

Development of Executive Functions in Monolingual and Bilingual Children: Separating Working Memory and Inhibitory Control



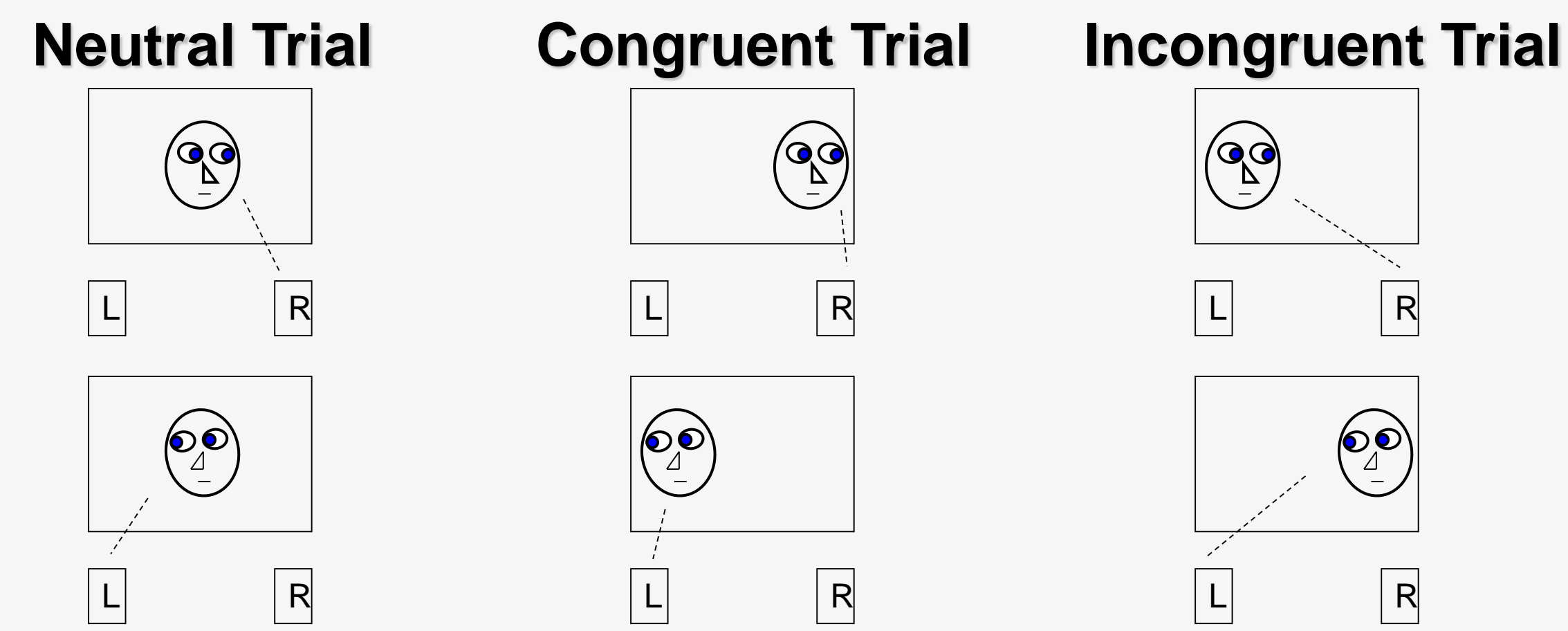
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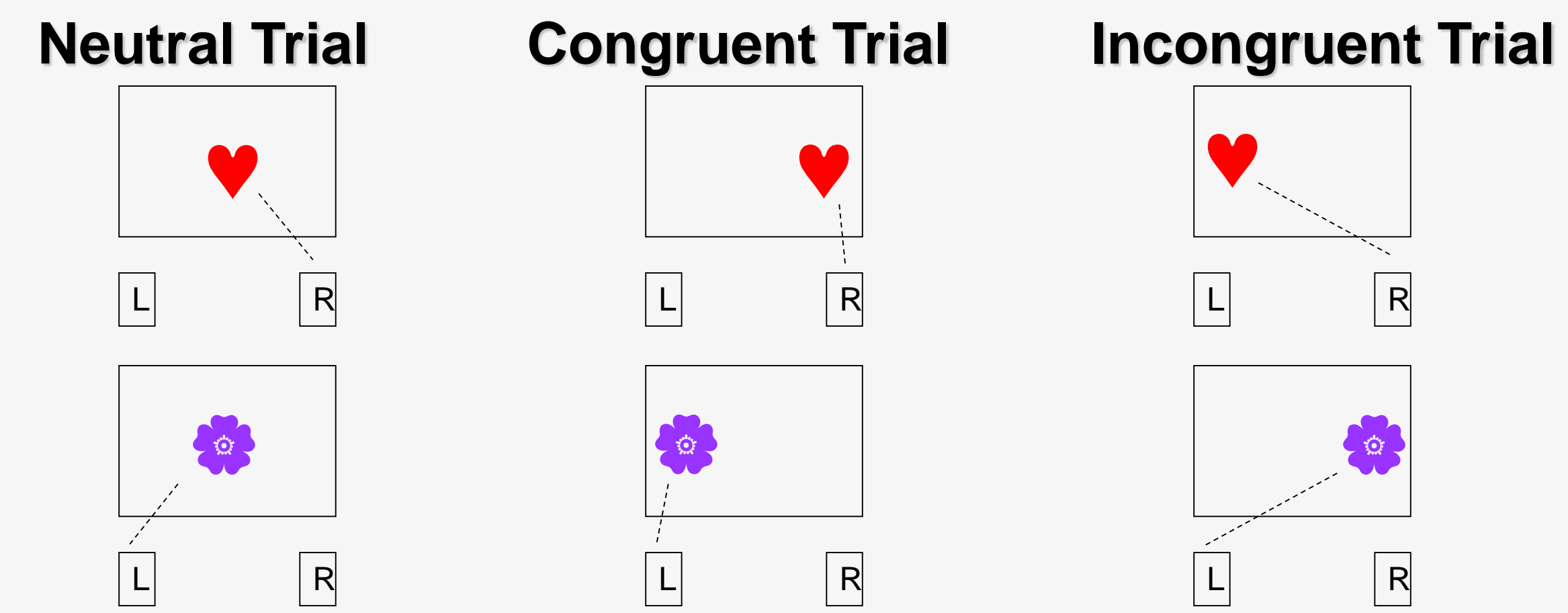
Introduction

