The Effects of Cognitive Individual Differences on the L3 Acquisition of French Grammatical Gender: Insights from Arabic- and Mandarin-speaking Learners

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Overview of Today’s Presentation

1) My positionality as a researcher
2) Grammatical agreement
3) Inter-learner variability during L2A & Individual differences
4) Study, “Language experience and linguistic skills among multilingual learners in higher education”
My Positionality as a Researcher
I am an

- L1 English, L2 French (C2) and L3 German (A2) user
- ESL and FSL instructor
- an experimental linguist with many applied interests
Whom am I? How do I View Language and Second Language Acquisition?

Language

- is a system shaped by **human cognition** (e.g., memory, attention) and **physiology** (e.g., the auditory & articulatory systems) as well as a user’s linguistic and social experience

- involves **implicit & explicit knowledge** that is both **qualitative** (e.g., a word’s forms & meanings) and **quantitative** (e.g., the probability that, in English and French, /p/ is more likely to be follow by /l/ than /j/)
Whom am I? How do I View Language and Second Language Acquisition?

- Second language acquisition (L2A)
  - is a **bilingual phenomenon** involving on-going interactions between a learner’s L1 and L2
  - involves the acquisition of **vocabulary, grammar, pronunciation & sociopragmatics**
  - is **shaped by a range of variables** including input quality & quantity, and L2 learning aptitude
Grammatical Agreement
What is Agreement?

- A linguistic phenomenon that signals the links between elements in a phrase / sentence.
  
  *Pete wrote to your brother* \textcolor{red}{3P.SG.MASC} Adam and your sister \textcolor{red}{3P.SG.FEM} Katie but only she \textcolor{red}{3P.SG.FEM} answered.

- Along with word meaning and word order, one of the key mechanisms for communicating meaning.
Agreement across Languages

- Languages vary widely in the types of grammatical agreement they use.

- Some semantic features such as **NUMBER** (SG, PL), **PERSON** (1st, 2nd, 3rd), and **TENSE** (PAST, PRES, FUT) are very common cross-linguistically.

- Other grammatical features such as **GENDER** (MASC, FEM) are less so.
<table>
<thead>
<tr>
<th>English</th>
<th>Mandarin</th>
<th>French</th>
<th>Arabic</th>
</tr>
</thead>
<tbody>
<tr>
<td>I relaxed</td>
<td>我 休息 了 (wǒ xiūxǐ le) ‘I go PERF’</td>
<td>je me suis reposé.e ‘I self₁.P.SG be₁.P.SG relaxed MASC/FEM’</td>
<td>أنا استرخِتُ 1P.SG relaxed’ ana₁.P.SG is-ta-rh root verb٣marker-1P.SG</td>
</tr>
<tr>
<td>You&lt;sub&gt;SG&lt;/sub&gt; relaxed</td>
<td>你 休息 了 (nǐ xiūxǐ le) ‘you&lt;sub&gt;SG&lt;/sub&gt; go PERF’</td>
<td>tu t’as reposé.e ‘you self₂.P.SG be₂.P.SG relaxed MASC/FEM’</td>
<td>أنتّ استرخِتْ/أنتّ استرخِتْ ’you&lt;sub&gt;MASC&lt;/sub&gt;/2P.SG relaxed&lt;sub&gt;MASC/FEM&lt;/sub&gt;’ ant&lt;sub&gt;2P.SG&lt;/sub&gt; is-ta-rh root verb٣marker-2P.MASC.SG</td>
</tr>
<tr>
<td>S/he relaxed</td>
<td>她/他 休息 了 (tā xiūxǐ le) ‘s/he go PERF’</td>
<td>il/elle s’est reposé.e ‘s/he self₃.P.SG be₃.P.SG relaxed&lt;sub&gt;MASC/FEM&lt;/sub&gt;’</td>
<td>هو استرخَ/هي استرخَت ‘s/he&lt;sub&gt;MASC&lt;/sub&gt;3P.SG relaxed&lt;sub&gt;MASC/FEM&lt;/sub&gt;’ huwa&lt;sub&gt;MASC&lt;/sub&gt;/3P.SG is-ta-rh root verb٣marker-2P.MASC.SG</td>
</tr>
<tr>
<td>We relaxed</td>
<td>我们 休息 了 (wǒmen xiūxǐ le) ‘we go PERF’</td>
<td>nous nous sommes reposé.e. ‘we self₁.P.SG be₁.P.PL relaxed MASC/FEM/PL’</td>
<td>نحنّ استرخَنا ‘we&lt;sub&gt;MASC&lt;/sub&gt;1P.PL relaxed MASC/FEM/PL’ nhnu₁.P.PL is-ta-rh root verb٣marker-3P.SG.MASC/FEM/PL</td>
</tr>
<tr>
<td>You&lt;sub&gt;PL&lt;/sub&gt; relaxed</td>
<td>你们 休息 了 (nímen xiūxǐ le) ‘you&lt;sub&gt;PL&lt;/sub&gt; go PERF’</td>
<td>vous vous êtes reposé.e.s ‘you self₂.P.PL be₂.P.PL relaxed MASC/FEM/PL’</td>
<td>أنتمّ استرخَتمّ/أنتمّ استرخَتْ ‘you&lt;sub&gt;MASC&lt;/sub&gt;/2P.PL relaxed&lt;sub&gt;MASC/FEM&lt;/sub&gt;/PL’ antum&lt;sub&gt;2P.PL&lt;/sub&gt; is-ta-rh root verb٣marker-2P.MASC.PL</td>
</tr>
<tr>
<td>They relaxed</td>
<td>他们 休息 了 (tāmen xiūxǐ le) ‘they go PERF’</td>
<td>ils/elles se sont reposé.e.s ‘they self₃.P.PL be₃.P.PL relaxed MASC/FEM/PL’</td>
<td>هم استراحوا/هم استرخَت ‘they&lt;sub&gt;MASC&lt;/sub&gt;3P.PL relaxed&lt;sub&gt;MASC/FEM&lt;/sub&gt;/PL’ hum&lt;sub&gt;MASC&lt;/sub&gt;/3P.PL is-ta-rh root verb٣marker-3P.SG.MASC.FEM/PL</td>
</tr>
</tbody>
</table>
Nouns are gendered (MASC, FEM) and all modifiers (articles, adjectives) agree in gender

