

# How do languages evolve in multilingual societies?

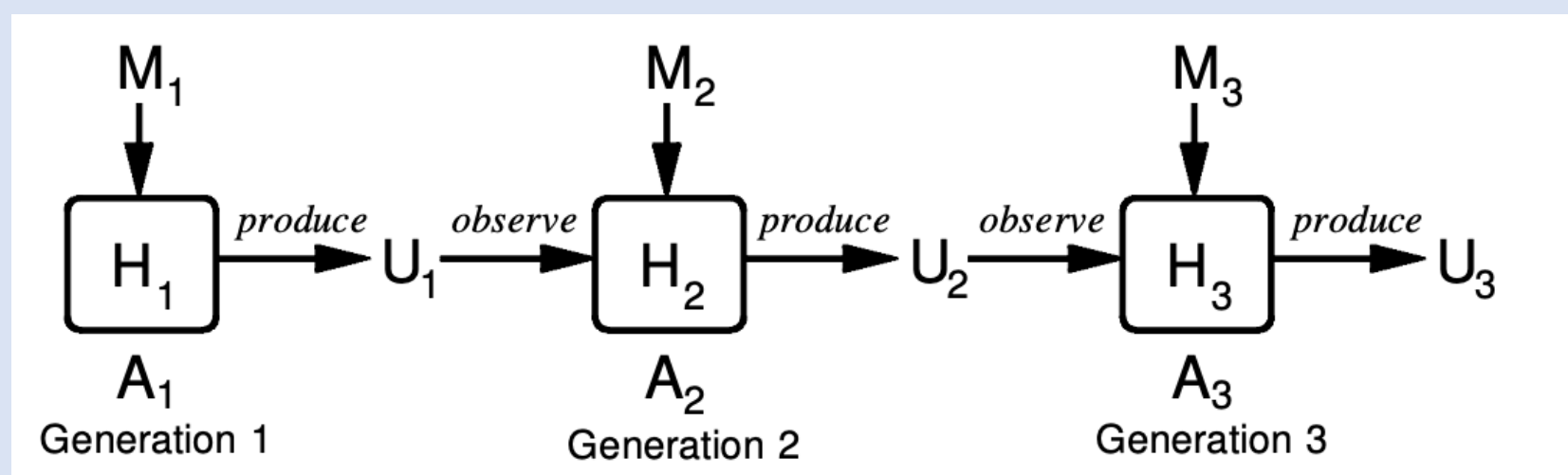
## Evidence from the Iterated Learning paradigm

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### Introduction

- Iterated learning is a paradigm for studying cultural language evolution in the lab.
- Each participant learns and then transmits the language to the next one, in a chain-like fashion.



(Kirby, Cornish & Smith, 2008)

- Previous results: as an artificial, unstructured language is transmitted over generations, its learnability and structure increase ([1]).
- These studies have traditionally examined monolingual speakers and societies ([2],[3]).
- However, variations in linguistic experience between speakers leads to different individual biases, which impact cultural evolution distinctively. ([3]).
- Specifically, monolinguals and bilinguals show different individual biases as a result of prior linguistic experiences ([4]).
- Previous study in the lab: languages learned by bilinguals increase in structure and learnability, but:
  - French-like languages > English-like languages (structure)
  - Effects resemble those in monolingual subjects, but are stronger.

→ How will the specific type of bilingual you are (e.g. English dominant or French dominant) impact iterated learning?

