

Learning a second language with an app: What learning principles are the most effective?

17th Conference of the Swiss Psychological Society – Zurich, 4-6 September 2022

Background

- We live in a digital world providing easy access to applications allowing to learn a second language
- Meta-analysis supports that mobile applications are beneficial to learn second language (Mihaylova et al., 2020)
- Research on learning and memory established the efficiency of different learning principles:
 - [Retrieval practice](#) (Roediger & Butler, 2011)
 - [Multimodality of presentation](#) (Shams & Seitz, 2008)
 - [Use of corrective feedback](#) (Metcalfe, 2017)
 - [Spacing](#) (Carpenter, 2020)
- Little is known on boosting learning when implementing these learning principles within a mobile application (Reber & Rothen, 2018)

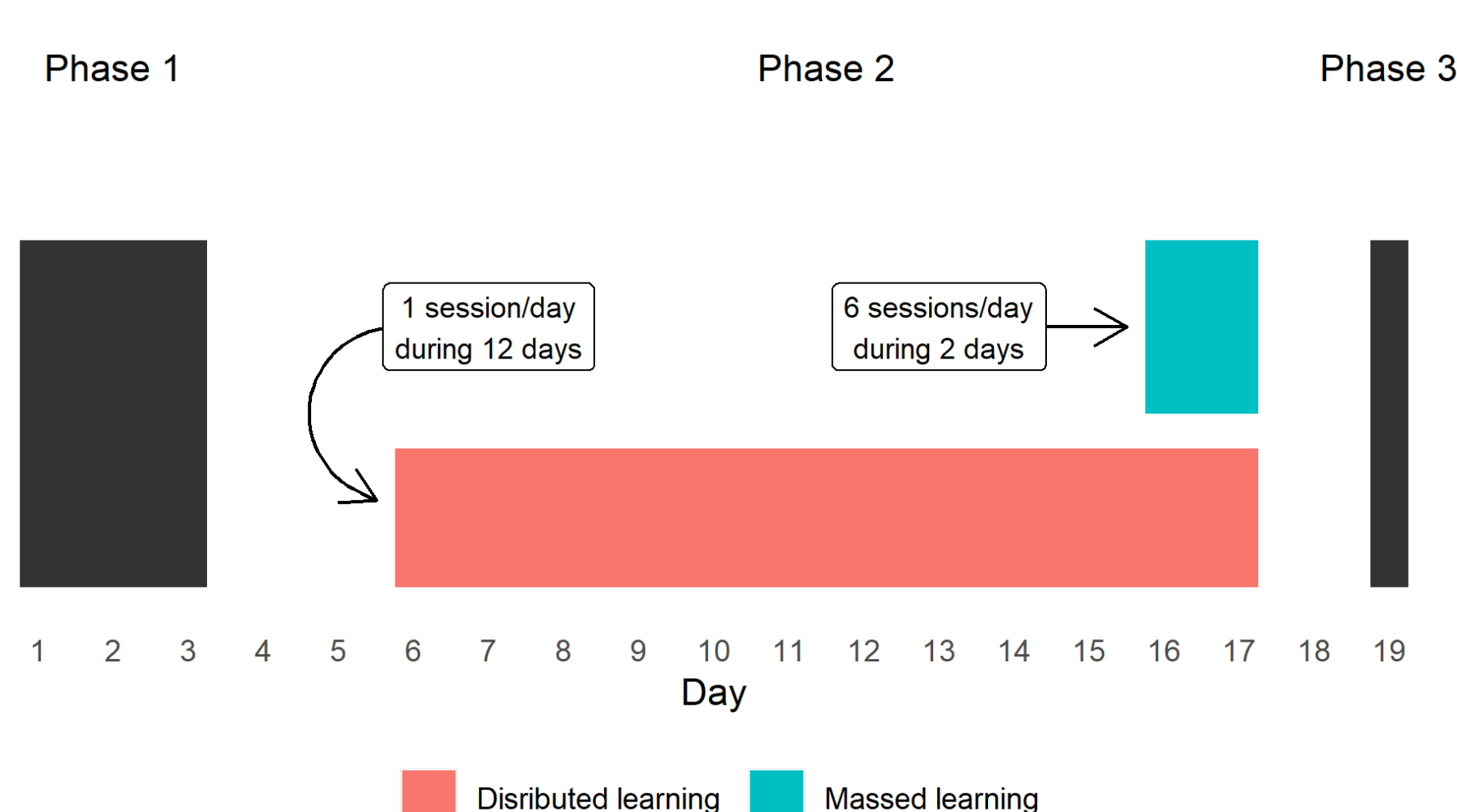
