

INTRODUCTION

- Traditionally, errors during learning have been considered as harmful for subsequent recovery of the correct information (Postman & Underwood, 1973). However, experimental evidence has shown that experiencing errors during learning, if it is followed by corrective feedback, benefits long-term memory (Metcalfe, 2017).
- This effect has been usually found with semantically related learning material. But there is some evidence that Learning from Errors occurs with semantically unrelated material (Iwaki et al., 2013; Potts & Shanks, 2014; Clark, 2016; Cyr and Anderson, 2018).
- These are proposed explanations for Learning from Errors effect:
 - Search set theory** argues that retrieval attempts, albeit unsuccessful, triggers a search process within semantically related candidates.
 - Error prediction theory** proposes that discrepancy between the recovery attempt and the subsequent corrective feedback would enhance attention and thus, learning.
 - Mediator effectiveness hypothesis** suggests that errors may serve as mediators between the cue and the target making the correct answer more accessible.
 - Recursive reminding theory** suggests that as the error and the correct response (through feedback) share the same episodic event (temporal and spatial context and encoding details), then during the final test, the recovery of the error will activate the encoding context and facilitate access to the correct response.

	Semantic association	Error recovery at final test
Search set theory	Yes	No
Error prediction theory	No	No
Mediator effectiveness hypothesis	Yes	Yes
Recursive reminding theory	No	Yes

AIM

The aim of this study is to investigate:

- whether learning from errors is modulated by the semantic relationship of the material.
 - Weak vs. Strong semantic relationship between word-pairs
 - Semantically related vs. unrelated word-pairs
- whether error is recovered at the final test when a correct response is given.

METHODS

PARTICIPANTS

Exp 1: Within participants n=30

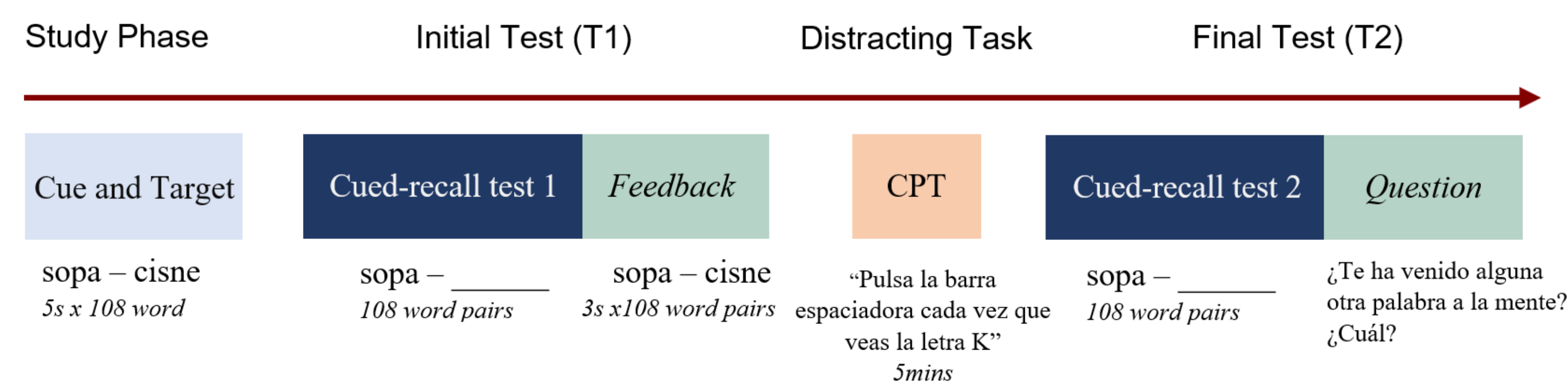
Exp 2: Between participants - related group n=30; unrelated group n=30

