



Sentence context influences the subjective perception of foreign accents

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ABSTRACT

We examined whether sentence context (the predictability of the final word) influences listeners' ratings of foreign-accented words. Previous work has demonstrated that accent manipulations affect listeners' processing of spoken language. We examined the converse of this relationship; whether context manipulations affect listeners' perceptions of accents. If there is a bidirectional relationship, listeners should be more likely to rate an accent as strong when the accented word is not predicted by the sentence. In Experiment 1, the results revealed that participants were significantly more likely to rate words spoken by foreign-accented speakers as "Strong Accent" in the unpredictable sentences when compared to the predictable sentences. Moreover, in Experiment 2, this effect was replicated and extended to a native speaker. These results support the idea that there is a bidirectional relationship between language processing and perceptions of accents. We discuss the practical implications for foreign-accented speakers.

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1. Introduction

According to the United Nations the number of international migrants (those living outside their countries of birth) reached 244 million in 2015, a 41% increase compared to 2000. Most of these immigrants spoke a different language in their countries of origin, and thus likely speak their new language with a foreign accent. Understanding how these speakers communicate is an important topic with widespread practical implications. Until very recently (Porretta, Kyröläinen & Tucker, 2015), the vast majority of the literature in accentedness has focused on how accents influence comprehension (Bent & Holt, 2013; Bradlow & Bent, 2008; Bradlow & Bent, 2008; Clarke & Garrett, 2004; Flege, Munro & MacKay, 1995; Levi, Winters & Pisoni, 2007; Shi & Farooq, 2012; Ulbrich, 2013). In the present study we aim to understand the converse of this relationship, how comprehension – or lack thereof – influences the subjective experience of perceiving a foreign accent. If there is a bidirectional relationship between comprehension and the perception of accents, foreign accents would make comprehension more difficult, and at the same time, difficulties in comprehension would make the accents seem stronger.

We argue that people might misattribute communication difficulties (due to the sentence context) to the speaker's accent. If this is the case, participants will subjectively rate the accent as stronger when the accented stimulus is presented in a challenging contextual situation (unpredictable sentence) than when it is presented in an easy contextual situation (predictable sentence). When the stimulus is presented at

the end of a sentence that it does not complete (e.g., The dog chased our cat up the _ *stamp*) it will be rated as "Strong Accent" more often than when the exact same foreign-accented recording is presented at the end of a sentence it completes (e.g., He mailed the letter without a _ *stamp*). The novel contribution of the present study is that we used the exact same recordings in two contextual situations (predicted or unpredicted final word). If we find differences in the ratings, we can attribute these effects to the predictability of the sentence and not to characteristics of the speaker. In this experiment, speaker-dependent factors were not confounded with sentence context because all words (spoken by all speakers) were counterbalanced across all sentences – half the time completing the sentence and half the time finishing a different sentence in an unpredictable way (see the Appendix).

1.1. Accents influence comprehension

The relationship between foreign-accented speech and comprehension has been a widely studied topic in spoken language research. As stated above, much of the literature on this topic has focused on how the perception of accents affects comprehension (Atagi & Bent, 2014, 2015; Bent & Holt, 2013; Bradlow & Bent, 2008; Bradlow & Bent, 2008; Clarke & Garrett, 2004; Flege et al., 1995; Levi et al., 2007; Shi & Farooq, 2011; Ulbrich, 2013). Researchers have studied how regional and foreign-accented speech influences listeners' perception of spoken words (Goslin, Duffy & Floccia, 2012; Hanulíková, Van Alphen, Van Goch & Weber, 2012; Brunellière & Soto-Faraco, 2013; Jacewicz & Fox, 2015). Studies using map-drawing (Preston, 1986), card-sorting (Tamas, 2003), accent and dialect labeling, and categorizing (Shah, 2007; Clopper & Bradlow, 2008, 2009) tasks support the idea that listeners attend to foreign accent and dialectal variations in speech.

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Moreover, listeners perceive non-native speakers as less credible (Lev-Ari & Keysar, 2010), and listeners represent non-native speakers' language with fewer details than that of native speakers (Lev-Ari & Keysar, 2012). When listeners hear foreign-accented speech, processing is slowed down, as indicated by an increase in processing time, a reduction in perceptual intelligibility and accuracy of the message, lowered perception of overall signal comprehensibility, lowered phonetic and word discrimination scores, a compromise in the ability to detect mispronunciations, and a need for greater perceptual effort and cognitive resources (e.g., Munro & Derwing, 1995a, 1995b; Weil, 2003; Shah, Schmidt, Goral & Opler, 2005; Van Wijngaarden, 2001; Rogers, 1997; Schmid & Yeni-Komshian, 1999). All of this evidence supports the idea that foreign accents play a role in speech perception and processing.

1.2. Comprehension influences accents

The literature has focused on how the perception of accents affects how speech is understood. Nevertheless, the opposite direction of this relationship, how comprehension influences the subjective perception of foreign accents, has not been studied in detail. It is important to highlight that very few studies have examined how contextual information influences speech perception. Levi et al. (2007, p. 2328) argued that "speaker-independent factors [...] can also affect the perceived degree of foreign accent." Levi et al. (2007) evaluated the differences between native and non-native speakers in two listening contexts (auditory-only, auditory + orthography). These authors found that in the auditory + orthography condition the perceived differences between native and non-native speakers increased. Seeing the written word made participants more aware of the differences between the native and non-native speakers. Levi et al. (2007) did not specifically control for production differences. Even though they argued that production differences could not account for all the observed interactions, a controlled experiment will help to evaluate the isolated effect of speaker-independent factors.

