Adapting to Foreign-Accented Speech After a Brief On-Line Intervention

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Introduction

U.S. schools attract students from all over the world, especially in STEM fields. In 2012, ~18% of U.S. graduate students were international; these individuals make valued contributions to diversity, research, and teaching. Many international teaching assistants (ITAs) speak English as a second language (L2) with accents that native English-speaking listeners may find difficult.

Emphasis has been on improving ITAs' proficiency and accent; however, listeners *can* adapt to accented speech ([1], [2], [3]). Previous adaptation studies have relied on off-line measures. We used a shadowing task to capture, **on-line**, listeners' perception of features that can make an accent challenging.

Question

What kind of experience with a non-native speaker's accent is most beneficial to native English listeners?

Stimuli & Procedure

Recordings of 68 ITAs (Mandarin speakers of English as L2) yielded these 7 difficult features of Mandarin-accented English:

1. /v/ vs. /w/: *very* ambiguous with *wary*
2. /r/ vs. /l/: *rocket* ambiguous with *locket*
3. Consonant clusters: schwa added or consonant dropped
4. Final consonant voicing: *mob* ambiguous with *mop*
5. Interdental fricative /th/: *thin* ambiguous with *sin*
6. /l/ vs. /i/ contrast: *ship* ambiguous with *sheep*
7. /ai/ and /ei/ diphthongs: *smile* ambiguous with *small*

7 short, meaningful stories were created w/ multiple instances of each feature and recorded, spoken by a native Mandarin speaker and a native English speaker.

Story 4: Cat videos

Steve hated his job and wanted to do something else. Since he had a cat he loved very much, he decided to invent something for cats and sell it.

He tried a few things: scratching posts, self-cleaning litter boxes, and a cat warmer that heated the animal with a light bulb. But he had no luck.

Steve was about to give up when fate intervened. He was sitting at the breakfast table on Sunday morning one day, watching TV. A scene came on with a flock of various birds chirping and pecking at birdseed and bugs. Steve hadn't even seen his cat that day, but as soon as he heard the first chirp, the cat shot out from behind.