- Previous research has shown that constant management of two languages on a daily basis enhances executive control.
- For example, young bilingual children (4-9 years old) demonstrated more effective controlled processing than monolinguals on the flanker task and on the Simon task.
- We attempted to examine which aspects of executive functioning (cognitive control) develop precociously in bilingual children.

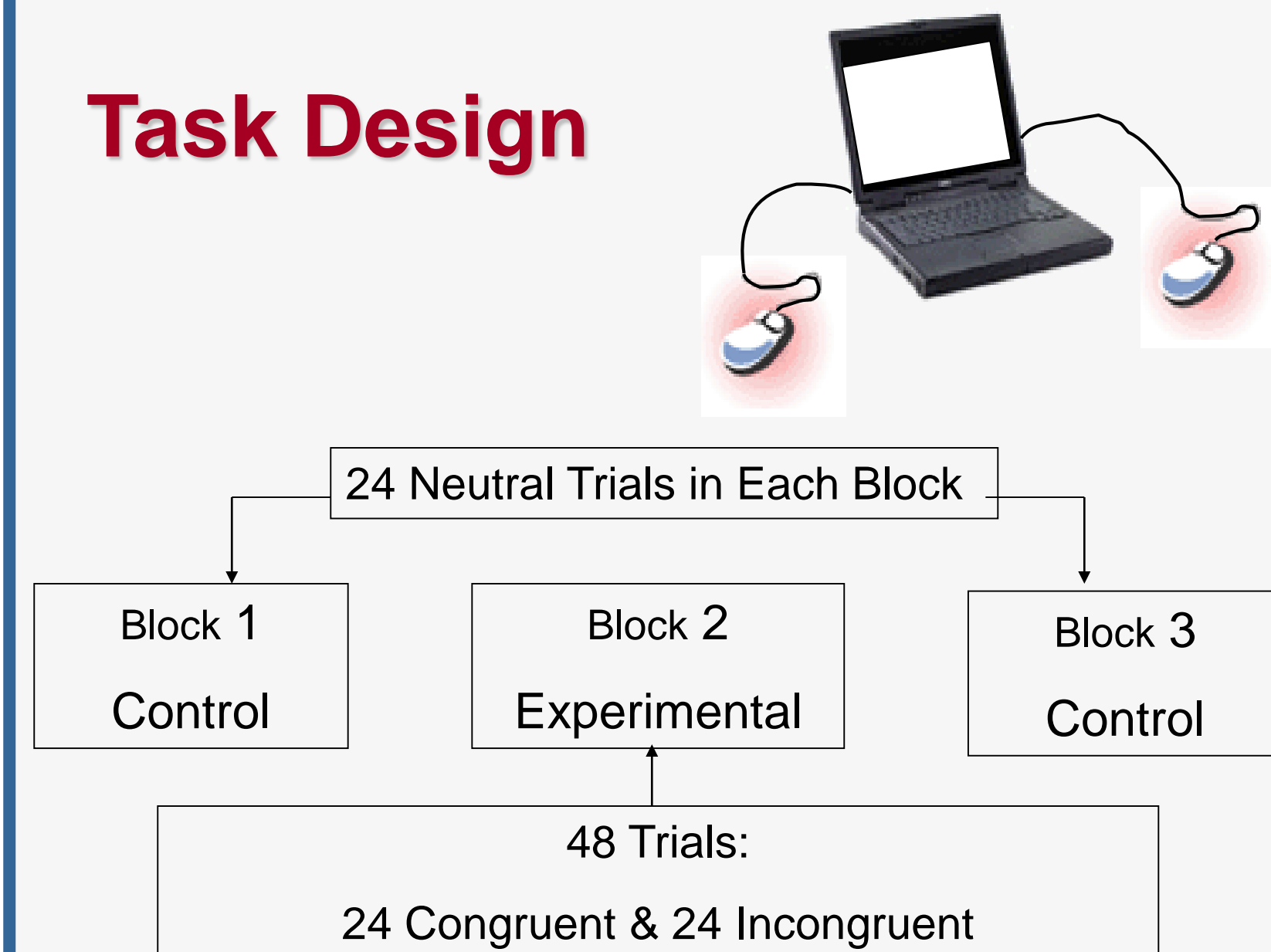
Low Working Memory/Transparent Condition



Higher Working Memory/Arbitrary Condition



Task Design



Background Measures

Groups	Age (years)	PPVT* (Receptive Vocabulary)	Sequencing Span Task (Working Memory)	Frog Matrix Span Task (Spatial Working Memory)
Monolingual (n=23)	6.8 sd= 0.6	102.3 sd=10.5	16.0 sd= 9.2	44.7 sd= 16.1
Bilingual (n=23)	7.1 sd= 0.7	96.2 sd= 8.2	21.7 sd= 7.3	53.1 sd=16.2

*PPVT-Peabody Picture Vocabulary Test - III.
PPVT standardized scores were better for the monolingual children, $F(1,45) = 4.8, p < .003$
Sequencing Span scores were better for the bilingual children, $F(1,45) = 5.4, p < .002$

