LANGUAGE-MIXING IN CLIL EDUCATION: BENEFIT OR BURDEN?

THE INFLUENCE OF MIXED-LANGUAGE INPUT ON AUDITORY RECALL OF INFORMATION

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INTRODUCTION

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LANGUAGE-MIXING: A DEFINITION

The presence of and need to maintain multiple languages within the same context (Caira et al., under review)

= Integral part of the bilingual experience (e.g., language-mixing in conversations)

INTRODUCTION

LANGUAGE-MIXING IN EDUCATION

Typically not the dominant pedagogy in educational contexts, even in multilingual programmes (e.g., CLIL education) (Wei, 2018)

→ Prevalence of one language-one subject rule (Lambert & Tucker, 1972)

→ Language-mixing considered as a sign of lacking proficiency in both languages (Reyes, 2004)

This goes against the CLIL pedagogy as it was originally intended (Marsh, 2013) and recent theoretical recommendations (i.e., translanguaging) (e.g., Nikula & Moore, 2019)

→ Systematic reviews point to a distinctive lack of quantitative assessment of LM-practices and learning outcomes (Prilutskaya, 2021; Lu et al., 2023)

INTRODUCTION

LANGUAGE-MIXING IN COGNITIVE RESEARCH

Researching cross-language interference

- Need for language control to prevent it (Declerck & Koch, 2023)

→ Additional cognitive resources which may lead to mixing costs (Declerck, 2020)

- Keeping multiple languages separate is more demanding than dense code-switching (see Figure 1)

Control processes	*Interactional contexts*		
	Single language	*Dual language*	*Dense code-switching*
Goal maintenance	+	+	=
Interference control: conflict monitoring and interference suppression	+	+	=
Salient cue detection	=	+	=
Selective response inhibition	=	+	=
Task disengagement	=	+	=
Task engagement	=	+	=
Opportunistic planning	=	=	+

Figure 1 (Green & Abutalebi, 2013)

INTRODUCTION

LANGUAGE-MIXING IN COGNITIVE RESEARCH

Previous studies investigating language-mixing:

- **Production**: non-cued switching tasks bring about a mixing benefit (no competition between languages) (de Bruin et al., 2020; Grunden et al., 2020)

- **Comprehension**: no mixing costs, except in language pairs with a high cognate rate (Declerck et al., 2019)

→ Has this been investigated in an educational context before?

INTRODUCTION

PREVIOUS STUDIES COMBINING BOTH

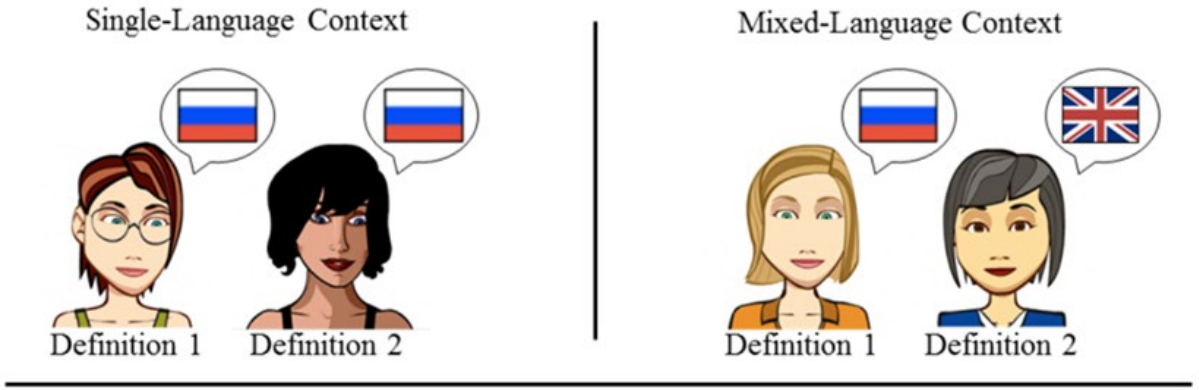
Only a couple studies investigated the link between language-mixing and recall of information (Anton et al., 2016)**:**

30 unbalanced bilinguals (mean age = 14,38 years)

→ Russian as L1, English as L2 at school

→ 50/50 language exposure at school

Old/New experiment with SLC & MLC:



RESEARCH BACKGROUND

PREVIOUS STUDIES COMBINING BOTH

Results:

no differences in terms of accuracy scores and RT's between the two conditions

→ Confirms previous results for balanced Spanish-Basque bilinguals (Anton et al., 2015)

Why is there no disadvantage for the mixed-language condition?

→ T*he processing of L2 input requires L1-mediation through translation* (Anton et al., 2016, p.44)

→*The cognitively costlier or slower decoding process linked to MLCs might have caused the information to be better internalized and established in memory* (Anton et al., 2016, p.44)

PRESENT DESIGN

PRESENT DESIGN

LIMITATIONS OF PREVIOUS STUDIES

1) Perfectly balanced exposure rate is not representative of most (educational) contexts

2) No comparison with a single language L2 context

3) Immediate recall only, no findings on long-term effects.

