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Effect of implicit training on the processing of morphosyntactic violations by French learners of English

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Introduction
Implicit grammar learning with artificial languages has shown that novel grammatical structures can be learned implicitly. We aimed to see if these results could be extended to natural L2 learning. We investigated the effect of implicit training on the processing of morphosyntactic violations with different salience and similarity between L1 and L2.

Methods and Materials

PARTICIPANTS
16 French learners of English

MATERIAL
EEG recording with Semantic Acceptability Judgment

Task (SAJT)
192 critical polar questions, ½ with violations:
- Similar L1/L2: Had Mary finished/*finish our dinner?
- Specific L2: Did Mary finish/*finished our dinner?
120 syntactic fillers, ½ with determinant/noun agreement violations:
- Did John govern that country/*countries for years?
- Had Mary fired what happened?

Timed Grammaticality Judgment Task (GJT)
40 polar questions, 24 determinant-noun fillers and 64 additional syntactic fillers; ½ ungrammatical

Training
Initial: 72 polar questions and declarative counterparts
Main: 256 correct polar questions * 3 sessions

PROCEDURE

<table>
<thead>
<tr>
<th>PRETEST</th>
<th>TRAINING</th>
<th>POSTTEST</th>
</tr>
</thead>
<tbody>
<tr>
<td>EEG recording, SAJT</td>
<td>Initial Training</td>
<td>EEG recording, SAJT</td>
</tr>
<tr>
<td>* Official goal: learn vocabulary</td>
<td>* Listen and choose the right picture</td>
<td>* Listen and choose the right answer</td>
</tr>
<tr>
<td></td>
<td></td>
<td>* 3 propositions with semantic / critical violations</td>
</tr>
</tbody>
</table>

Results

<table>
<thead>
<tr>
<th>GJT</th>
<th>Pre-test</th>
<th>Post-test</th>
</tr>
</thead>
<tbody>
<tr>
<td>DID</td>
<td>HAD</td>
<td>DID</td>
</tr>
<tr>
<td>d’</td>
<td>0.18 (1.44)</td>
<td>0.87 (1.18)</td>
</tr>
<tr>
<td>Perf (%)</td>
<td>53.8 (22.7)</td>
<td>62.8 (19.0)</td>
</tr>
<tr>
<td>RT (ms) µ(σ), t</td>
<td>283 (245),386</td>
<td>447 (266),294</td>
</tr>
</tbody>
</table>

Performance: Effect of Auxiliary: F(1,15)=7.10, p<.05
RT: analyses performed on an exGaussian distribution with a normal part described by µ and a and exponential part described by τ.

Effect of Session: F(1,15)=13.6, p<.01: slower in post-test

<table>
<thead>
<tr>
<th>ERPs</th>
<th>Pre-test</th>
<th>Post-test</th>
</tr>
</thead>
<tbody>
<tr>
<td>Auxiliary</td>
<td>DID</td>
<td>HAD</td>
</tr>
<tr>
<td>300-600 ms</td>
<td>Cond.*Aux.: F(1,15)=7.50, p&lt;.05</td>
<td>No effect of Condition</td>
</tr>
<tr>
<td></td>
<td>Positive, p&lt;.05</td>
<td>Negative, p&lt;.05</td>
</tr>
<tr>
<td>600-900 ms</td>
<td>Cond*Aux.: F(1,15)=4.91, p&lt;.05</td>
<td>No effect of Condition</td>
</tr>
<tr>
<td></td>
<td>Positive, p&lt;.01</td>
<td>No effect</td>
</tr>
</tbody>
</table>

Discussion
Results show that participants were more sensitive to the L1-like violation (with HAD) despite the superior saliency of the DID violation.
Learners seemed to rely on different processes with the 2 auxiliaries:
- an attention-related response with DID
- morphosyntactic processing with HAD.
No significant effect of session was found on accuracy but the disappearance of the positive effect with DID suggests the start of a change in processing strategy. Participants show some degree of implicit knowledge but relied successfully on explicit knowledge in the GJT.

Acknowledgments
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