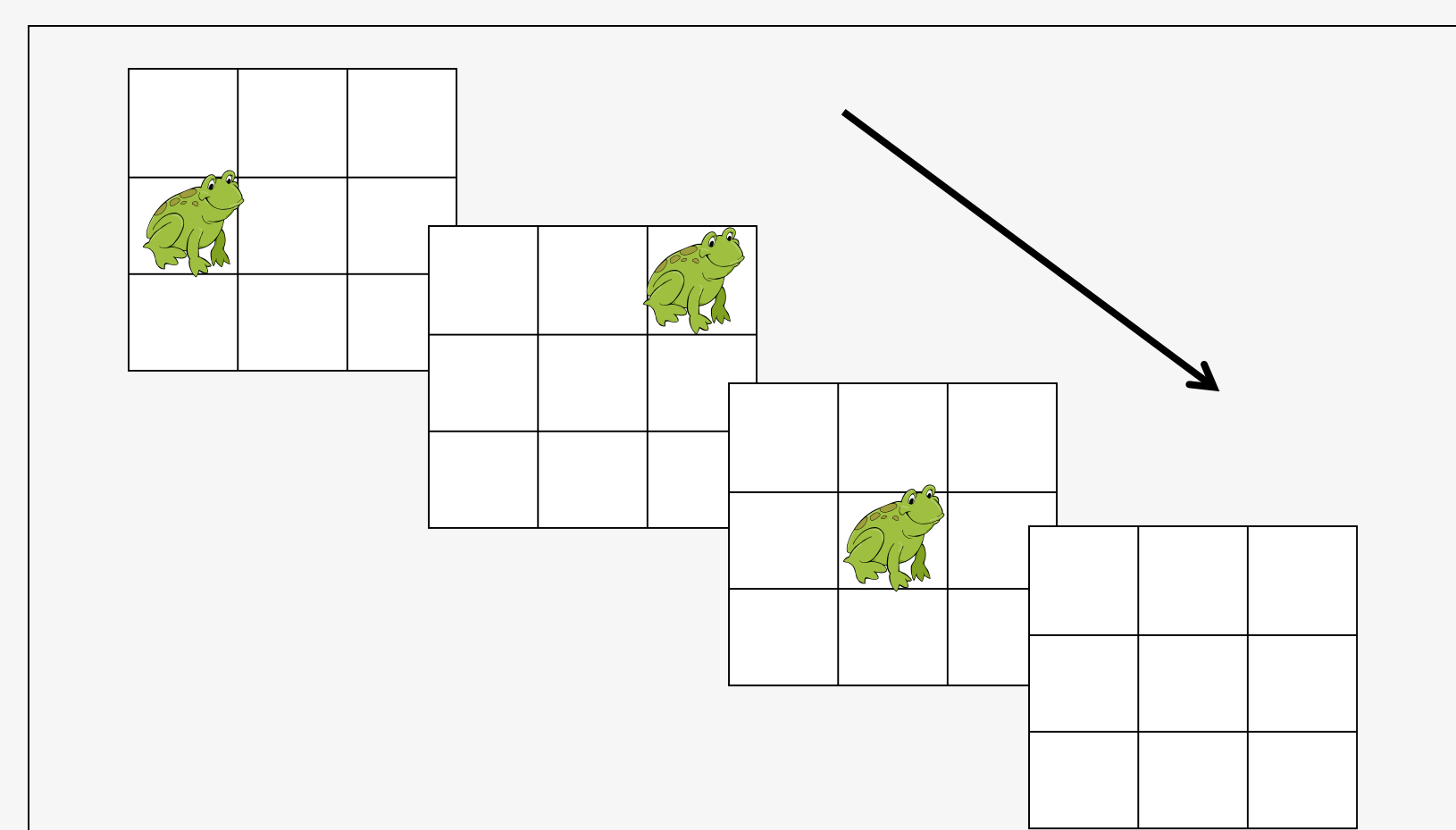
Sequencing Span Task

- Repeat a list of single digit number in ascending order, starting from 2 numbers in a list