50 native-English-speaking undergraduates then listened to each story 3 times: (1) shadowing the brand-new story, (2) silently listening to the same story while viewing its text script, and (3) shadowing the same story again.
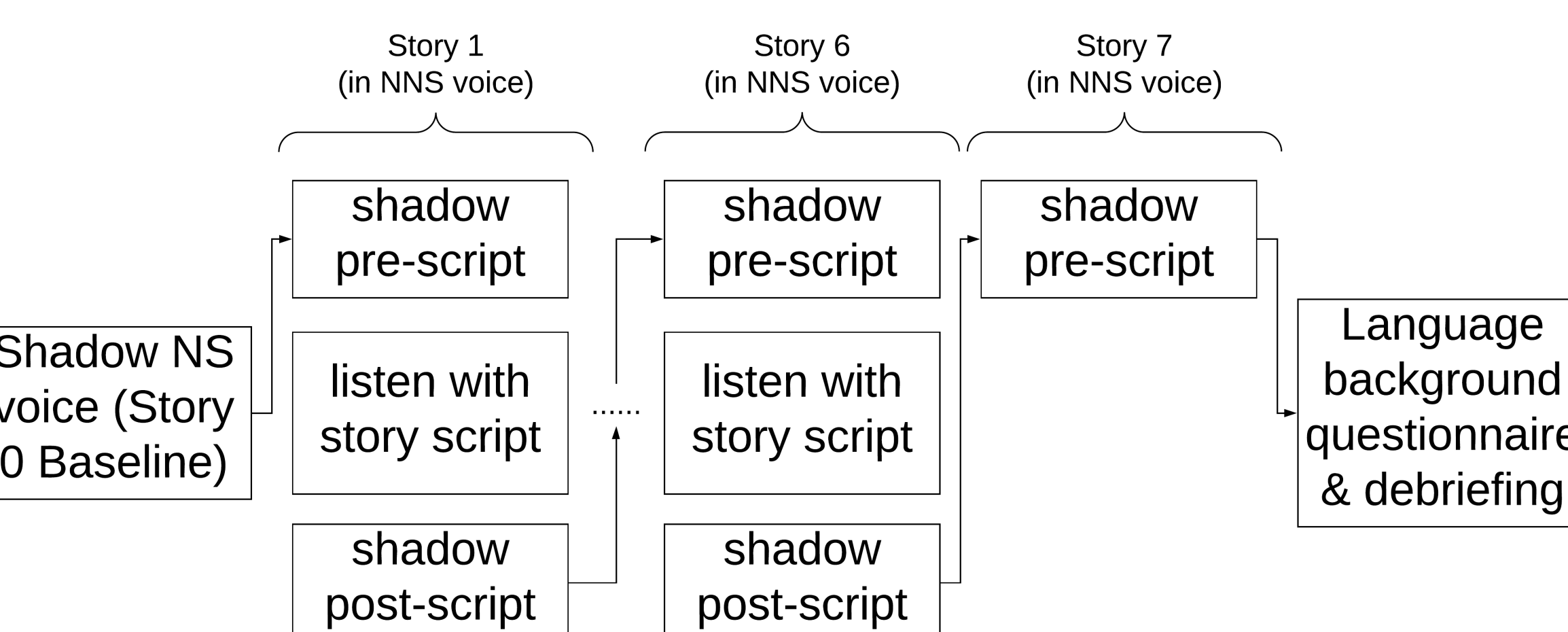
Results: Missed words
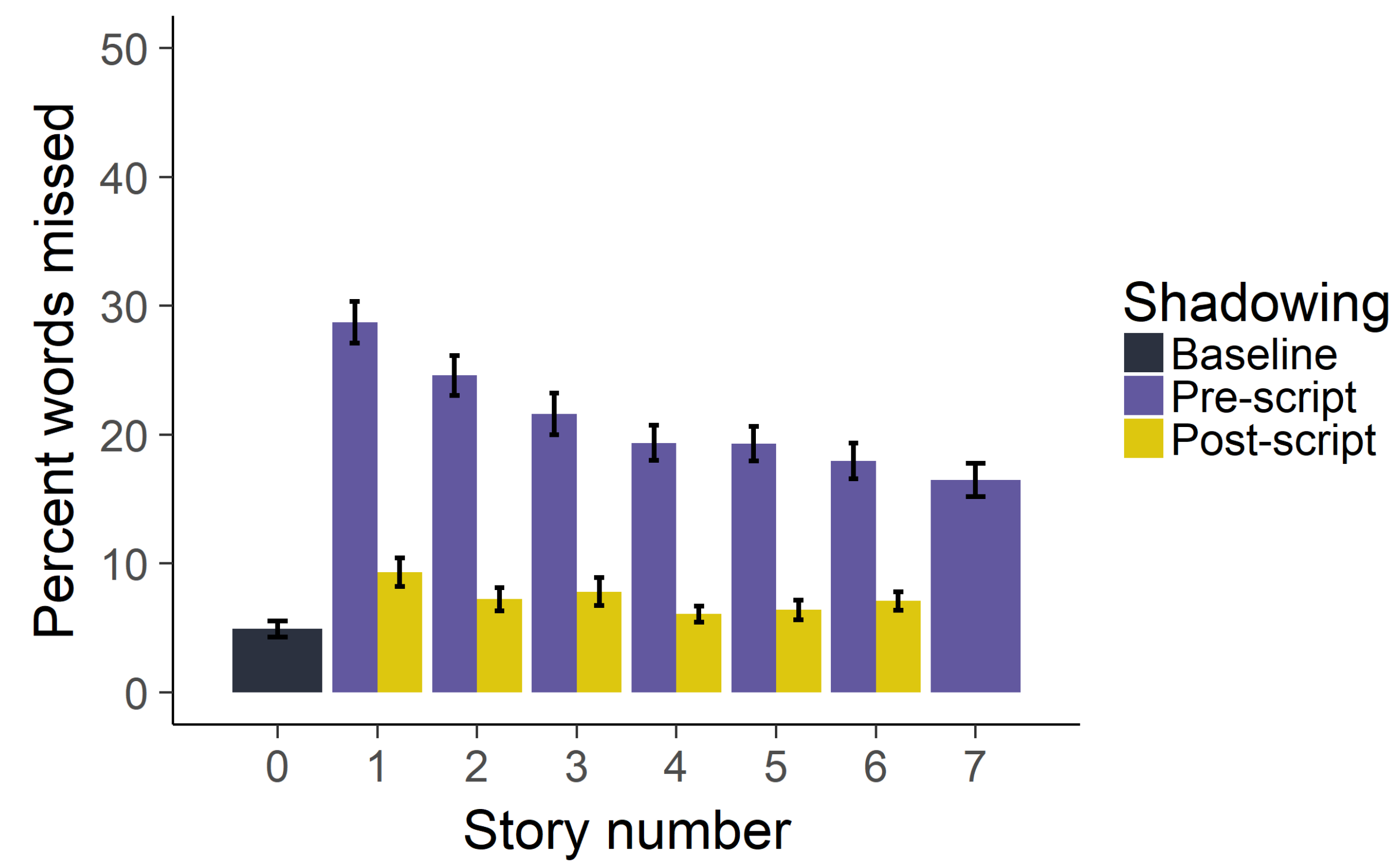
Coding

