Iterated Learning in Bilingual Populations: The Impact of Prior Linguistic Knowledge on Cultural Transmission of a Novel Language

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BACKGROUND

How does structure develop in human languages?

(Navarro et al., 2018)

- Iterated Learning paradigm: simulates the integration of individual biases in the cultural transmission of a language throughout generations of a society ([2]).
  - ➢ *Systematic underspecification*: homonymous mapping indicating *only one meaning.*
  - ➢ *Compositional* structure: non-random mapping coding for *more than one meaning.*

Iterated learning studies to date have traditionally examined monolingual societies ([2], [4]).

- Performance on the iterated learning task differs across types of societies ([4]).
- Monolinguals and bilinguals exhibit different individual biases as a result of prior linguistic experiences ([3], [5]).

→ *How does the prior linguistic knowledge of bilinguals affect the evolution of a language using the Iterated Learning paradigm?*

METHODS

Participants: 60 young adult English-French bilinguals from McGill University
Each participated in one French-like and one English-like artificial language
→ 6 "groups" of 2 diffusion chains each

Measures

- *Learnability*: mean transmission error across generations ⟶ how accurately did subjects reproduce the language?
- *Structure*: Monte Carlo sample analysis across generations ⟶ how non-random were their meaning-signal mappings?

Stimuli

COLOUR	OBJECT TYPE	PLURALITY
Blue	A	Single
Magenta	B	Multiple
	C	

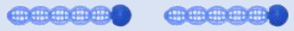
- Labels: 2-3 syllable words, with or without diacritics
  - ➢ French-like artificial language (e.g., "dègu")
  - ➢ English-like artificial language (e.g., "popalpo")

- SEEN set: what the subject learns (*n* = 9)
- UNSEEN set: not learned by subject (*n* = 3)
  - ➢ Integration of personal biases

Cultural transmission: output of *n* becomes input for *n+1*
→ *NO homonym filtering*

Procedure: for each language learned

1) Exposure: SEEN set + labels + audio



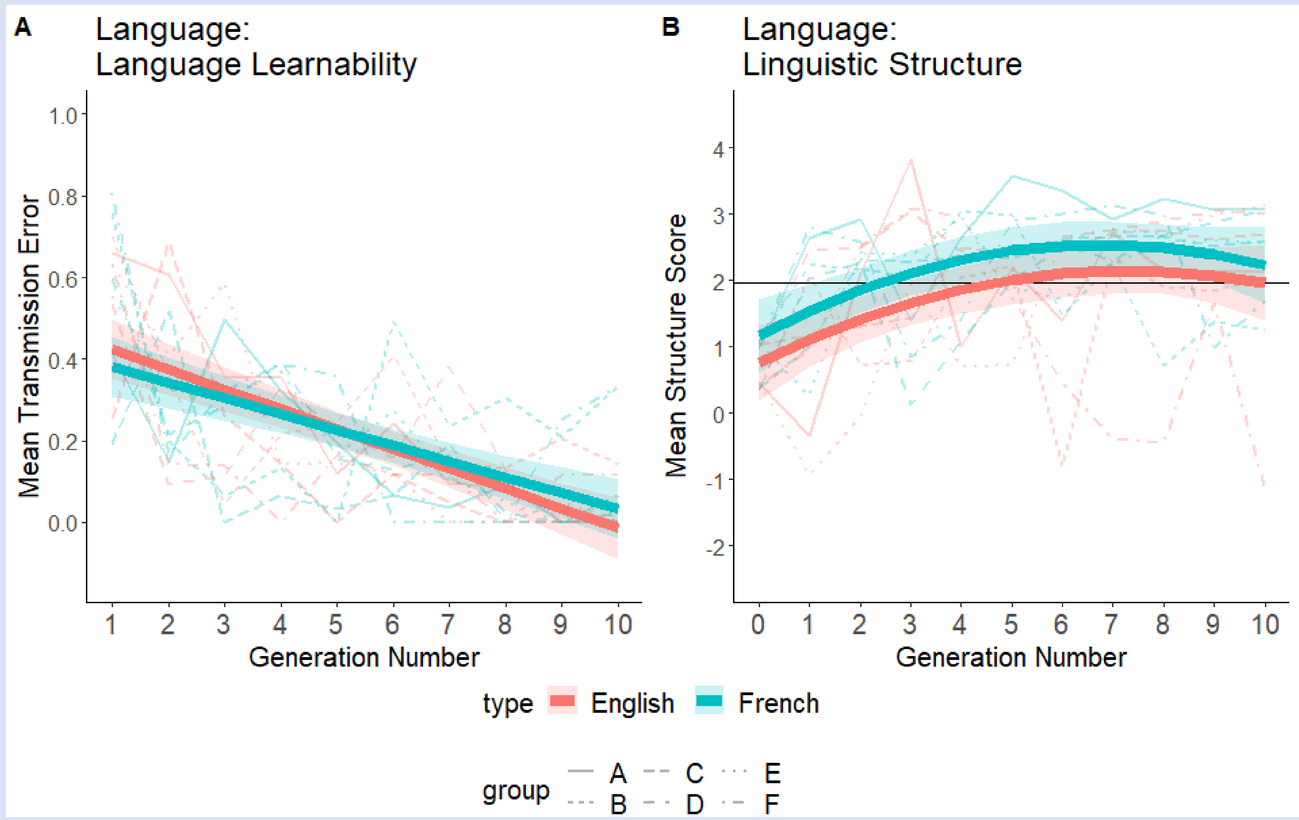
dègu

2) Training: SEEN set + labels

dègu

3) Reproduction: (SEEN + UNSEEN) - labels

RESULTS & DISCUSSION



- **Linear increase** in learnability
- **Nonlinear increase** in structure
  - Structure increases in a quadratic fashion then levels off ([1])
- Presence of *compositional structure* (see Table 1)
- French-like languages > English-like languages (structure)
  - 75% vs. 62%

➢ Effects resemble those in monolingual subjects (e.g., [4]), but they are **stronger**.

Table 1

A Significantly Structured French-like Language

	Blue		Magenta	
	Single	Plural	Single	Plural
Object A	Turti	Turti	Titur	Titur
Object B	Dègu	**Dèkâgu**	Dègu	**Dèkâgu**
Object C	Pogu	**Popâlgu**	Pogu	**Popâlgu**

Notes. A French-like language in generation 6 of diffusion chain 2.

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