11 Early vocabulary development in late talkers
- Collecting and analyzing data from pediatric medical fields -
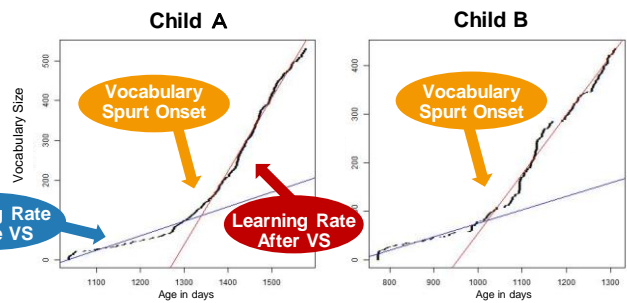
Abstract

To clarify the characteristics of early vocabulary development in late talkers, we are collecting and analyzing multiple types of vocabulary development data in a pediatric medical fields. In Study 1, we used a diary-based tablet application to collect longitudinal vocabulary data from mothers of late talkers (N=2). A piecewise linear approximation indicated that both late talkers show rapid vocabulary growth (i.e., vocabulary spurt) even if the growth begins much later than typically developing children (N=17). In Study 2, we used a 2,688-item vocabulary checklist tablet application to collect data from mothers of atypically developing children (N=20). An analysis based on vocabulary commonality index indicated that atypically developing children (e.g., late talkers, autism spectrum disorder) as well as typically developing children (N=1,451) tend to acquire similar words at earlier stages of language development. Based these findings, we are proposing a support system for speech-language therapy.

1 Longitudinal Diary Data Analysis

- Participants: 2 Late talkers
- Procedure: Mothers recorded vocabulary data on diary-based tablet application
- Data Analysis: Vocabulary spurt (VS) is estimated by piecewise linear approximation

Child A **Child B**

Vocabulary Spurt Onset

Learning Rate Before VS

Learning Rate After VS

Results

Both late talkers show rapid vocabulary growth even if the growth begins much later than typical children

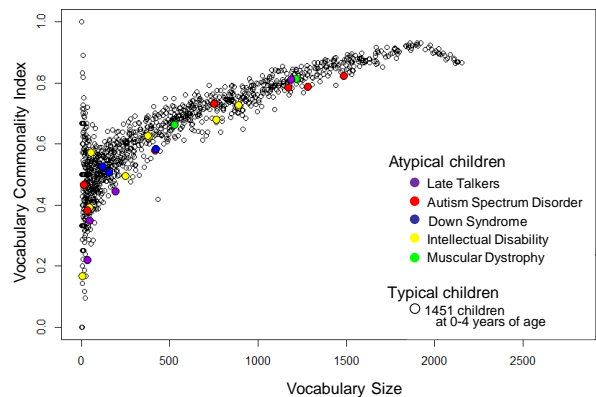|	Learning Rate		Vocabulary Spurt Onset	
	Before VS	After VS	Months	Word Number
Child A	0.36 words/day	1.21 words/day	44.1 months	136 words
Child B	0.27 words/day	1.84 words/day	33.7 months	94 words
Typical Children (N=17)	0.18 words/day (range:0.05-0.30)	0.83 words/day (range:0.18-1.85)	20.1 months (range:15.7-23.0)	39.5 words (range:19-79)

2 Vocabulary Checklist Data Analysis

- Participants: 20 atypical children
- Procedure: Mothers completed a 2688-item vocabulary checklist in a hospital
- Data Analysis: Vocabulary Commonality Index (*VocIndex*) is calculated

$$VocIndex(i) = \frac{|set\ Voc(i) \cap set\ AoA(i)|}{|set\ AoA(i)|}$$

$setVoc(i)$: a set of words that child i can speak
$setAoA(i)$: a set of words ranked by AoA (Age of Acquisition) estimation order with the same number of words in $setVoc(i)$

Results

Atypical children as well as typical children tend to acquire similar words during earlier stages of language development

Atypical children
- Late Talkers
- Autism Spectrum Disorder
- Down Syndrome
- Intellectual Disability
- Muscular Dystrophy

Typical children
- 1451 children at 0-4 years of age

Joint research with Univ. of Electro-Communications and Takeda General Hospital

References

[1] Y. Cao, Y. Minami, Y. Okumura, and T. Kobayashi, "Analyzing Vocabulary Commonality Index Using Large-scaled Database of Child Language Development," *11th edition of Language Resources & Evaluation Conference (LREC),* 2018.

[2] Y. Akutsu, T. Kobayashi, S. Watanabe, K. Saito, and Y. Minami, "Collecting and analyzing longitudinal vocabulary-checklist data in late talkers" *18th Conference on Japanese Association of Speech-Language–Hearing Therapists*, 2017.

Contact

Tessei Kobayashi Interaction Research Group, Innovative Communication Laboratory