Is it easier to segment words in speech directed to a child than an adult?

Seongmin Mun, Eon-Suk Ko & Jun-Ho Chai

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아주대학교
AJOU UNIVERSITY

Outline

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Is it easier to segment words in speech directed to a child than an adult?

Introduction

The problem
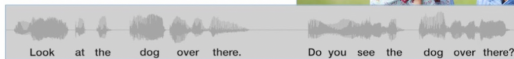
Wherearethesilencesbetweenwords?

Where are the silences between words?

A prerequisite for infants to build a lexicon for word learning is the ability to segment words out of the speech stream. (Jusczyk and Aslin, 1995).

CDS vs ADS

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CDS advantages

▶ Behavioral studies suggest that infants segments words more easily in CDS (child directed speech) than ADS (adult-directed speech) (Thiessen et al., 2005).

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Previous studies on word segmentation

Researches	Languages	Algorithms	CDS advantage?
Batchelder (2002)	English, Spanish, Japanese	1	Yes
Fourtassi et al. (2013)	English, Japanese	1	Yes
Ludusan et al. (2017)	Japanese	4	Yes
Cristina et al. (2018)	English	9	Not much
Loukatou et al. (2019)	French	17	Not much

Research question: Are there CDS advantages over ADS in the statistical segmentation of words in Korean?

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What is Ko corpus?

- ▶ Ko corpus containing 35 mothers freely interacting with their own children for about 40 minutes(Ko et al., 2020).
- ▶ The same corpus also contains ADS in which the mother talks to their family members and experimenters for about 10 minutes(Ko et al., 2020).
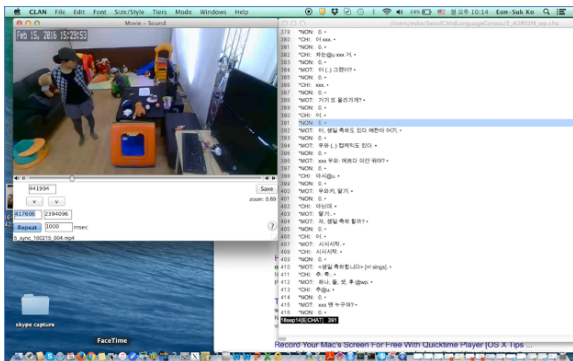
What is Ko corpus?

Figure: The pictures show the environment of the apartment where the data were collected and the hand-coded transcriptions.

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KoG2P (Cho, 2017)

Orthography:	차가 있어 (i.e., chaakfaa iissvv; There is a car.)
Orthography (for algorithm):	ch aa ;esyll kf aa ;esyll ;eword ii ss ;esyll vv ;esyll ;eword
Phonetic input:	차가 이써 (i.e., chaakfaa iissvv; There is a car.)
Phonetic input (for algorithm):	ch aa ;esyll kf aa ;esyll ;eword ii ;esyll ss vv ;esyll ;eword

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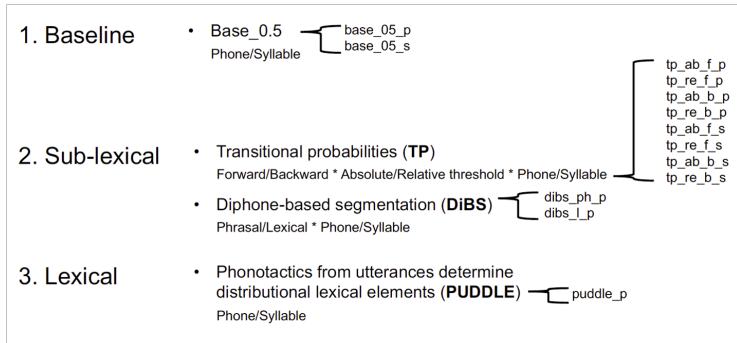
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Word segmentation models

Figure: 13 models from WordSeg package (Bernard et al., 2018)