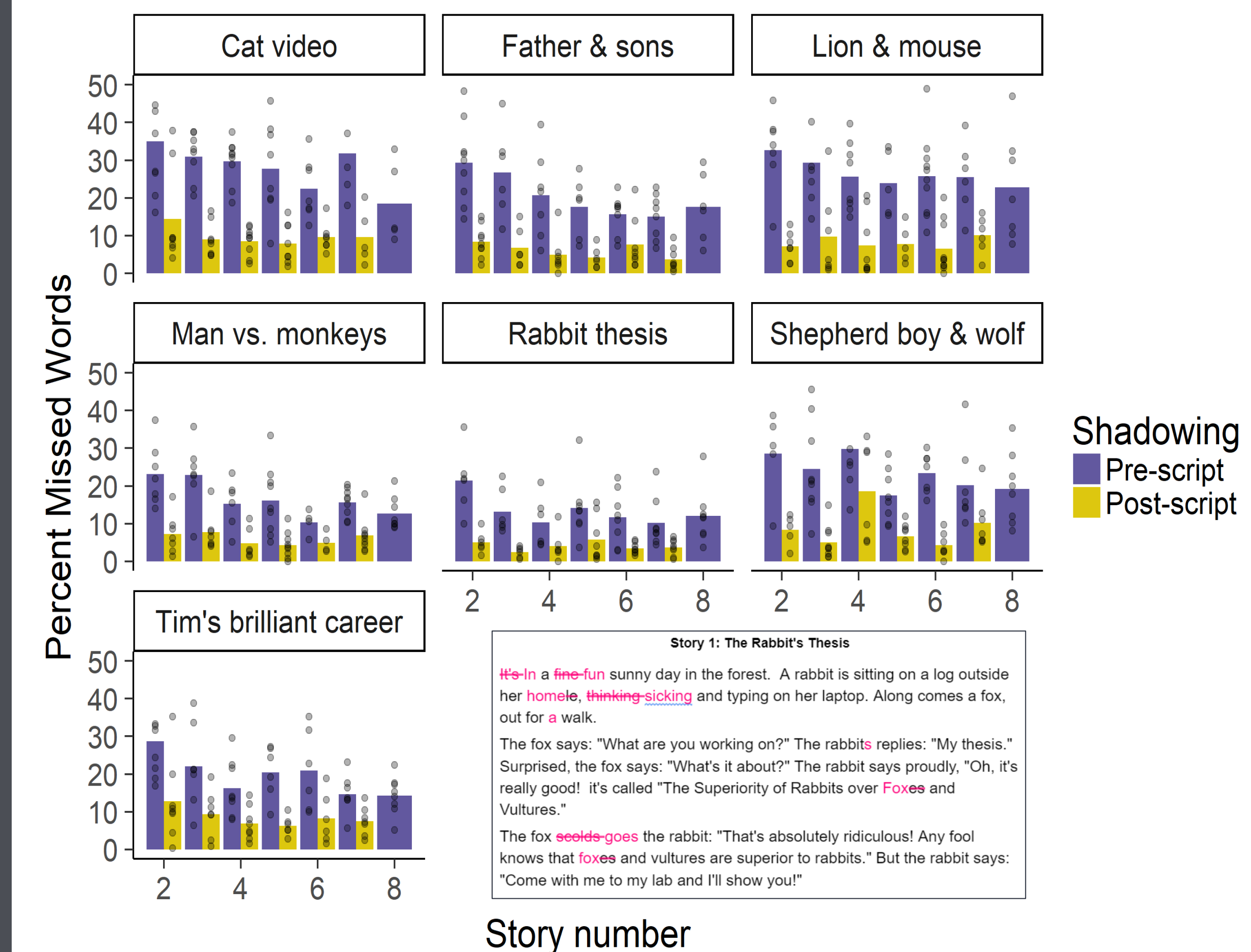**Counted missed words** *(omitted or replaced with gibberish or different word)*