5-2-8 Correct response: 2-5-8

Frog Matrix Spatial Span Task

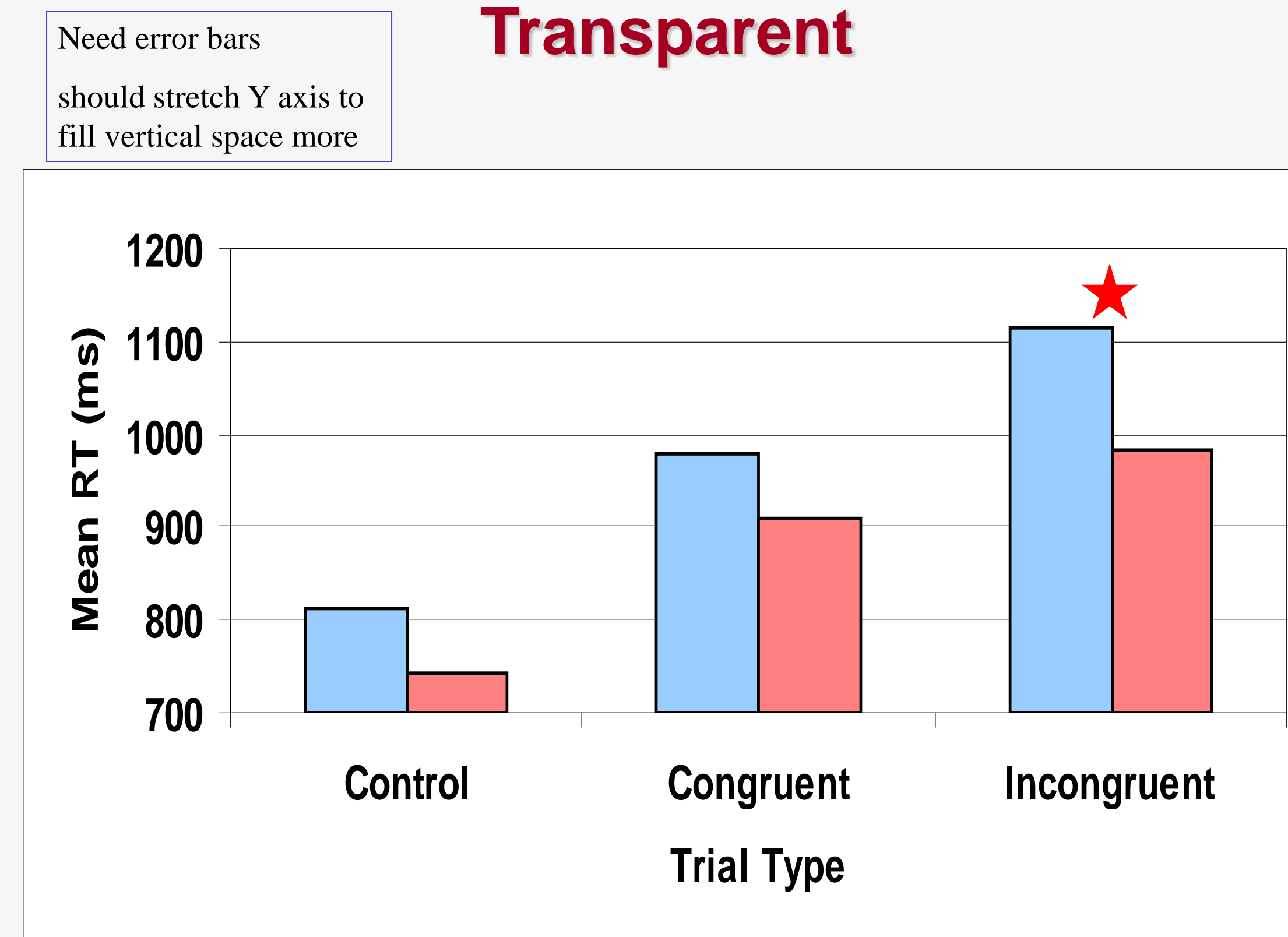
- Recall the locations of presentations of a cartoon frog in a 3 X 3 matrix in order, starting from 2 presentations in a series.



