

The role of variability in linguistic generalization: evidence from a computerized language training game with 7-year-olds

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Hypothesis: greater variability in the input leads to greater generalization

Successful language learning involves acquiring abstract structures which operate across certain linguistic items. Generalization should be more likely when learners are exposed to more varied instances, since this allows linguistic structures to be disassociated from trained instances (Bybee 1995; Ramscar et al. 2010; Wonnacott et al. 2012). The current work explores this hypothesis in a second language training experiment with child learners.

Current study

Japanese spatial postpositions

“above” sentence	<p><i>banana o chokorēto no ue ni oku</i></p> <p>object case-marker above oku = put</p> <p>“Put the banana above the chocolate”</p>
“below” sentence	<p><i>banana o chokorēto no shita ni oku</i></p> <p>object case-marker below oku = put</p> <p>“Put the banana below the chocolate”</p>

High variability (HV) condition: 28 unique “above” sentences, 28 unique “below” sentences, each presented once (total = 56); 8 nouns in various combinations (each noun equally frequent in each sentence type and position)

Low variability (LV) condition: 2 “above” sentences, 2 “below” sentences, each presented 14 times (total = 56); each sentence had two unique nouns (8)

Each condition tested on sentences with novel nouns

Computerized training game

Recorded by a native speaker of Japanese

Participant hears:
banana o chokorēto no ue ni oku

Participant should put the banana above the chocolate. If they do something else, they see a demonstration of the correct response and have another go. This is repeated until the participant is correct.

Input variability improves generalization

Thirty-eight 7-8-year-old native English speakers with no knowledge of Japanese or any other postpositional language

Procedure

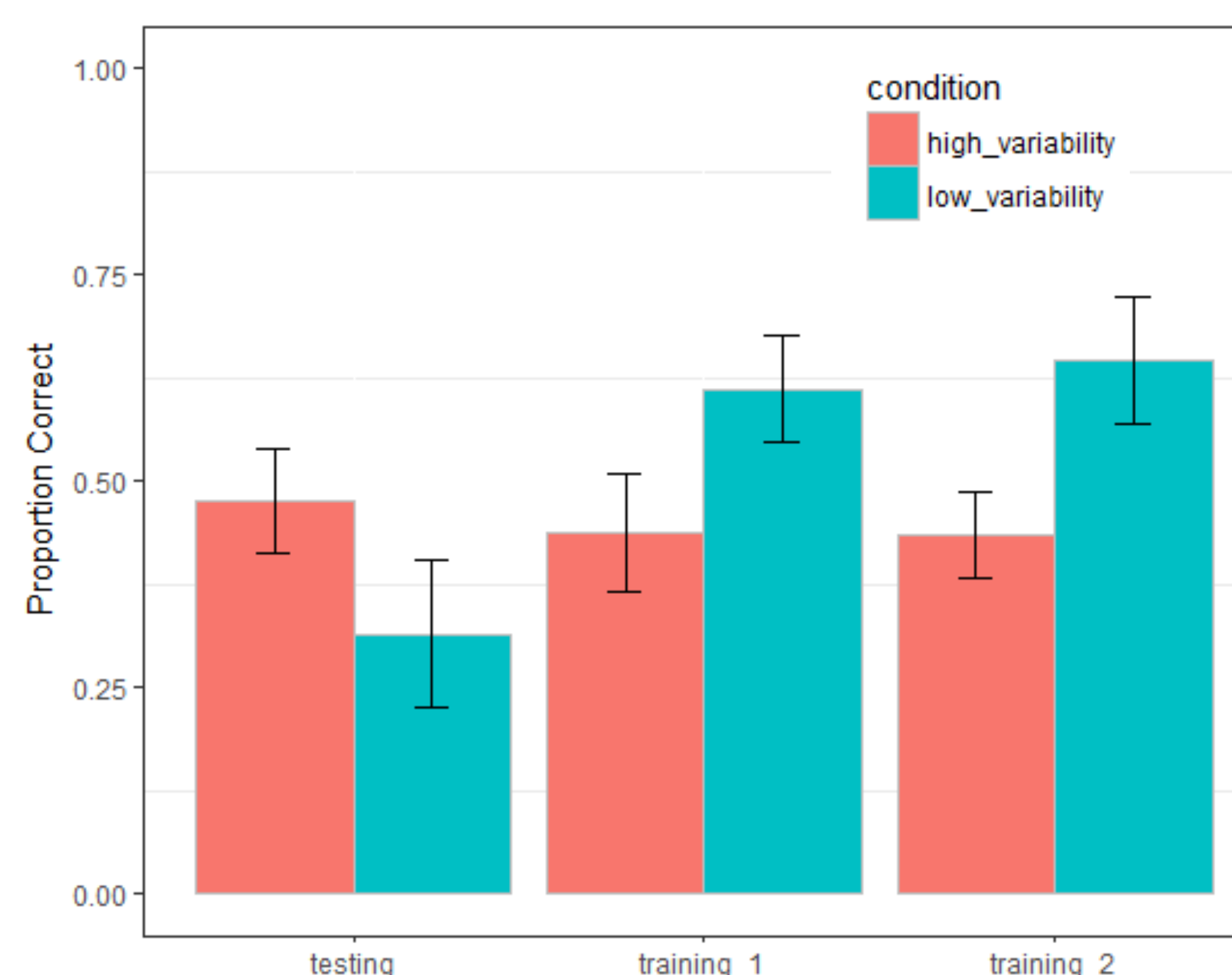
Day 1

- Vocab identification task (introduces training nouns)
- Training game: 32 trials
 - HV: 16 unique “above” & 16 unique “below” sentences
 - LV: 8 blocks of 2 “above” & 2 “below” sentences

Day 2 (one week later)

- Training game: 24 trials
 - HV: 16 unique “above” & 16 unique “below” sentences
 - LV: 6 blocks of 2 “above” & 2 “below” sentences
- Vocab identification task 2 (introduces testing nouns)
- Testing: 24 trials (untrained nouns & no feedback)

Results



Training
main effect of variability:
LV > HV

Testing
main effect of variability:
HV > LV

		HV	LV
ILLEGAL MOVES (4)		1%	10%
LEGAL MOVES	Incorrect picture (2)	23%	23%
	Correct picture, wrong position (1)	28%	36%
	CORRECT! (1)	48%	32%

Only HV condition were more likely to move the correct picture to the correct position

Summary and discussion

Although both groups of participants learned to move the first item, only the HV group were above chance in knowing the abstract meaning of the spatial postpositions

- Variation allows learners to dissociate structures from particular trained instances

Participants show stronger performance in training when repeatedly trained on the same sentences (LV advantage)

- Distributions of constructions in natural language input are often skewed around particular items. Future work will look at benefits of skewed input → combine repeating and unique sentences in training