Incidental second language grammar learning through dialogue

The acquisition of stem-vowel alternations in German strong verbs by adult native speakers of Dutch
Co-authors

Johanna de Vos
Radboud University Nijmegen & Donders Institute

Kristin Lemhöfer
Radboud University Nijmegen & Donders Institute

Alex Housen
Vrije Universiteit Brussel

Aline Godfroid
Michigan State University
Main research questions

• Can the initial steps of learning (difficult) morphosyntactic features in a foreign language take place during conversation, based on (correct) spoken native-speaker input?
  • target language → German
  • target structure → German strong verb conjugation
  • participants → L1 Dutch, L2 German
  • method → experiment: learning during dialogue
    naturalness vs. experimental control

• What is the role of awareness?
  **Explicit condition:** Participants know that they should try to learn conjugation
  **Implicit condition:** Participants don’t know that they are supposed to learn and what they are supposed to learn
# The target structure

**Weak verbs** (regular, unmarked, productive)

<table>
<thead>
<tr>
<th></th>
<th>Dutch</th>
<th>German</th>
<th>English</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>jagen</strong></td>
<td>ik jaag</td>
<td>ich jag-e</td>
<td>I hunt</td>
</tr>
<tr>
<td>1SG</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>2SG</td>
<td>jij jaagt</td>
<td>du jag-st</td>
<td>you hunt</td>
</tr>
<tr>
<td>3SG</td>
<td>hij/zij jaagt</td>
<td>er/sie/es jag-t</td>
<td>he/she/it hunts</td>
</tr>
<tr>
<td>1PL</td>
<td>wij jagen</td>
<td>wir jag-en</td>
<td>we hunt</td>
</tr>
<tr>
<td>2PL</td>
<td>jullie jagen</td>
<td>ihr jag-t</td>
<td>you hunt</td>
</tr>
<tr>
<td>3PL</td>
<td>zij jagen</td>
<td>sie jag-en</td>
<td>they hunt</td>
</tr>
</tbody>
</table>

**Strong verbs** (irregular, marked, unproductive)

<table>
<thead>
<tr>
<th></th>
<th>Dutch</th>
<th>German</th>
<th>English</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>vangen</strong></td>
<td>ik vang</td>
<td>ich fang-e</td>
<td>I catch</td>
</tr>
<tr>
<td>1SG</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>2SG</td>
<td>jij vangt</td>
<td>du fäng-st</td>
<td>you catch</td>
</tr>
<tr>
<td>3SG</td>
<td>hij/zij vangt</td>
<td>er/sie/es fäng-t</td>
<td>he/she/it catches</td>
</tr>
<tr>
<td>1PL</td>
<td>wij vangen</td>
<td>wir fang-en</td>
<td>we catch</td>
</tr>
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<td>you catch</td>
</tr>
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<td>3PL</td>
<td>zij vangen</td>
<td>sie fang-en</td>
<td>they catch</td>
</tr>
</tbody>
</table>
The target structure

- Stem-vowel alternations in German strong verbs
  
  \[\text{ich fange} \rightarrow \text{er fängt} \] (to catch)
  \[\text{ich lese} \rightarrow \text{er liest} \] (to read)

- A problem for learners!
  - Information redundancy
  - Perceptually non-salient
  - Unpredictable

- Even advanced learners keep making persistent errors
- Especially difficult for native speakers of Dutch (many cognates that do not change stem vowels)
THE EXPERIMENT
We are investigating how the language one speaks influences one’s way of thinking.

Cover story: put focus on meaning, not grammar
Procedure

Participants come to the lab, having the cover story in mind.

- Background questionnaire
- LexTALE (Lemhöfer & Broersma, 2012)
- Conversational learning task
- Awareness interview (Rebuschat, 2013)
- Phonemic discrimination task
- Explicit conjugation task
- Verb knowledge assessment

→ approximately 1.5 hours in total
The conversational learning task

• **Aim:** investigating morphosyntactic learning processes in the wild

→ prior research: artificial languages
(e.g., DeKeyser, 1995; Leung, 2007; Leung & Williams, 2006, 2011, 2012, 2014; Williams, 2005)

→ finding a balance between...
(vocabulary: De Vos, Schriefers, & Lemhöfer, in prep.; **grammatical gender**: Brandt, Schriefers, & Lemhöfer, in prep.; **morphosyntax**: Godfroid, 2016)

→ how does this task look like...
The conversational learning task

• A scripted “pseudo-dialogue” between participant and experimenter

  Experimenter
  L1 German

  Participant
  L1 Dutch, L2 German

• We had to produce sentences in turns, based on pictures:

  Speaker instruction: “Form the sentence that makes most sense”

  → Possible answer:
  “Der Schlüssel liegt auf dem Tisch neben dem Glas.”
  (“The key lies on the table next to the glass.”)