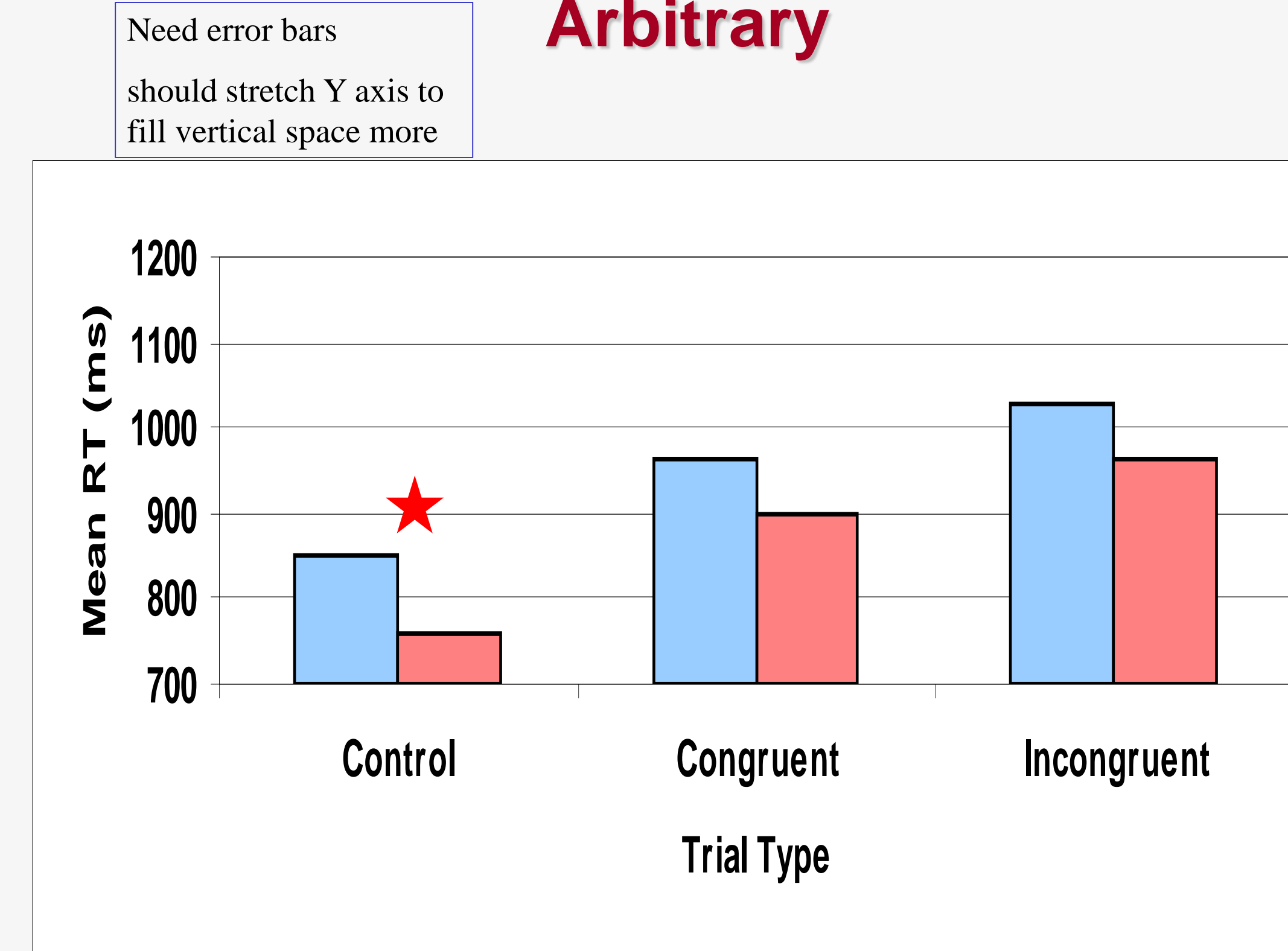
• Correct response:

