Stability of Motor Behavior Among Different Language Conditions

Elisabeth M. Boersma
Mentor Dr. Steeve
& Co investigator Dr. Allen

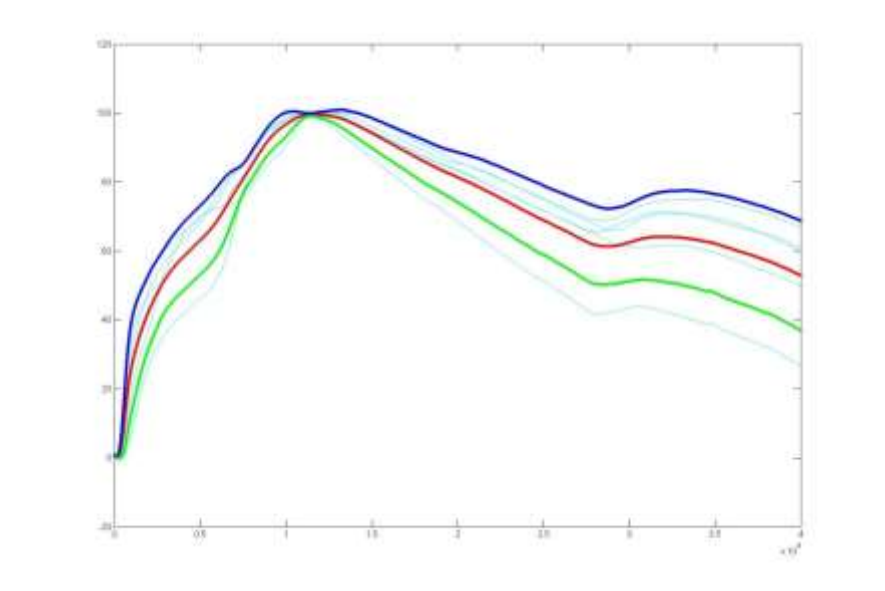
Purpose

Identify the interaction between components of language and motor production skill

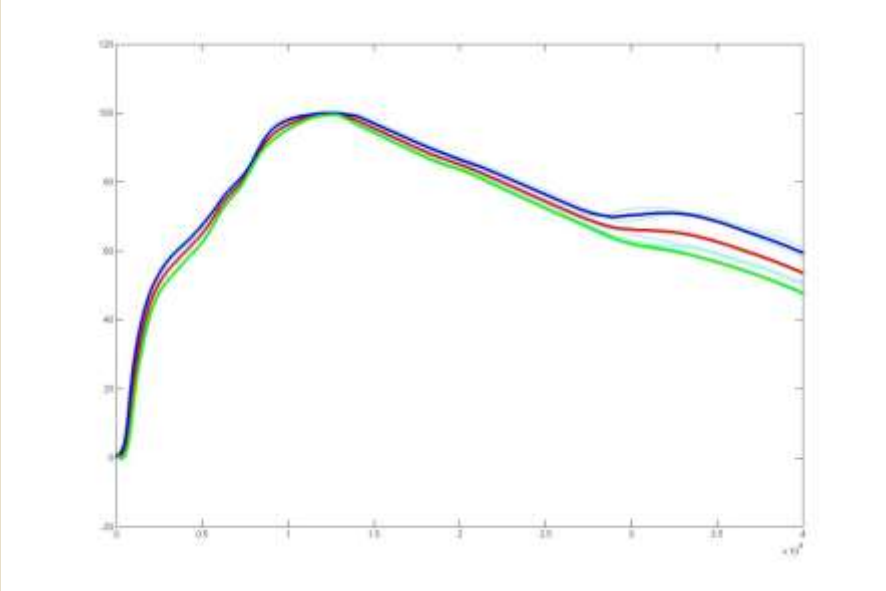
- Language Components
  - Word knowledge
  - Phonological memory
- Motor Production
  - Intensity contour