### Materials & Methods

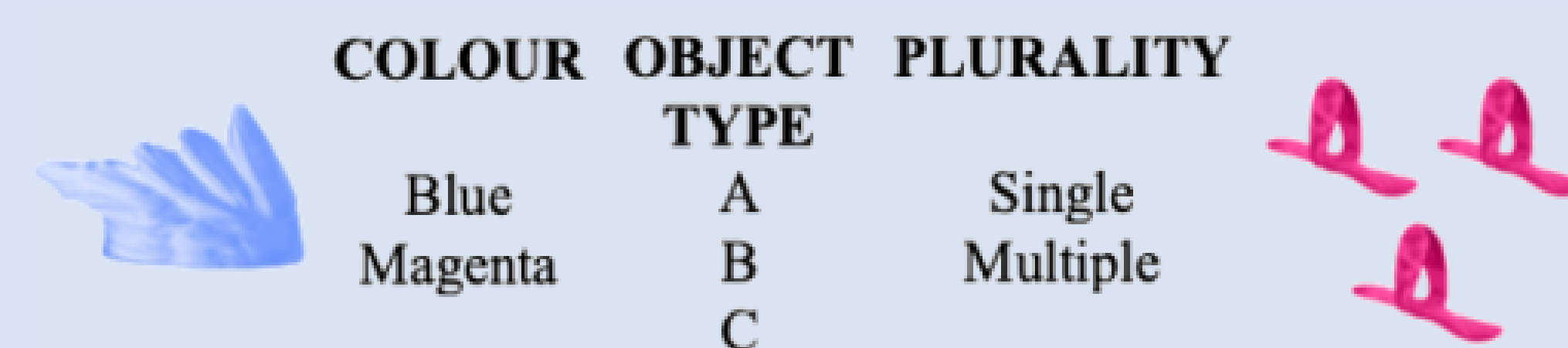
#### Participants

- 64 EN-FR bilingual participants:
  - 32 EN dominant bilinguals, 32 FR dominant bilinguals
  - 8 groups of 8 participants
  - 2 chains (EN-like and FR-like) per group

#### Stimuli

- FR-like and EN-like artificial languages

- Word stimuli: FR-like or EN-like words
  - CV or CVC syllables, same across languages except for diacritics in FR-like
  - 2 or 3 syllables per word
  - EN-like e.g.: 'turgebu'
  - FR-like e.g.: 'pâlpopâl'
- Visual stimuli: unfamiliar objects from NOUN database (Horst & Hout 2016), matched on familiarity and nameability



- Audio stimuli: computer generated speech reading the artificial words in French or English
- 12 items per language

#### Measures

- Learnability = transmission error; the less error, the higher the learnability
- Structure = systematicity, i.e. the degree of relation between form and meaning; the higher systematicity, the higher the structure

#### Procedure:

- For each language learned: seen set (n=9 words) and unseen set (n = 3 words)

1) Exposure: SEEN set + labels + audio



dègu

2) Training: SEEN set + labels



dègu

	po	tur	ti	bé	dè	gu	kà	pâ	è
Syllable 1	○	○	○	○	○	○	○	○	○
Syllable 2	○	○	○	○	○	○	○	○	○
Syllable 3	○	○	○	○	○	○	○	○	○

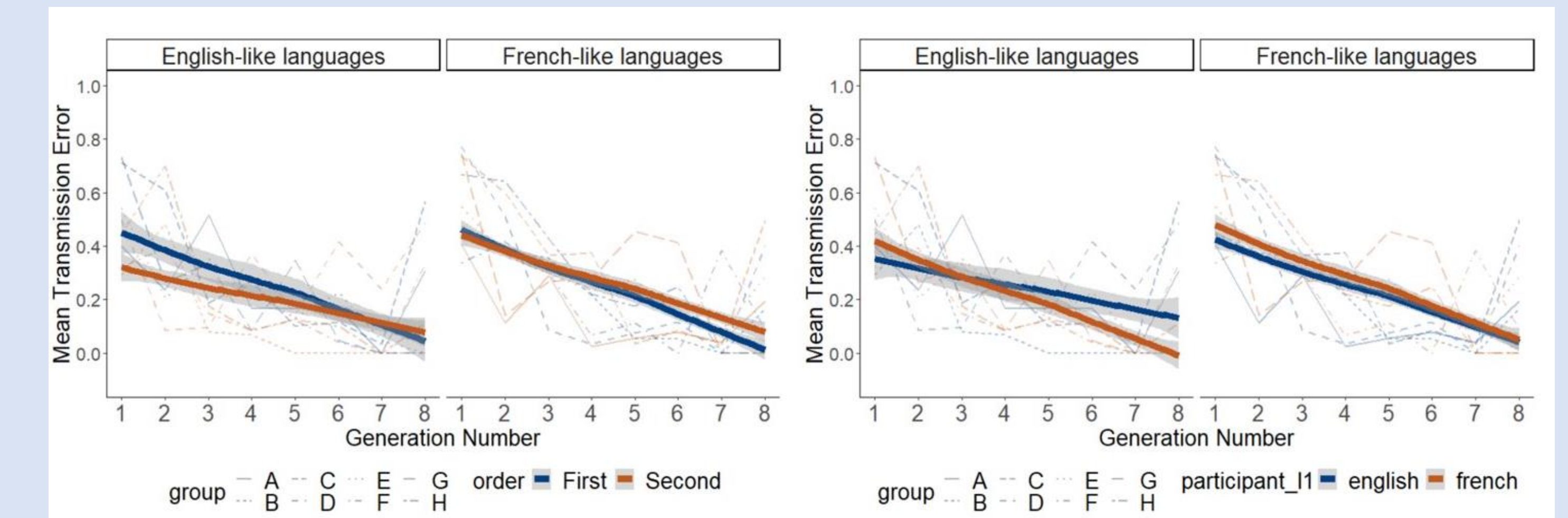
3) Reproduction: SEEN + UNSEEN sets, no labels, no audio



