Master’s Thesis:

Lexical Gender in Non-Native Spoken-Word Recognition

The Origin of the Gender Effect

Garance PARIS
Advisor: Andrea WEBER
Saarland University
Competition in Spoken-Word Recognition

- Word onset activates a set of words consistent with acoustic input
- These candidates compete for recognition
- As input unfolds, candidates which become inconsistent drop out of the competitor set
Eyetracking in Visual Worlds
Lexical Competition and Eyetracking

Tanenhaus et al. (1995):

When participants heard the noun onset /kæn/, they fixated both the picture of a *candy* and that of a *candle*
Influence of Morpho-Syntactic Context

Also with eyetracking, Dahan et al. (2000) showed an influence of morpho-syntactic context:

- French: 2 arbitrary gender classes, masculine & feminine
- Article preceding a noun agrees with it in gender
- \textit{le} \textit{bouton} \text{Art}_{[masc]} \text{N}_{[masc]} \quad \text{la} \textit{bouteille} \text{Art}_{[fem]} \text{N}_{[fem]}
  
  ‘the button’ \quad \text{‘the bottle’}
Gender **Can** Restrict the Competitor Set

Dahan et al. (2000):

- Following a gender-marked article, gender-mismatching competitors are not activated.
- E.g. after “le\textsuperscript{masc} bou...”, there were as little looks to \textit{bouteille}\textsuperscript{fem} as to the distractors.
How Does this Effect Arise?

Two possible explanations are (Dahan et al., 2000):

- **Co-occurrence of the forms of articles and nouns** (surface effect):
  \[
P(\text{boutron} \mid /\text{bu}/, /\text{lə}/) \quad \text{is higher than} \quad P(\text{bouteille} \mid /\text{bu}/, /\text{lə}/)
  \]

- **Co-occurrence of gender categories and nouns** (grammar-based effect):
  \[
P(\text{boutron} \mid /\text{bu}/, \text{Art}_{[\text{masc}]}) \quad \text{is higher than} \quad P(\text{bouteille} \mid /\text{bu}/, \text{Art}_{[\text{masc}]})
  \]
Non-Native Spoken-Word Recognition

When listening to foreign language, competitors from the mother-tongue are also activated (e.g. Weber & Cutler, 2004):

"Click on the desk"

Dutch competitor: deksel "lid"
French and German Gender Compared

- Both: masculine & feminine nouns (+ neuter in German)
- Definite articles mark gender:
  - French: *le, la*
  - German: *der, die, das*
- Some French-German cognates share gender, some do not

<table>
<thead>
<tr>
<th>French</th>
<th>German</th>
<th>English</th>
</tr>
</thead>
<tbody>
<tr>
<td>perruque[fem]</td>
<td>Perücke[fem]</td>
<td>“wig”</td>
</tr>
</tbody>
</table>
Materials

(a) Same-gender pairs

Target: perle[fem]  "pearl"
Perle[fem]  "pearl"

Competitor: perruque[fem]  "wig"
Perücke[fem]  "wig"

(b) Different-gender pairs

Target: cassette[fem]  "tape"
Kassette[fem]  "tape"

Competitor: cannon[fem]  "canon"
Kanone[fem]  "canon"
Materials (2)

- **Same-gender pairs:**
  Target & competitor shared gender in both languages
  ⇒ Neither French nor German gender could constrain the competitor set
    (as with *candy/candle*)

- **Different-gender pairs:**
  Target & competitor differed in gender in French, but not in German
  ⇒ French gender might exclude competitor
    (as with *bouton/bouteille*), but German gender could not
Experiment 1: French Instructions

- **Cliquez sur le**[masc]/la[fem]…
  - Click on the...