More recently, Porretta et al. (2015) examined how perception of accentedness is affected by speaker-dependent and speaker-independent variables simultaneously. In their study the speaker-dependent factors were acoustic distances (how far the speaker is in relation to typical native-speaker values), while the speaker-independent variables were lexical characteristics of the individual words (lexical frequency for each word, number of phonological neighbors, and phonotactic probability). These authors found that increased probability and activation of a particular item within the mental lexicon (e.g., higher lexical frequency) resulted in lower perceived foreign accentedness. This finding is intriguing, participants associate native-like processing with easiness, and they rate the accent as less strong when it is easier to process – even when the easiness comes from characteristics of the words that have nothing to do with the accent. Porretta et al. (2015) concluded that both acoustic (speaker-dependent) and lexical (speaker-independent) properties are involved in the matching of a particular token to the representation of what constitutes a native-like production.

1.3. Sentence context

Semantic predictability facilitates word recognition during language processing. Researchers report that high-predictability sentences display lower error rates and faster response times than low-predictability sentences (Pisoni, Manous & Dedina, 1987). Luke and Christianson (2012) argued that during online language processing highly specific predictions preactivate some features of upcoming words. Importantly, semantic predictability has been shown to interact with familiar dialects. Clopper (2012) observed larger semantic predictability benefits in the perception of words produced by speakers with more familiar dialects than speakers with less familiar dialects. In production, vowel duration was reduced in sentences with high-semantic predictability for Southern and Northern talkers of American English (Clopper &

Pierrehumbert, 2008). If the relationship between semantic predictability and foreign accents is bidirectional, the predictability of the final word will influence judgments about the speaker. There have been a few studies (Behrman & Akhund, 2013; Derwing & Munro, 1997; Kennedy & Trofimovich, 2008) that have touched on whether sentence context affects accents ratings independently of the acoustic information.

Derwing and Munro (1997) attempted to correlate intelligibility, comprehensibility, and accentedness by asking participants to listen to a short story told by speakers with foreign accents. Participants can distinguish between speaker-dependent (accentedness) and context-dependent (comprehensibility) factors, but these factors influence one another. Their findings suggest that accentedness, comprehensibility, and intelligibility scores are clearly related but are not equivalent (Derwing & Munro, 1997). Behrman and Akhund (2013) found a significant main effect of semantic context on accentedness, comprehensibility, and intelligibility. Accents were perceived to be stronger, and both comprehensibility and intelligibility were worse, in semantically anomalous contexts. Finally, Kennedy and Trofimovich (2008) studied whether semantic context affects perception of foreign accents. These researchers found that sentences that were more difficult to understand (semantically meaningless) were rated as more accented for the non-native speakers.

Studies to date do not rule out the possibility that accents may indeed become stronger as speakers find complex material more difficult to pronounce. Our experiment adds to the literature by explicitly distinguishing between speaker-dependent and speaker-independent factors (a confound in these previous studies). We used the same recording in two different sentence contexts in order to ensure that speaker-dependent factors are not influencing the results. The goal is to study the unique influence of speaker-independent factors (i.e., sentence predictability).

1.4. Mixed models

In the present study, participants rated the level of accentedness of spoken words by clicking on the "Weak Accent" or on the "Strong Accent" response option with a computer mouse (see Fig. 1). We implemented the mouse-tracking paradigm (Spivey, Grosjean & Knoblich, 2005) using the computer program MouseTracker (Freeman & Ambady, 2010). We used mixed logit models (Jaeger, 2008) to evaluate participants' ratings of the foreign-accented words (0 – Weak Accent, 1 – Strong Accent). Their responses are dichotomous, therefore mixed logit models are the best approach to evaluate the effects of Accent and Sentence Context. Moreover, using mixed models it is possible to include participants and words crossed at the same level of sampling.

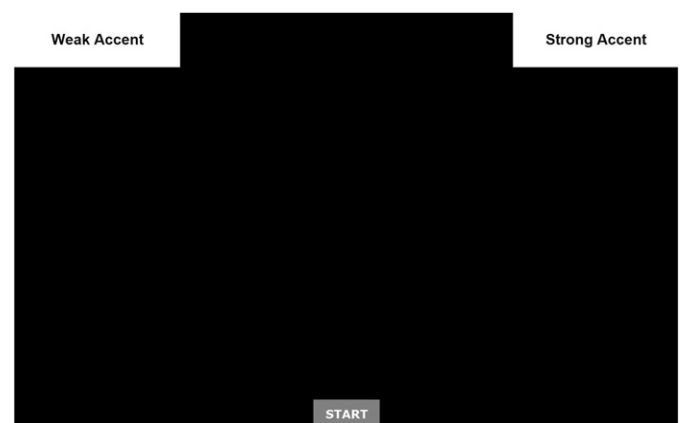


Fig. 1. This is the screen that participants viewed during the experiment. They had to click "START" to hear each sentence, and then move the mouse toward one of the response alternatives (Weak Accent or Strong Accent).

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