  Listener instruction: “Judge whether this would also have been your solution”
  (silent yes/no button press)
The conversational learning task

- Operationalization of ‘learning’:

**fangen (to catch) → input condition**

```
"Der Mann *fängt den Ball ..." = first test moment (T1)
...
(2 trials)
...
"Die Frau fängt den Ball ..." = input 1
...
(5 trials)
...
"Der Mann fängt den Ball ..." = input 2
...
(4 trials)
...
"Der Junge fängt / *fangt... = second test moment (T2)
```
The conversational learning task

- Operationalization of ‘learning’:

  tragen (to carry) → no-input condition

  “Der Mann *trag* das Baby ...” = first test moment (T1)

  (13 trials)  NO INPUT!

  “Der Junge *trag* den ...” = second test moment (T2)
The conversational learning task

- Operationalization of ‘learning’:

  an improvement from T1 to T2 after input, subtracting from it any improvement when no input is given.

- 90 test items:
  - 32 critical: fangen – fängt, geben – gibt...
  - 32 control: jagen – jagt, reden – redet...
  - + 26 filler: lieben – liebt, suchen – sucht...

- 280 trials:
  - 10 “practice” trials → pre-measure (participant only)
    - turn-taking instructions & awareness manipulation –
  - 270 treatment trials (in turn; 135 trials each)
The experimental conditions

48 participants
L1 Dutch; L2 German (intermediate-advanced)

EXPLICIT CONDITION
Attention guided towards target
“This is actually about strong verbs!”
“Try to learn the vowel change from the experimenter!”

21 explicit learners
+ aware of target structure
+ aware of learning purpose

IMPLICIT CONDITION
Attention guided away from target
“This is about meaning, not grammar!”

21 incidental learners
+ aware of target structure
- aware of learning purpose

6 unaware participants
- aware of target structure
- aware of learning purpose
Research questions

Main research questions → learning-related → mixed-effects modelling

RQ 1: Is there learning?
RQ 2: Does awareness of the learning purpose influence the amount of learning?
RQ 3: Does awareness of the learning purpose influence the participants’ test performance already before they receive input? (at T1)

Secondary questions → New Statistics (Cumming, 2012)

• Performance on control items
• Performance of the unaware subgroup (n = 6)
Mixed-effects analysis

- **Dependent variable**: binary score
  \(1 = \text{correct stem vowel}; \ 0 = \text{incorrect}\)
- Only critical items (strong verbs); only explicit & incidental groups

- **Final model**:
  \((\text{Correct / Incorrect stem vowel}) \sim \text{Input*Test moment*Condition} + (1 + \text{Input | Item}) + (1 | \text{Participant})\)

- **Fixed effects**:
  - **Input** (Yes/No)
  - **Test moment** (T1/T2)
  - **Condition** (explicit/incidental)

- **Random effects**:
  - random intercepts for participants
  - random intercepts for items
  - random slopes for input over items
RESULTS
Results: Group equivalence

Descriptive statistics and group difference tests on variables related to the participants’ language background in L2 German

