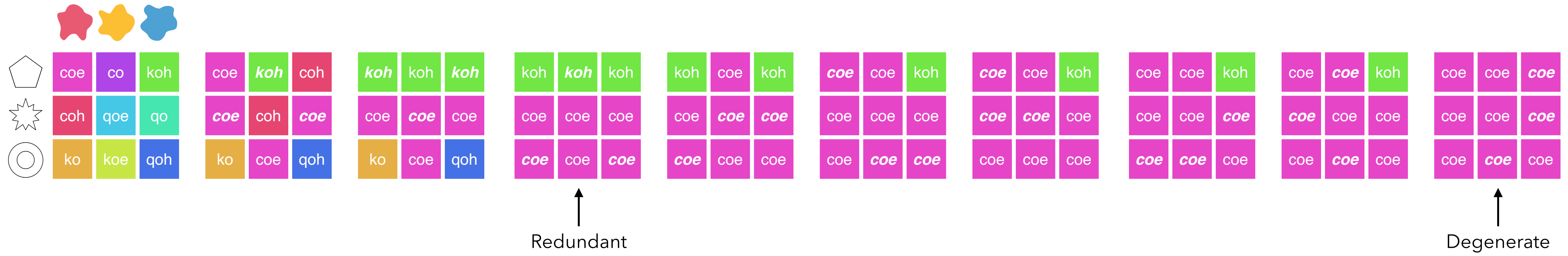
A B C D E F G H I J



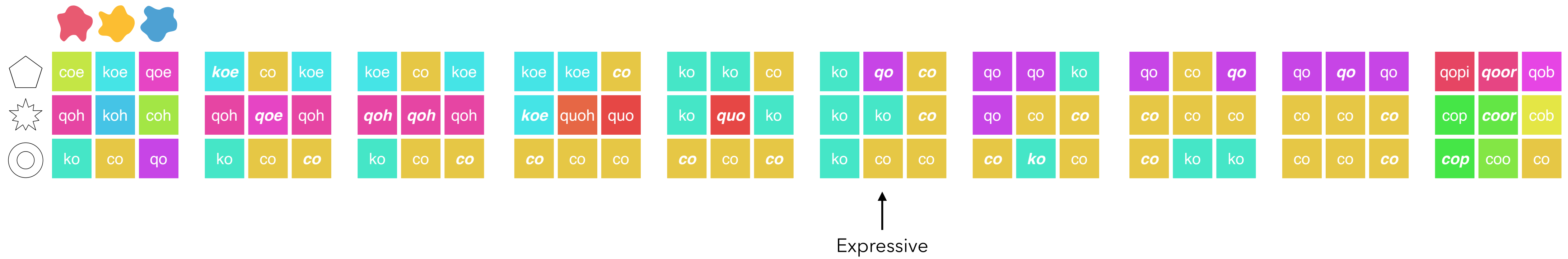
K L M N O P Q R S T

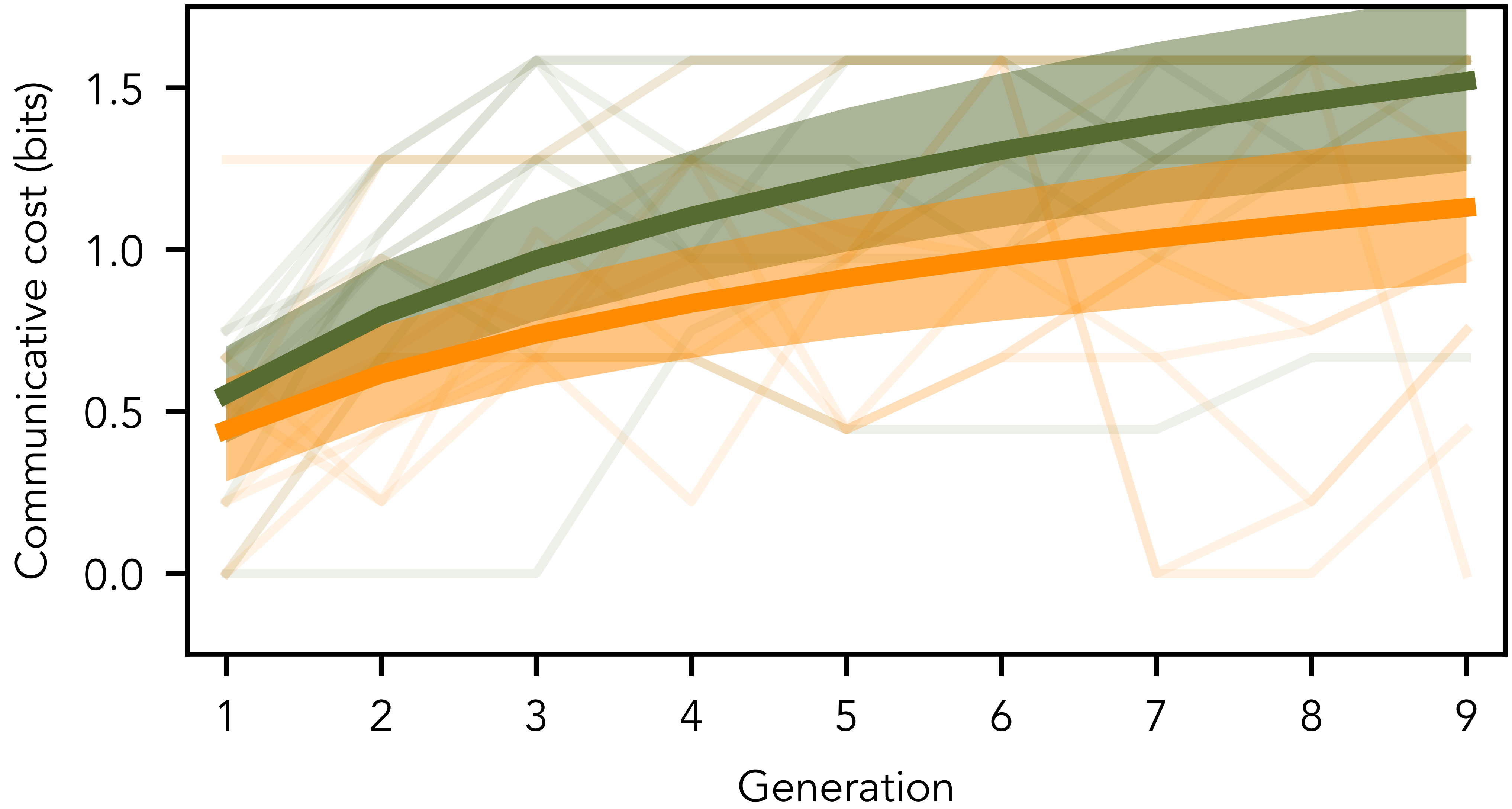


### Transmission-only



### Transmission + Communication

