

Testing a perceptual fluency/disfluency model of priming with a model of choice and response time

Kevin Potter, Chris Donkin, and David Huber

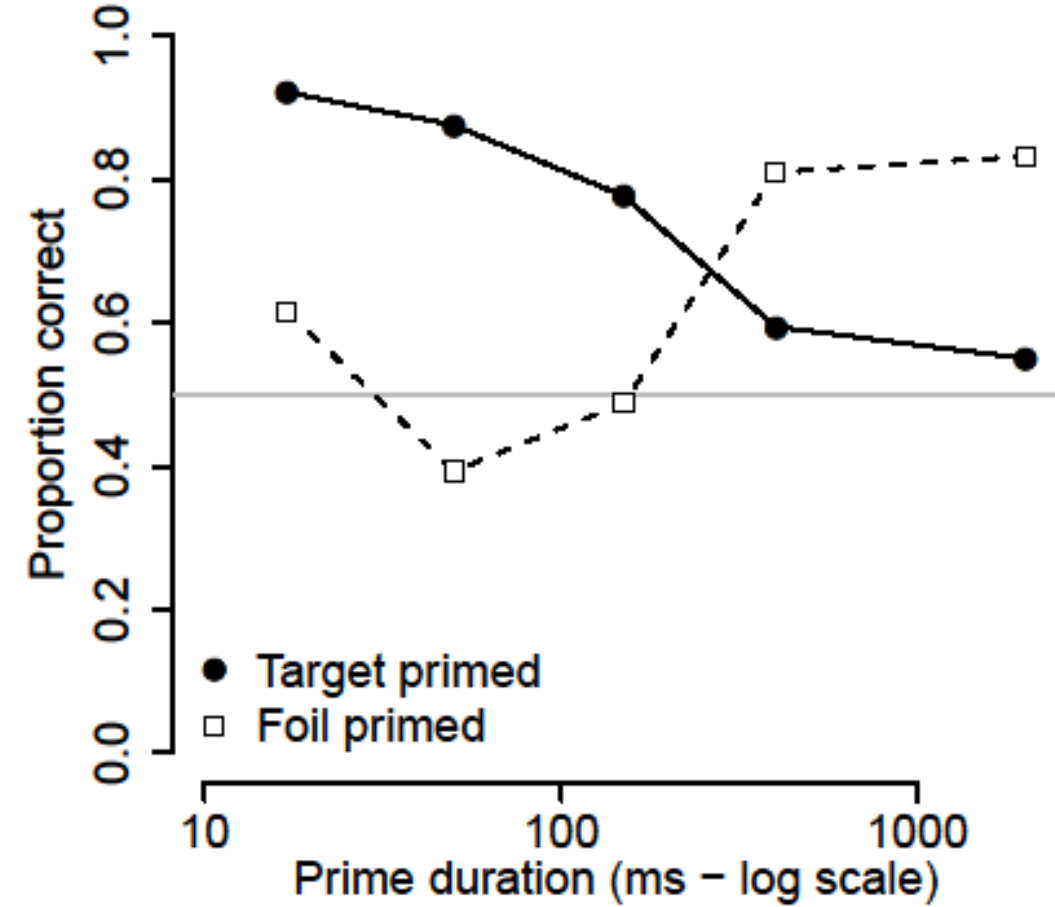
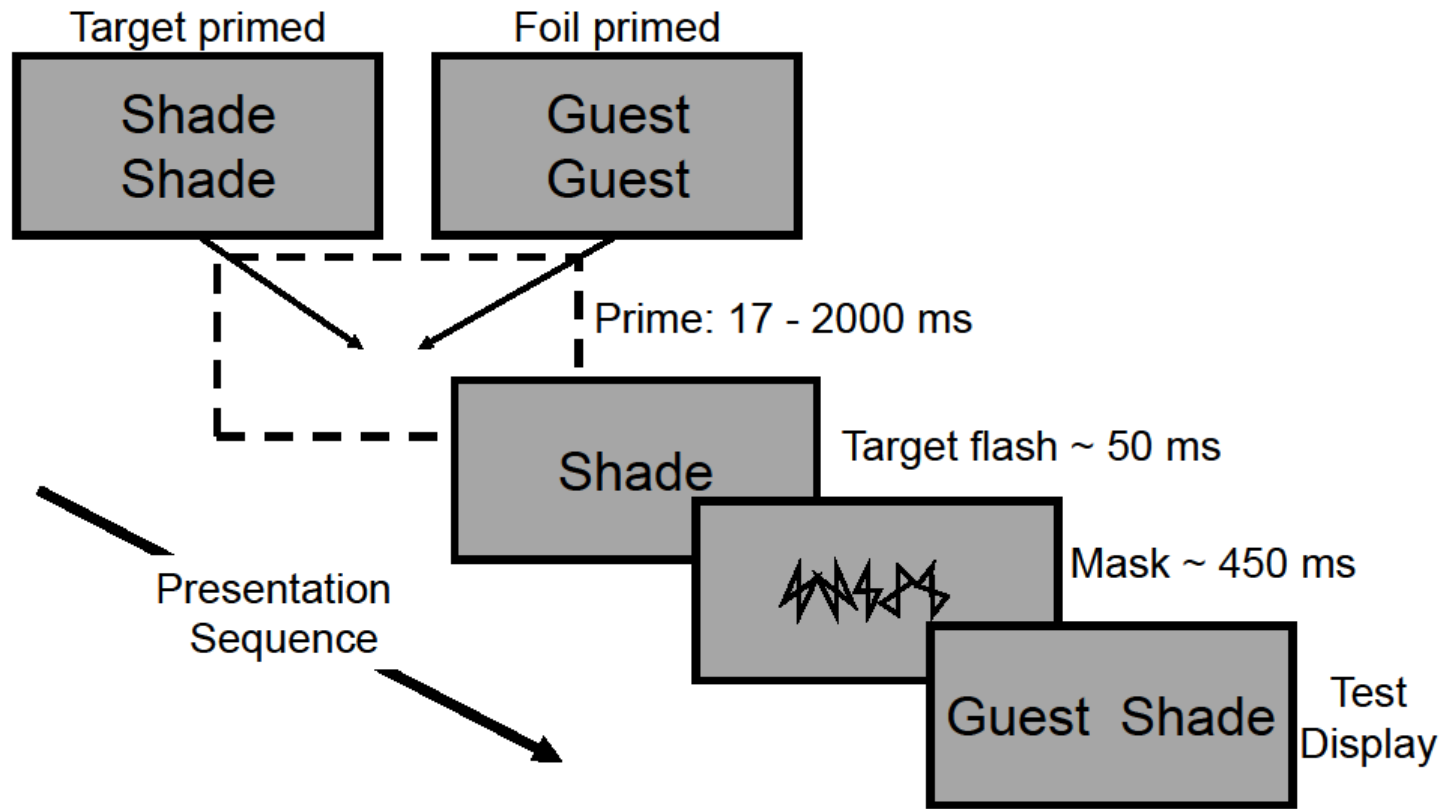
Outline

- Perceptual priming
- The nROUSE model
- Experimental design
- The diffusion race model
