

The Origin of the Linguistic Gender Effect in Spoken-Word Recognition: Evidence from Non-Native Listening



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Introduction

- During spoken-word recognition, words with similar onsets get simultaneously activated and compete against each other until they no longer match incoming acoustic input. Eyetracking has been found to be well suited for the investigation of this competition effect (e.g., Tanenhaus et al., 1995).
- Dahan et al. (2000) showed that a preceding gender-marked article can prevent activation of gender-inconsistent competitor nouns: Upon hearing "le_[masc] bou..." ('the bu...'), French listeners looked at the picture of a button (*bouton*_[masc]) but not of a bottle (*bouteille*_[fem]), because bottle is feminine in French.
- Non-native listeners consider candidate words in both mother-tongue and second language simultaneously (Spivey & Marian, 1999; Weber & Cutler, 2004).
- In an auditory naming study, Guillemon and Grosjean (2001) found no effect of French gender for native English listeners who were fluent in in their second language.

Questions

- How does preceding gender information influence the recognition of subsequent spoken nouns in a non-native language?
- What can observations about gender's impact in a non-native language contribute to the ongoing debate on the origin of the gender effect (Dahan et al., 2000; see conclusion)?

Experiment 1: Non-Native Listeners

Method

- Participants: 18 proficient Francophone late learners of German
- Display:
 - Target (to be clicked on)
 - Competitor (name overlapping in onset with the target in both French and German)
 - 2 unrelated distractors
- Target always had same gender in both languages
- Two conditions, depending on competitor's gender:
 - "Same-gender" pairs (Figure 1a): Target and competitor shared gender in both languages
 - "Different-gender" pairs (Figure 1b): Target and competitor differed in gender in French, but not in German



(a) Same-gender pairs

(b) Different-gender pairs

Figure 1: Examples of German target-competitor pairs and their French translations (in italics), together with corresponding visual displays. The gender-mismatching French translation of the competitor in the different-gender pairs is highlighted.

Method (cont'ed)

- Target was preceded by gender-marked definite article in German instructions: "Wo befindet sich die_[fem] Kassette?" ('Where is the...?')
- 30 experimental trials alternated with 30 fillers (so that phonologically similar or gender matching objects were not likely targets)
- Eye-movements and mouseclicks were recorded using SMI-eyetracker
- In post-hoc vocabulary test participants were asked to name gender of all targets and competitors (7% errors between masculine and feminine)

Predictions

- Launching an eye-movement takes about 150-200 ms
 - Fixations triggered by onset of target noun are observable from 200 ms on
- (a) **Same-gender pairs**: Both Francophone and Germanophone listeners expected to show competitor activation
- (b) **Different-gender pairs**: Francophone listeners not expected to show competitor activation, if they are using French gender to disambiguate between target and competitor in German

Results

- Competitor was fixated significantly more than unrelated distractors in same-gender pairs (Figure 2a) but not in different-gender pairs (Figure 2b):
 - Same-gender pairs**: Between 200 and 600 ms, 23.9% of fixations to competitor and 14.9% to distractors
 - Different-gender pairs**: Between 200 to 600 ms, 17.9% fixations to competitor and 15.6% to distractors
- French gender information influenced competitor activation for Francophone listeners even though French was not the presentation language of the experiment

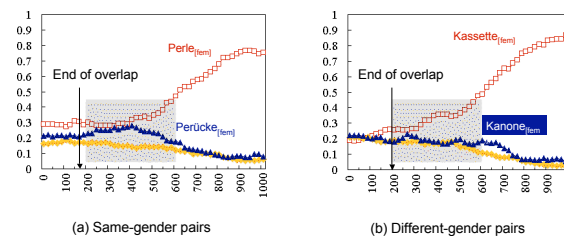


Figure 2: Fixation proportions over time (ms) to target, competitor and distractors since target onset, for Francophones listening to German.

Dahan, D., Swingle, D., Tanenhaus, M., & Magnuson, J. (2000). Linguistic gender and spoken-word recognition in French. *Journal of Memory and Language*, 42, 465-480.

Guillemon, D., & Grosjean, F. (2001). The gender marking effect in spoken word recognition: The case of bilinguals. *Memory and Cognition*, 29, 503-511.

Spivey, M., & Marian, V. (1999). Crosstalk between native and second languages: Partial activation of an irrelevant lexicon. *Psychological Science*, 10, 281-284.

Tanenhaus, M., Spivey-Knowlton, M., Eberhard, K., & Sedivy, J. (1995). Integration of visual and linguistic information in spoken-language comprehension. *Science*, 268, 1632-1634.

Weber, A., & Cutler, A. (2004). Lexical competition in non-native spoken-word recognition. *Journal of Memory and Language*, 50, 1-25.

Experiment 2: Native Listeners

In German, target and competitor share gender in both same-gender pairs and different-gender pairs. Germanophone listeners are therefore expected to show competitor activation in both cases.

Method

- Participants: 12 native Germanophone listeners
- Materials and Procedure as in Experiment 1

Results

- Competitor was fixated significantly more than unrelated distractors in both same-gender pairs (Figure 3a) and different-gender pairs (Figure 3b):
 - Same-gender pairs**: Between 200 and 600 ms, 26.7% of fixations to competitor and 11.2% to distractors
 - Different-gender pairs**: Between 200 and 600 ms, 21.0% of fixations to competitor and 11.9% to distractors
- German gender information did not constrain competitor activation for Germanophone listeners

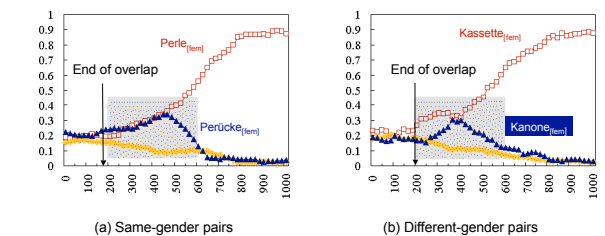


Figure 3: Fixation proportions over time (ms) to target, competitor and distractors since target onset, for Germanophones listening to German.

Conclusion

- When target and competitor were of the same gender in German, but of different gender in French, Francophone listeners did not activate the competitor during spoken-word recognition in German
 - In non-native listening, native gender information can wrongfully restrict the competitor set to nouns matching in gender in the mother-tongue
- Two mechanisms have been proposed to give rise to the gender effect (see Dahan et al., 2000):
 - Co-occurrence of form of article and noun: "die Ka..." is likely to be completed as *Kassette* because the segmental sequence /di:kaSt@/ is more frequent than */di:kantsl/ (form-based effect)
 - Co-occurrence of matching gender categories: "die Ka..." is likely to be completed as *Kassette* because the preceding gender information co-occurs more often together with a gender-matching noun than with a gender-mismatching noun (grammar-based effect)
- Our results rather support a grammar-based origin of the gender effect:
 - The form of the article differs between German and French. Thus, gender effects of the non-presentation language French, as we found them, are very unlikely to be caused by form-based regularities of that language