- **Participants:**
  20 proficient Germanophone learners of French
  + 12 native listeners

- **Predictions:**
  - **Same-gender:** More fixations to the competitor than to distractors for both listener groups
  - **Different-gender:**
    - Francophones should not activate the competitor, replicating Dahan et al. (2000)
    - If Germanophones use French gender, they should not activate the competitor either
Exp. 1a: Germanophones listening to French

**Same-gender**

- Fixations from 200 to 600 ms (%)
- Comp: 21.8%
- Distr: 11.2%

**Different-gender**

- Fixations from 200 to 600 ms (%)
- Comp: 20.5%
- Distr: 11.9%
Exp. 1b: Francophones listening to French

**Same-gender**

<table>
<thead>
<tr>
<th>Time from noun onset (x100 ms)</th>
<th>Fixation proportions</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td>1</td>
</tr>
<tr>
<td>2</td>
<td>0.8</td>
</tr>
<tr>
<td>4</td>
<td>0.6</td>
</tr>
<tr>
<td>6</td>
<td>0.4</td>
</tr>
<tr>
<td>8</td>
<td>0.2</td>
</tr>
<tr>
<td>10</td>
<td>0</td>
</tr>
</tbody>
</table>

Fixations from 200 to 600 ms (%)

- Comp: 16.4
- Distr: 7.2

**Different-gender**

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<td>10</td>
<td>0</td>
</tr>
</tbody>
</table>

Fixations from 200 to 600 ms (%)

- Comp: 13
- Distr: 9.6
Experiment 1: Results

- **Non-natives (Germanophones):**
  More fixations to the competitor than to distractors in both conditions
  ⇒ In the different-gender trials, participants could not use non-native gender to eliminate competitor activation

- **Natives (Francophones):**
  Competition for same-gender but not for different-gender trials
  ⇒ As in Dahan et al. (2000), native listeners made use of gender to constrain lexical access
### Experiment 2: Materials

<table>
<thead>
<tr>
<th>Target</th>
<th>Competitor</th>
</tr>
</thead>
<tbody>
<tr>
<td>perle</td>
<td>perruque</td>
</tr>
<tr>
<td>&quot;pearl&quot;</td>
<td>&quot;wig&quot;</td>
</tr>
</tbody>
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<th>Target</th>
<th>Competitor</th>
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</thead>
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<tr>
<td>cassette</td>
<td>canon</td>
</tr>
<tr>
<td>&quot;tape&quot;</td>
<td>&quot;canon&quot;</td>
</tr>
</tbody>
</table>

- **(a) Same-gender pairs**
- **(b) Different-gender pairs**
Experiment 2: German Instructions

- **Wo befindet sich der/die...?**
  Where is the...?

- **Participants:**
  20 proficient non-natives + 12 native listeners

- **Predictions:**
  - **Same-gender:** Both listener groups should activate the competitor
  - **Different-gender:**
    - Germanophones should activate the competitor
    - If Francophones use French gender, they should not activate it
Exp. 2a: Francophones listening to German

**Same-gender**

- Fixations from 200 to 600 ms (%): Comp 23.3, Distr 15.6

**Different-gender**

- Fixations from 200 to 600 ms (%): Comp 19.6, Distr 15.8

Fixation proportions vs. Time from noun onset (x100 ms)
Exp. 2b: Germanophones listening to German

Same-gender

Different-gender

Fixations from 200 to 600 ms (%)

Comp | Distr
-----|-----
25.7 | 11.7

Fixations from 200 to 600 ms (%)

Comp | Distr
-----|-----
21 | 11.5
Experiment 2: Results

- **Non-natives (Francophones):**
  Competition only in the *same-gender* trials
  ⇒ In *different-gender* pairs, natives did use gender, but not the gender of the presentation language; instead they used the gender of their mother-tongue

- **Natives (Germanophones):**
  Competition in both conditions
Conclusion

- Non-native listeners do not make use of their foreign language’s gender to reduce competition, even when they know the gender of a word.
- Instead, they seem to use the gender of their mother-tongue.
- Consequence: Spoken-word recognition requires more effort.

**Origin of the gender effect:**
Results rather suggest that the gender effect is grammar-mediated, not form-based.
Discussion Elements

- How does the gender effect come about? Through a gender “node”? How is noun-gender stored in the lexicon in the mother-tongue? In a 2nd language?
- Our items: mostly cognates, both as targets and as competitors. What about non-cognate competitors?
- What is this late “blip” in data for both groups of non-natives? Is this before or after word-recognition?