- Modeling results
- Discussion

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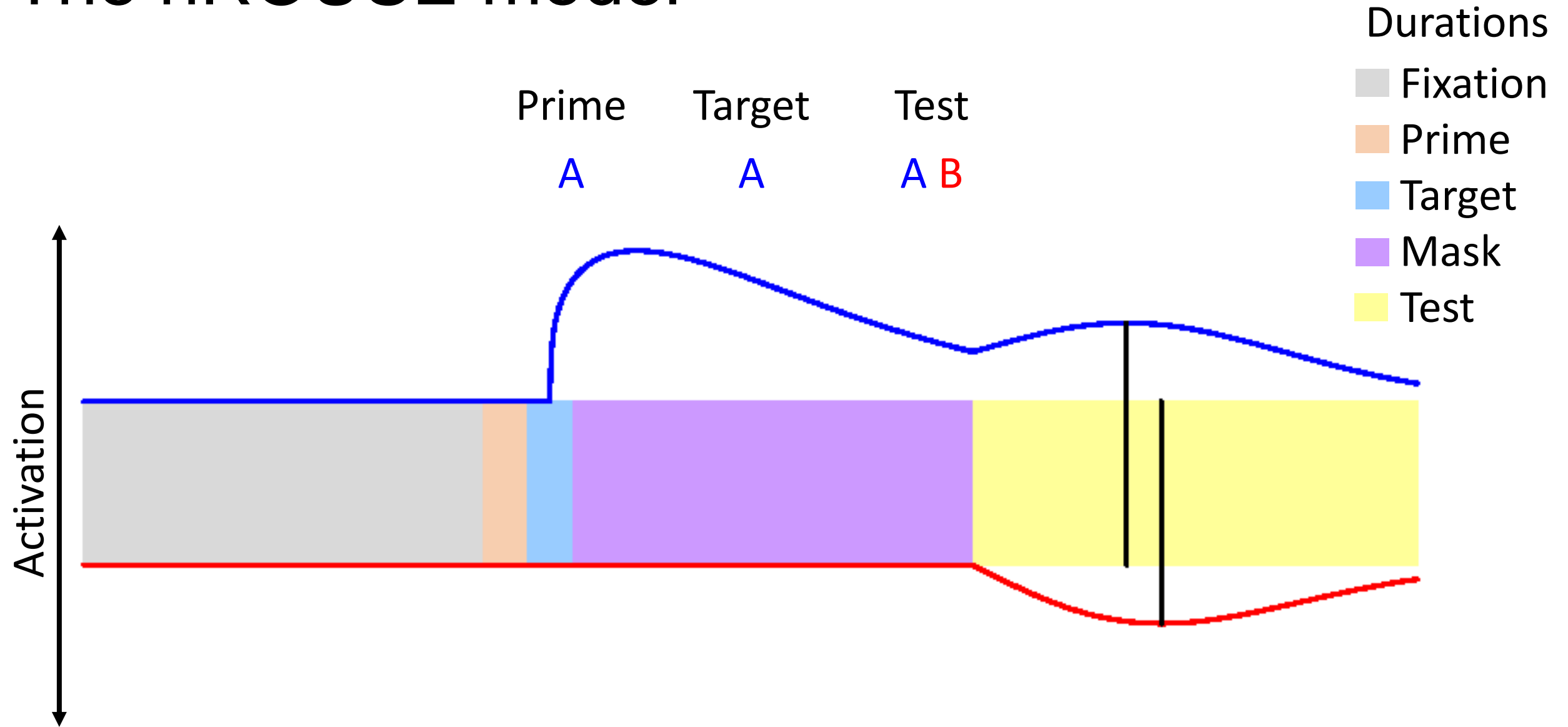
Perceptual priming