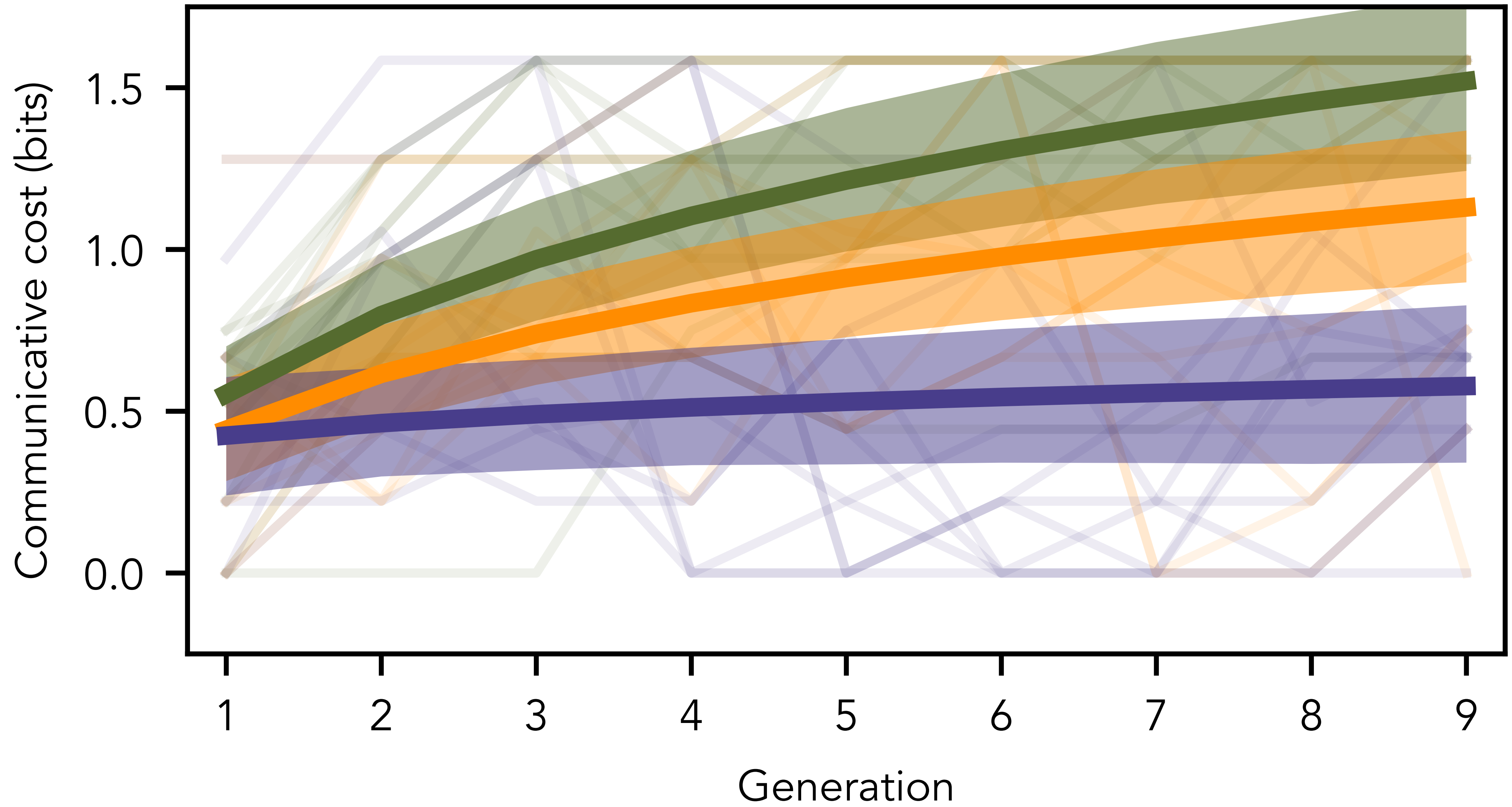




■ Transmission-only

■ Transmission + Communication





Transmission-only



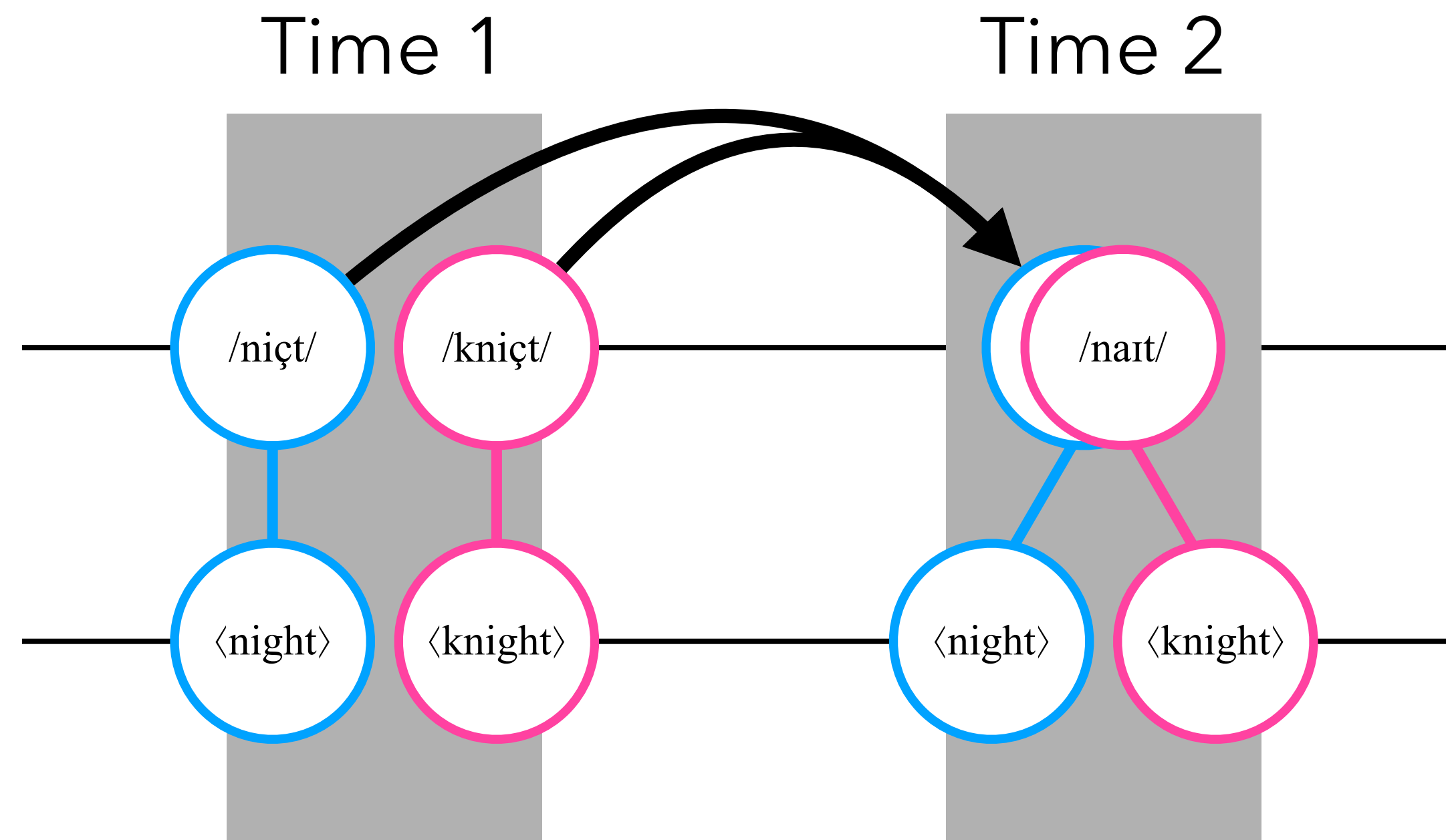
Transmission + Communication

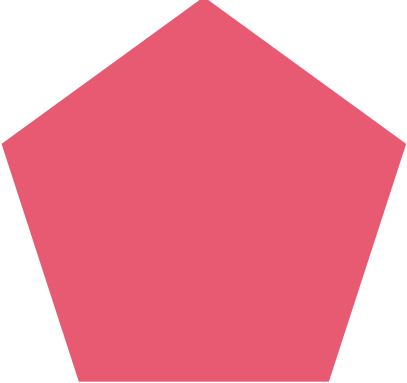