Purpose

Motor production: Intensity contour

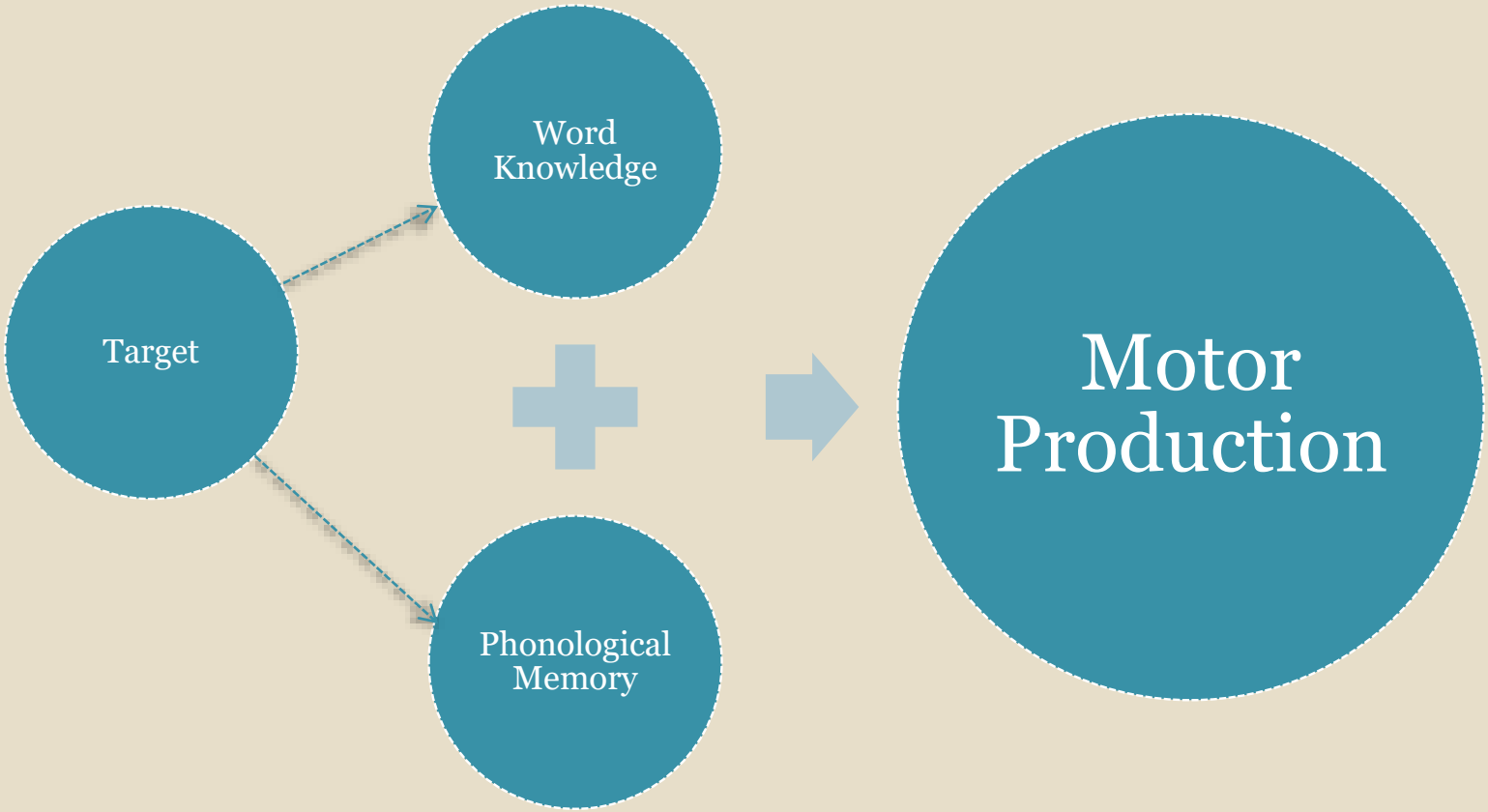


5 productions: unstable



5 productions: stable

Purpose


Word Knowledge
Target
Phonological Memory
Motor Production

Purpose

Target conditions

- Word frequency
  - Low
  - High
- Syllable length
  - 4
  - 6
- Word type
  - Real
  - Nonsense

Hypotheses

- If word knowledge impacts motor production skills, then you would expect differences for:
  - Word frequency
  - Syllable length
  - Word type
- If phonological memory impacts motor production skills, then you would expect differences for:
  - Word type

Research questions:

- Does word knowledge impact the motor production skill of intensity?
- Does phonological memory impact the motor production skill of intensity?