<table>
<thead>
<tr>
<th>Variable</th>
<th>explicit n = 21</th>
<th>incidental n = 21</th>
<th>unaware n = 6</th>
<th>explicit vs. incidental</th>
</tr>
</thead>
<tbody>
<tr>
<td>Age</td>
<td>Mdn</td>
<td>IQR</td>
<td>Mdn</td>
<td>IQR</td>
</tr>
<tr>
<td>Years of instruction (school)(a)</td>
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<td>0.75</td>
<td>3.00</td>
<td>2.00</td>
</tr>
<tr>
<td>Years of instruction (university)(b)</td>
<td>0.08</td>
<td>1.00</td>
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<td>2.00</td>
</tr>
<tr>
<td>Number of other L2s(c)</td>
<td>2.00</td>
<td>1.00</td>
<td>2.00</td>
<td>1.00</td>
</tr>
<tr>
<td>General frequency of usage(d)</td>
<td>2.00</td>
<td>2.00</td>
<td>2.00</td>
<td>1.00</td>
</tr>
<tr>
<td>General proficiency(d)</td>
<td>3.00</td>
<td>1.00</td>
<td>3.00</td>
<td>1.00</td>
</tr>
<tr>
<td>Speaking proficiency(d)</td>
<td>3.00</td>
<td>1.00</td>
<td>3.00</td>
<td>2.00</td>
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<tr>
<td>Writing proficiency(d)</td>
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<td>1.00</td>
<td>3.00</td>
<td>1.00</td>
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<td>Listening proficiency(d)</td>
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<td>4.00</td>
<td>1.00</td>
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<td>Reading proficiency(d)</td>
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<td>1.00</td>
<td>4.00</td>
<td>0.00</td>
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<tr>
<td>Pre-measure critical items</td>
<td>25</td>
<td>50</td>
<td>0</td>
<td>25</td>
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<tr>
<td>Pre-measure control items</td>
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<td>25</td>
<td>100</td>
<td>0</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Variable</th>
<th>M</th>
<th>SD</th>
<th>M</th>
<th>SD</th>
<th>M</th>
<th>SD</th>
<th>Welch t-test</th>
<th>d</th>
</tr>
</thead>
<tbody>
<tr>
<td>Vocabulary size(e)</td>
<td>65.77</td>
<td>8.08</td>
<td>65.42</td>
<td>6.35</td>
<td>66.46</td>
<td>0.87</td>
<td>t(37.90) = 0.16, p = .87</td>
<td>0.04</td>
</tr>
<tr>
<td>Average proficiency(f)</td>
<td>2.93</td>
<td>0.73</td>
<td>3.13</td>
<td>0.69</td>
<td>2.54</td>
<td>0.87</td>
<td>t(39.86) = -0.95, p = .35</td>
<td>-0.30</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Bilingual status (from birth)</th>
<th>Count</th>
<th>Count</th>
<th>Count</th>
<th>Pearson’s chi-square</th>
<th>Odds ratio</th>
</tr>
</thead>
<tbody>
<tr>
<td>Bilingual</td>
<td>8</td>
<td>3</td>
<td>0</td>
<td>χ²(1) = 1.97, p = .16</td>
<td>3.54</td>
</tr>
<tr>
<td>Monolingual</td>
<td>13</td>
<td>18</td>
<td>6</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Variant of Dutch (L1)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Belgium</td>
<td>16</td>
<td>15</td>
<td>6</td>
<td>χ²(1) = 0.00, p = 1.00</td>
<td>1.27</td>
</tr>
<tr>
<td>The Netherlands</td>
<td>5</td>
<td>6</td>
<td>0</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
Results: Learning (RQs 1-3)

Model output:

Significant effects:
- Input x Test moment ($p > .001$)
- Main effect of Condition at T1 ($p = .009$)

Not significant:
- Input x Test moment x Condition

Conclusion
- Regardless of condition, the participants learned from input (**RQ1**)
- The learning effect was similar in both groups (**RQ2**)
- The explicit group had higher scores overall from the beginning (**RQ3**)
Results: Control items

Control vs. critical items:
• High scores on controls (yet not ceiling!)
• Strong effect of Verb type: Controls on average 30% higher than criticals

Effect of awareness manipulation:
• Small effect of Condition at T1 (explicit < incidental)

Conclusion
• Weak conjugation = default
• No alarming overgeneralization
• Awareness manipulation causes slightly more errors in explicit group (= overgeneralization) from the start
Results: Unaware group \((n = 6)\)

**Critical items:**
- Very low scores throughout learning task \((T1, T2)\) for both input and no input

**Control items:**
- Opposite picture!
- Close to ceiling scores at \(T1\) and \(T2\)

**Conclusion**
- No learning whatsoever
- Weak conjugation paradigm = default
Conclusions

• **Summary of main results:**
  - Both groups learn equally well
  - The explicit learners have higher results overall
  - No learning in the unaware group

• **Conclusions:**
  - Minimal spoken input leads to *further* morphosyntactic learning
    ([Attention: what we see here are micro-steps of learning that may or may not lead to the development of sustainable knowledge]
  - ... but only if there is awareness of the target structure
  - Intentionally directing attention to the target structure increases accuracy, but does not necessarily lead to more learning *(divided attention?)*
  - Stem-vowel alternations are clearly a difficulty, especially if you don’t pay attention
  - Weak conjugation paradigm = default
  - Method: successful combination of experimental control & naturalistic elements
Thank you for your attention!

[eva.marie.koch@vub.be]
[https://www.researchgate.net/profile/Eva_Koch5]
References


