

Age 2 toddlers' imitation of sublexical information has long-term effects on the encoding of novel sound forms

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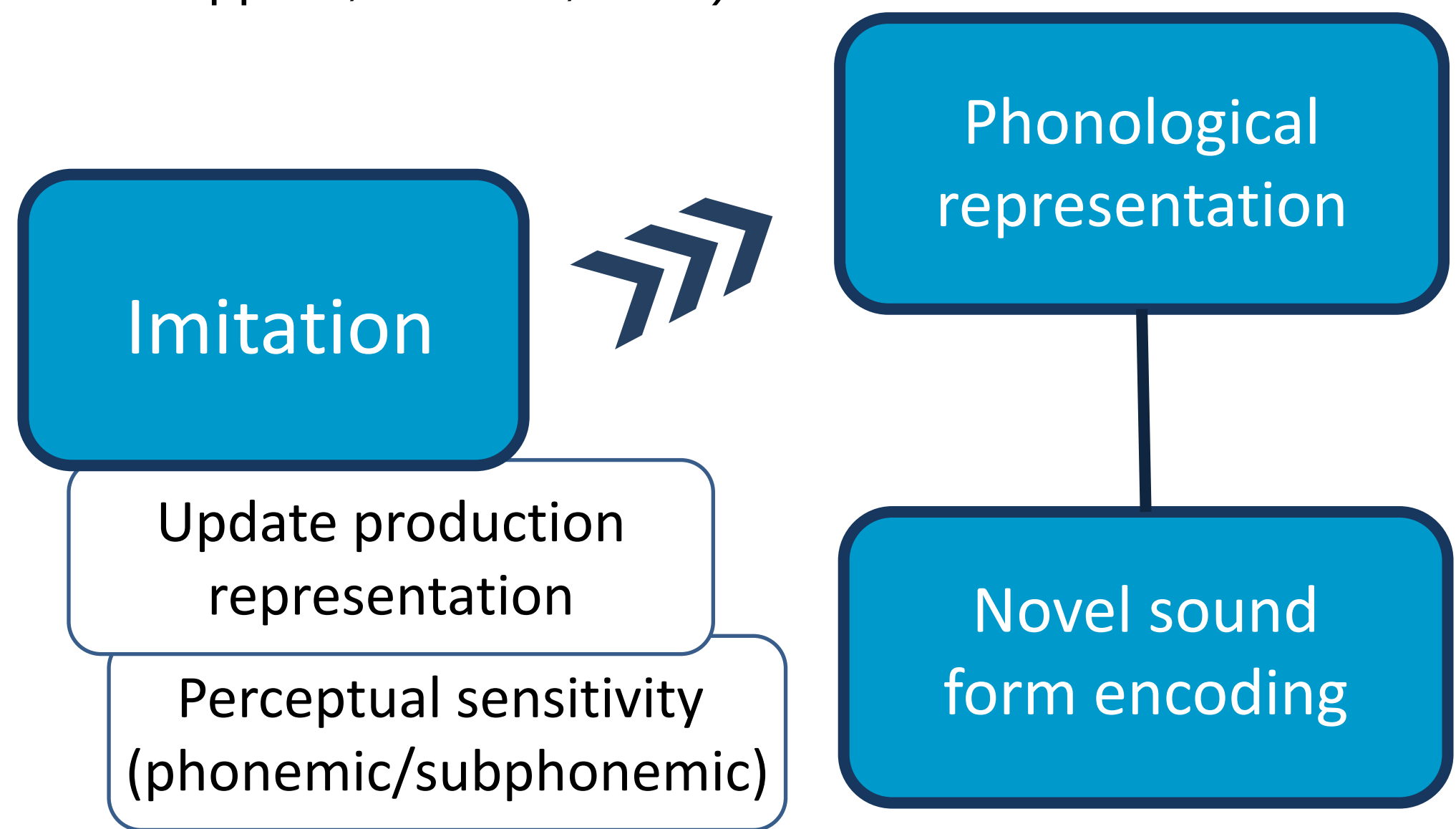
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Introduction