French

`un petit livre`  
`a_{MASC.SG} small_{MASC.SG} book_{MASC.SG}`

`une petite table`  
`a_{FEM.SG} small_{MASC.SG} table_{FEM.SG}`
Gender Agreement in Arabic & French

Arabic

هذا كتاب صغير

‘this mâsc.sg book mâsc.sg small mâsc.sg’

هذه طاولة صغيرة

‘this fem.sg table fem.sg small fem.sg’

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Acquiring grammatical agreement is one of the most persistent challenges for L2 learners (e.g., Bartning, 2000; Ayoun, 2007; Côté, 2021 for French gender)

Even (very) advanced learners may make errors under certain conditions (e.g., highly complex tasks, fatigue)
L2A of Agreement

- When errors occur, these may involve

  1) Omission of the grammatical morpheme (e.g., she *say she coming)

  2) Incorrect agreement (e.g., une *grand boîte 'a_{FEM.SG} big\_MASC.SG box_{FEM.SG})

* Ungrammatical form
Researchers have proposed that non-target grammatical agreement is due to:

- L1-based crosslinguistic influence (e.g., Hawkins & Franceschina, 2004; Goad et al., 2003)
- Constraints on grammatical parsing (e.g., Prévost & White, 2000; Pienemann, 1998; 2005)
Inter-learner Variability during L2A & Individual Differences
Variability: An Intrinsic Quality of Language

- Language is inherently variable, conditioned by
  - **speaker & interlocutor identity** (e.g., dialect, age, gender, socioeconomic status)
  - the **communicative task & situation** (e.g., formality, type of speech act)
  - **bi-/multilingualism** (e.g., Birdsong, 2018)
Variability & L2 Acquisition

- Non-native speakers’ language use is normally more variable than that of native speakers.
- Understanding such variability is one of the main goals of L2A research.
This additional variability is related to factors such as:
- L1-based crosslinguistic influence
- Language experience & TL proficiency
- Individual differences
Individual Differences (IDs)

“dimensions of enduring personal characteristics that are assumed to apply to everybody and on which people differ by degree” (Dörnyei, 2005, p.4)

In the case of L2A, one normally distinguishes between **cognitive** & **affective** IDs (e.g., Dörnyei & Ryan, 2015)
Cognitive Individual Differences

- These include
  - memory (e.g., Aliaga-García et al., 2011)
  - executive function (e.g. Ghaffarvand Mokari & Werner, 2019)
  - metalinguistic awareness (e.g., Roehr-Brackin, 2018)
  - statistical learning (e.g., McDonough & Trofimovich, 2016)
Affective Individual Differences