Methods

PHASES 1 & 3

- Assessment of French to Finnish translation knowledge for the 48 pairs to be learned

PHASE 2

- Learning of the 48 Finnish-French translations using a dedicated app (stellar-learning.app)
- Learning with/without four learning principles:
 - [Testing vs. restudy](#)
 - [Multimodal vs. unimodal presentation](#)
 - [Corrective vs. non-corrective feedback](#)
 - [Spacing vs. distributed learning](#)
- Two groups of participants:
 - [Distributed](#) (1 session/day during 12 days – 96 participants)
 - [Massed](#) (6 sessions/day during 2 days – 88 participants)



Hypothesis

Translations learned with...:

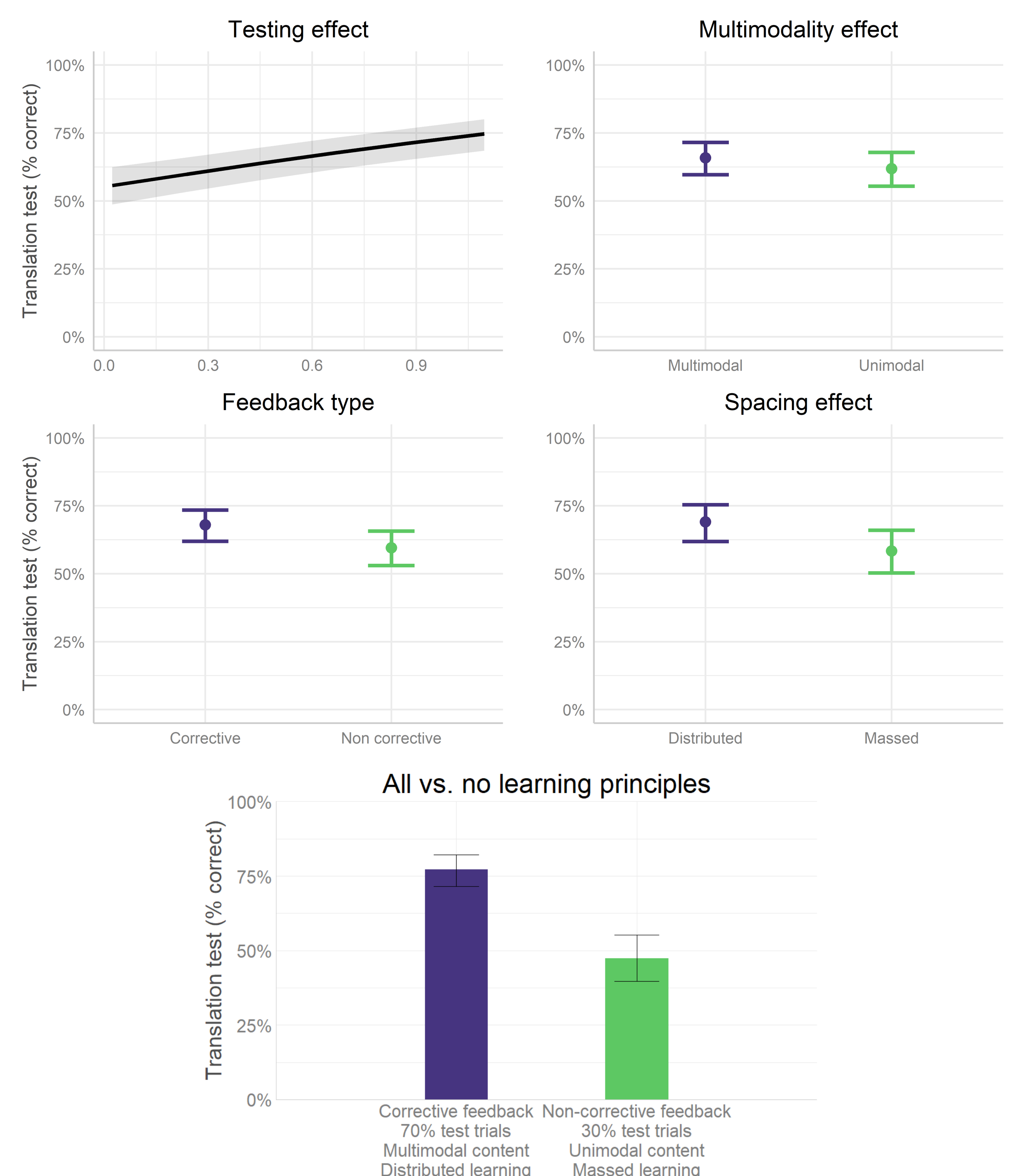
- higher rate of test trials
- multimodal content (compared to unimodal)
- corrective feedback (compared to non-corrective feedback)
- distributed learning schedule (compared to massed)

