

## **The mechanisms of anticipation during the processing of foreign-accented speech: A comparison between familiar and unfamiliar foreign accents**

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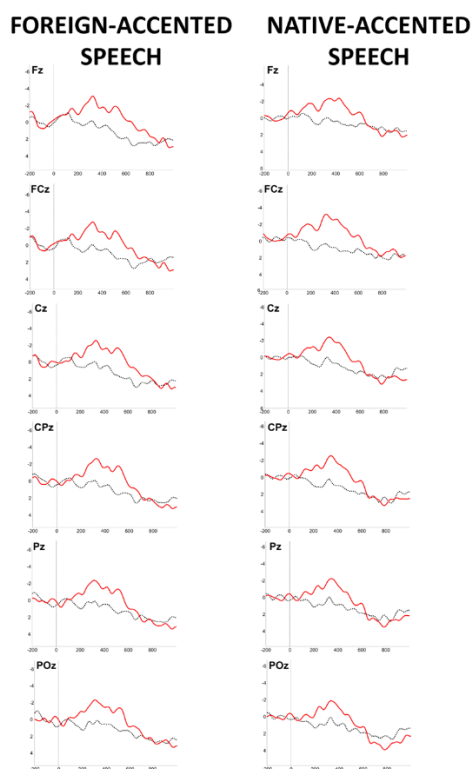
Templates could be defined as high cloze probability multiword strings stored in semantic memory such as, for instance, idioms (Vespignani et al., 2010) or antonym-pairs (Roehm et al., 2007). The encounter of the unique, highly expected ending is usually associated with the decreased amplitude of the N400 event-related related brain potentials component (Federmeier and Kutas, 1999) or the presence of the P300 component (Roehm et al., 2007; Vespignani et al., 2010). The aim of the current study was to extend our knowledge concerning neural anticipatory processing by determining whether the mechanisms responsible for categorical template matching remain active during the processing of foreign-accented speech. Although the processing of foreign accents has been scarcely investigated so far in neurolinguistic studies, recent findings tend to suggest that semantic processing is, in general, hampered in non-native speech (Hanulíková et al., 2012; Romero-Rivas et al., 2015; Romero-Rivas et al., 2016; Grey and van Hell, 2017). In the present study, we wished to verify whether the previous findings concerning impaired semantic access (supposedly reflected in the lower N400 amplitude) can be equally applied to familiar and unfamiliar foreign accents.

We conducted two ERP experiments with auditorily presented sentences to investigate neural reactions towards templates (see examples in Table 1). The high cloze probability template endings and their unexpected counterparts were selected in a pre-test on the basis of native speakers' judgements. Mean cloze probability for items in the expected ending condition amounted to .93 (CP range: 0.7-1), while the cloze probability of items used in the unexpected ending condition equaled 0 (i.e., no continuations used in this condition were ever provided by the respondents). The experimental material was also pre-tested to determine whether the L2 Polish accent used was easily identifiable (i.e., Ukrainian) or caused identification problems (i.e., Korean). Both accents were also perceived as fairly strong: on average, they obtained 3.9 (Ukrainian) and 4.2 (Korean) on a Likert scale from 1 (no accent) to 5 (very strong accent). In Experiment 1, 360 Polish sentences (including fillers) were recorded by an L1 Polish speaker and an L1 Ukrainian speaker. In Experiment 2, the same material was read by L1 Polish and L1 Korean speakers. The brain activity of 53 native Polish speakers (N = 28 in Experiment 1 and N = 25 in Experiment 2) was recorded during the EEG sessions. At the same time, the behavioral data for sentence comprehension was gathered: 120 sentences (i.e., one third of the whole experimental stimuli) were followed by comprehension yes-no question

