# 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?*

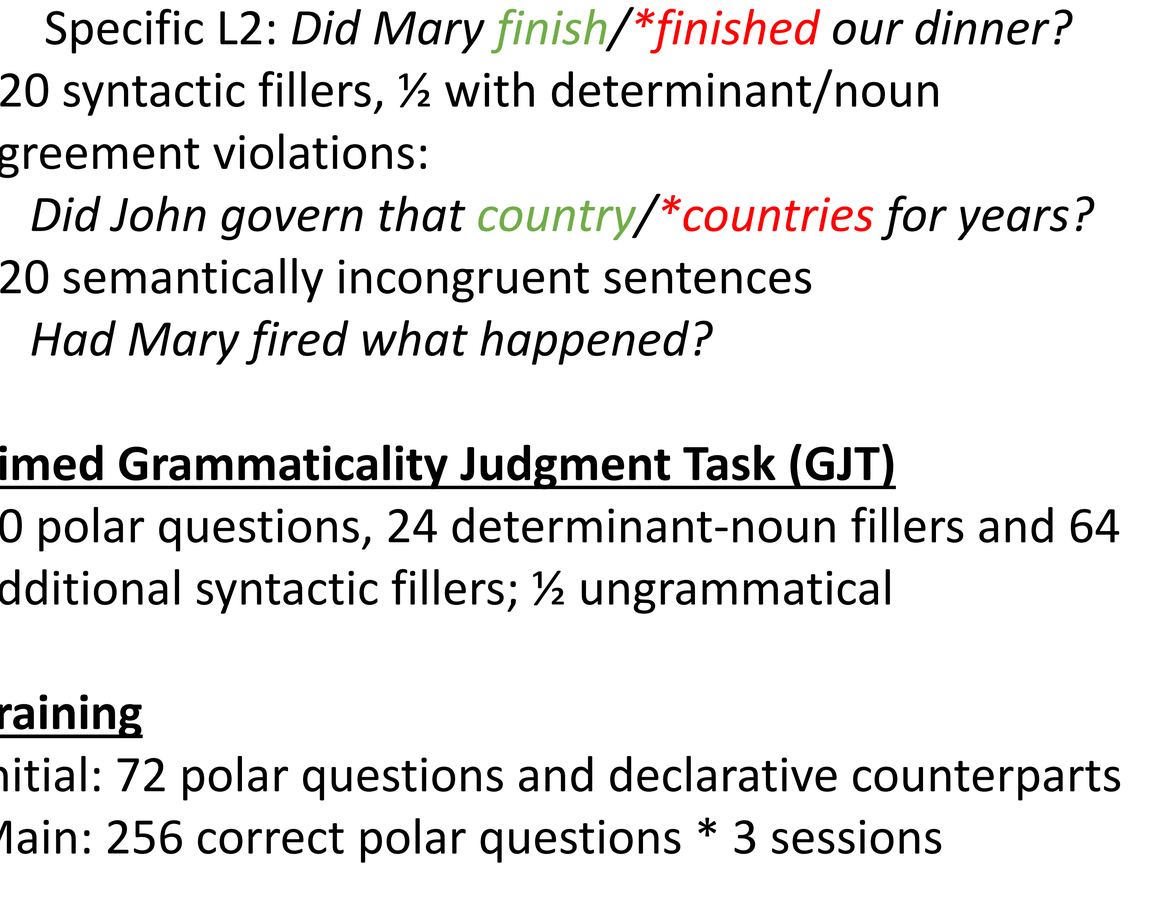
120 syntactic fillers, ½ with determinant/noun agreement violations:
- *Did John govern that country/*countries for years?*

120 semantically incongruent sentences
- *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**

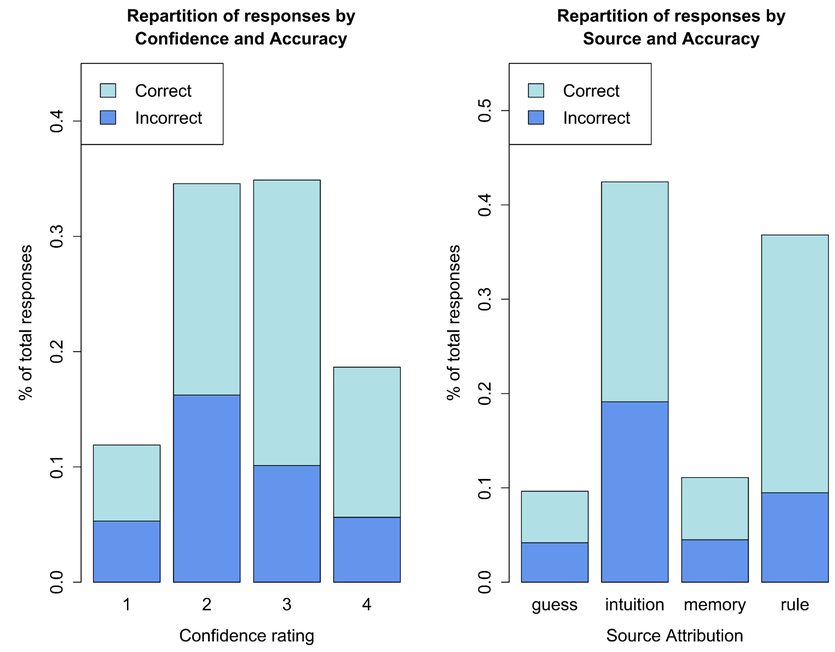



## Results

| GJT | Pre-test | | Post-test | |
|---|---|---|---|---|
| | **DID** | **HAD** | **DID** | **HAD** |
| ***d'*** | 0,18 (1,44) | 0,87 (1,18) | 0,39 (1,14) | 1,25 (0,85) |
| ***Perf (%)*** | 53,8 (22,7) | **62,8** (19,0) | 57,2 (17,7) | **69,1** (14,3) |
| ***RT* (ms)** μ(σ), τ | 283 (245),386 | **447** (266),294 | 533 (260),331 | **568** (274),338 |

***Performance***: Effect of **Auxiliary**: $F(1,15)=7.10$, $p<.05$
*RT: analyses performed on exGaussian distribution with a normal part described by μ and σ and exponential part described by τ.*
***RT**:* Effect of **Aux.** on μ: $F(1,15)=10.3$, $p<.01$: slower with HAD
Effect of **Session**: $F(1,15)=13.6$, $p<.01$: slower in post-test

| ERPs | Pre-test | | Post-test | |
|---|---|---|---|---|
| **Auxiliary** | **DID** | **HAD** | **DID** | **HAD** |
| **300-600 ms** | *Cond.*Aux.*: $F(1,15)=7,50$, $p<.05$ | | *No effect of Condition* | |
| | **Positive**, $p<.05$ | **Negative**, $p<.05$ | | |
| **600-900 ms** | *Cond*Aux.*: $F(1,15)=4,91$, $p<.05$ | | *No effect of Condition* | |
| | **Positive**, $p<.01$ | No effect | | |




| SAJT | Pre-test | Post-test |
|---|---|---|
| *Performance (%)* | 71.6 (8.9) | 78.5 (8.7) |
| | *Session*: $F(1,15)=17.24$, $p<.001$ | |

## 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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