1) Inclusion of participants with unbalanced L2 exposure at school

2) Addition of a third context in the L2

3) Addition of a delayed post-test 36 hours later

PRESENT DESIGN

RESEARCH QUESTIONS

1. Can the previously reported absence of mixing costs in memory recall (cf. Antón et al., 2015, 2016) be replicated with CLIL students who have an unbalanced exposure context at school?

2. How do recall abilities in a mixed-language context compare to a single-language context in the CLIL language (L2)?

3. What are the consolidation effects of mixed-language input over time for recall of information?

METHODOLOGY

METHODOLOGY

PARTICIPANTS

Two schools with Dutch bilingual (CLIL) programmes in Wallonia:

- 29 Participants at both T1 & T2
- 10 hours of L2 exposure (31% of the curriculum)
- First and second year pupils with French as L1, Dutch as L2
- Controlled for L2 proficiency (LexTale, *Lemhöfer & Broersma, 2012*), SES, language background and neurodiversity (Leap-Q, *Marian et al., 2007*)

	n	M	SD
Gender	29	18 female	
Age	21	13,17	0,54
SES	20	5,25	0,85
French Lextale	29	75,12 %	8,86 %
Dutch Lextale	29	53,41 %	5,64 %

METHODOLOGY

OLD/NEW TASK: GENERAL DESIGN

Input phase:

3 sets of 14 different auditory definitions of concrete nouns in French with high frequency (Eduscol, 2023)

Each definition consists of two characteristics

Test phase:

3 sets of 28 different image pairs of equally frequent words (Eduscol, 2023)

14 'old' items & 14 'new' items in every language context

One distinct set for each of the three contexts (counter-balanced order)

METHODOLOGY

OLD/NEW TASK: THREE LANGUAGE CONTEXTS

L1 (French):

(1) on s'en sert pour se déplacer

(2) a quatre roues et un moteur

L2 – (Dutch):

(1) wordt gebruikt om zich te verplaatsen

(2) Heeft vier wielen en een motor

Mixed context:

(1) on s'en sert pour se déplacer

(2) Heeft vier wielen en een motor

(Car:
- *Used to get around*
- *Has four wheels and an engine)*

METHODOLOGY

OLD/NEW TASK IN PRACTICE: SINGLE LANGUAGE L1

Exposure phase

3*14 stimuli:
stimulus + 500 ms

Test phase

3*28 stimuli:
keyboard response:
'y' or 'n'