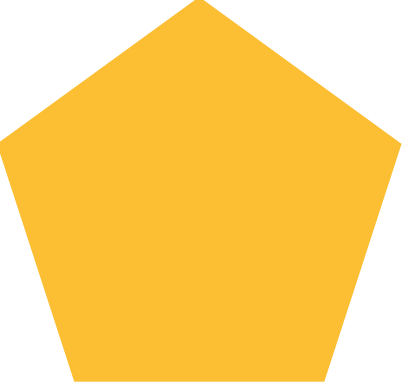
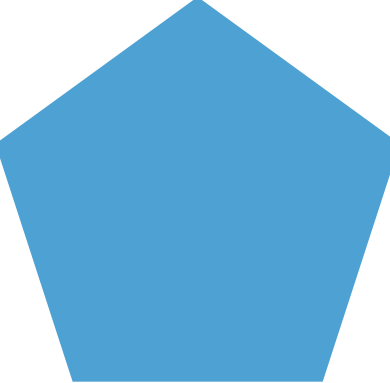
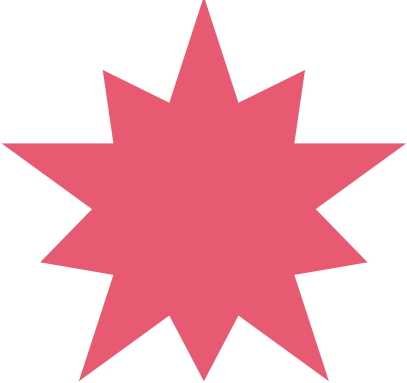


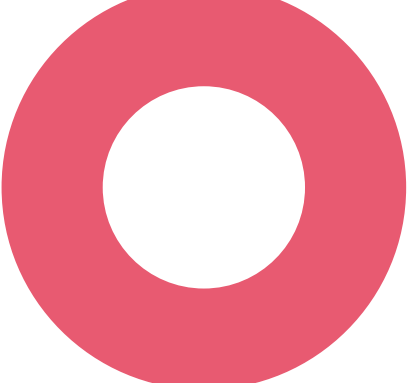

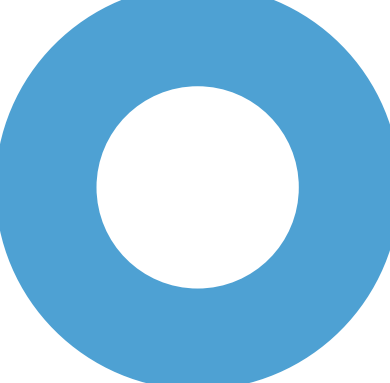


T+C (no homophony)

*Experiment 2:*  
*Conservation*

# Conservation mechanism

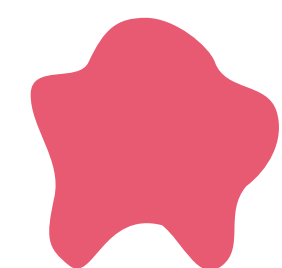


		Suffixes		
		/-fəʊ/ <-foe>	/-ʃə/ <-xa>	/-sɛɪ/ <-sei>
Stems	/buvi-/ <buvi->			
	/zɛti-/ <zeti->			
	/wɒpi-/ <wopi->			