...should be better remembered

Results

- There is support for the view that providing a [corrective feedback](#) is [beneficial](#) compared to non-corrective feedback
- Increasing the rate of [test](#) trials is [also beneficial](#) but the effect is quite small
- [Spacing](#) has the [largest effect](#) with an advantage for the distributed group but [evidence is weak](#)
- Studying translations with multimodal content does not provide an advantage compared to unimodal content

Effect	Estimate (adjusted)	Standard error	Bayes factor	Effect size (Cohen's d)
Testing	0.171	.027	2.911E+6	0.094
Multimodality	0.175	0.054	1.870	0.096
Feedback	0.367	0.054	7.611E+7	0.202
Spacing	0.465	0.195	0.177	0.256



Conclusion

- When considered individually [learning principles have small effects](#)
- When [combining learning principles](#), the [learning benefit is around 30%](#) compared to the case when no learning principles is present

References

- Carpenter, S. K. (2020). Distributed Practice or Spacing Effect. In S. K. Carpenter, *Oxford Research Encyclopedia of Education*. Oxford University Press.
- Metcalfe, J. (2017). Learning from Errors. *Annual Review of Psychology*, 68(1), 465–489.
- Mihaylova, M., Gorin, S., Reber, T. P., & Rothen, N. (2020, August 13). A Meta-Analysis on Mobile-Assisted Language Learning Applications: Benefits and Risks. <https://doi.org/10.31219/osf.io/ux93y>
- Roediger, H. L., & Butler, A. C. (2011). The critical role of retrieval practice in long-term retention. *Trends in Cognitive Sciences*, 15(1), 20–27.
- Reber, T. P., & Rothen, N. (2018). Educational App-Development needs to be informed by the Cognitive Neurosciences of Learning & Memory. *Science of Learning*, 3(1), 22.
- Shams, L., & Seitz, A. R. (2008). Benefits of multisensory learning. *Trends in Cognitive Sciences*, 12(11), 411–417

Simon Gorin, Nicole Skieresz, Sandy C. Marca, Thomas P. Reber & Nicolas Rothen

Faculté de Psychologie, UniDistance Suisse

✉ simon.gorin@unidistance.ch

🌐 <https://schooloftomorrow.fernuni.ch>