Method

- Participant
  - 1 female subject
  - 22-year-old college student
- Design
  - Single subject design
  - Feasibility study

Method

- During production aerodynamic energy and acoustics were recorded to determine the stability of intensity

Method

- Participant produced 10 repetitions of:
  - 8 high frequency words and their 8 non-word counterpart
    - /Sek ri ter i/
    - /Ri sek ri ter/
  - 8 low frequency words and their 8 non-word counterpart
    - /Ther sit i kel/
    - /Kel ther i sit/

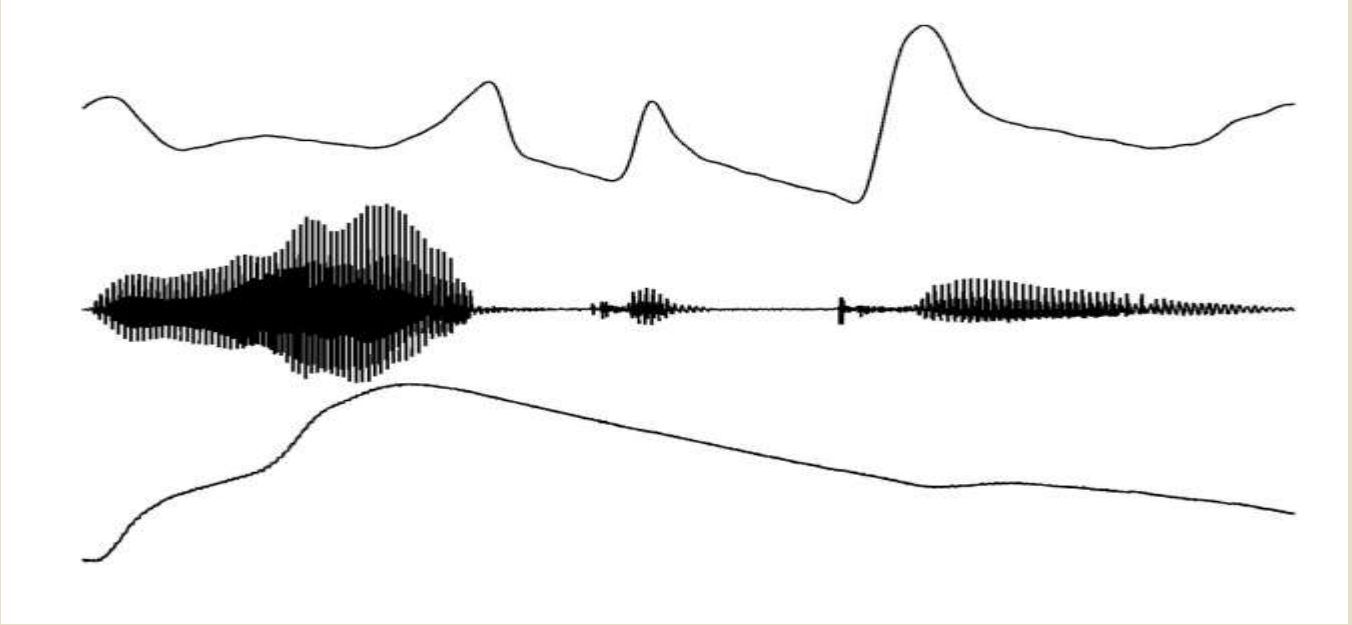
Method

- Data streams were digitized onto a computer

Oral airflow

Acoustic signal

Intensity contour



Method

- Productions were recorded onto a continuous date stream and data were digitized
- 320 recordings were parsed
- Stability was measured across all 10 productions
- A statistical analysis of each condition was completed