Ignored in coding: *articles, changes in grammatical affix*

Results

Undergraduates adapted to the ITA's accent. Experience with the accent led to fewer missed words when shadowing a new story.

(As expected, post-script shadowing was better than pre-script shadowing.)

Results: "Imposter" words

Cases where the ITA's accent led to perceived "imposters" or homophones:
- "vest" → "west" (/v/-/w/ contrast)
- "cards" → "cars" (consonant cluster)
- "length" → "lens" (/th/-/s/ contrast)
- "pitch" → "peach" (/l/-/i/ contrast)
- "pile" → "pale" (diphthongs contrast)

Such imposters can be difficult to recognize (e.g., [4])
Mean # per story: M=16, SD=4.8, $Range$=7-23 imposters

Coding:
- **Target**: intended word
- **Impostor**: impostor homophone
- **Missed**: missed word
- **Other**: word that was neither target nor homophone
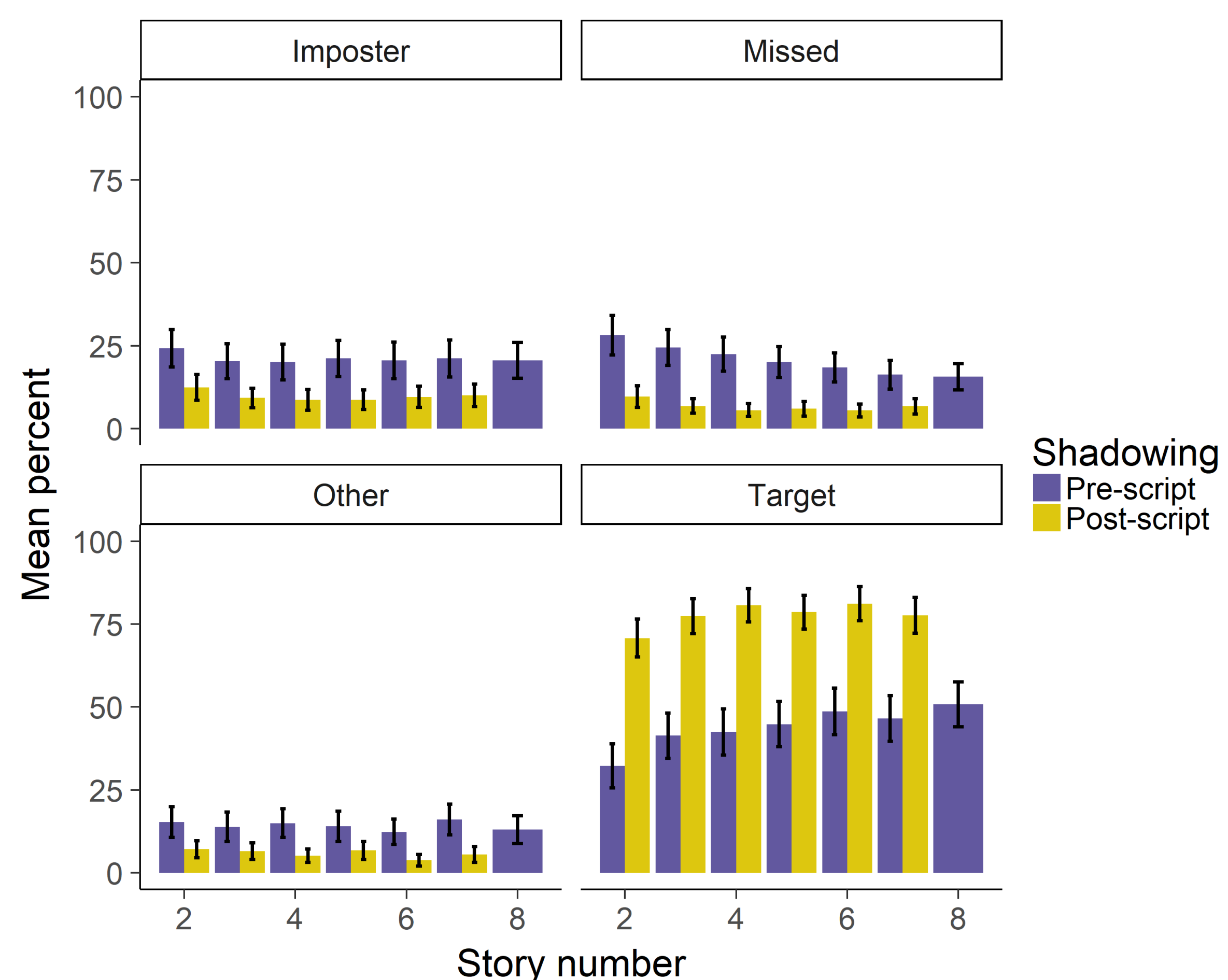
Undergraduates missed fewer of the "imposter" words as the experiment unfolded. Simultaneously, they were better able to report the intended form of these words (i.e. the target)

