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Speech rate differences in regional variants of English

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ABSTRACT

This study compares the articulation rate in the northern and southern regional varieties of American English spoken in south-central Wisconsin and western North Carolina, respectively. It aims to provide a comprehensive set of data to test the stereotypical contrast between "fast-talking Northerners" and "slow-talking Southerners." The results provide strong evidence that, in both reading and spontaneous speech, the articulation rate of the northern speakers is indeed faster than that of the southern speakers. The effects of speaker age and gender on articulation rate were also examined and were found to be more variable than the effects of regional dialect.

INTRODUCTION

One of the most pervasive stereotypes about American speech is the contrast between "slow-talking Southerners" and "fast-talking Northerners." However, few studies to date have provided direct evidence that overall speech rate differs regionally. Byrd (1994) reported notable differences in the speech rate in the TIMIT database for broadly defined eight dialectal regions in the United States. Similarly, Verhoeven et al. (2004), working on speech rate in Dutch spoken in Netherlands and Belgium, found significant effects of country and region.

While our present research focus is on regional dialects in the United States, we also look at two other factors that might affect speech rate: age and gender. Most available evidence suggests that men speak somewhat faster than women (e.g. Byrd 1994 for American English, Whiteside 1996 for British Northern English). There is also some evidence that the speech rate of older talkers is slower than that of younger talkers (Yuan et al. 2006).

The present study examines speech rate differences between two dialects — south-central Wisconsin (WI) and westernmost North Carolina (NC) — and two different generations of speakers. Our own earlier work has brought to light consistent and statistically significant differences in vowel duration across these two dialects, showing that NC vowels are longer than WI vowels (Jacewicz et al. 2007). This led us to hypothesize that the same general pattern also holds for overall speech rate, such as that found in sentences and longer stretches of discourse.

METHODS

Speakers

Read Sentences: 76 Speakers, 38 from Wisconsin, Madison area (19 men and 19 women) and 38 from western North Carolina, Cullowhee area (19 men and 19 women) • Speakers fell into two age groups: young adults (18-34 year olds) and older adults (51-65 year olds) • There were 36 young adults and 40 older adults.

Spontaneous Talks: 80 Speakers, 40 from Wisconsin and 40 from North Carolina • Gender and age groups (same age ranges as read sentences) were equally represented within each dialect group. 62 speakers took part in both tasks and 16 new speakers recorded talks at a later date.

Stimuli

Read Sentences: Each speaker read two sets of 60 sentence pairs for a total of 240 sentences • Sentences were contextually and prosodically constrained to elicit variable levels of emphasis in vowel production.

Spontaneous Talks: Each speaker was encouraged to speak freely about his/her life with minimum interaction with the experimenter • Topics included family, jobs, hobbies, etc. • Only the first five minutes of each talk were analyzed in this study.

Procedure

Read Sentences: Recording was controlled by a custom Matlab program • Tokens were recorded directly to a hard drive disk at a 44.1-kHz sampling rate • The speaker was seated in a sound treated IAC booth or quiet room • A unidirectional head-mounted microphone (Shure SM10A) was used, 1-in. distance from the lips • Sentence pairs appeared in random order on computer screen • **Spontaneous Talks:** Recorded using Adobe Audition waveform editing program.

Acoustic Measurements

Read Sentences: The average speech rate for each sentence was measured in syllables per second (the sentence duration was divided by the total number of syllables) • Any pauses were edited out and subtracted from the duration of the sentence.

Spontaneous Talks: Talks were transcribed • Each transcript was broken down into phrases • A "phrase" was defined as a run of speech 5 or more syllables long produced without pause or hesitation • All non-fluent productions were eliminated • Rate was calculated in the same manner as for the sentences (measuring the duration of the phrase and divided by the number of syllables) • A total of 4350 phrases were analyzed from all speakers and the number of syllables per phrase varied (mean = 12.7 syllables per phrase, s.d. = 6.9).

Statistical Analysis

Two separate univariate analyses of variance (ANOVAs) were used to initially assess results • In the first ANOVA the dependent variable was speech rate in read sentences with between-subject factors dialect, age, and gender • The second ANOVA had the dependent variable speech rate in spontaneous talks, age, and the same between-subject factors as the first.

1 Effects of Dialect

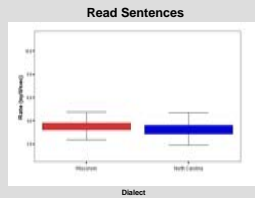


Figure 1. Central tendency and dispersion of the speech rate in read sentences.

• WI mean: 3.54 syll/s
• NC mean: 3.26 syll/s

Significant main effect of dialect [F(1, 68) = 12.7, p < 0.001, η² = 0.157].

WI speakers read at a rate 8% faster than NC speakers.

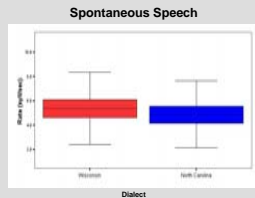


Figure 2. Central tendency and dispersion of the speech rate in spontaneous speech.

• WI mean: 5.41 syll/s
• NC mean: 4.89 syll/s

Significant main effect of dialect [F(1, 72) = 28.8, p < 0.001, η² = 0.286].

WI speakers speak at a rate 12.5% faster than NC speakers.

