

Babbling as a Potential Predictor of Difficulty in Segmental Acquisition

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Background

- Research into relationships between babbled utterances (non-meaningful word-like utterances) and phonological development has been ongoing over the last three decades (e.g. Oller 1980; Stark 1980; Stoel-Gammon & Cooper 1984; Vihman, Ferguson & Elbert 1986)
- Broad similarities across babbles and word productions have been documented
- Research into broad segmental properties of babbles suggests that there is a high degree of cross-linguistic universality (Kern & Davis 2009)
- The current research compares the segmental development of sounds which are or are not produced in babbled utterances to attempt to find

Research Questions

- 1) Are there sounds absent from recorded babbled utterances?
- 2) If so, how do they develop in words?
- 3) Are there sounds which are present in babbles that display similar acquisition patterns?

Data

- Cameron: Davis corpus on PhonBank
- Corpus contains transcribed audio recordings from naturalistic setting
- Dataset properties:
 - Number of Sessions: 52
 - Age Range: 0;07.11 – 2;11.24
 - Number of Babbled Utterances: 4680
 - Number of Word Attempts: 10537

Results

- With the exception of [θ]:
 - All English phonemes are
 - Every segment present in babbles before words

(1) Selected Segmental inventory in babbles and words (B=babble; A=attempt in words; P=produced in words)

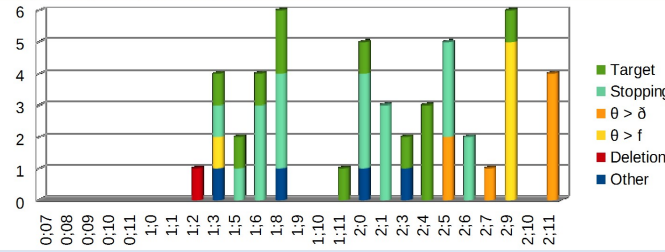
	0:07			0:08			0:09			0:10			1:0			1:1			1:2			1:3			1:5					
	B	A	P	B	A	P	B	A	P	B	A	P	B	A	P	B	A	P	B	A	P	B	A	P	B	A	P	B	A	P
b/	2		182			290	2		144	0	0	487	94	79	264	78	65	331	108	103	201	74	69	173	224	212	19	13	13	
k/	2		7			20	0	0	6	0	0	6	9	11	19	17	2	33	17	6	39	31	6	97	81	9	34	32	32	
j/	4		15			154	0	0	70	0	0	165	5	57	2	2	35	2	2	36	48	47	79	147	9	14	13	13		
m/	1		37			40	0	0	27	0	0	133	9	40	10	9	49	33	68	92	89	50	78	75	3	26	24	24		
w/			7			4	0	0	1	0	0	9	0	0	1	0	0	2	0	1	1	0	2	2	0	0	2	0	2	
l/			31			30	2	0	51	0	0	5	6	27	7	2	16	33	2	0	25	1	2	66	8	1	19	6		
t/						6	0	0	2	0	0	1	2	6	10	3	5	24	11	2	37	27	7	103	92	5	47	37		
ð/						1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	5	0	0	15	0	0	0	8		
s/																					1	5	4	22	13	6	33	31		
ʃ/																					2	0	0	5	3	0	4	0		
r/																												6		
θ/																												2		

- There are only two recorded babbled utterances of [ð]
 - Will it behave as if absent from babbles?
- Large number of [l] present in early recorded babbles
 - Number quickly drops at 1;02
- No direct relationship between the specific order of the sounds emergence in babbles and the order of their emergence in words

How do sounds (nearly) absent from babbling develop in words?

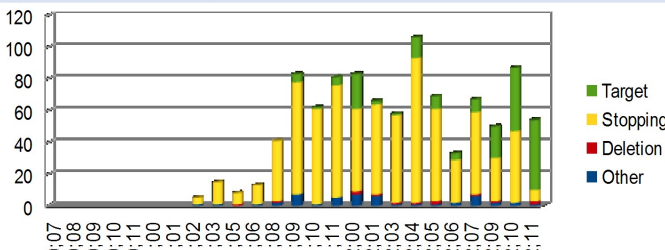
- sounds which are absent in babbles could be expected to behave differently since the child has no practice producing them

(2) Attempts of [θ] in Singleton Onsets



- [θ] is variable throughout all of Cameron's recorded development
- But [ð] shows almost no variation in word attempts, instead it is systematically substituted with [d]

