

Unnatural freedom or natural restrictions?

A learning experiment on the impact of time pressure on sentence processing in Latin

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INTRODUCTION: Learning Latin is very special

Learning Latin is very different from learning a modern foreign language, e.g.:

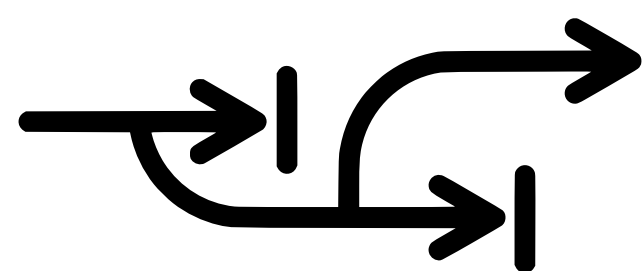
- No focus on communicative skills, but on **translation** into L1
- Working with the **visual modality** (texts) only, **no time pressure**
- **Non-linear approaches** of de- and recoding are very common



This raises the general question of how sentences are processed in Latin. Research has shown that nonetheless advanced learners of Latin are able to process Latin sentences incrementally when set under time pressure.[1]

Research Question:

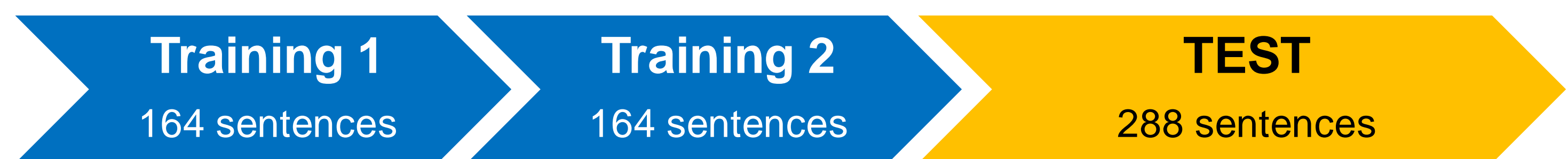
How does **time pressure** and **strict linear processing** affect sentence processing in Latin for beginners?



METHOD: A Learning Experiment with 2 Groups

Participants 53 absolute beginners of Latin, L1 = German (monolingual)
2 Groups: **Linear Readers (LR)** vs. **Non-Linear Readers (NLR)**
Apparatus Online Experiment (PsychoPy / Pavlovla)

Example stimuli (for training & test session)	First Argument	Verb Position	Acceptability
Mulieres vinum amat. <i>The women love the wine.</i>	typical (animate subject)	V3	acceptable
Vinum mulieres amat. <i>The women love the wine.</i>	typical (inanimate object)	V3	acceptable
Mulieres vinum delectat. <i>The wine pleases the women.</i>	untypical (animate object)	V3	acceptable
Vinum mulieres delectat. <i>The wine pleases the women.</i>	untypical (inanimate subject)	V3	acceptable



LR Group:	Time Pressure (RSVP) Linear Presentation (word by word)	<ul style="list-style-type: none">• Self-Paced Reading (SPR)• Time Pressure, but under personal control• No Feedback FACTORS: <ul style="list-style-type: none">• First argument: typical vs. untypical• Verbposition: V1 vs. V2 vs. V3• Acceptability: acceptable inacceptable – GR inacceptable – SEM
NLR Group:	No Time Pressure Presentation of complete sentences	
<ul style="list-style-type: none">• German translation was presented afterwards: Correct? → Y / N• Feedback• Only acceptable sentences with V3, non-ambiguous		

Hypotheses:

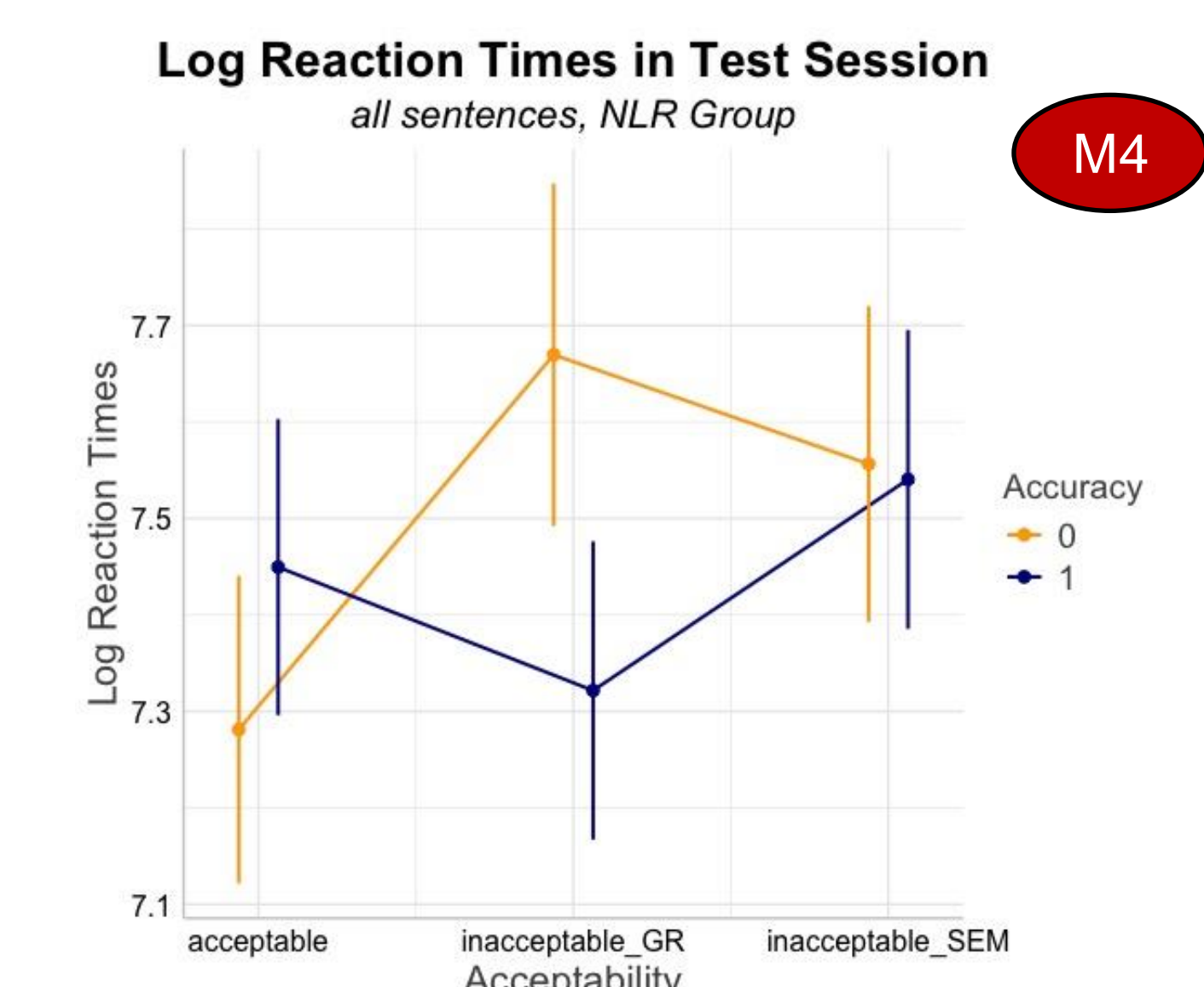
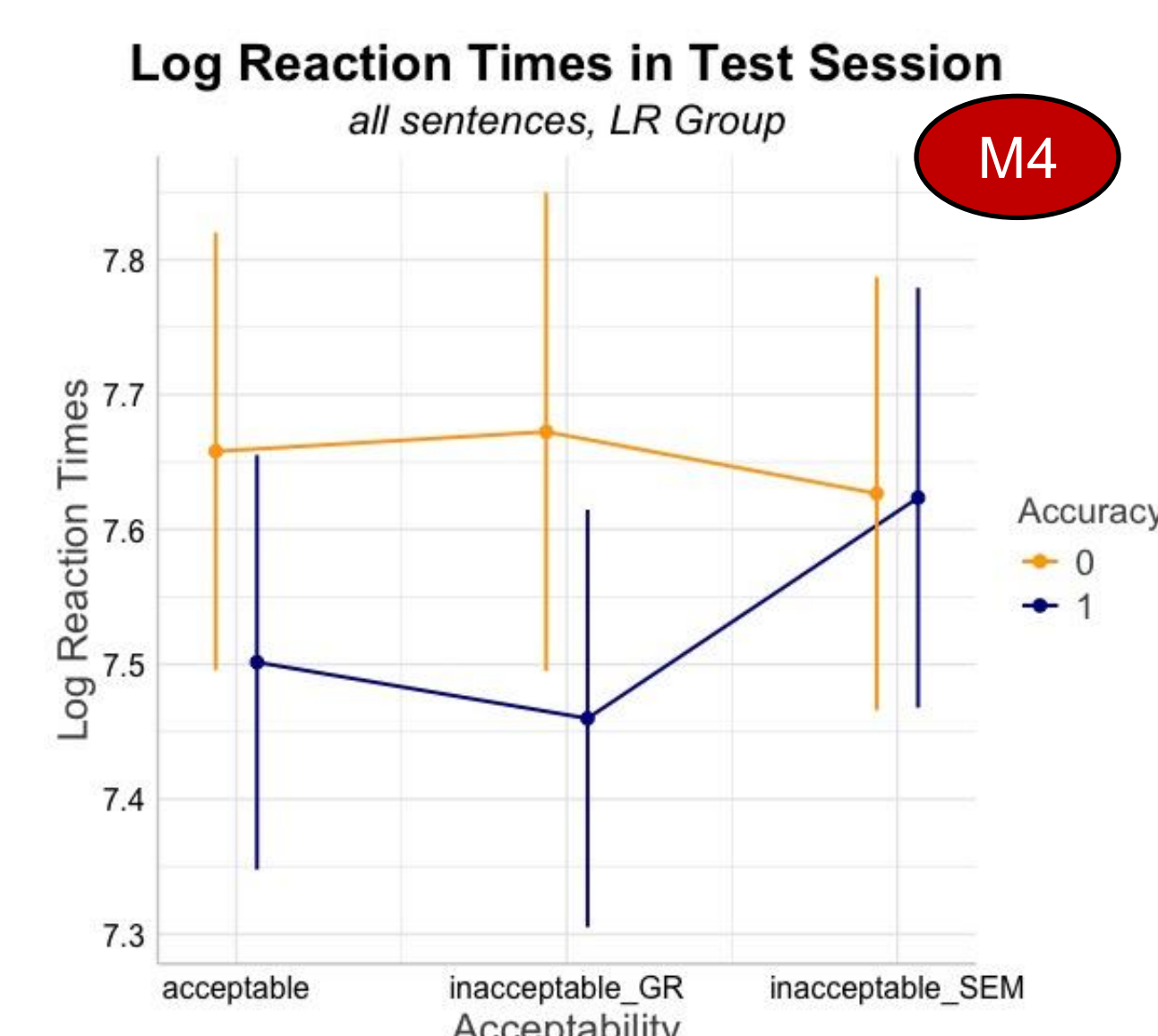
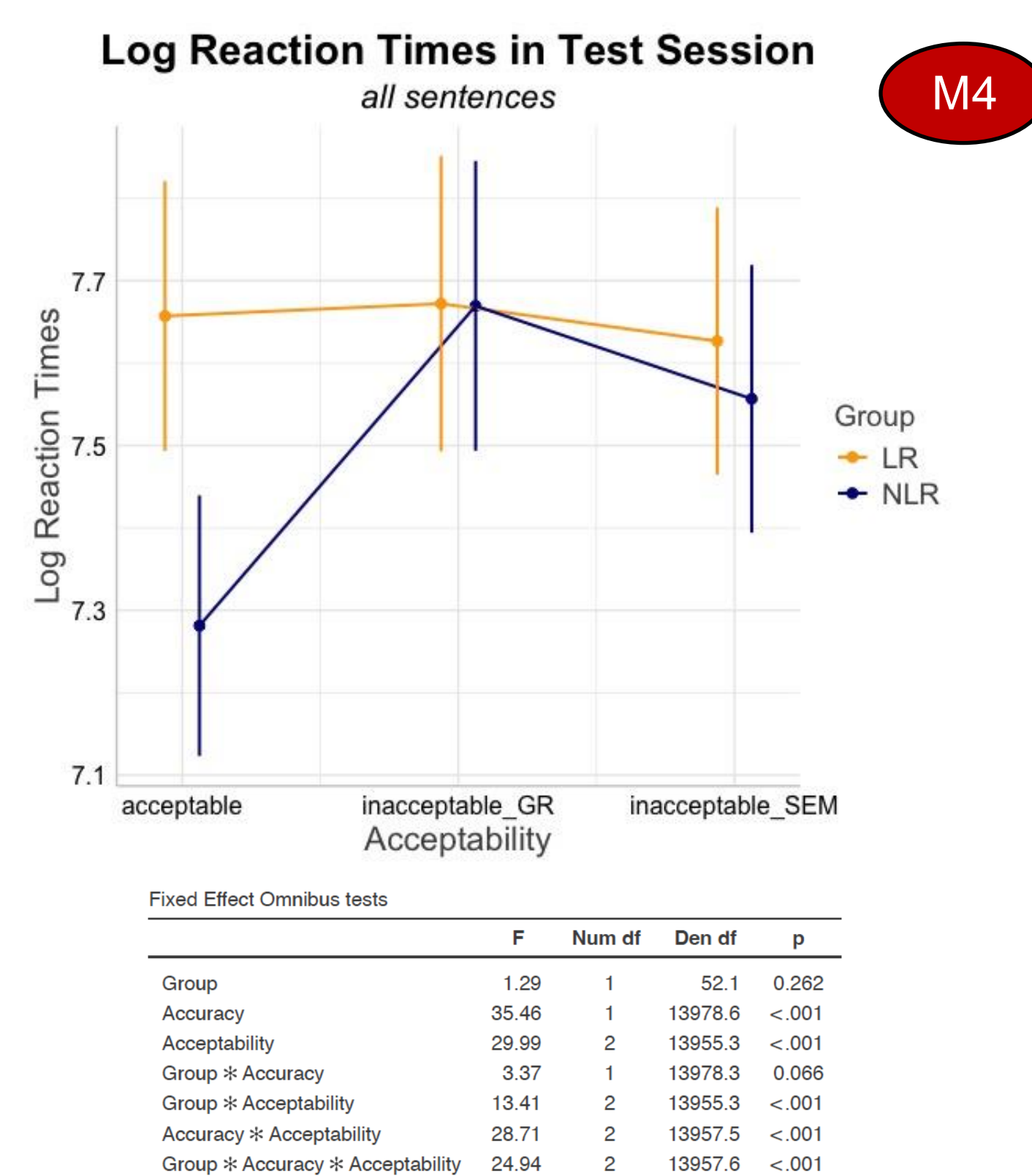
