

Introduction

Background & Research Objectives:

- The phonetic realization of word duration in homophone pairs, such as *time* and *thyme* systematically differs based on their lexical characteristics, including part of speech, frequency, and orthographic consistency [1].
- Higher orthographic consistency is associated with shorter homophone duration in English [1].
 - Investigate whether orthographic consistency effects on homophone duration generalize beyond alphabetic languages.
- Examine two directions of orthographic consistency: spelling-to-sound (feedforward) and sound-to-spelling (feedback).

Method

Corpus data: The Corpus of Spontaneous Japanese [2]

- 174 homophone sets (146 pairs, 22 triples, and 6 quadruples), comprising 381 word types and 3,149 word tokens.
- 4-mora, 2-logograph words, nouns, and spontaneous monologue (i.e., Academic Presentation and Simulated Public Speech).
- Phonological-Orthographic (P-O: sound-to-spelling) and Orthographic-Phonological (O-P: spelling-to-sound) consistencies.

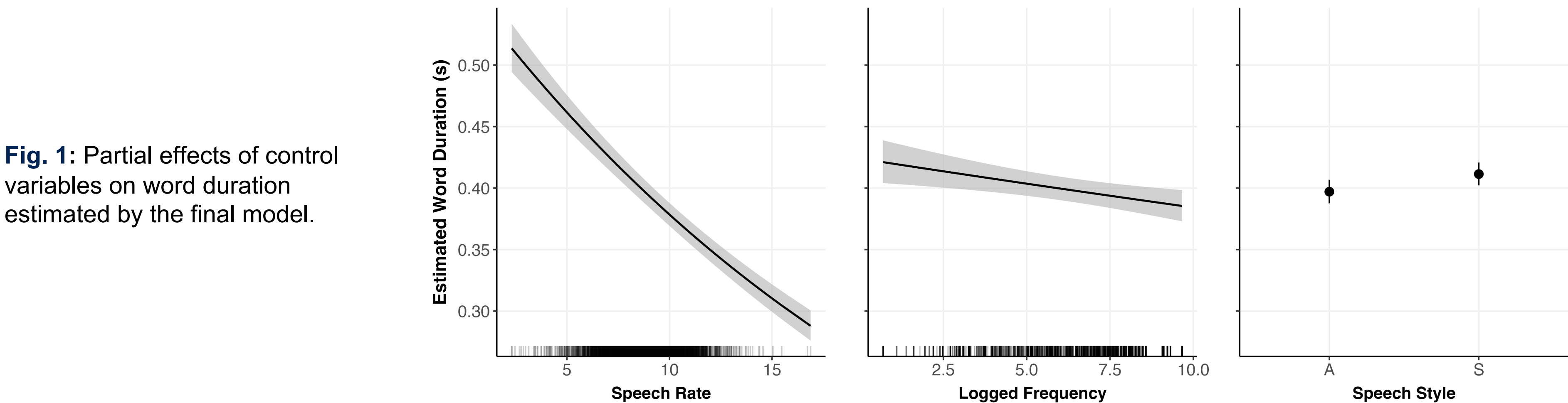
Target word	現在	/ge.n.za.i/	‘now’	24	
Phonological neighbours	現代	/ge.n.da.i/	‘modern times’	38	OF (Both PN and ON)
	存在	/so.n.za.i/	‘existence’	28	OF (Both PN and ON)
	犯罪	/ha.n.za.i/	‘crime’	35	OE (PN but not ON)
	限界	/ge.n.ka.i/	‘limit’	31	OE (PN but not ON)
Consistency Index	$\frac{24 + 38 + 28}{24 + 38 + 28 + 35 + 31} = 0.58$				

Analysis:

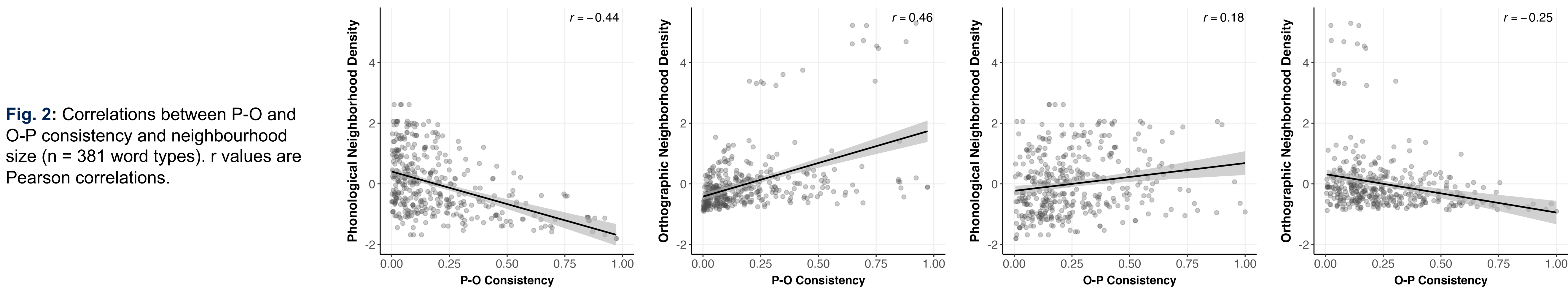
- Dependent variable: Log-transformed Word Duration; Independent variable: P-O-within, O-P-within.
 - P-O-within and O-P-within: each homophone member’s own consistency value minus its homophone set mean. They are unique to each homophone and capture consistency effects among the members within each set.
- Covariate: P-O-between, O-P-between, Speech Rate, Log-transformed Frequency, Log-transformed Bigram Probability, and Speech Style.
 - P-O-between and O-P-between: the mean consistency values of homophones in each homophone set. They are constant across the homophone members of each set and capture consistency effects between sets.

