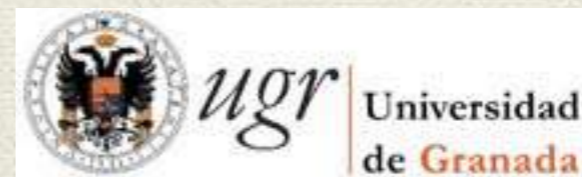


Do past and future potential events activate the Left-Right mental timeline?

Aguirre, R. & Santiago, J.



37th CogSci. Meeting 2015, Pasadena, CA



Space-Time Conceptual Congruency Effect



- 0 Speakers use their experience on processing space when processing conceptual time by updating events on a sequential order of a mental timeline
- 0 This effect has been interpreted as evidence of the use of an underlying left-to-right mental timeline



Current evidence on factuality

- o Evidence supports the idea that conceptual time is mentally represented by a Left-Right mental timeline
- o Available studies have tested only **factual events**, i.e., those which have already occurred in the past (*She woke up*) or will occur in the future (*She will weak up*)

What about potential events?

- o Representing future potential events supports manipulation of alternative scenarios and evaluation of their consequences in order to make decisions about courses of action (*If she had woken up*)
- o Past potential events are a necessary component of counterfactuals. As events that did not happen (*If she had woken up*), they are directly related to the processing of negation

Relevance for mental timeline

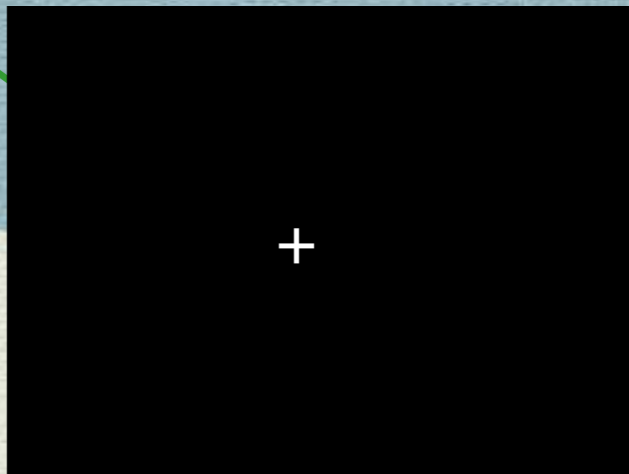
- o If comprehension is mediated by detailed, modal mental simulations of linguistic content, uncertain and negated events pose an important theoretical challenge to embodied theories of language comprehension

Aim of the study

- Shed light on whether potential events are mentally arranged along a left-right axis
- We expected that potential events would activate the lateralized mental timeline as factual events do

Conceptual Congruency Tasks

- Temporality task: Presenting words referring to either past or future events, and categorizing the temporality of their reference by pressing either a left or right response key
- Potentiality task: Presenting words referring either to the factuality or to the potentiality, and categorizing their potential reference by pressing either a left or right response key



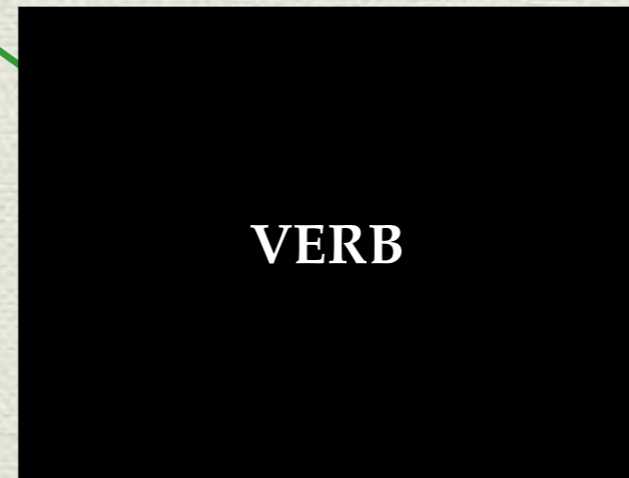
(500ms)