Data analysis

Response Times + Accuracy scores

METHODOLOGY

DATA ANALYSIS

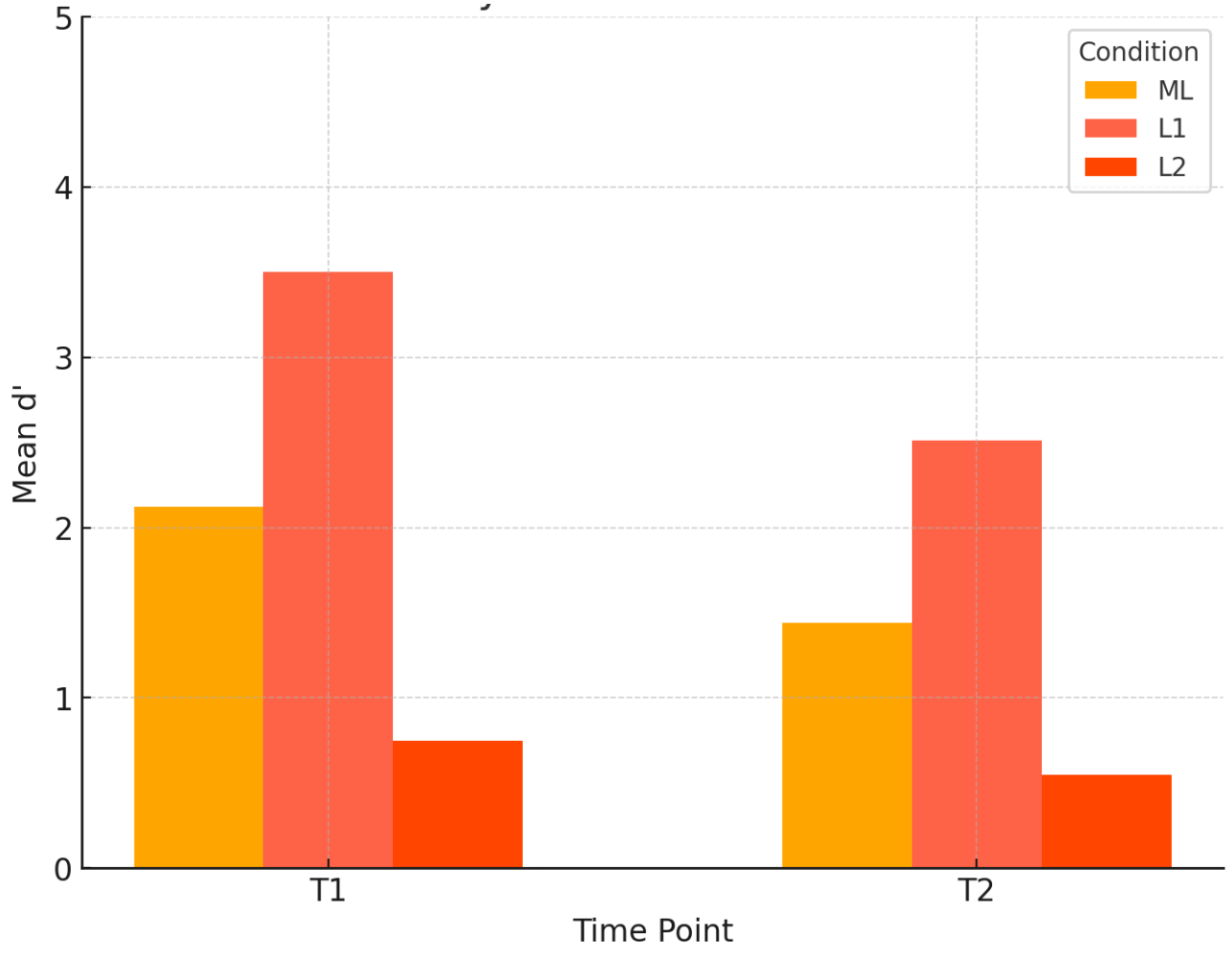
- **Accurate recall (d')** = proportion of hits (i.e. correct responses to old items) – proportion of false alarms (i.e. incorrect responses to new items) (Anton et al., 2016)
- **Response Times (RT's):** 500ms lower limit and M + 2*SD as upper limit (deleted 4,30% of the data)
- **LME's in R**: language context (ML vs L1 vs L2) & time (immediate vs delayed) as fixed effects; variance between participants and stimuli as random effects

  → follow-up analyses with L2 proficiency scores as additional fixed effect

RESULTS & DISCUSSION

RESULTS

ACCURATE RECALL



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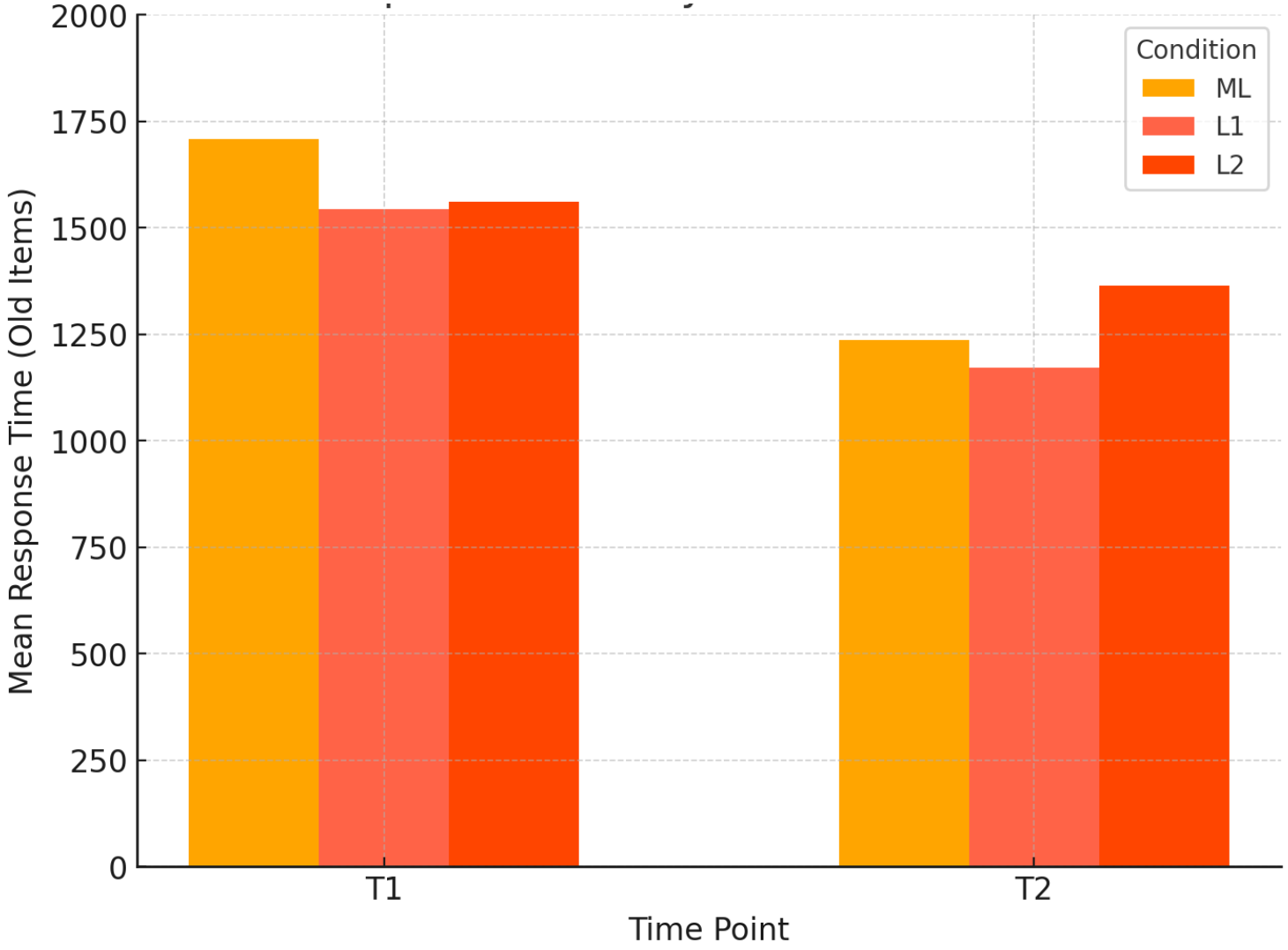
RESULTS