MATERIAL & PROCEDURE

108 Spanish word-pairs lists

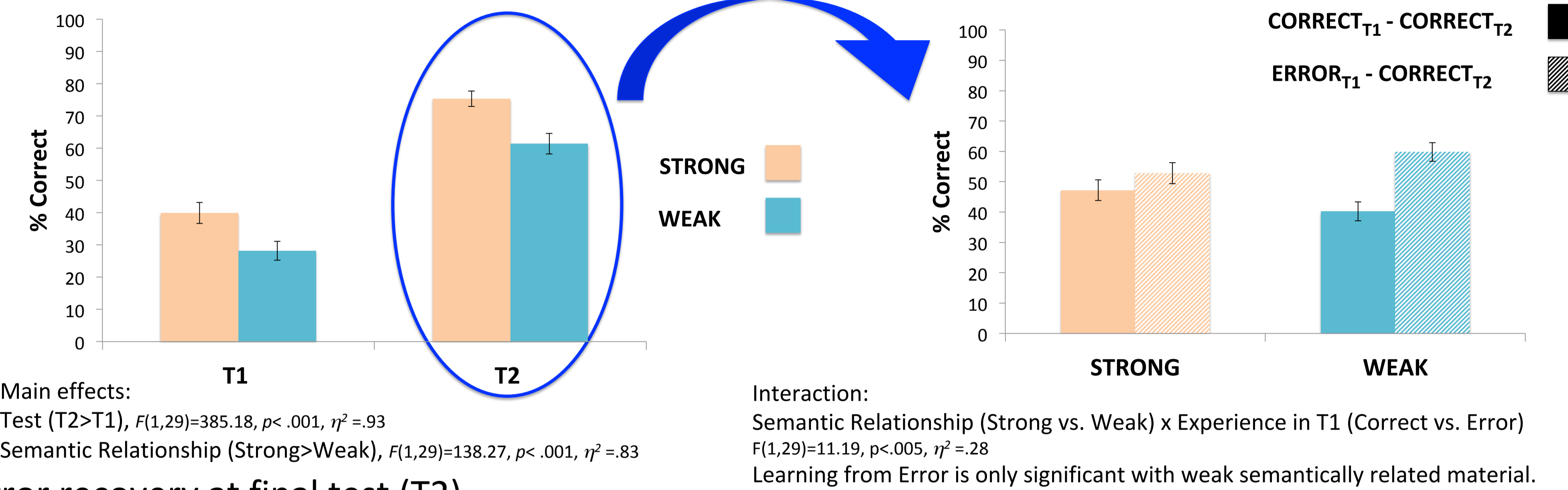
Exp 1: Strongly (forward cue-to-target strength between .05 -.054) and weakly (.01 - .014) semantically related word-pairs selected from the NALC database (Fernández et al., 2010).

Exp 2: Semantically related and unrelated word-pairs. Both lists maintained the same target but different cue. Related word-pairs - same cues used in Exp. 1; Unrelated word-pairs - cues extracted from the EsPal repository (Duchon et al., 2013). Cues between Related and Unrelated groups did not differ in imaginability and concreteness ($p > 0.05$).

