The effect of population size on intergenerational language convergence:
An artificial language learning paradigm

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1. Introduction

- When input is variable, children regularize while adults frequency-match, except in cases of highly variable and unpredictable input[1]
- Artificial language learning paradigms using transmission chains allow us to probe the effect of iterated learning on linguistic structure[2]
- Typological work and artificial language learning studies demonstrate a bias for subject-initial word orders[3-5]
- How do learning biases interact with features of the input such as the number of speakers and tokens per speaker?

Question 1

When one word order is dominant within and across multiple speakers, will adults regularize or frequency-match?

Question 2

Is regularization of SOV driven by the number of speakers or the number of tokens per speaker?

Question 3

Will we see the same pattern of regularization vs. frequency-matching in a more ecologically valid context?

2. Methods & Results

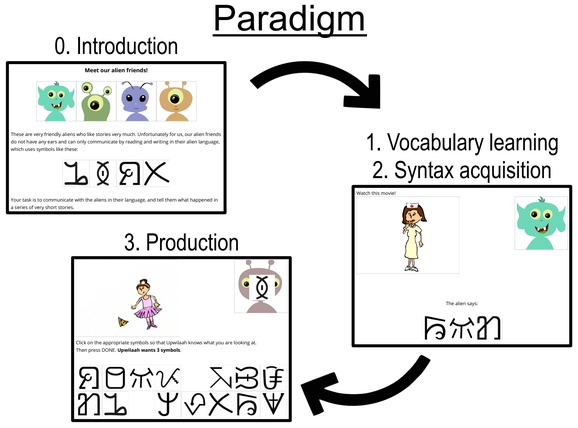
Iterated artificial grammar learning
Output of one generation input to next generation

Version A:
- ✧ 16 hieroglyph symbols
- ✧ Mean output of GenN becomes each alien's production in GenN+1

Version B:
- ✧ 24 nonce words
- ✧ Output of one learner in GenN becomes production for one alien in GenN+1

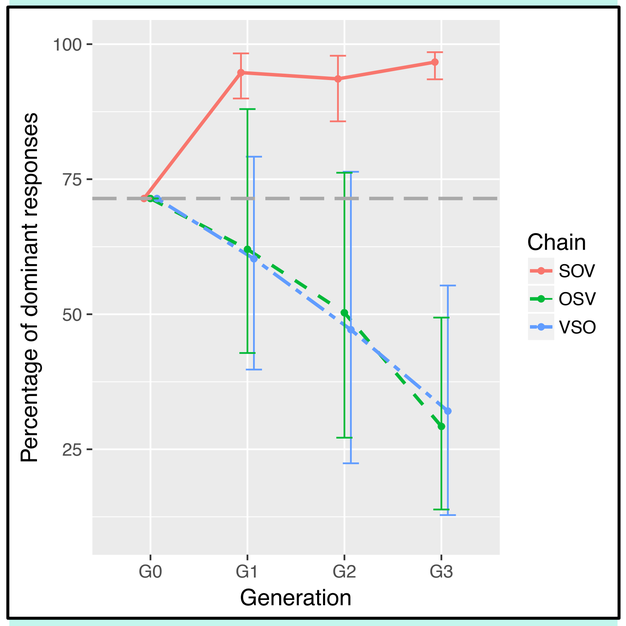
*Checks confirm attending to alien identity