Epoch I  
Generations 1-3

Epoch II  
Generations 4-6

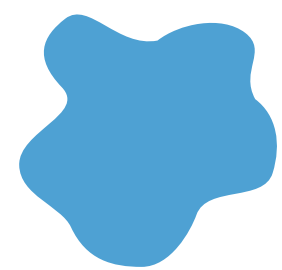
Epoch III  
Generations 7-9



$/-fəʊ/ \longrightarrow /-fɛɪ/ \longrightarrow /-fə/$



$/-ʃə/ \longrightarrow /-ʃə/ \longrightarrow /-fə/$



$/-sɛɪ/ \longrightarrow /-fɛɪ/ \longrightarrow /-fə/$

Sound change 1

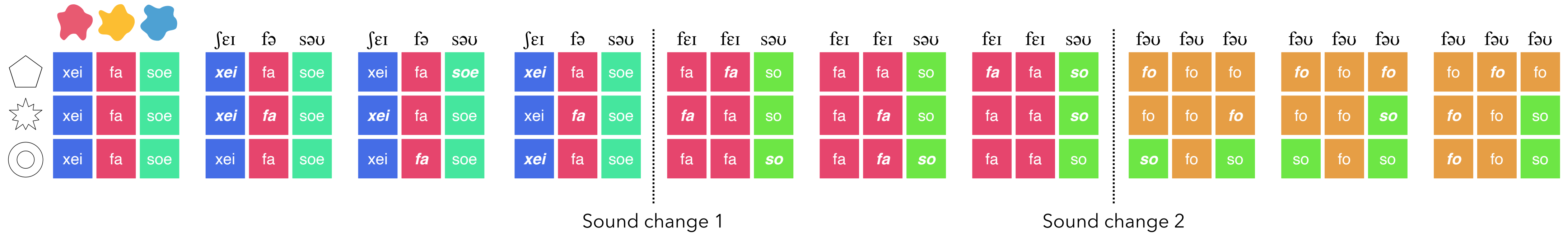
$/s/ \rightarrow /f/, /əʊ/ \rightarrow /ɛɪ/$

Sound change 2

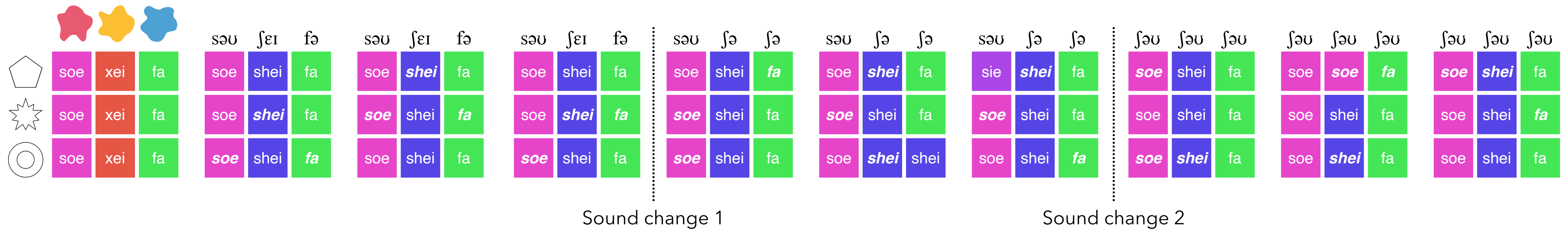
$/ʃ/ \rightarrow /f/, /ɛɪ/ \rightarrow /ə/$