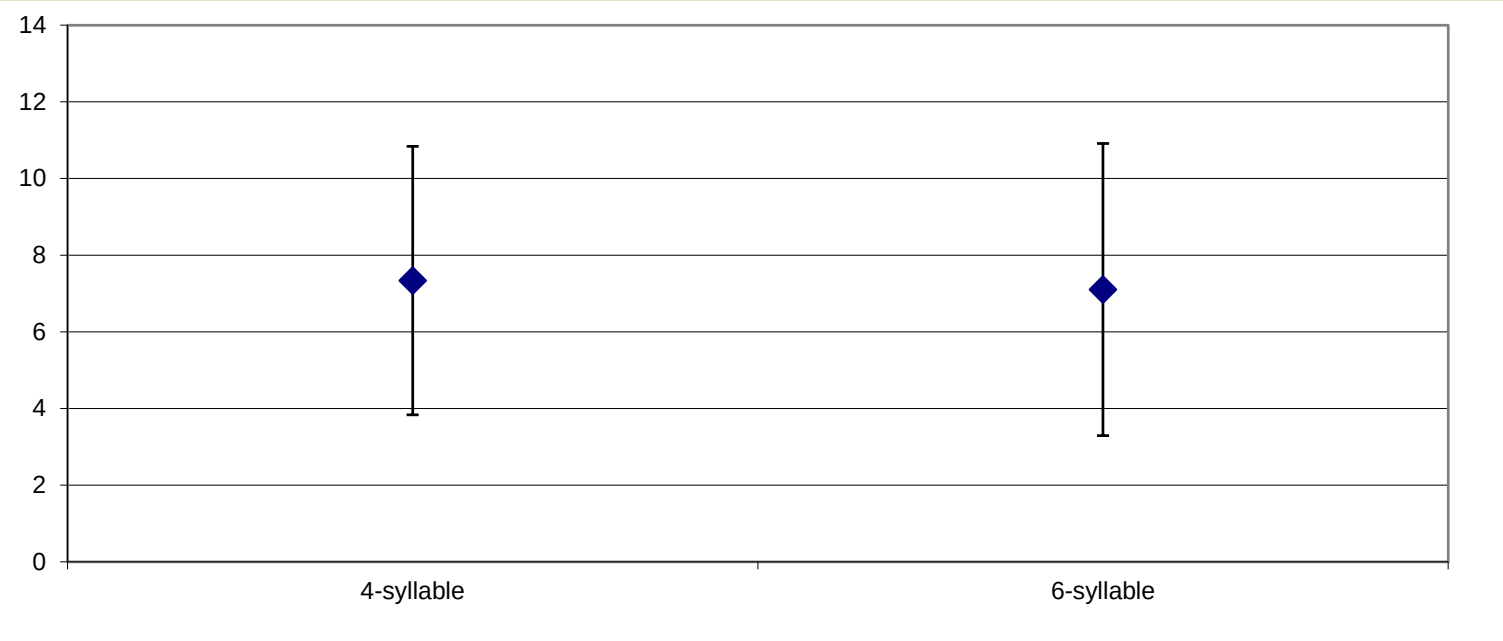
Results

- Word frequency difference in means: 1.185

- Word frequency: Not significant (p = .138)

Results

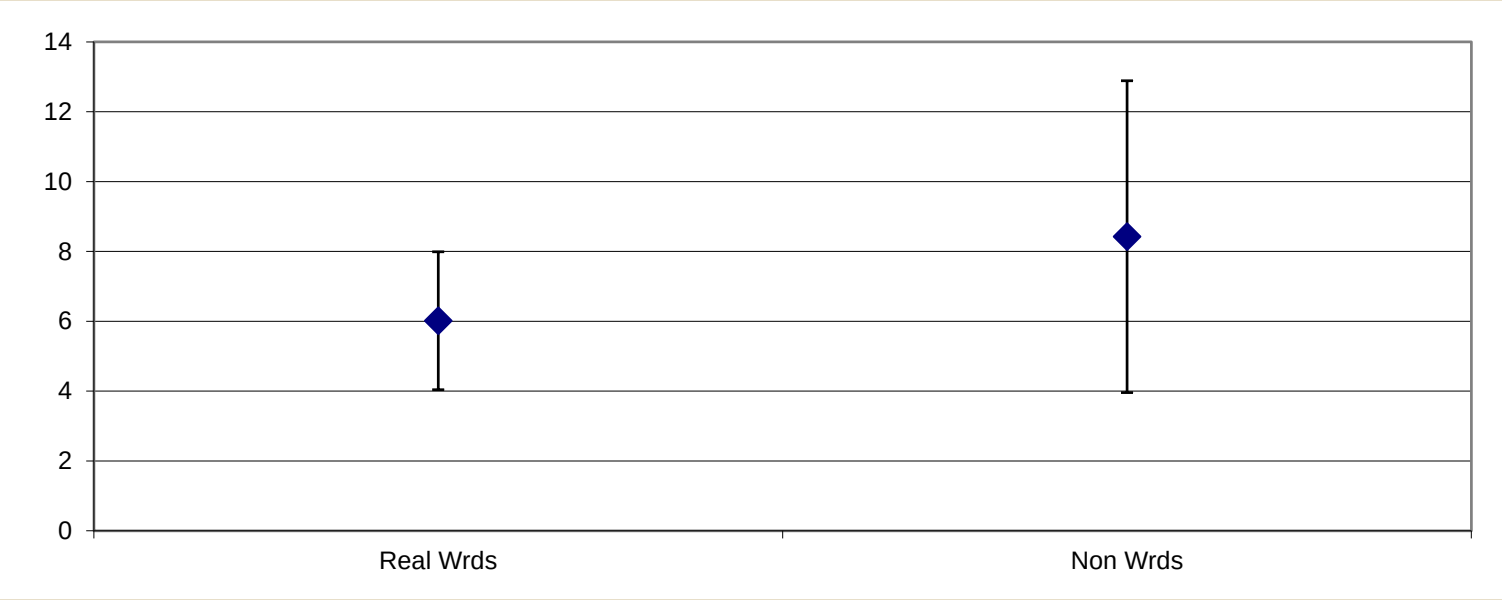
- Syllable length difference in means: .231