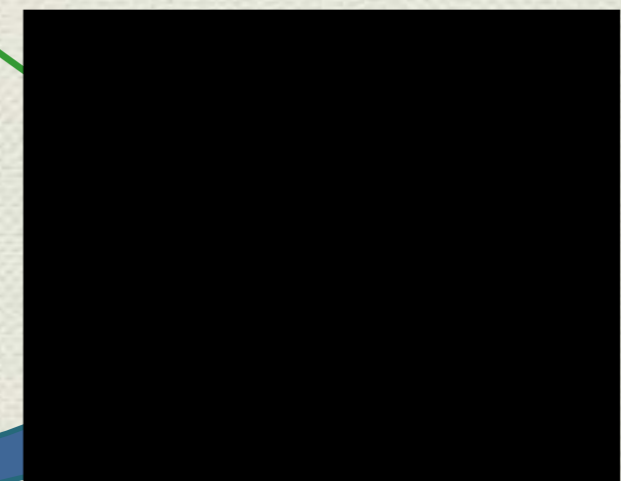
left



right



(4000ms)

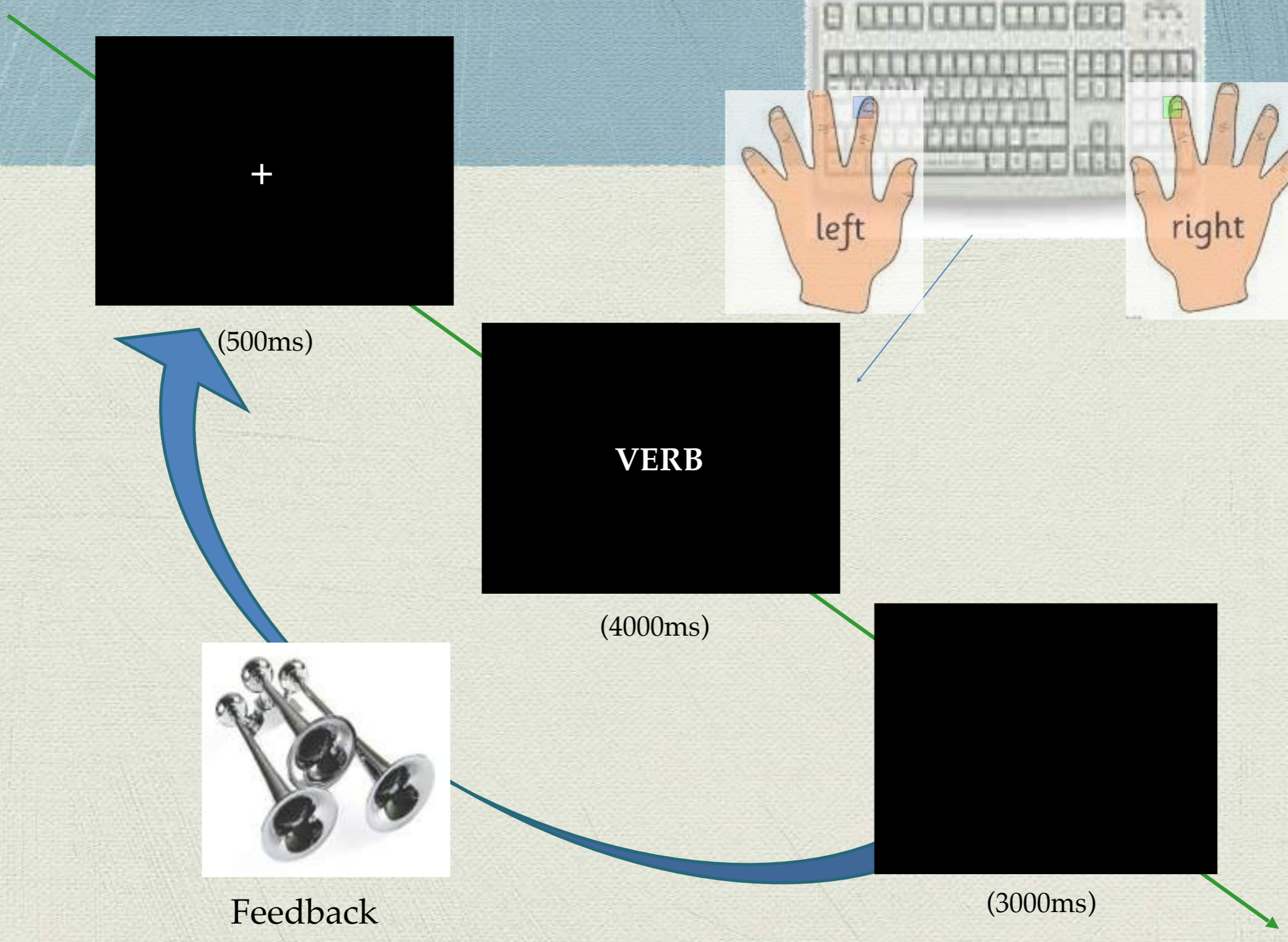


(3000ms)



Feedback

Tono de 440 Hz (500 ms)



General study sequence

Mixed Temporality
Task (E1)

Pure potential
Temporality Task (E2)

Mixed Potentiality
Task (E3)



Mixed: Factual and Potential trials

General settings

Variables: Time (Past-Future) X Mood (Factual-Potential) X Response side (Left-Right)

Verb form	Spanish	English (approximate)
<i>Factual past</i>	Ella despertó	She woke up
<i>Factual Future</i>	Ella despertará	She will wake up
<i>Potential past</i>	Ella hubiera despertado	She had woken up
<i>Potential Future</i>	Ella despertaría	She would wake up

E1: Mixed Temporality Task

- We expected that potential events would activate the lateralized mental timeline as well as factual events do
- We predicted an interaction between temporal reference and response side both for factual and potential events