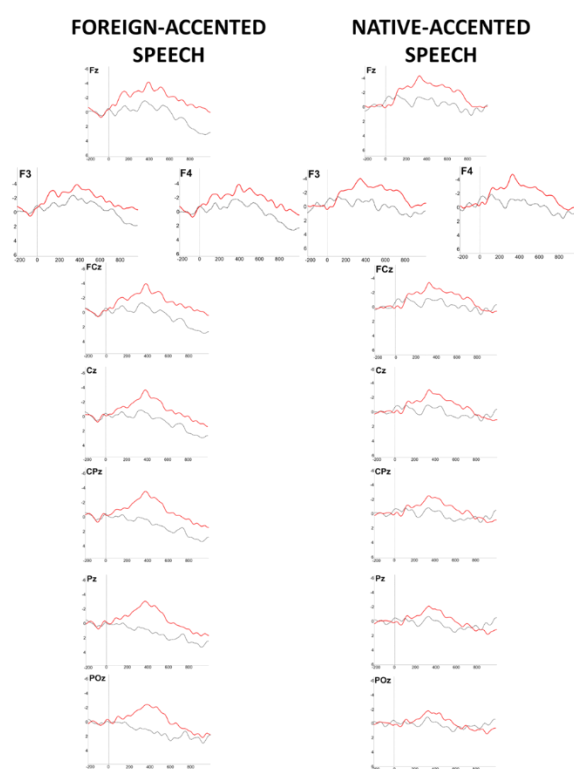
In both experiments, behavioral measures were high both in the case of native and foreign-accented condition: mean sentence comprehension accuracy equaled 87.46% in Experiment 1 and 84.67% in Experiment 2, with the differences between speakers being not statistically significant. The statistical analysis of the results employed repeated measures ANOVAs of the mean voltages per condition, performed separately for Experiment 1 and Experiment 2. The statistical analysis of Experiment 1 suggests that template violations resulted in a sustained globally-distributed N400 effect followed by late positivity (associated with meaning analysis) in the case of Polish accent. As for the Ukrainian accent, the N400 effect was similar in nature, but no late positivity was observed (see Figure 1). In the case of Korean accent, the N400 effect was better pronounced in the case of native- when compared with foreign-accented speech, and no late positivity was observed either (see Figure 2). Such results would confirm that meaning reanalysis processes are hampered in non-native speech, which is indicated by the lack of late positivity in foreign when compared with native speech. Also, the anticipation mechanisms seem to be hampered for foreign-accented speech but only in the case of unfamiliar – as opposed to familiar – foreign accents. Such results remain in accordance with the findings of the previous studies on non-native speech processing (Hanulíková et al., 2012; Romero-Rivas et al., 2015; Gibson et al., 2017).

**Table 1:** A sample of experimental material used in Experiment 1 and Experiment 2

Sample stimuli
<p>W czasie spotkania Tomek był nie w humorze, więc jego znajomy tylko dolał oliwy do <b>(C1) ognia / (C2) ciasta</b> i zdenerwował go swoim komentarzem.  <i>During the meeting, Tom was out of sorts so his friend only added fuel (lit. 'olive') to the <b>(C1) fire / (C2) dough</b> and made Tom annoyed with his comment.</i></p> <p>Od dziecka Paweł był bardzo zasadniczy, więc i tym razem był uparty jak <b>(C1) osioł/ (C2) koza</b> i postawił na swoim.  <i>Since childhood Paul had been very principled so also that time he was as stubborn as a <b>(C1) mule (lit. 'donkey') / (C2) goat</b> and got it all his own way.</i></p> <p>Przed Wigilią Tomek chciał zrobić córce prezent, więc kupił książkę pt. Ania z Zielonego <b>(C1) Wzgórza / (C2) Boru</b> i córka była zachwycona.  <i>Before Christmas, Tom wished to make his daughter a gift, so he bought a book titled Anne of Green <b>(C1) Gables / (C2) Forest</b>, and the daughter was delighted.</i></p>



**Figure 1:** Grand average ERPs obtained in Experiment 1



**Figure 2:** Grand average ERPs obtained in Experiment 2

## References:

Federmeier and Kutas, Journal of Memory and Language, 1999.

Gibson et al., Psychological Science, 2017.

Grey and van Hell, Journal of Neurolinguistics, 2017.

Hanulíková et al., Journal of Cognitive Neuroscience, 2012.

Roehm et al., Journal of Cognitive Neuroscience, 2008.

Romero-Rivas, et al., Frontiers in Human Neuroscience, 2015.

Romero-Rivas et al., Neuropsychologia, 2016.

Vespignani et al. Journal of Cognitive Neuroscience, 2010.