- Phonetic imitation is an important language learning process in which children gradually develop adult-like phonological representations by repeatedly approximating adult models
- Children's individual difference in the imitation ability would be an indication of their sensitivity for sounds, which affects the construction of phonological representation
- Children at age 2 are still developing their phonological system, but with considerable individual variation (Li, Cheung, & Tsao, 2014)
- Children's phonological capacities would affect children's encoding of novel sound forms, an ability prerequisite for word learning (Li & Cheung, to appear; Metsala, 1999)



Research goal

- To investigate whether age 2 toddlers' phonetic imitation at the sublexical level facilitates their encoding of novel sound forms at a later age
 - Target phonemes: /p/, /t/, /k/
 - Stops become stabilized during age 2 to 3
- The phonemic level
 - Scores of produced stop categories
- The subphonemic level
 - Voice Onset Time (VOT) measurements

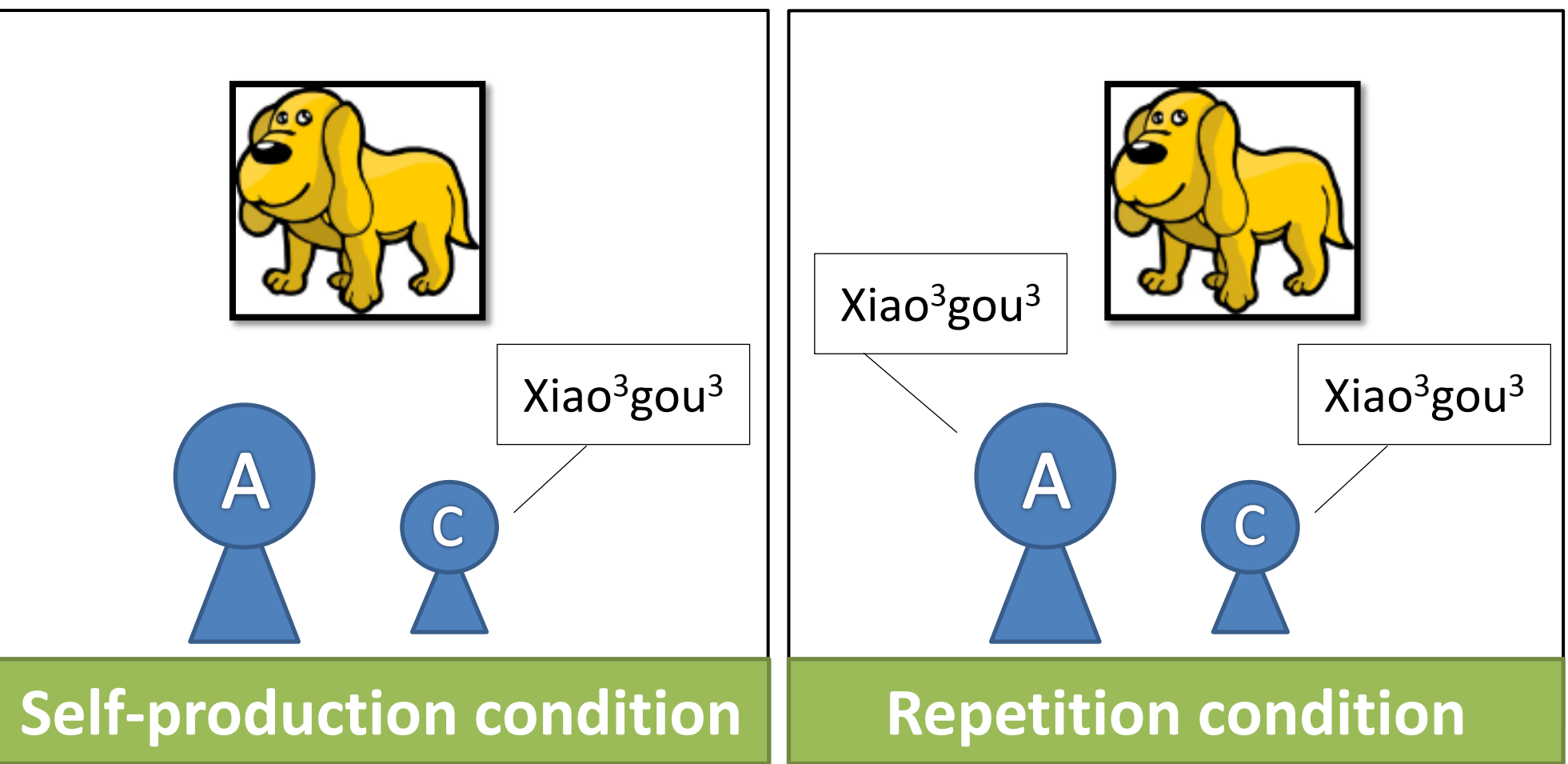
Method

Participants

- Sixteen children (9 boys) were followed for half a year

	Time 1 (T1)	Time 2 (T2)
Average age	25.03	31.09
Average range	24.1-26.63	29.93-32.63

Picture naming task



Novel word encoding

- Children repeated nonwords given by adults

Length	Stimuli
1-word	biao¹-luo³
2-word	bao⁴-li³ gao¹-dan⁴

Scoring at the phonemic level

Target	C_production	Scoring			
		aspiration	manner	place	total
p	p	1	1	1	3
p	p ^h	0	1	1	2

Scoring at the subphonemic level

- Absolute z-score value was computed for children's correct production as referencing to adults' production