E1: Mixed Temporality Task

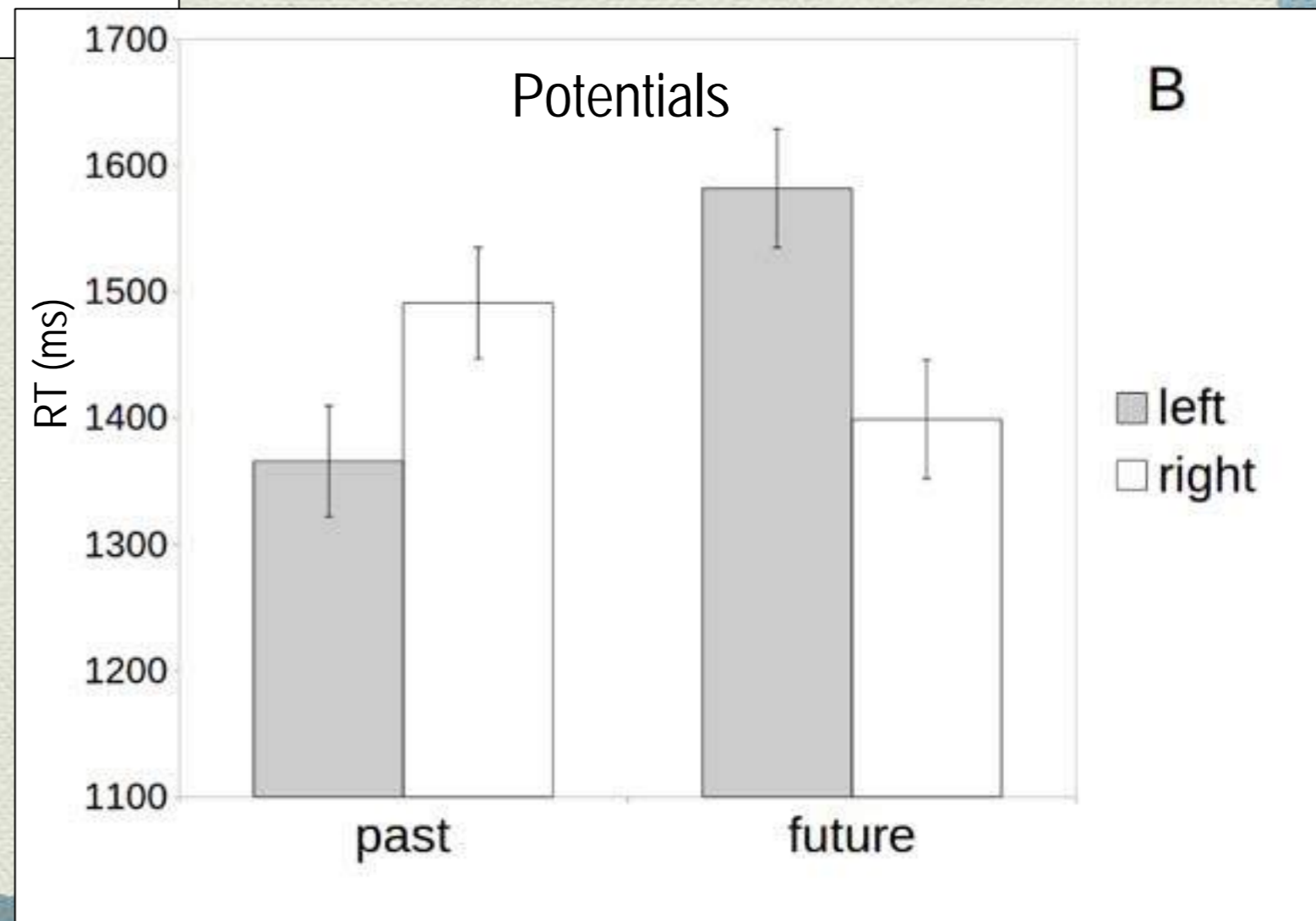
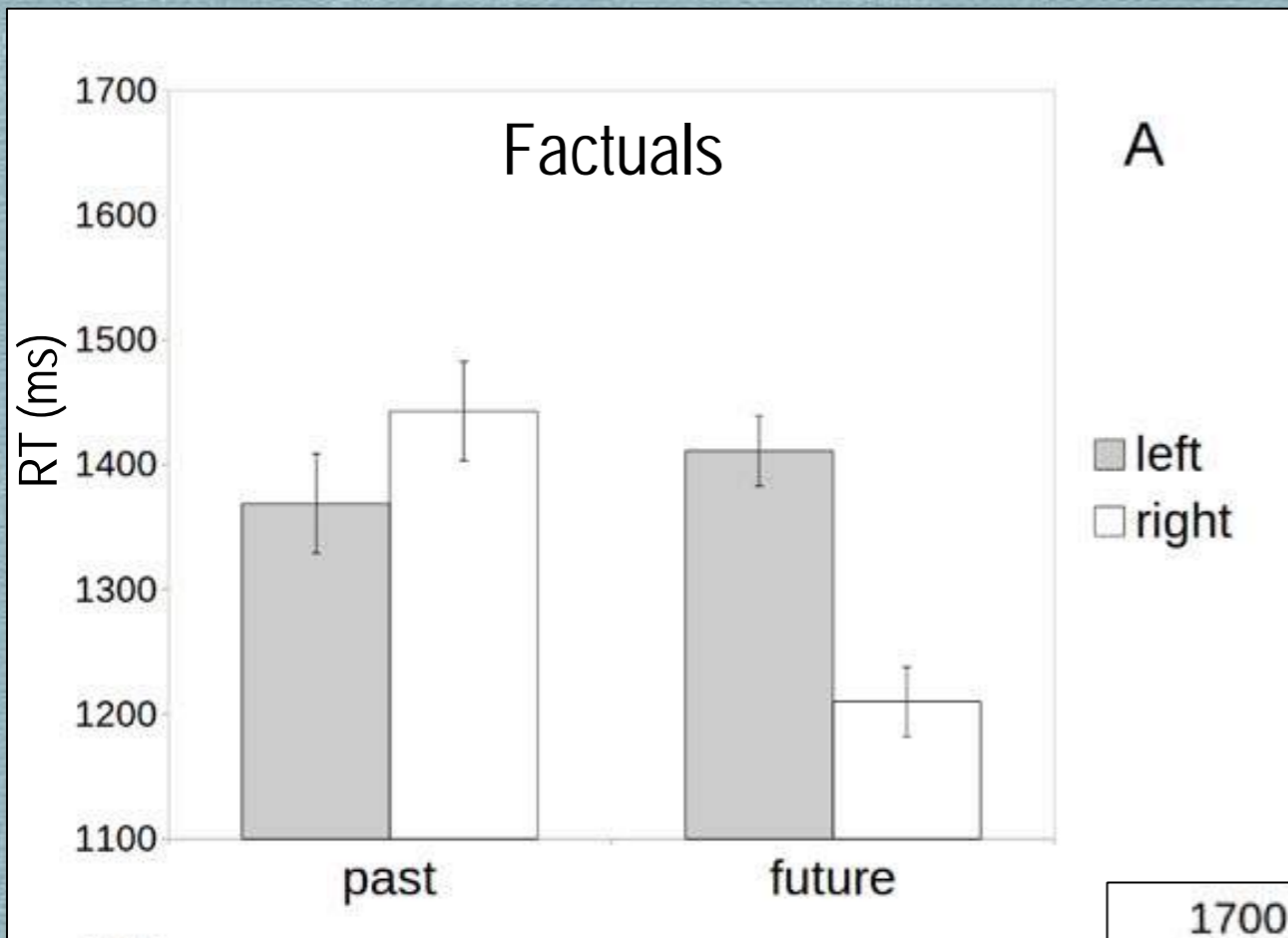
- ◆ 28 undergraduate students (32.5 mean age, one left-handed) as volunteers. Spanish native speakers
 - A priori power analysis showed N=23 is a sample size big enough to detect a small-sized effect with a 90% probability
- ◆ 80 Spanish expressions (20 verbs x 2 Mood levels x 2 Time levels)