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Procedure
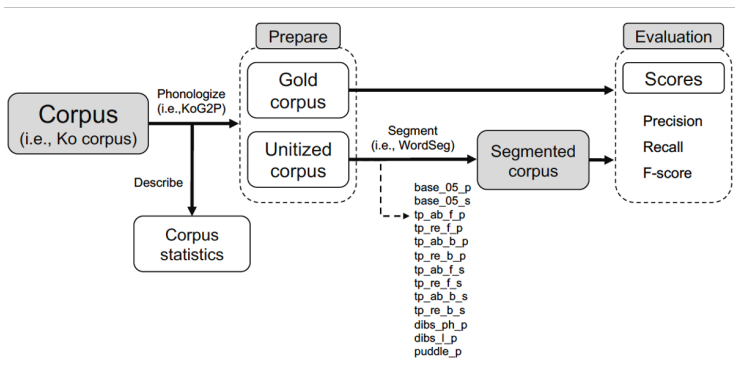
Figure: The overview of research process

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Results and Discussion

Case study 1: Are properties different between CDS and ADS?

Characteristics of our CDS vs ADS data

Properties	CDS	ADS	p
Word length (s)	1.679 (.108)	1.735 (.164)	.094
Utterance length (s)	6.540 (.879)	9.210 (2.763)	.000 ***
% hapaxes	.216 (.054)	.487 (.069)	.000 ***
% 1-w phrase	.332 (.059)	.326 (.117)	.779
MATTR	.837 (.065)	.908 (.034)	.000 ***
Mono	.239 (.044)	.313 (.057)	.000 ***
Ono	.042 (.020)	.001 (.003)	.000 ***

Note. *** $p < .001$, ** $p < .01$, * $p < .05$; Word length (s): the average length of words;

Utterance length (s): the average length of utterances; % hapaxes: percent of hapaxes; % 1-w

phrase: ratio of single word phrases; MATTR = Moving Average Type to Token Ratio (over a

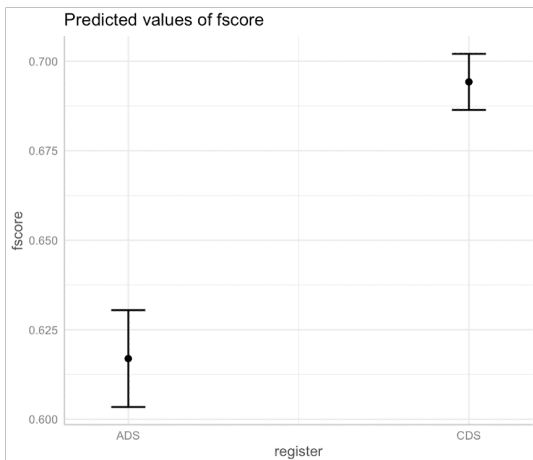sliding 10-word window); Mono = monosyllabic word; Ono = onomatopoeia

Case study 2: Does CDS have a segmentation advantage over ADS?

Does CDS have a segmentation advantage over ADS?

lmer(fscore ~ register + algo + (1+register|dyad), data=segDF)

factor	chisq	df	*p*
register	112.4	1	***
algorithm	6178.9	12	***

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Does CDS have a segmentation advantage over ADS?

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Case study 3: Which corpus properties have an effect on the
segmentation advantages of CDS?

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Which corpus properties have an effect on the segmentation advantages of CDS?

Properties	β	SE	df	t	p
(Intercept)	.942	.068	903	13.883	.000 ***
Word length (s)	-.009	.034	903	-0.276	.782
Utterance length (s)	-.017	.002	903	-7.668	.000 ***
MATTR	-.169	.055	903	-3.099	.002 **
Mono	.038	.050	903	.750	.453
Ono	2.105	.996	903	2.114	.035 *

Note. *** p < .001, ** p < .01, * p < .05

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Conclusion

- ▶ The properties of ADS and CDS are different from each other.
- ▶ CDS seems to have advantages over ADS in segmentation.
- ▶ The different properties of the registers affect the performance of word segmentation.

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Thank you for listening.