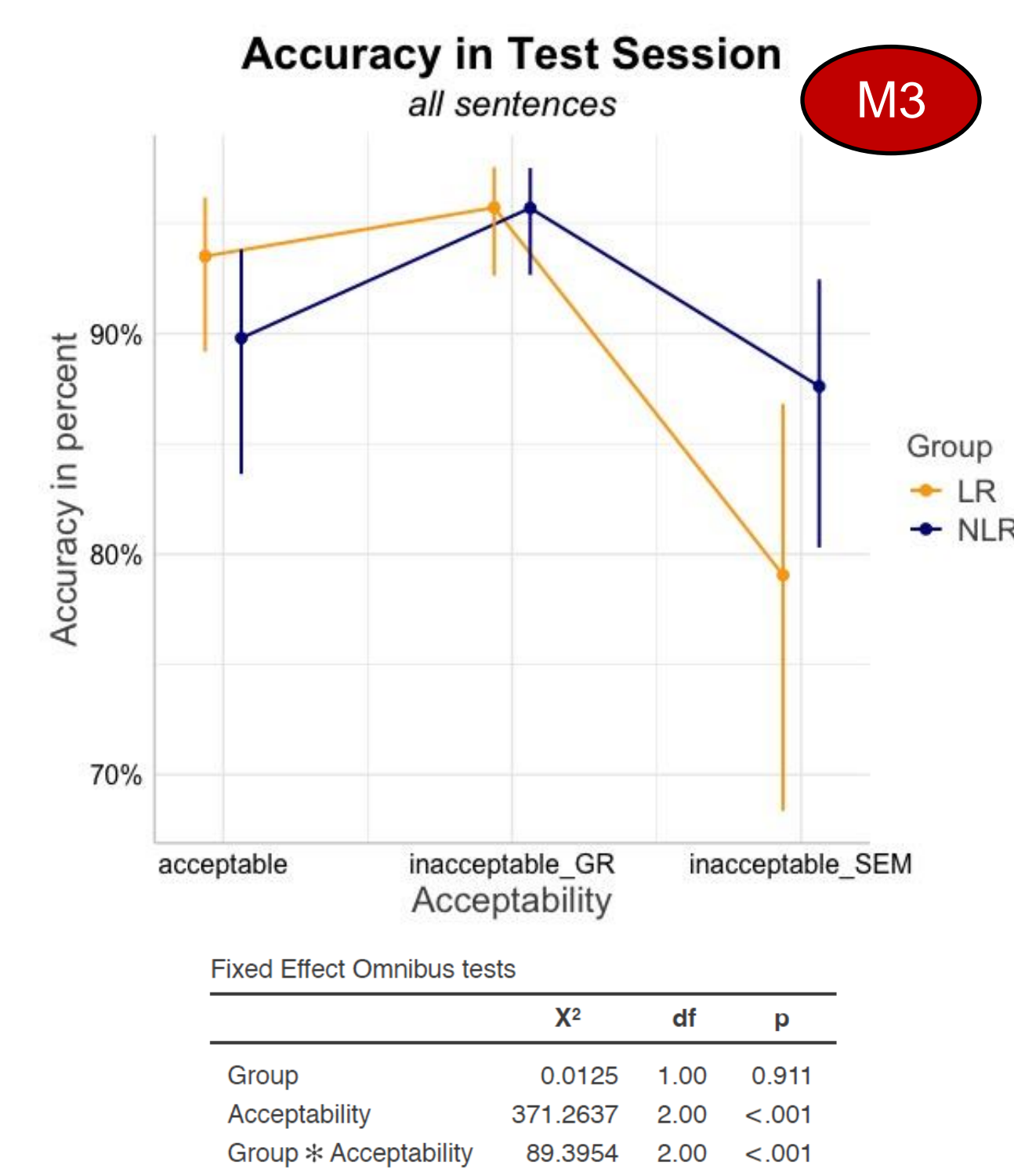
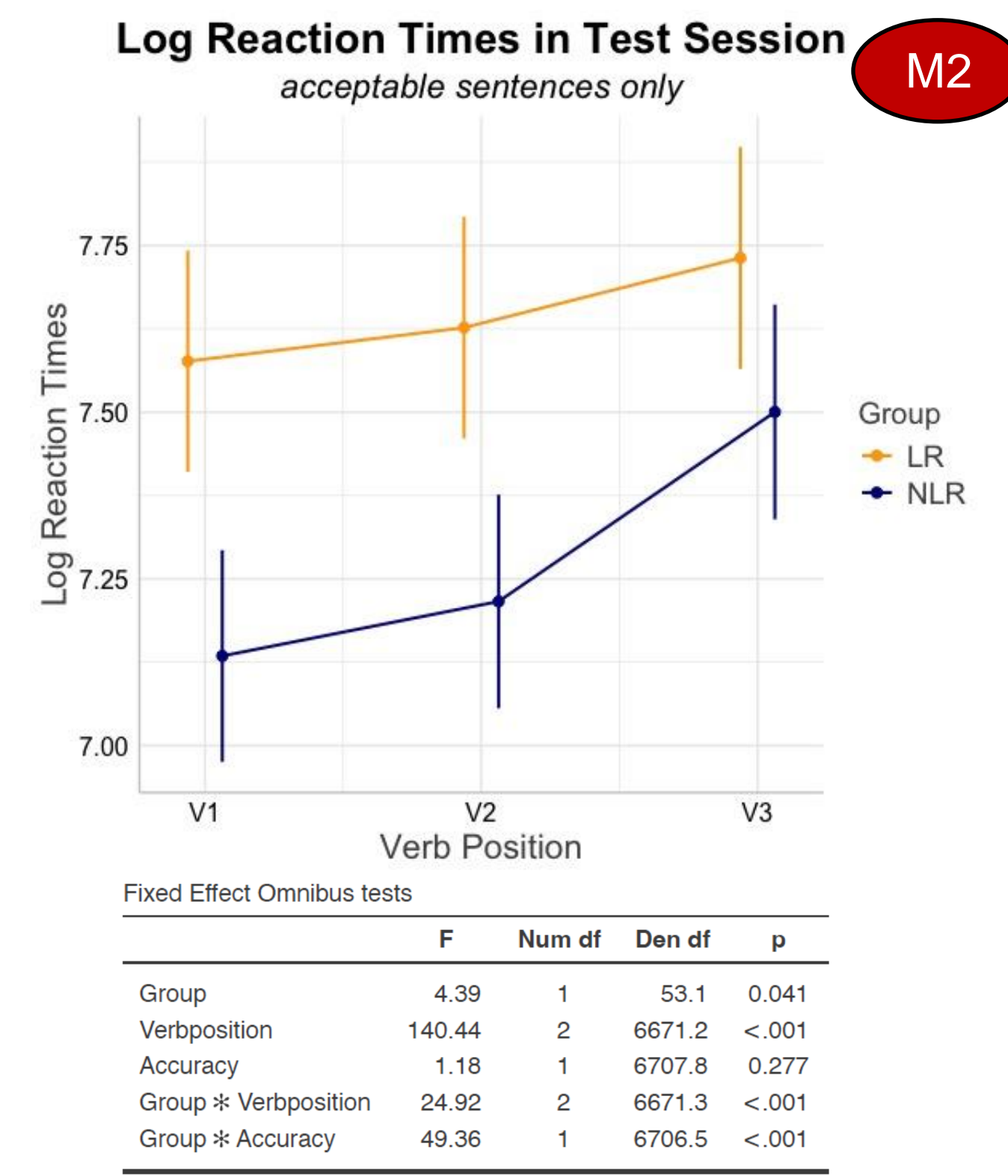
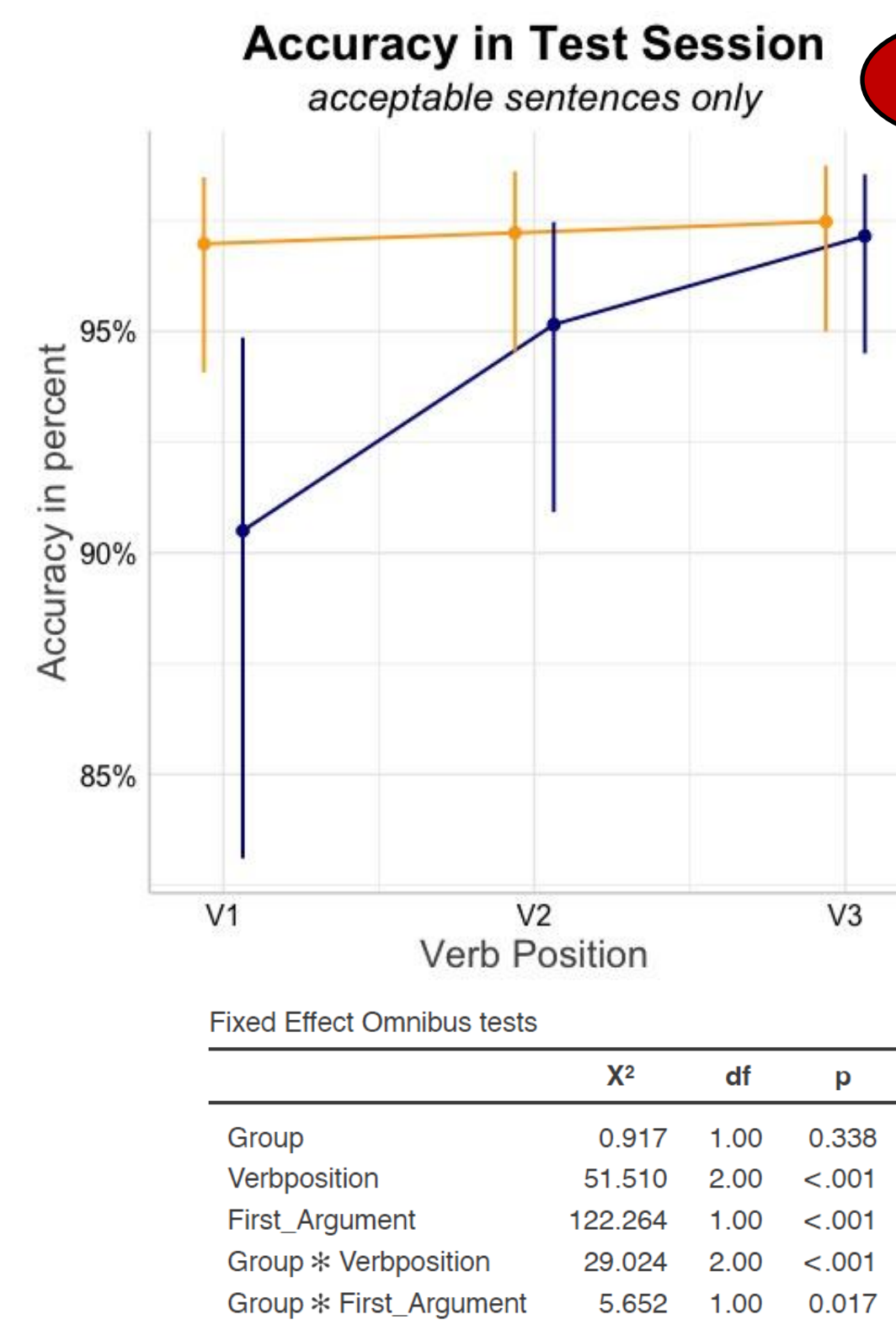
- H1: Sentences in which the first argument is typically marked should be processed faster and more accurately (by both groups – validity of the experimental design). [2]
H2: The LR group should be faster and more accurate overall.
H3: The LR group should show more indications of using linguistic cues during sentence interpretation than the NLR group does.