Instruction (*Congruent mapping*):

Press the left key if the sentence yields a past event.

Press the right key if the sentence yields a future event

E1: Results



Time-Response side: $p=.006$

No differences between Factual
and Potential trials ($F<1$)

E1: Discussion

- ◆ Participants responded faster to factual and potential events when past was mapped to the left hand and future to the right hand than with the opposite mapping
- ◆ Alternative explanation: Potential trials only showed the left-right past-future congruency effect because they were intermixed with factual trials, which do show the effect

E2: Pure potential Temporality Task

- o To examine whether the potential past and future verb forms are able to activate left and right space when presented in a context that does not include factual events
- o We expected that performance would be better in the congruent conditions

E2: Potentials Temporal Task

- ◆ 40 undergraduate students (26.8 mean age, three left-handed) as volunteers. Spanish native speakers
- ◆ 40 potential expressions of E1

Instruction (*Congruent mapping*):

Press the left key if the sentence yields a past event.

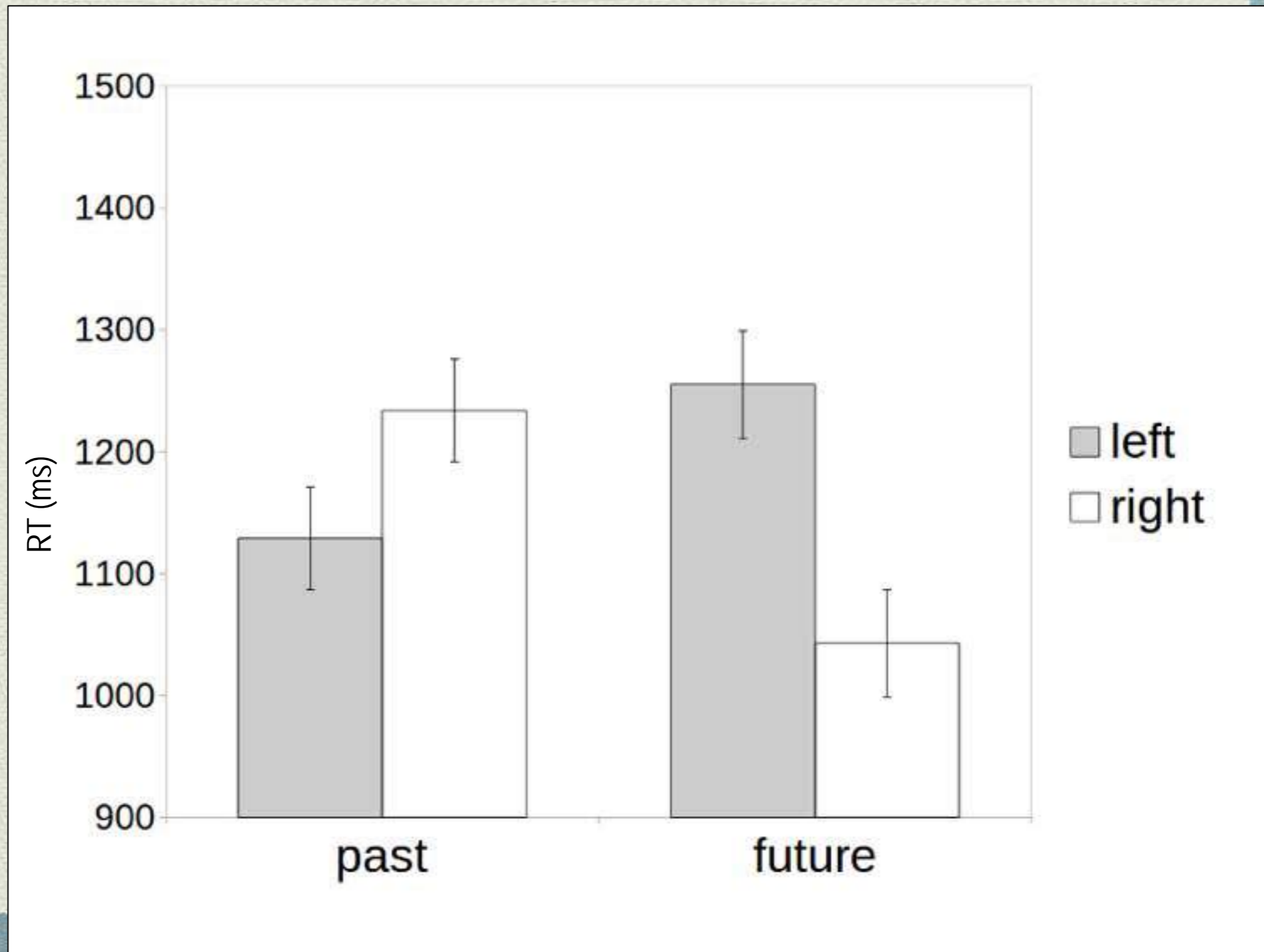
Press the right key if the sentence yields a future event

E2: Results

Time-Response side:

$p=.02$

Non differences for
potentials between E1
and E2 ($F<1$)



E2: Discussion

- ◆ Same effect size as that observed in E1
- ◆ Carry-over explanation from factual to potential trials ruled out by data
- ◆ Next: assessing whether there is an automatic activation of the left-right timeline for potential events

E3: Mixed Potentiality Task

- o To examine whether there is an automatic activation of the left-right mental timeline for potential (as well as factual) events
- o The potentiality dimension was made task-relevant and the temporality dimension task-irrelevant"
- o We did not expect a space-time congruency effect under these conditions, neither for factual nor potential events

E3: Mixed Potentiality Task

- ◆ 30 undergraduate students (26 mean age, just right-handed) as volunteers. Spanish native speakers
- ◆ 80 expressions of E1