- These include
  - motivation (e.g., Masgoret & Gardiner, 2003)
  - foreign language anxiety (e.g., MacIntyre & Gardner, 1994)
  - foreign language enjoyment (e.g., Dewaele & MacIntyre, 2014)
Working Memory (WM)

“a system that is used for the temporary maintenance of task-relevant information whilst performing cognitive tasks” (Wen, 2019, p.189)

- Responsible for both storing and processing information for brief periods
Baddeley’s (2007) Model of WM

Central Executive

- Visuospatial Sketchpad
- Episodic Buffer
- Phonological Loop

Visual Semantics

Episodic LTM

Language
Metalinguistic Awareness

“awareness of certain properties of language and the ability to analyse linguistic input” (Roehr-Brackin, 2018, p.1)

- A predictor of many language-related abilities including early literacy (e.g., Zhang & Li, 2017)
“Language Experience and Linguistic Skills Among Multilingual Learners in Higher Education”
Study Overview

- This study investigates the effects of
  - Learners’ L1 (Arabic, Mandarin)
  - L2 English lexical and grammatical knowledge
  - cognitive IDs (working memory, executive function, metasyntactic awareness, statistical learning)

on the L3 acquisition of French grammatical gender and verbal agreement
Research Hypotheses: RQ1 – L1-based Crosslinguistic Influence

**General**: The presence of a rich L1 agreement system facilitates the acquisition of L3 agreement.

**Specific**: Arabic-speaking learners of French will be more accurate in their production of number and person agreement than their Mandarin-speaking peers, all else equal.
General: The differences observed in the production of L3 French agreement with learners sharing the same L1 can be explained by L1, L2 & L3 lexical and grammatical knowledge as well as cognitive IDs.
Specific: Individuals with larger L1, L2 & L3 vocabularies; better L2 & L3 grammatical knowledge; and greater working memory, executive function, metasyntactic awareness & statistical learning skills will be more accurate in producing L3 French gender and verbal agreement.
## Participants (by end of study)

<table>
<thead>
<tr>
<th>Group</th>
<th>n</th>
<th>L1</th>
<th>L2</th>
<th>L3</th>
</tr>
</thead>
<tbody>
<tr>
<td>i.  Weak L1 Agreement</td>
<td>70</td>
<td>Mandarin</td>
<td>English</td>
<td>French</td>
</tr>
<tr>
<td>ii. Rich L1 Agreement</td>
<td>70</td>
<td>Arabic</td>
<td>English</td>
<td>French</td>
</tr>
<tr>
<td>iii. Controls</td>
<td>15</td>
<td>English</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>15</td>
<td>French</td>
<td></td>
<td></td>
</tr>
<tr>
<td>TOTAL</td>
<td>170</td>
<td></td>
<td></td>
<td></td>
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</tbody>
</table>

- Undergraduate students; Learners: Low intermediate+
Tasks

- Learners completed
  - written & spoken production tasks
  - tests of lexical and lexico-grammatical competence
  - measures of the four cognitive IDs
# Session 1: L1 Arabic/Mandarin

<table>
<thead>
<tr>
<th>Construct</th>
<th>Task</th>
</tr>
</thead>
<tbody>
<tr>
<td>Lexical breadth</td>
<td>Vocabulary Size Test</td>
</tr>
<tr>
<td>Lexical-grammatical proficiency</td>
<td>Cloze test</td>
</tr>
<tr>
<td>Working memory</td>
<td>Digit span task</td>
</tr>
<tr>
<td>Metasyntactic awareness</td>
<td>Error reproduction task</td>
</tr>
<tr>
<td>Executive function</td>
<td>Simon Task</td>
</tr>
<tr>
<td>Statistical learning</td>
<td>Pattern learning task</td>
</tr>
</tbody>
</table>
Metasyntactic Awareness: Error Reproduction Task

Instructions

“In this task, you’re going to hear two sentences that you will also see to help you. For each pair of sentences, the first sentence always contains an English error, while the second sentence is correct and contains no error. What you need to do is to find the error in the first sentence then change the second sentence so that it contains the same error. We’ll do two practice examples to check that you understand what you need to do.”
The TV on the stand is really old that's made of wood.

The car on the driveway that's paved is a Porsche.