- Syllable length: Not significant (p = .792)

Results

- Word type difference in means: -2.408



- Word type: Significant (p = .007)

Discussion

- Research Question 1: Does word knowledge impact the motor production skill of intensity?
  - NO

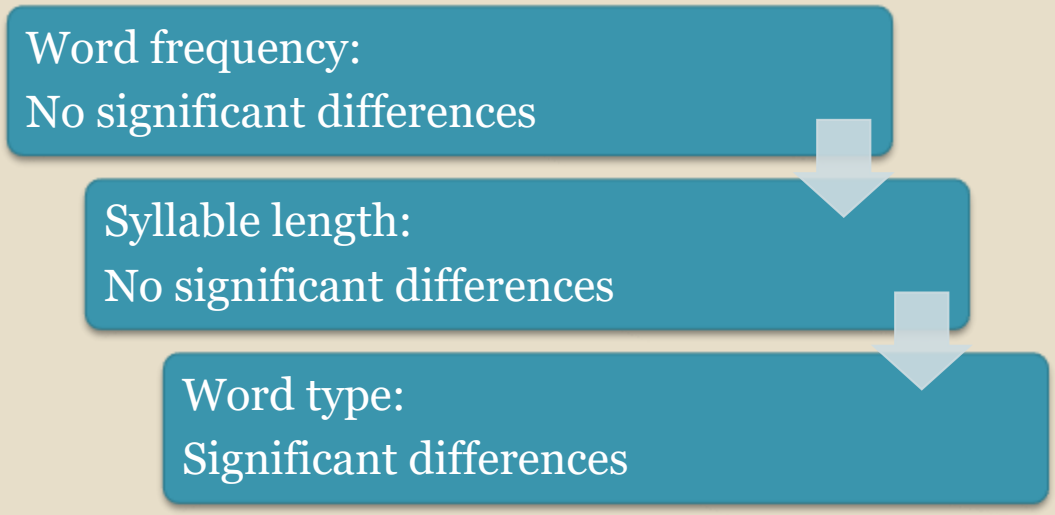
Word frequency:
No significant differences

Syllable length:
No significant differences

Word type:
Significant differences

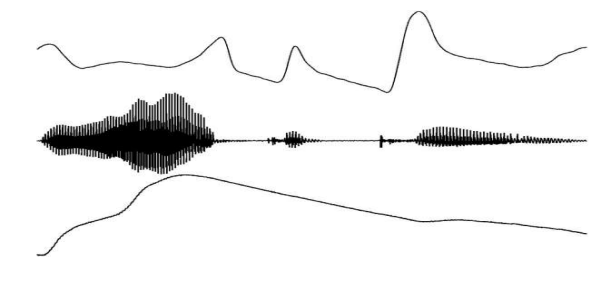
Discussion

- Research Question 2: Does phonological memory impact the motor production skill of intensity?
  - YES



Future Considerations

- Do other measures of motor production produce the same results?
  - Oral airflow
  - Acoustic signal



- Could the word frequency difference between low and high frequency words be increased and produce different results?

References

- Wagner, R.K., Torgeson, J.K., & Rashotte, C.A. (1999). *Comprehensive test of phonological processing examiner's manual*. Austin, Texas: Pro-ed.
- Johansson, s., & Hofland, K. (1989). *Frequency analysis of english vocabulary and grammer*. Oxford, NY: Clarendon Press.

Acknowledgements

- Wyoming EPSCoR for funding and encouraging research and growth at the University

Mentor

- Dr. Roger Steeve

Co investigator

- Dr. Melissa Allen