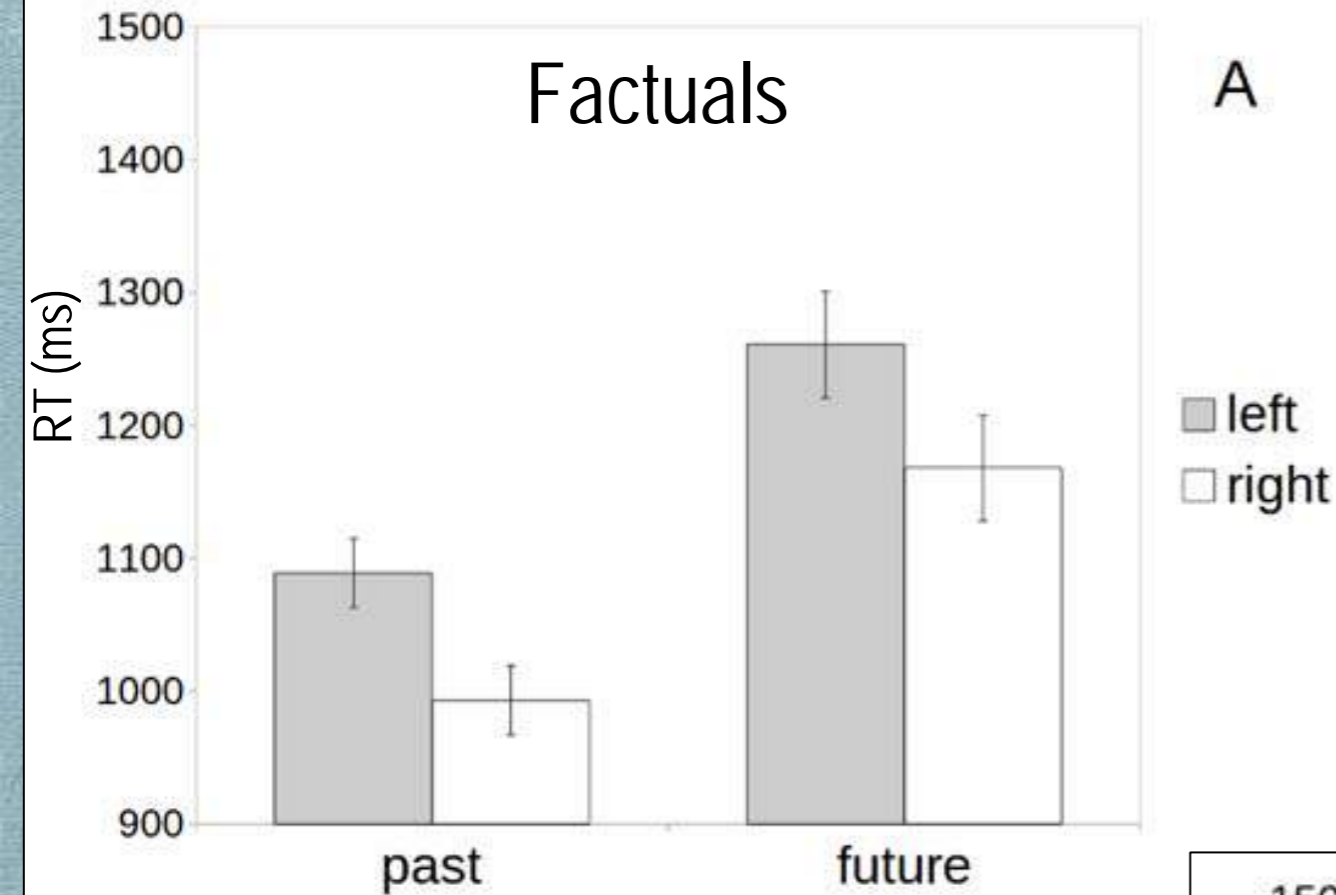
Instruction (*Congruent mapping*):

Press the left key if the sentence yields a factual event.