$$|z_{child}| = \frac{|VOT_{child} - \bar{x}_{adult}|}{s_{adult}}$$

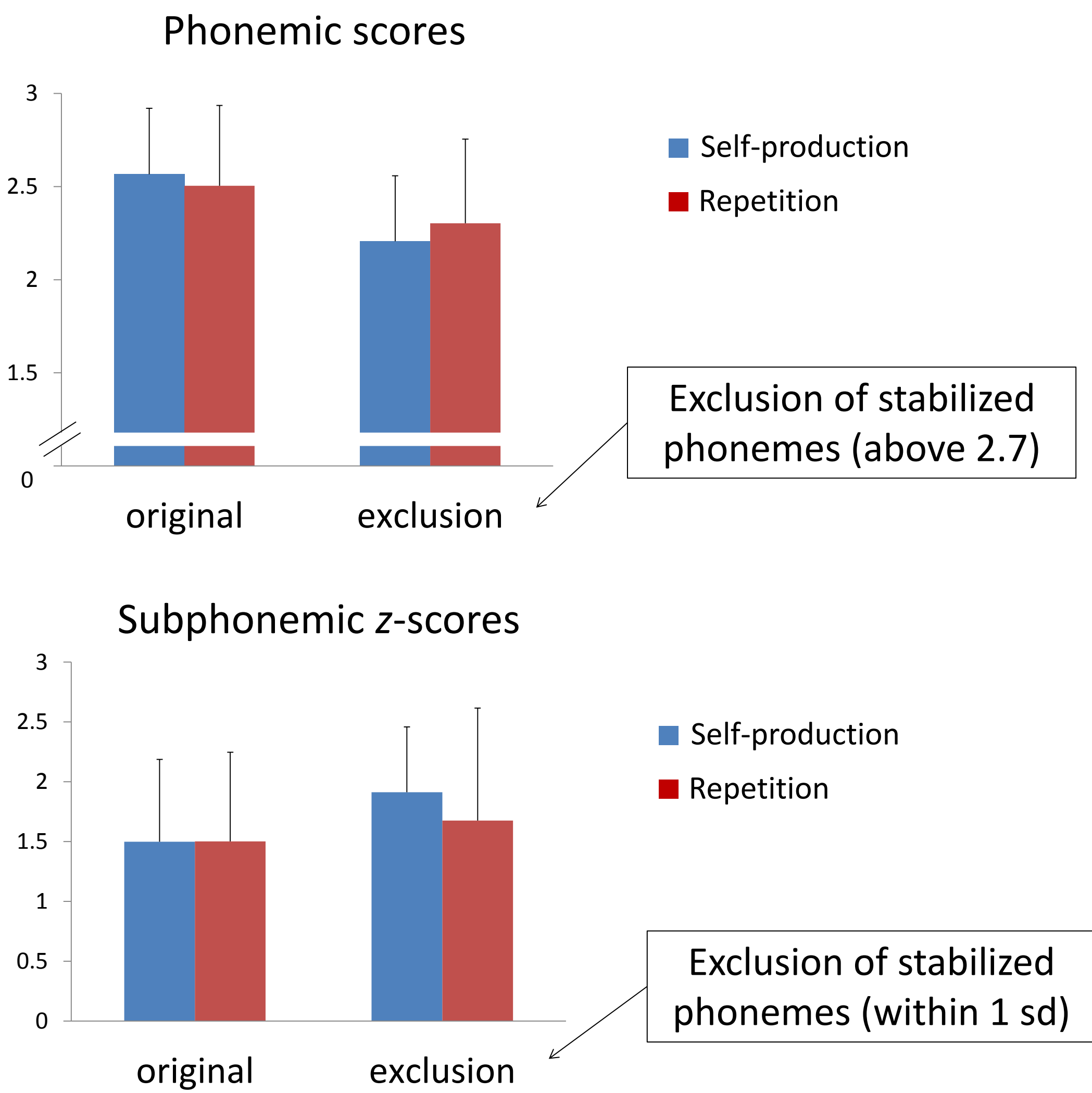
$$\text{Imitation} = \text{repetition} - \text{self-production}$$

Novel word encoding scores

- Syllables containing target phonemes
- Each correctly repeated syllable was credited with one point

Results

Self-production vs. repetition



Imitation effect on novel sound encoding

- Hierarchical regression

Dependent variables

Novel sound encoding score @ T2

Independent variables

Step 1 Self_phonemic score
Self_subphonemic score

Step 2 Imitation_phonemic Imitation_subphonemic

Overall

Independent	R² change	F change	p	β	p
Self_phonemic	.25	2.15	.16	.46	.04
Self_subphonemic				.19	.38
*Imitation_subphonemic	.29	7.36	.02	.57	.02

Children with good vs. poor output phonology

- Imitation ability is in part constrained by children's phonological output ability

Independent	R² change	F change	p	β	p
Good: mean output score = 27.43 (4.83)					
Self_phonemic	.34	1.27	.36	1.19	.00
Self_subphonemic				-.43	.01
**Imitation_subphonemic	.64	124.88	.00	1.22	.00
Poor: mean output score = 16.58 (3.90)					
Self_phonemic	.23	.75	.52	.00	.10
Self_subphonemic				-.12	.77
†Imitation_phonemic	.44	5.35	.08	.89	.08

Discussion

- Not every child's production better resembled the adult model in the repetition condition
 - Task design: number of adult inputs
 - Stimuli: children's familiarity with lexical items
 - Participants: number of participants, differences in children's personalities
- Imitation indeed predicted children's novel sound encoding ability at the later age
 - Poor output phonology → phonemic level
 - Less stabilized phonemic boundaries
 - Children that better calibrate phonemic features towards the adult model would be at a better chance to construct adult-like phonological representations
- Good output phonology → subphonemic level
 - More stabilized phonemic boundaries, though not as stable as those of adults
 - Subphonemic imitation leads to more precise phonological representations

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