→ The car on the driveway is a Porsche that’s paved
**Session 2: French**

<table>
<thead>
<tr>
<th>Construct</th>
<th>Task</th>
</tr>
</thead>
<tbody>
<tr>
<td>Lexical breadth</td>
<td>Vocabulary Levels Test</td>
</tr>
<tr>
<td>Lexical-grammatical proficiency</td>
<td>Cloze test</td>
</tr>
<tr>
<td>Nominal agreement</td>
<td>Identification task</td>
</tr>
<tr>
<td>Written nominal &amp; verbal agreement</td>
<td>Written narrative</td>
</tr>
<tr>
<td>Oral nominal &amp; verbal agreement</td>
<td>Oral narrative</td>
</tr>
</tbody>
</table>
Grammatical Gender Production: Identification Task

Instructions

“You are going to see pairs of images, each with two similar people or objects. For each pair, you will be asked a question. The answer to the question will involve identifying one of the people or objects. Your answer should include a characteristic of one of the people or objects as well as the person or object's name (for example, ‘The big dog’). Do not answer by referring to the position of the image (for example, ‘The one on the right’). Let’s start with a couple of practice items!”
Grammatical Gender Production: Identification Task – Sample Item

→ La petite voiture ‘the FEM.SG small FEM.SG car FEM.SG’
# Session 3: English

<table>
<thead>
<tr>
<th>Construct</th>
<th>Task</th>
</tr>
</thead>
<tbody>
<tr>
<td>Lexical breadth</td>
<td>Vocabulary Size Test</td>
</tr>
<tr>
<td>Lexical-grammatical proficiency</td>
<td>Cloze test</td>
</tr>
<tr>
<td>Written nominal &amp; verbal agreement</td>
<td>Written narrative</td>
</tr>
<tr>
<td>Oral Nominal &amp; verbal agreement</td>
<td>Oral narrative</td>
</tr>
</tbody>
</table>

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Grammatical Gender Production: Written Narrative

‘Tell the story shown in the pictures.’
The woman is calling someone, possibly a friend, to talk about what happened during her vacation at the beach. She had been preparing for this and she was excited. At the beach she could be seen sitting on the sling chair and relaxing herself. There were people surfing and building sand castles around. However, things took an unexpected turn when she went to take a swim in the ocean, where she was suddenly attacked by a shark. The paramedics arrived almost immediately and she was taken to the hospital for treatments.
Data Preparation & Analysis

- This is the most time-consuming aspect of the current project, given the large number of sessions (140 learners x 3 = 420 + 30 NS = 450 1-hour sessions)
- While some tasks are autoscored (e.g., multiple choice vocabulary tests), other require human or computer + human assessment
Data Preparation & Analysis: Oral Narratives

1) Audio recording of the narrative is extracted from the session recording
2) The recording is transcribed by Google
3) Two RAs verify & correct the transcription
4) The corrected transcription is analyzed by a custom agreement algorithm
5) The output is checked by an RA
6) The data are analyzed by feature (gender agreement, verbal agreement)
Once the results of all 15 tasks are available, the hypotheses can be tested via regression analysis.
Hypothesis Evaluation: Role of linguistic knowledge & IDs in explaining variability in gender agreement: Identification Task

<table>
<thead>
<tr>
<th>Model</th>
<th>Description</th>
<th>β</th>
<th>p</th>
<th>R²</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>F(1, 25) = 27.35, p &lt; .001</td>
<td>.723</td>
<td>&lt; .001</td>
<td>.522</td>
</tr>
<tr>
<td></td>
<td>Lexico-grammatical competence</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>2</td>
<td>F(3, 23) = 10.89, p &lt; .001</td>
<td>.816</td>
<td>&lt; .001</td>
<td>.587</td>
</tr>
<tr>
<td></td>
<td>Lexico-grammatical competence</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Metasyntactic Awareness</td>
<td>.076</td>
<td>n.s.</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Working Memory</td>
<td>.219</td>
<td>n.s.</td>
<td></td>
</tr>
</tbody>
</table>

- Lexico-grammatical competence accounted for 52% of variance in L1 Mandarin (n=27) IT scores; MA & WM made no significant contribution.
Project Collaborators
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Colleagues

Becky Chen (APHD, OISE), Alexandra Gottardo (U Waterloo)

Graduate Student RAs

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Linguistic Consultants

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Social Science & Humanities Research Council

Insight Development Grant ##30-2018-0502
Project Collaborators

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Thank you
References


References