Paradigm



Version A

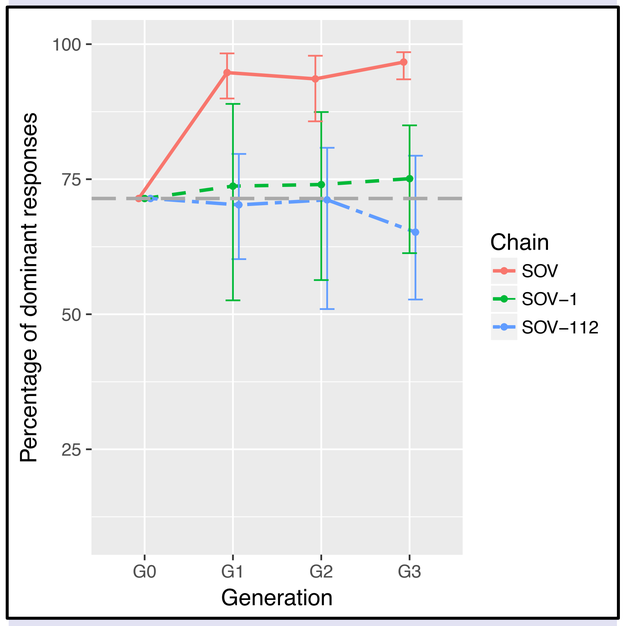
Aliens	Sentences	Dominant	Non-dom.
4	7*4=28	71% SOV	29% OSV
4	7*4=28	71% OSV	29% SOV
4	7*4=28	71% VSO	29% SOV



N = ~10 per generation

Version A

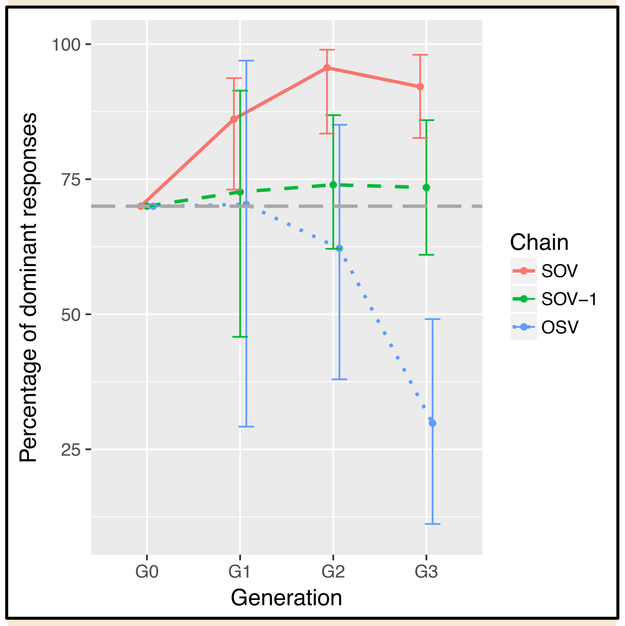
Aliens	Sentences	Dominant	Non-dom.
4	7*4=28	71% SOV	29% OSV
1	28	71% SOV	29% OSV
4	28*4=112	71% SOV	29% OSV



N = ~10 per generation

Version B

Aliens	Sentences	Dominant	Non-dom.
6	10*6=60	70% SOV	30% OSV
1	60	70% SOV	30% OSV
6	10*6=60	70% OSV	30% SOV



N = 6 per generation

4. Discussion

- Subject-initial word orders are privileged in non-gestural artificial language tasks with native English speakers
  - Even when the alternate word order shares as many features with participants' native language and is more common in the input, SOV is preferred to both OSV and VSO
- Whether adults frequency-match or regularize depends on both the amount of data and its distribution across speakers
  - Regularization occurs when there is insufficient information about each speaker

References: [1] Hudson Kam, C. L., & Newport, E. L. (2009). Getting it right by getting it wrong: When learners change languages. *Cognitive Psychology, 59*, 30-66. [2] Kirby, S., Cornish, H., & Smith, K. (2008). Cumulative cultural evolution in the laboratory: An experimental approach to the origins of structure in human language. *Proceedings of the National Academy of Sciences*, *105*, 10681-10686. [3] Greenberg, J. (1963). Some universals of grammar with particular reference to the order of meaningful elements. In J. Greenberg (Ed.), *Universals of Language* (pp. 73–113). Cambridge, MA: MIT Press. [4] Dryer, M. S. (2005). Order of subject, object, and verb. In M. Haspelmath, M. S. Dryer, D. Gil, & B. Comrie (Eds.), *The World Atlas of Language Structures* (pp. 330–333). Oxford, UK: Oxford University Press. [5] Goldin-Meadow, S., So, W. C., Özyürek, A., & Mylander, C. (2008). The natural order of events: How speakers of different languages represent events nonverbally. *Proceedings of the National Academy of Sciences*, *105*, 9163–9168.
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