		2
1	3	

Transparent

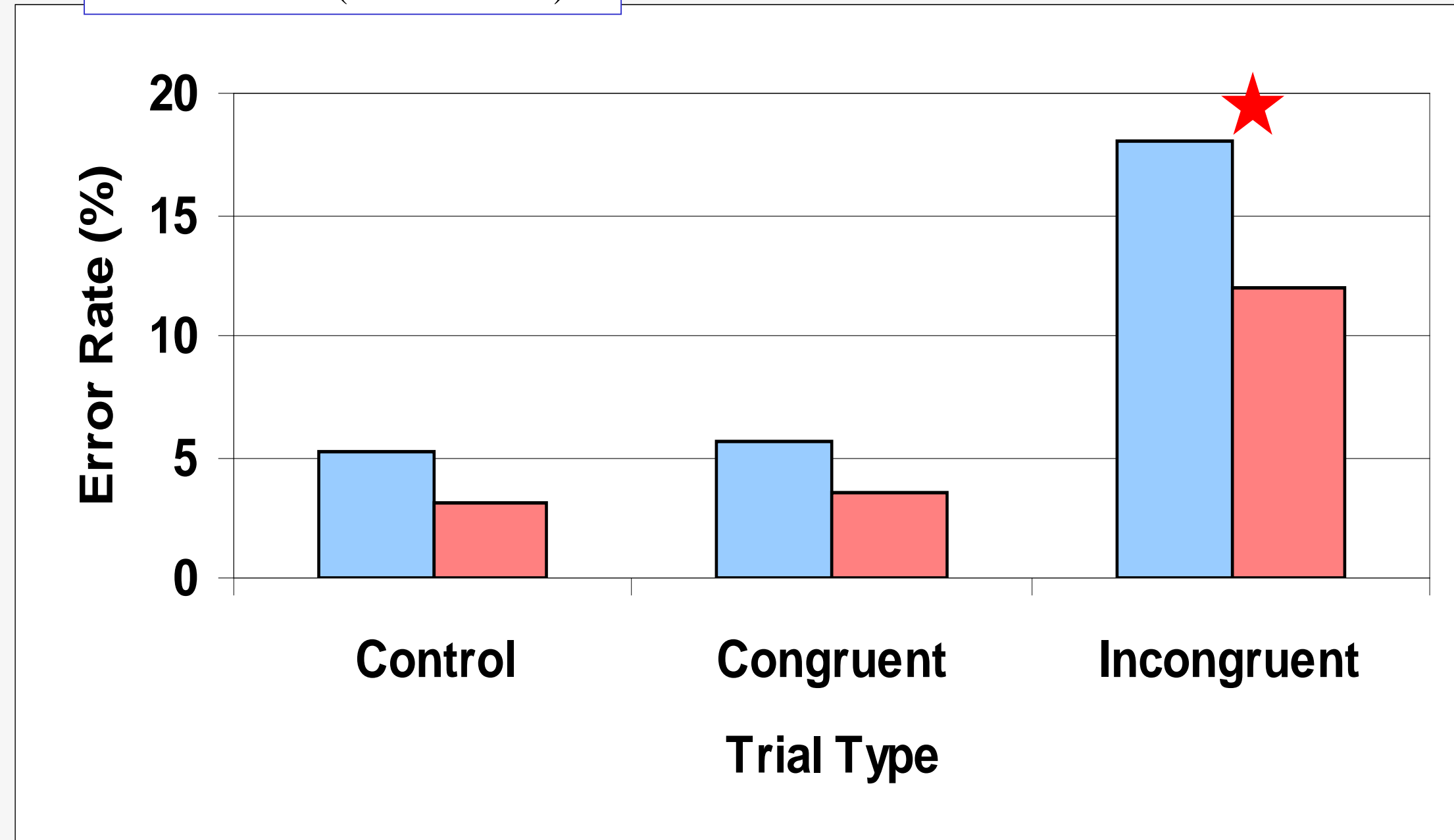


Arbitrary



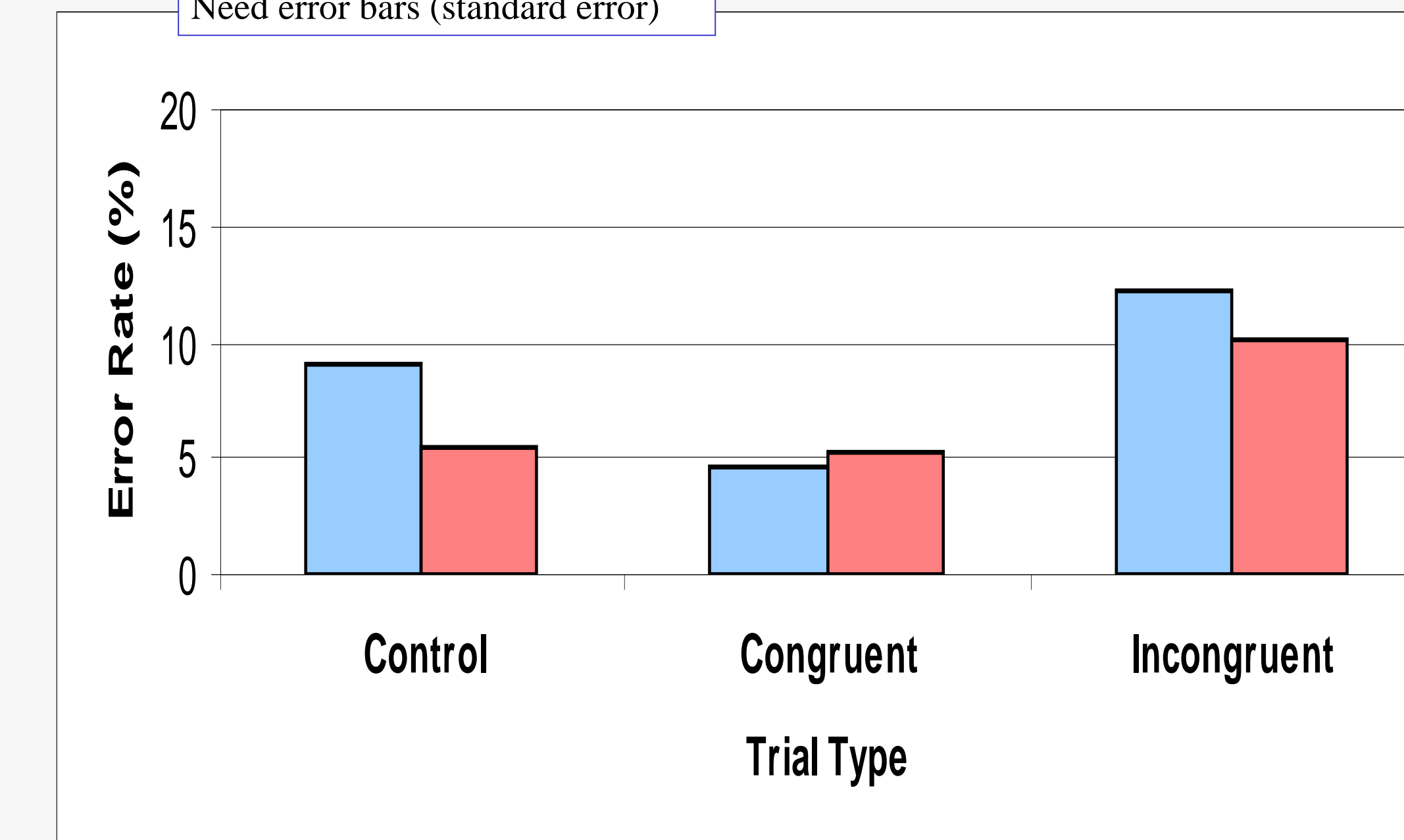
Response Time

Need error bars (standard error)



Error Rate

Need error bars (standard error)



Conclusions

- Bilinguals showed better working memory than monolinguals on the forward digit span task, the frog spatial sequence task, and the arbitrary symbol task.
- Bilinguals showed better inhibitory control than monolinguals in the incongruent condition of the low working memory/transparent symbol task, where virtually no memory was required. Bilinguals were thus better at resolving conflict in that situation.

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