2 Effects of Age

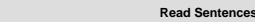
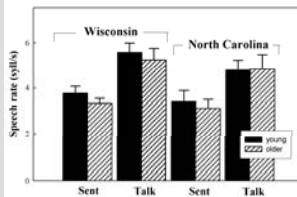


Figure 3. Mean speech rate in read sentences and talks as a function of speaker age. Error bars indicate one standard error.

Young adults read at a rate 11% faster than older adults.



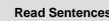
The main effect of age was not significant. Results from separate two-ways ANOVAs for each dialect.

WISCONSIN: There was a significant main effect of age [F(1, 36) = 5.19, p = 0.029, η² = 0.126]. Young adults mean: 5.60 syll/s • Older adults mean: 5.24 syll/s

Young WI adults speak at a rate 6% faster than older WI adults.

NORTH CAROLINA: No significant difference between young and older adults in NC.

3 Effects of Gender



The main effect of gender was not significant.

Men read at a rate 4.5% faster than women.

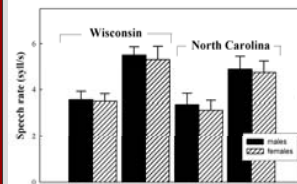


Figure 4. Mean speech rate in read sentences and talks as a function of speaker gender. Error bars indicate one standard error.

The main effect of gender was not significant.

Men read at a rate 3.6% faster than women.

4 Effects of Gender and Age in Read Sentences

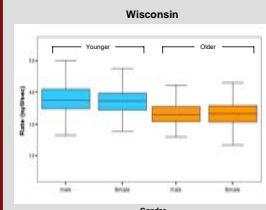


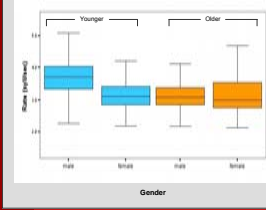
Figure 7 (top) and 8 (bottom). Central tendency and dispersion of the speech rate in read sentences.

WISCONSIN

No significant difference between the younger WI men and women.

No significant difference between the older WI men and women.

NORTH CAROLINA



There was a significant age by gender interaction: differences in the speech rate between young men and young women were greater compared to older men and older women.

Young NC men read at a rate 17% faster than young NC women.

• NC young men mean: 3.67 syll/s
• NC young women mean: 3.14 syll/s

No significant difference between older NC men and older NC women

DISCUSSION

Read versus Spontaneous Speech

The overall mean speech rate in read sentences was 3.40 syll/s and in spontaneous talks was 5.12 syll/s. This equates to a 66.4% difference between the read and spoken productions, showing that in general, speech rate in reading is much slower than in free speech. This result was not unexpected due to previous findings (Hirose & Kawanami, 2002).

Dialect

Dialect was significant for each of these rates, with Wisconsin speakers having a significantly faster speech rate than North Carolina speakers for both spontaneous talks and read sentences. The results are not consistent with those of Ray & Zahn (1990) who found that region had little effect on speech rate. The present results did support Byrd (1994) who found that out of eight dialect regions in TIMIT database, the speakers from the South had the slowest speaking rate. Though Byrd found the results to be inconclusive due to the broadly defined dialect regions represented, the results of the present study were derived from data from very specific dialect regions, so the presence of a slower speech rate among southern speakers can be drawn more conclusively here.

Age

Age also proved to be a significant factor, at least with Wisconsin speakers. Young Wisconsin speakers spoke significantly faster than older Wisconsin speakers for both spontaneous and reading rates, but North Carolina younger speakers had faster rates only for reading, and the differences for spontaneous speech rates were not significant. Perhaps the slower rate of sentence reading could be related to the educational levels of the older versus younger North Carolina speakers (all of the younger speakers were college-educated and the levels of education varied among the older speakers) and have less to do with an inherently different rate in speaking.

Gender

Results for gender were more mixed than for the other two factors, with very small differences found. Overall, men tended to speak faster than women but the only significant result was between young North Carolina men and women, with the young men reading faster than the young women. That one significant result agrees with Byrd (1994) who found that men speak significantly faster than women (6.2%), but overall this study did not find significant rate differences for gender.

Just Noticeable Difference

Most of the percentages of the differences between speech rates reported here are above the Just Noticeable Difference (JND) for speech rate. The JND is the amount of difference between two rates which listener will perceive. Quené (2007) found this difference to be around 5%. For example, the difference between the dialects found here was 8% for reading rates, and 12.5% for speaking rates. For speaker age, the difference between young and older speakers was 11% for reading rates. For gender, however, the differences between men and women fell below 5% (4.5% for read sentences and 3.6% for spontaneous talks). This means that overall, listeners should be able to hear the differences in speaking rates between the dialect and age groups, but not in the gender group overall.

CONCLUSION

The present results provide a comprehensive set of data for a detailed dialect comparison of articulation rate in the northern and southern regional varieties of American English. The study provides strong evidence that, in both reading and spontaneous speech, the speech rate of the northern speakers is faster than that of the southern speakers. Considering other factors such as age and gender, it was found that young adults read faster than older adults. However, in free speech, young adults tended to speak faster in the northern dialect but not in the southern where the articulation rates of both young and older adults did not differ. The effects of gender were small and less consistent. In general, men tended to speak a little faster than women.

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