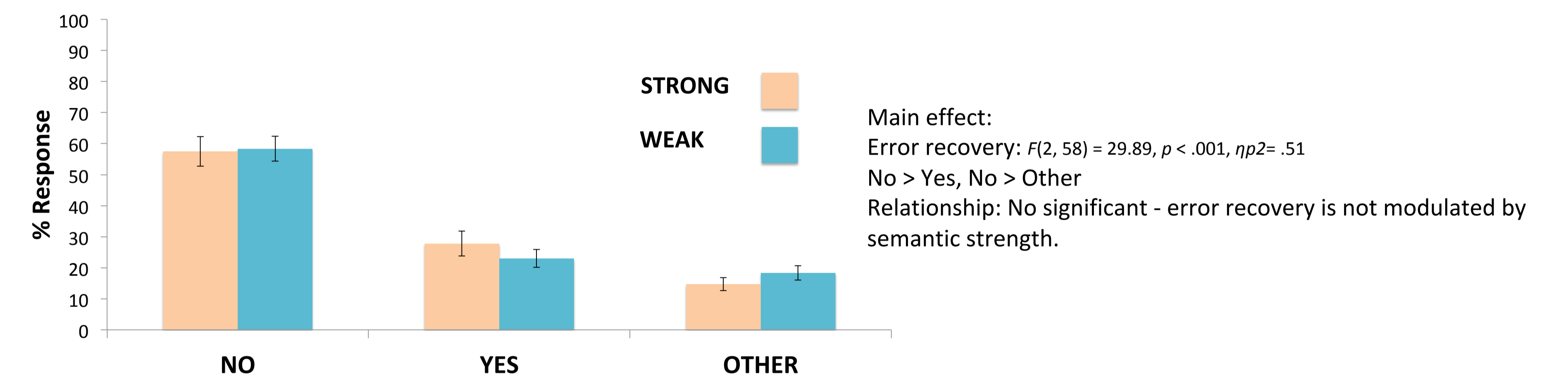


RESULTS

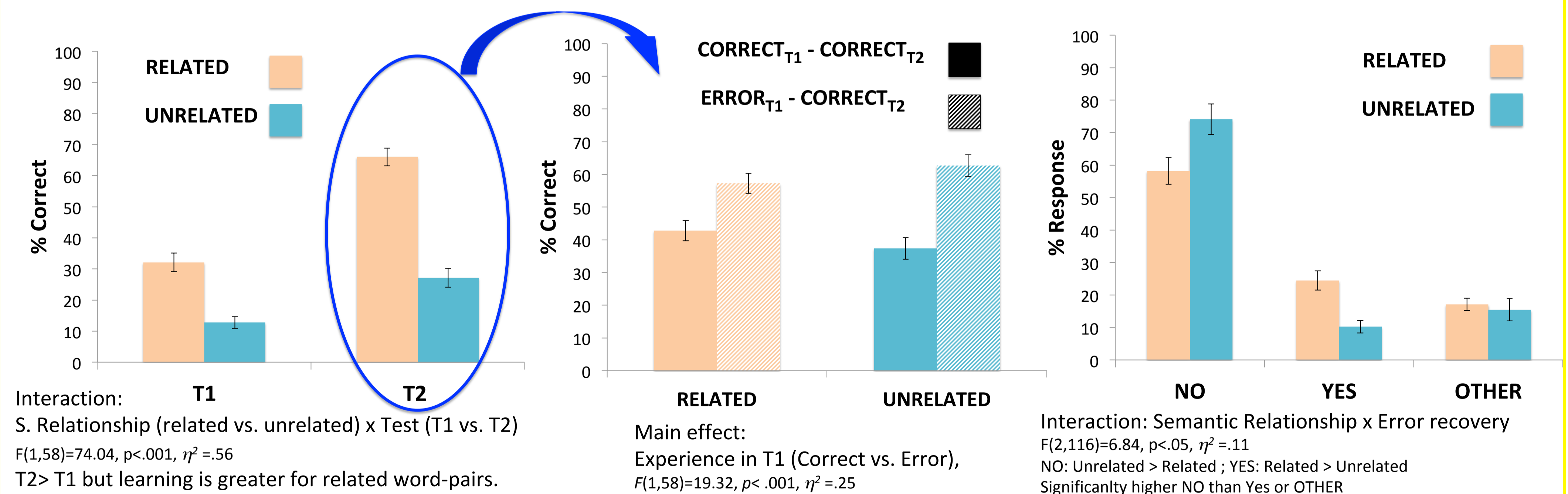
Exp 1 Week vs. Strong semantically related word pairs within participants



Error recovery at final test (T2)



Exp 2 Semantically related vs unrelated word pairs between participants



CONCLUSION

- Our procedure evidenced **learning** between T1 and T2 and this learning was stronger for strongly semantically related material, which is consistent with previous studies (Kintsch, 1970).
- The experience of **generating errors**, comparing with generating correct answers, enhanced correct recall, specially with **weak semantically related** and **unrelated** word pairs. Thus, even **semantic relationship** of the material benefited memory, it was not essential in order to produce LfE effect.
- The **explicit recovery of the previous error** along the correct answer at the final test was not required in order to find LfE effect. This supports the results by previous studies (Metcalfe & Miele, 2014).
- Our results are consistent with **Error prediction theory** that explains LfE based on the **enhanced attention** produced by the discrepancy between the recovery attempt and the subsequent corrective feedback. Thus, more attentional resources are expected to be required when **conditions are difficult**.
- Our results showed that less semantically related conditions and therefore, harder to learn conditions, benefited more from experiencing errors. Previous evidence has shown that **certain difficulties increase long-term retention** because greater elaborative processing and attention are engaged responding to these difficulties (Bjork & Bjork, 2014). Error learning benefit may be relying on these processes as well.