(3) Attempts of [ð] in Singleton Onsets

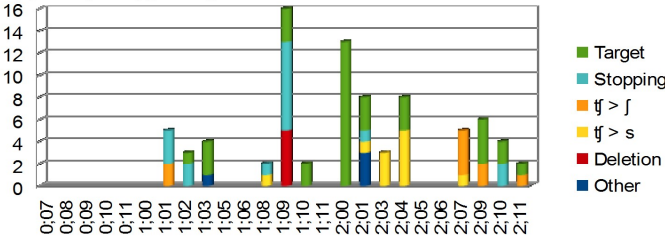


- Whether the [d] produced here is in fact the same as produced for [d] is unclear
- If these two sounds are acoustically different, then it is possible that Cameron did produce her approximation of [ð] in babbles

Do any sounds present in babbles show similar behaviour?

- Yes, variability is also observed in sounds produced in babbles
- [ʃ] is produced in babbled utterances in multiple sessions after 1;00, but displays variability similar to [θ]

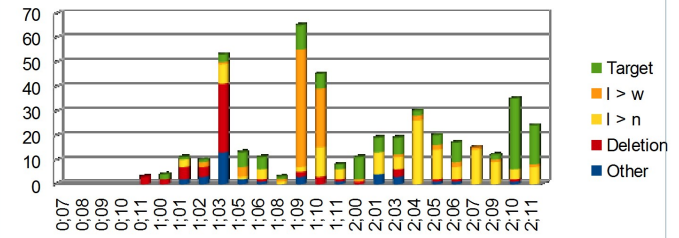
(4) Attempts of [ʃ] in Singleton Onsets



What about more frequently babbled sounds?

- Even sounds which are consistently produced in babbles can be variable in word attempts

(5) Attempts of [l] in Singleton Onsets



- Re: [l] is consistently produced in babbles between 0;08 and 1;02
 - [l] isn't acquired until 2;10
- Cameron even fails to produce target-like [l] in word attempts which share similarities with previously produced babbles

(6) Cameron's babbled [l] and targeted [l]

- | | |
|------------------------|--|
| a) Babbled Utterances | b) Attempted Words |
| i) [agələ] 0;08.08 | i) 'balloon' bə'lu:n → [bau] 0;11.06 |
| ii) [lʰaɪdʌ] 0;08.15 | ii) 'balloon' bə'lu:n → [bo] 1;00.25 |
| iii) [lababla] 0;10.03 | iii) 'pillow' 'pɪləʊ → [bio] 1;01.15 |
| iv) [lʌ:l] 0;10.03 | iv) 'leg' 'lɛg → [ne] 1;01.15 |
| v) [dolo] 1;00.25 | |

- [l] occurs in many positions in babbled utterances
- [l] fails to be produced in words, even when comparable to a recorded babble

Discussion

- There is variation in how babbled sounds behave in attempted words, even those which are consistently produced in babbles
- So babbling may be more useful to show what a child is unlikely to produce accurately in words

Conclusions

- In Cameron's development:
 - (Near) absence of a segment indicates potential difficulty in acquisition
 - Presence of a sound in babbling does not guarantee acquisition
 - The ability to produce a segment does not ensure it's acquisition

References: Kern, Sophie & Barbara L. Davis. 2009. Emergent Complexity in Early Vocal Acquisition: Cross Linguistic Comparisons of Canonical Babbling. In Ioana Chiriac, Christophe Coupé, Egidio Marisco & François Pellegrino (eds.), *Approaches to Phonological Complexity*, 353-375. Berlin: Mouton de Gruyter. * Oller, D. Kimbrough. 1980. The emergence of the sounds of speech in infancy. In Grace H. Yeni-Komshian, James Francis Kavanagh & Charles Albert Ferguson (eds.), *Child Phonology 1: Production*. New York: Academic Press. * Stark, Rachel E. 1980. Stages of speech development in the first year of life. In Grace H. Yeni-Komshian, James Francis Kavanagh & Charles Albert Ferguson (eds.), *Child Phonology 1: Production*. New York: Academic Press. * Stoel-Gammon, Carol & Judith A. Cooper. 1984. Patterns of Early Lexical and Phonological Development. *Journal of Child Language* 11. 247-271. * Vihman, Marilyn May, Charles A. Ferguson & M. Elbert. 1986. Phonological Development from Babbling to Speech: Common Tendencies and Individual Differences. *Applied Psycholinguistics* 7. 3-40.