Analysis LMMs/ GLMM for log Reaction Times and Accuracy in R / Jamovi [3,4]

- M1** Accuracy, acceptable sentences only:
GROUP, FIRST ARGUMENT, VERBPOSITION
M2 RT_log, acceptable sentences only:
GROUP, FRIST ARGUMENT, VERBPOSITION, ACCURACY
M3 Accuracy, all sentences:
GROUP, ACCEPTABILITY
M4 RT_log, all sentences:
GROUP, ACCEPTABILITY, ACCURACY

Random Slopes for each model: Intercepts by subj and item

RESULTS: Test Session



DISCUSSION and CONCLUSION

- Sentences in which the first argument is typically marked were processed faster and more accurately overall (**according to H1**).
- No general advantage of LR group (**in contrast to H2**).
- LR group seems to be slower but more accurate than the NLR group. This indicates that they use / evaluate the linguistic cues more carefully but that this takes some time.
- LR group is more accurate in V1 sentences: This indicates that they rely more on linguistic cues during sentence interpretation in predicting the upcoming arguments (**according to H3**).
- LR group has difficulties with semantically unacceptable sentences: Probably they are focusing more on „core grammar cues“.

Results suggest that time pressure and strict linear reading could help learners to use linguistic cues for sentence processing. This could also affect the way Latin is taught.

But: Results are very complex, a clear interpretation is difficult.

[1] Weiss, A. F. (2023). How do L2 learners deal with a “dead” language? A psycholinguistic study on sentence processing in Latin. *Journal of Cultural Cognitive Science*, 7(1), 43-61.

[2] According to accounts like the competition model: MacWhinney, B., Bates, E., & Kliegl, R. (1984). Cue validity and sentence interpretation in English, German, and Italian. *Journal of verbal learning and verbal behavior*, 23(2), 127-150.

[3] The jamovi project (2024). *jamovi*. (Version 2.5) [Computer Software]. Retrieved from <https://www.jamovi.org>.

[4] R Core Team (2023). R: A Language and environment for statistical computing. (Version 4.3) [Computer software]. Retrieved from <https://cran.r-project.org>. (R packages retrieved from CRAN snapshot 2024-01-09).