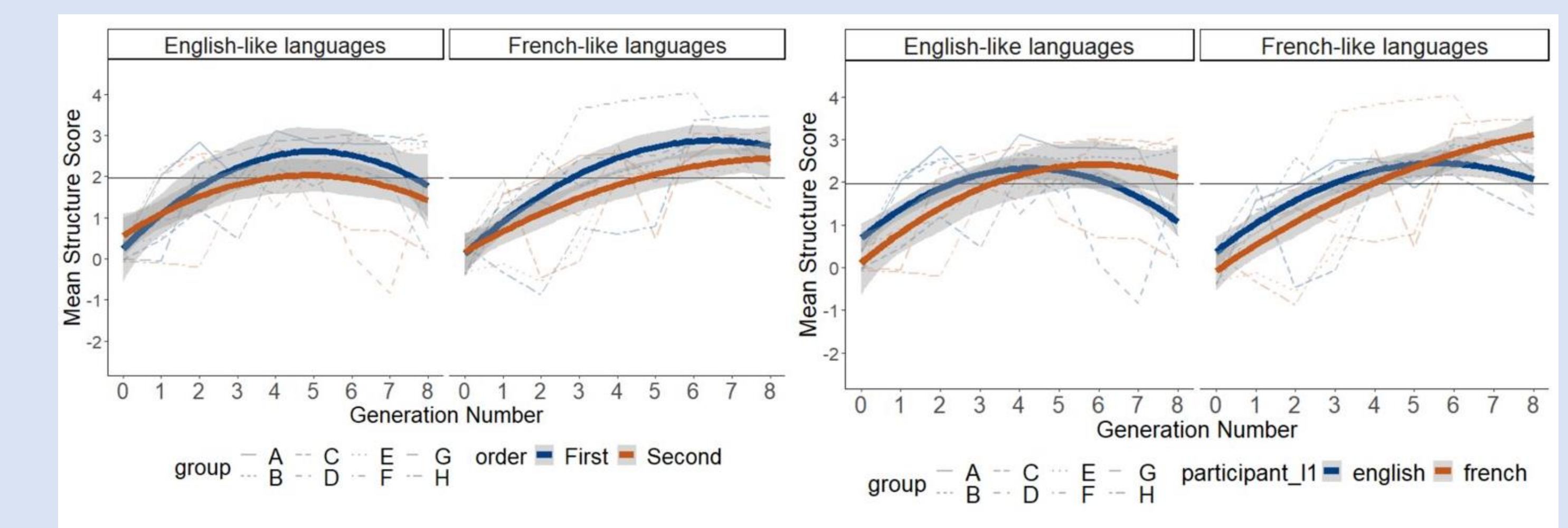
	po	tur	ti	bé	dè	gu	kà	pâ	è
Syllable 1	○	○	○	○	○	○	○	○	○
Syllable 2	○	○	○	○	○	○	○	○	○
Syllable 3	○	○	○	○	○	○	○	○	○

### Results & Discussion

#### → Learnability:



#### → Structure:



#### → Main effects:

- Learnability increases over generations, for both languages and both types of bilinguals.
- Structure increases over generations:
- Languages learned second develop less structure.

#### → Interactions:

- Greater structure over generations in French-like languages.
- Greater structure over generations within French L1 speakers.

→ French has an effect on the structure, at both the L1 and the language type level.

→ Further analyses are currently being conducted.

### Acknowledgements

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### References

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