RESPONSE TIMES



RESULTS

FOLLOW-UP ANALYSIS: L2 PROFICIENCY

Accurate recall:

L1 Language Context × Lextale NL	-0.25	-0.37 – -0.13	**<0.001**
L2 Language Context × Lextale NL	-0.13	-0.25 – -0.02	**0.024**

Response times:

L1 Language Context × Lextale NL	101.43	-0.76 – 203.62	0.052
L2 Language Context 3 × Lextale NL	74.37	-42.62 – 191.37	0.213

DISCUSSION

DISCUSSION

What are the effects of a mixed-language input on recall of information?

- **RQ1:** mixing costs for both accurate recall and response times compared to L1
- **RQ2:** mixing benefit in accurate recall and mixing cost in response times compared to L2
- **RQ3:** Overall decline in recall performance; steepest decline in mixed-language-context

Different results in comparison to Anton et al.:

RQ1: they reported no mixing costs or benefits between a mixed-language and L1 context

DISCUSSION

EXPLAINING MIXING COSTS AND BENEFITS

- **Lower L2 exposure at school:**

→ Differences in terms of L2 exposure (30% vs. 50%) and experience (13,17 vs. 14,38 years old)

→ *Weaker-link hypothesis*: word-concept associations in a language are highly dependent on prior use, exposure and experience (Gollan et al., 2008)

- **Lower L2-proficiency:**

→ Statistical evidence that an increase in L2 proficiency reduces mixing costs and benefits

→ insufficient L2 (lexical) knowledge to fully decode the L2 input (Sakai, 2009), which leads to worse recall performance

- **Response times:**

→ Account of mixing costs in languages with lower cognate rate (←→ French and Spanish in Declerck et al., 2020): presence of language control in mixed context?

DISCUSSION

TIME EFFECT

Both mixing cost and benefit in recall decrease over time

- Benefit: Possible floor effect in L2 context

- Cost: difference gets smaller, but steepest decline in recall performance over time in mixed-language context

→ General need for spaced repetition of learning materials both in education and memory in general (e.g., Abbas et al., 2023)

DISCUSSION

IMPLICATIONS FOR PRACTICE

Should LM be implemented in CLIL education?

- Mixing cost vs. L1 is not as relevant in single-language L2 environments

→ As their L2 proficiency increases over time, we predict that the mixing cost will subside over time

- Argument against 'one-subject one-language rule': LM is a great scaffold for pupils with low L2 exposure and proficiency

→ May become redundant from a linguistic perspective in later stages, but can still be relevant for psycho-emotional/political/… reasons depending on the context

DISCUSSION

LIMITATIONS & FUTURE DIRECTIONS

Are the observed mixing costs and benefits modality-dependent? (e.g., reading or production skills)

Would we observe similar results in other types of language-mixing? (i.e., intra-sentential language-mixing)

Further need to test the L2 exposure and proficiency hypotheses

→ Group comparisons based on different L2 exposure rates

CONCLUSION

CONCLUSION

When considering educational contexts with lower L2 exposure and proficiency, language mixing partly mitigates the L2 disadvantage in learning that would otherwise occur.

→ An additional, albeit more nuanced, argument in favour of the "plea to end the language-mixing taboo" (Anton et al., 2016)

THANK YOU!

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