Results & Discussion

- No effect of orthographic consistency, in either the spelling-to-sound or sound-to-spelling direction, or whether measured within or between homophone sets.
- Large effect of Speech Rate, and a modest effect of Log-transformed Frequency and Speech Style (Fig. 1).

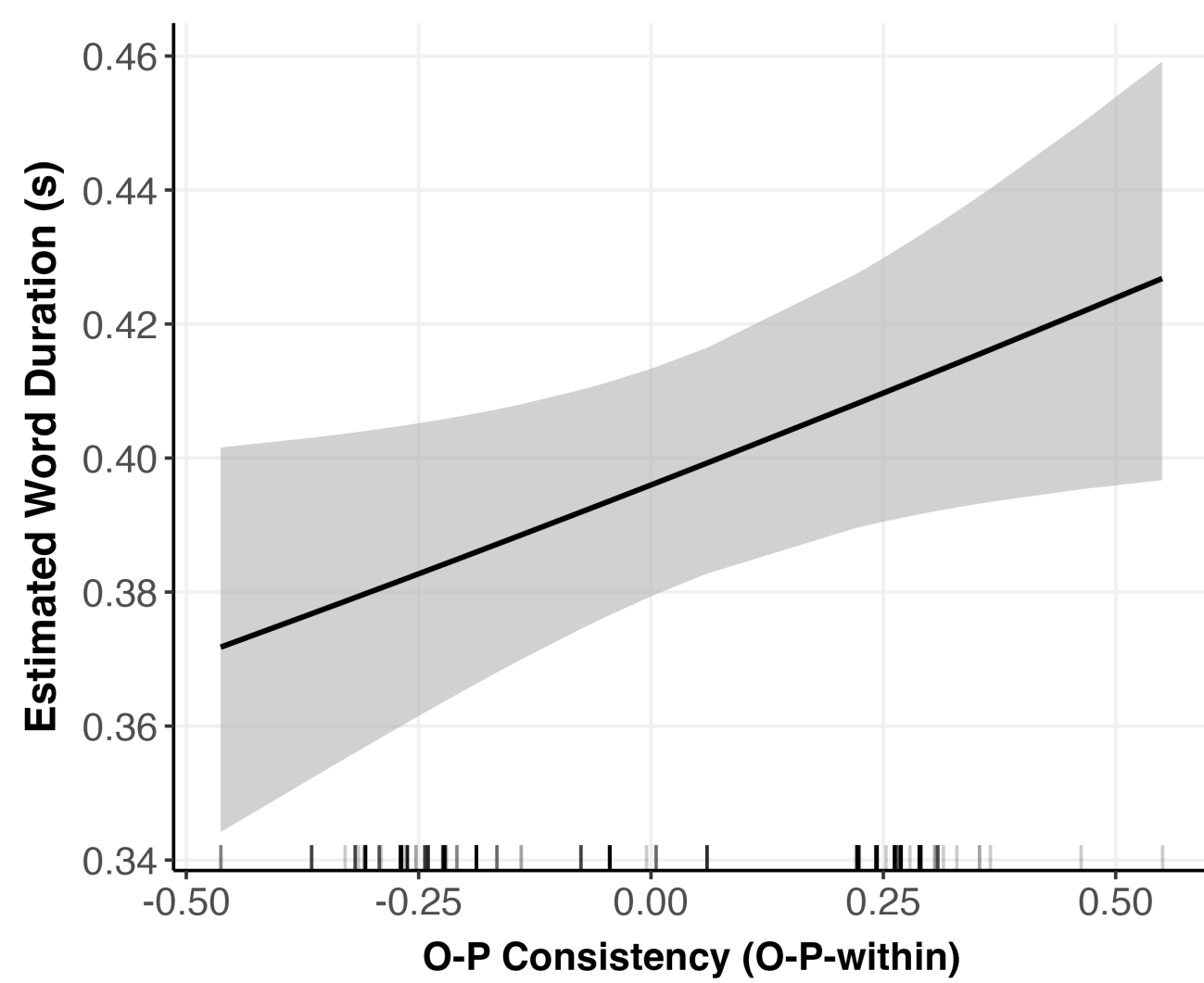


- Possible explanation for the absence of an effect lies in the distribution and range of consistency in our data set:
 - Limited range of orthographic neighbourhood sizes and clustered consistency values (Fig. 2). The difference is even narrower for within-set comparisons.



- Restricted homophone sets whose within-set consistency difference exceeded 0.4 (26 sets, 686 tokens):
 - Higher O-P consistency is associated with longer duration (Fig. 3).
 - In line with research [3]: dense PNs inhibit word production while dense ONs facilitate it.
 - Higher O-P consistency is modestly associated with dense PNs (strong inhibition) and sparse ONs (weak facilitation), resulting in overall inhibition.
- However, research [1] shows higher orthographic consistency (O-P consistency) is associated with shorter duration.
- This reversal may stem from the way consistency is calculated.
 - The probabilities of a word’s graphemes vs. the number and frequency of PNs and ONs.

Fig. 3: Partial effects of O-P Consistency (O-P-within) on word duration estimated by the model.



Ways in which we interact with written text are changing: blur boundary between spoken and written modalities. Written language is increasingly produced by speaking and consumed by listening. This could either strengthen or weaken the effect of orthography on speech.