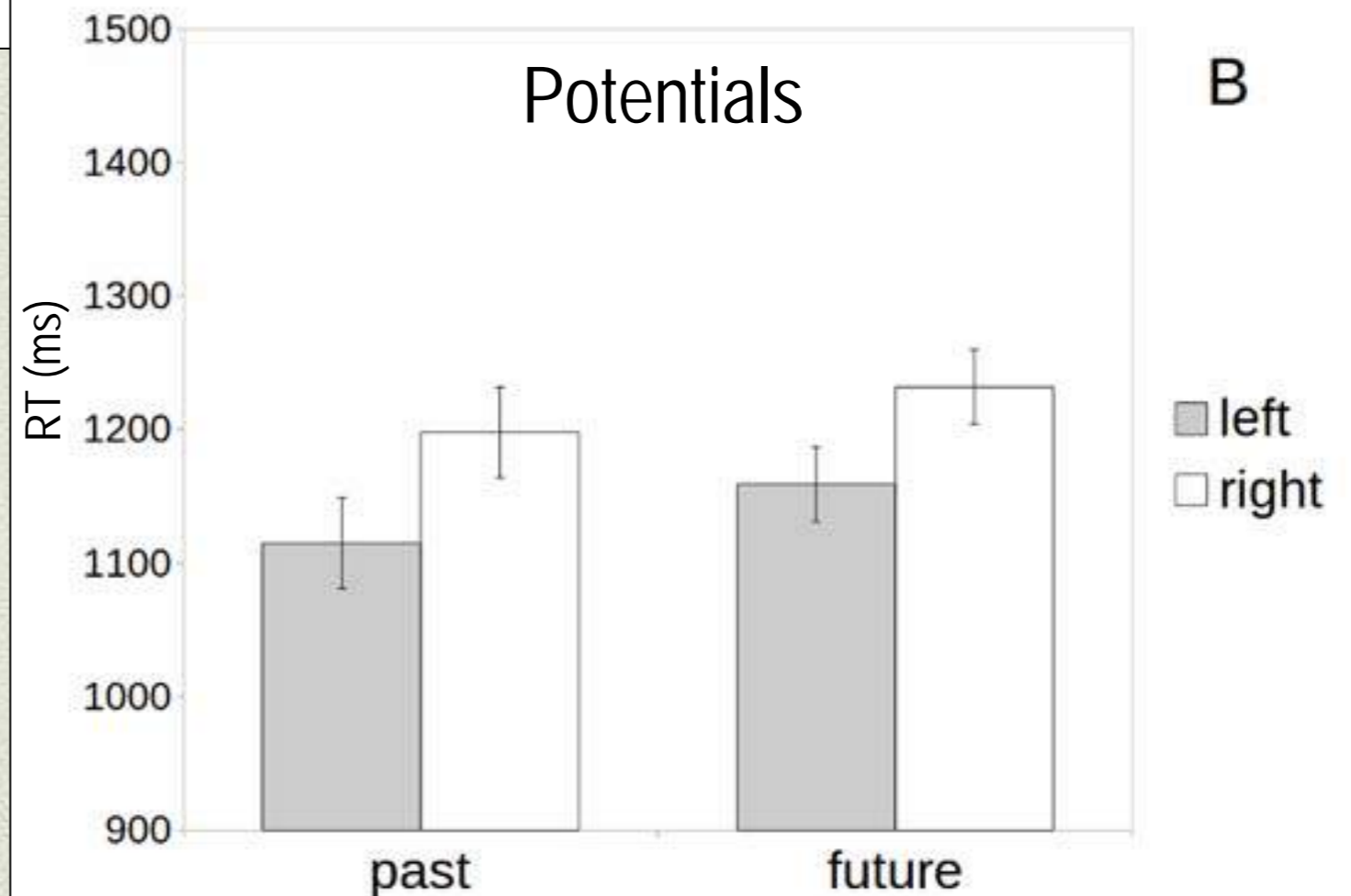
Press the right key if the sentence yields a potential event

E3: Results

A



B



Time-Response side: ($F < 1$)

Significant effect of task on Time-Response side:

$p = .006$

Unexpected:

Potentiality-Response side: $p = .01$

General discussion

0 Events occurring at different moments in factual and potential worlds are mentally represented along a continuum that runs along the lateral axis

Causes of Space-Potentiality Effect?

- 0 1. Inherent potentiality of future
- 0 2. Polarity correspondence explanation: processing should be facilitated when mapping the poles of the same sign (marked - unmarked) onto each other

Causes of Space-Potentiality Effect?

- o Santiago & Lakens (2015) showed that space-time and space-number effects cannot be explained by polarity correspondence
- o Why could polarity correspondence mediate the space-potentiality effect?
- o The relevant spatial axis is the main factor that distinguishes conceptual dimensions that generate polarity correspondence effects from those that do not.

Thanks !!!