However there were no changes in words were incorrectly shadowed as their imposter or as a completely different word.

Results suggest that undergraduate listeners missed fewer words because they learned (adapted to) the ITA's accent.

Results: Missed words by story

Story 1: The Rabbit's Thesis

It's In a fine fun sunny day in the forest. A rabbit is sitting on a log outside her homele, thinking sicking and typing on her laptop. Along comes a fox, out for a walk.

The fox says: "What are you working on?" The rabbits replies: "My thesis." Surprised, the fox says: "What's it about?" The rabbit says proudly, "Oh, it's really good! It's called "The Superiority of Rabbits over Foxes and Vultures."

The fox scolds goes the rabbit: "That's absolutely ridiculous! Any fool knows that foxes and vultures are superior to rabbits." But the rabbit says: "Come with me to my lab and I'll show you!"

Conclusion & Future Steps

Repeated exposure to non-native accented speech, along with a text "subtitle" intervention, leads to better on-line comprehension of that speaker's accent (as indicated by shadowing performance).

Even difficult "imposter" words can be accommodated after our procedure.

This simple intervention takes about an hour, and might be useful to improve communication with ITAs and their students.

Follow-up experiments will test:

1. Consolidation: Does learning a speaker's L2 accent last?
2. Generalization: The accents of Mandarin speakers of L2 English vary in the (7) identified features that native listeners find difficult. Can listeners who have adapted to one speaker's accent transfer to another speaker's accent?
3. Intervention: Presumably, seeing the text script supported adaptation. What, if any, effect did shadowing have?

References

[1] Bradlow, A. R., & Bent, T. (2003). Listener adaptation to foreign-accented English. In *Proceedings of the 15th International Congress of Phonetic Sciences* (pp. 2881-2884). Universitat Autònoma de Barcelona Barcelona.

[2] Bradlow, A. R., & Bent, T. (2008). Perceptual adaptation to non-native speech. *Cognition, 106*(2), 707-729.

[3] Clarke, C. M., & Garrett, M. F. (2004). Rapid adaptation to foreign-accented English. *The Journal of the Acoustical Society of America, 116*(6), 3647-3658.

[4] Trude, A. M., Tremblay, A., & Brown-Schmidt, S. (2013). Limitations on adaptation to foreign accents. *Journal of memory and language, 69*(3), 349-367.