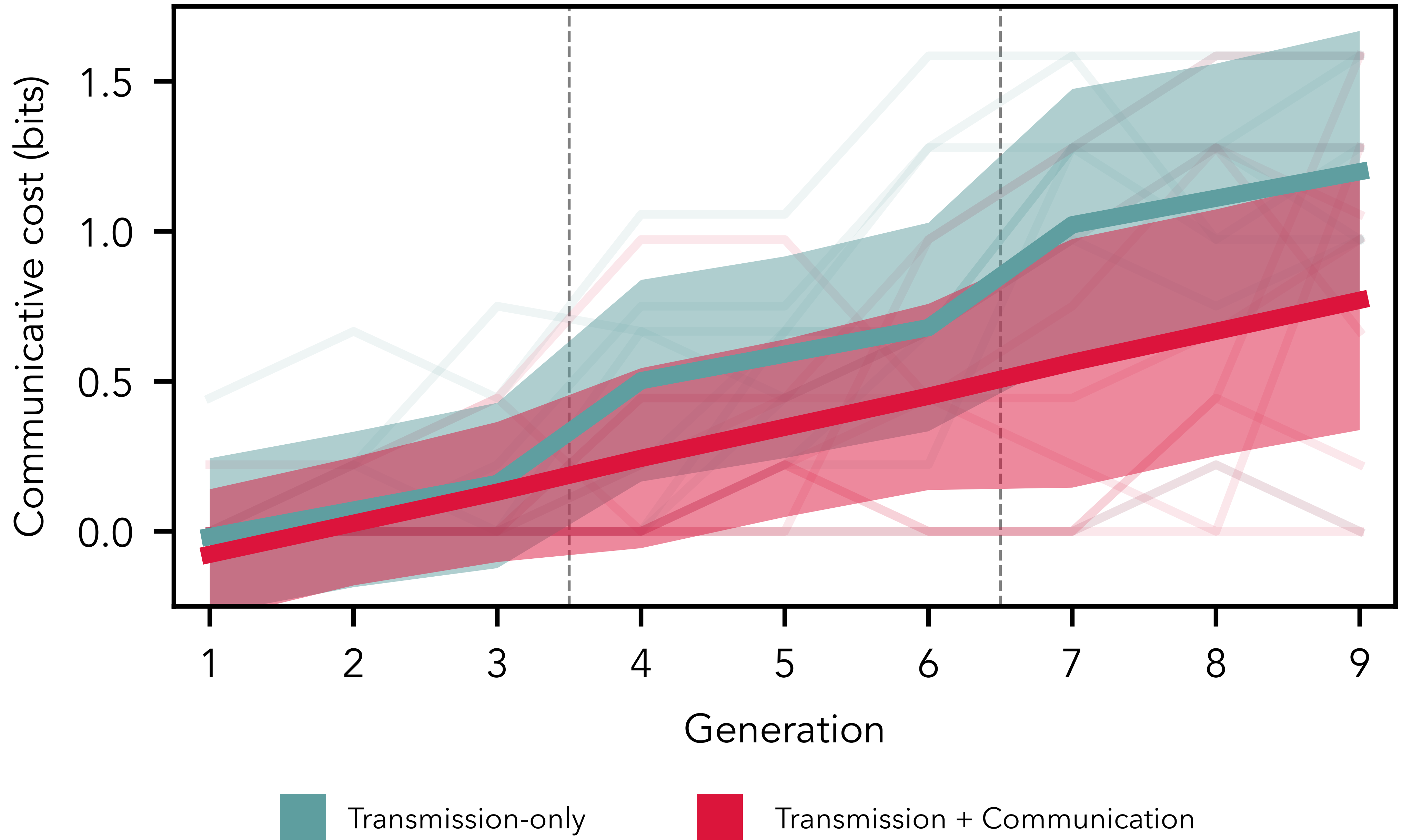


### Transmission-only



### Transmission + Communication

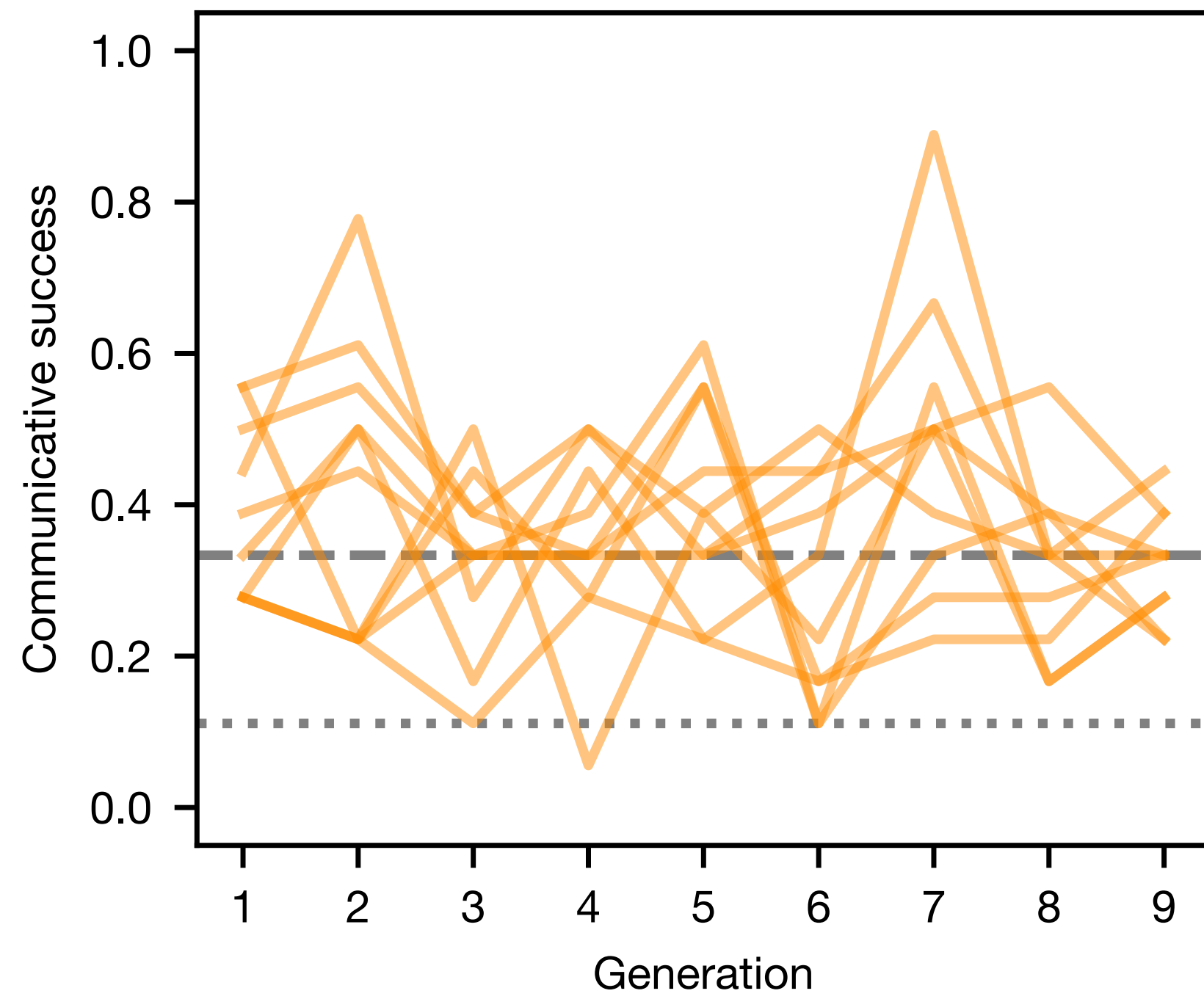




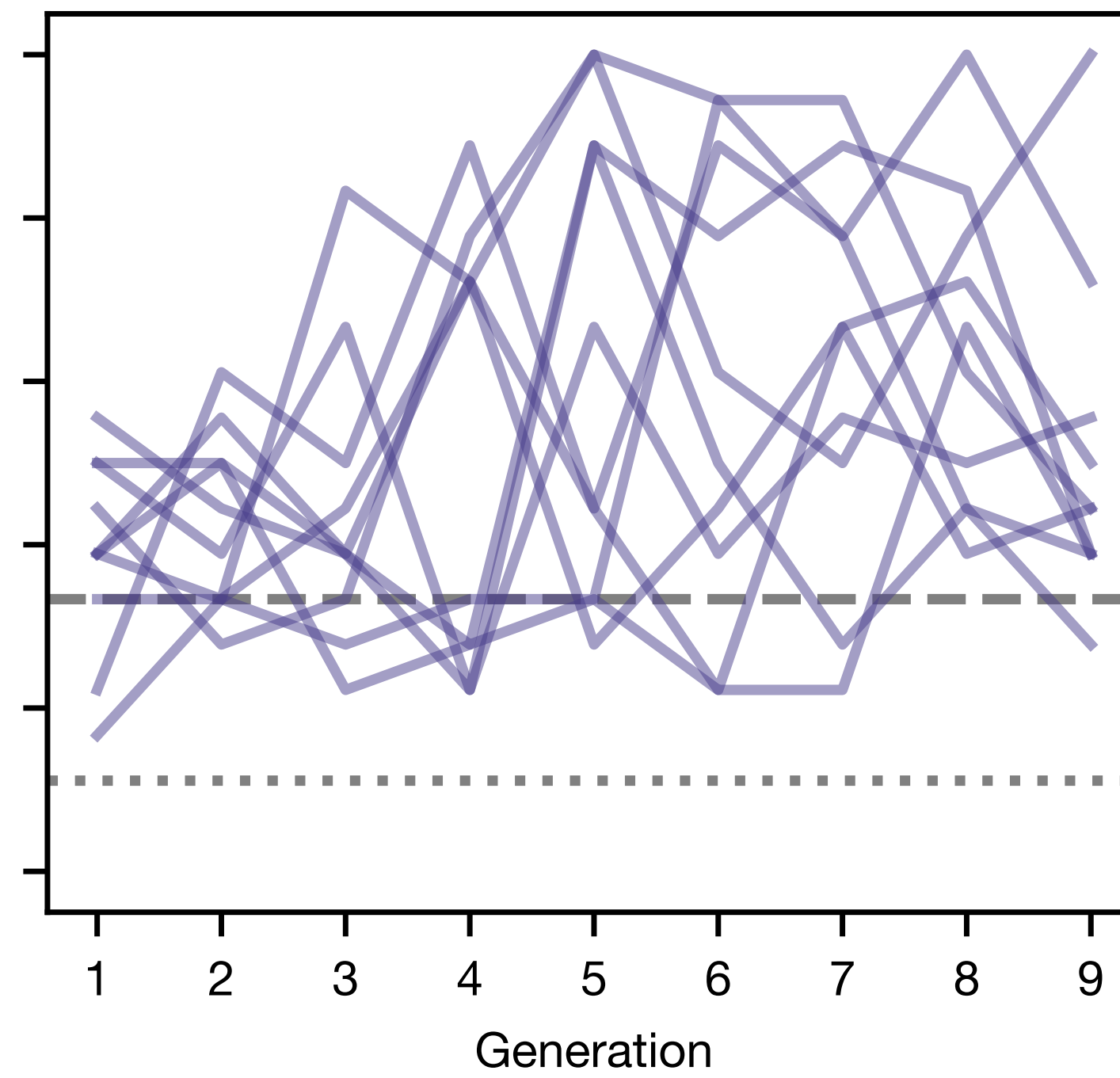


*Conclusions*

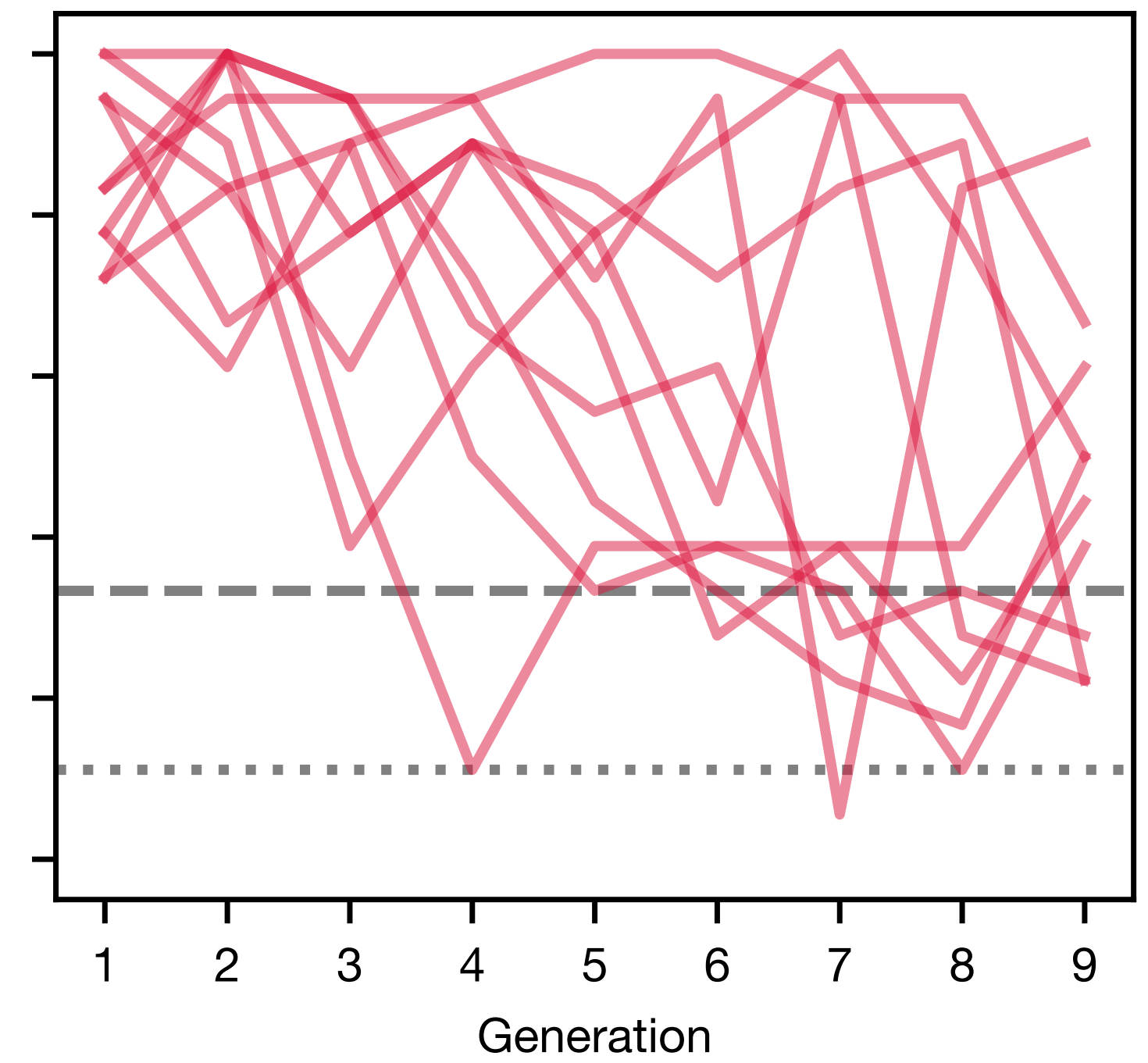
**Experiment 1**  
Differentiation



**Experiment 1b (control experiment)**  
Differentiation (no homophony)



**Experiment 2**  
Conservation



## Hurdles in differentiation

**The apprehension problem:** Participants must grasp the mechanics of the game and its incentive structure

**The theory of mind problem:** Participants must be able to put themselves in the shoes of their partners

**The innovation problem:** Participants must be capable of devising linguistic solutions

**The alignment problem:** Participants must be able to align with an interlocutor separated in time and space

**The social problem:** Participants must be prepared to rebel against their input, overcoming various social stigmas in the process

## Hurdles in conservation

**The learnability problem:** Participants must be able to learn a spelling system that is not transparent

Heterographic spelling permits greater informativeness at the expense of simplicity.

Left to evolve freely, might writing systems sometimes forego some simplicity for the sake of informativeness?

Heterography is sometimes favoured in response to communicative pressure.

*Differentiation* is difficult; it's hard to introduce new spellings in the face of homophony.

*Conservation* is easy; heterography emerges as a by-product of sound merger.



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