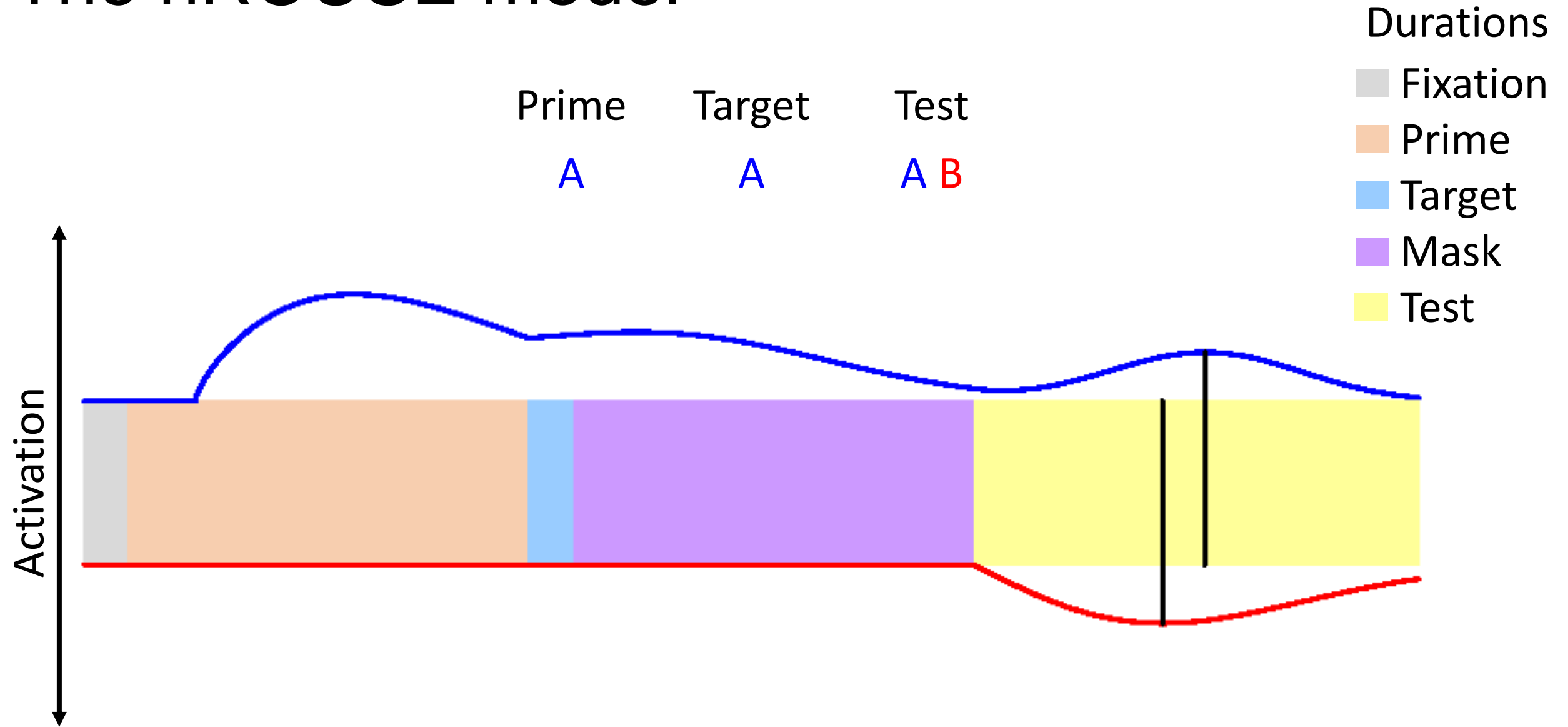
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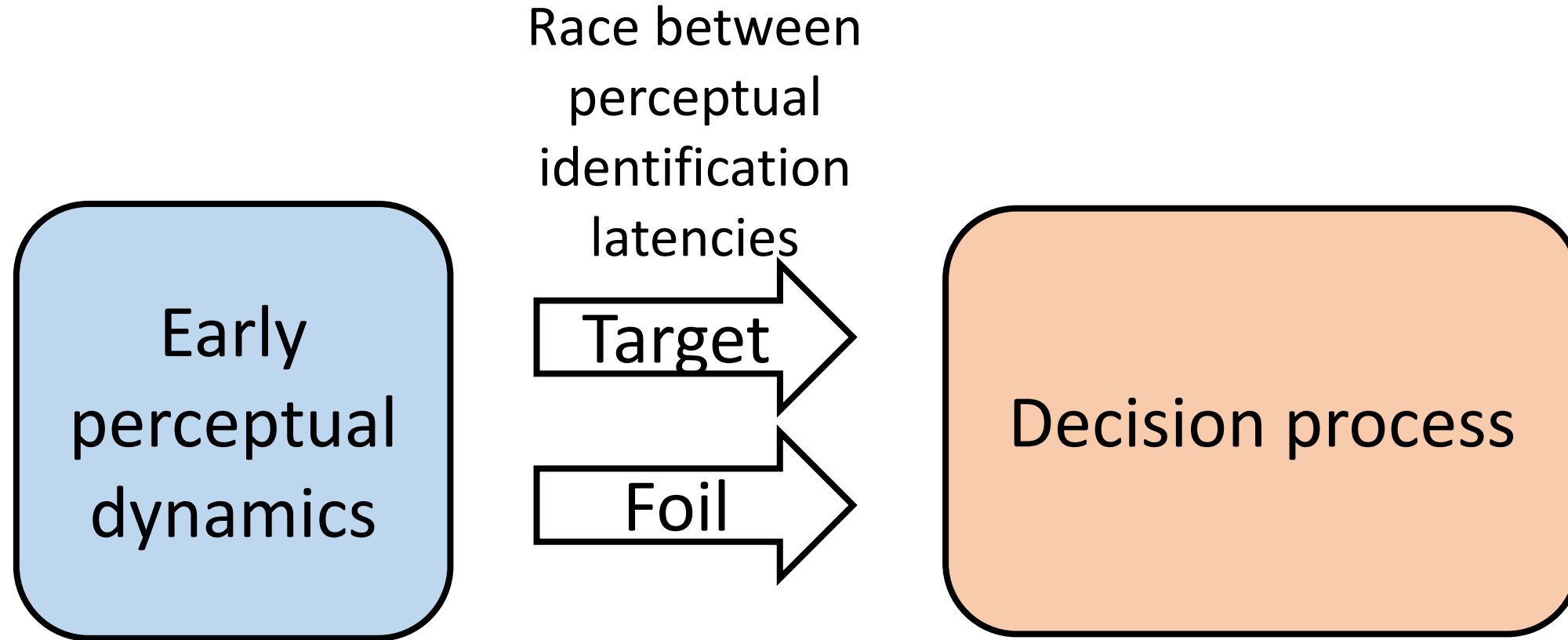
The nROUSE model



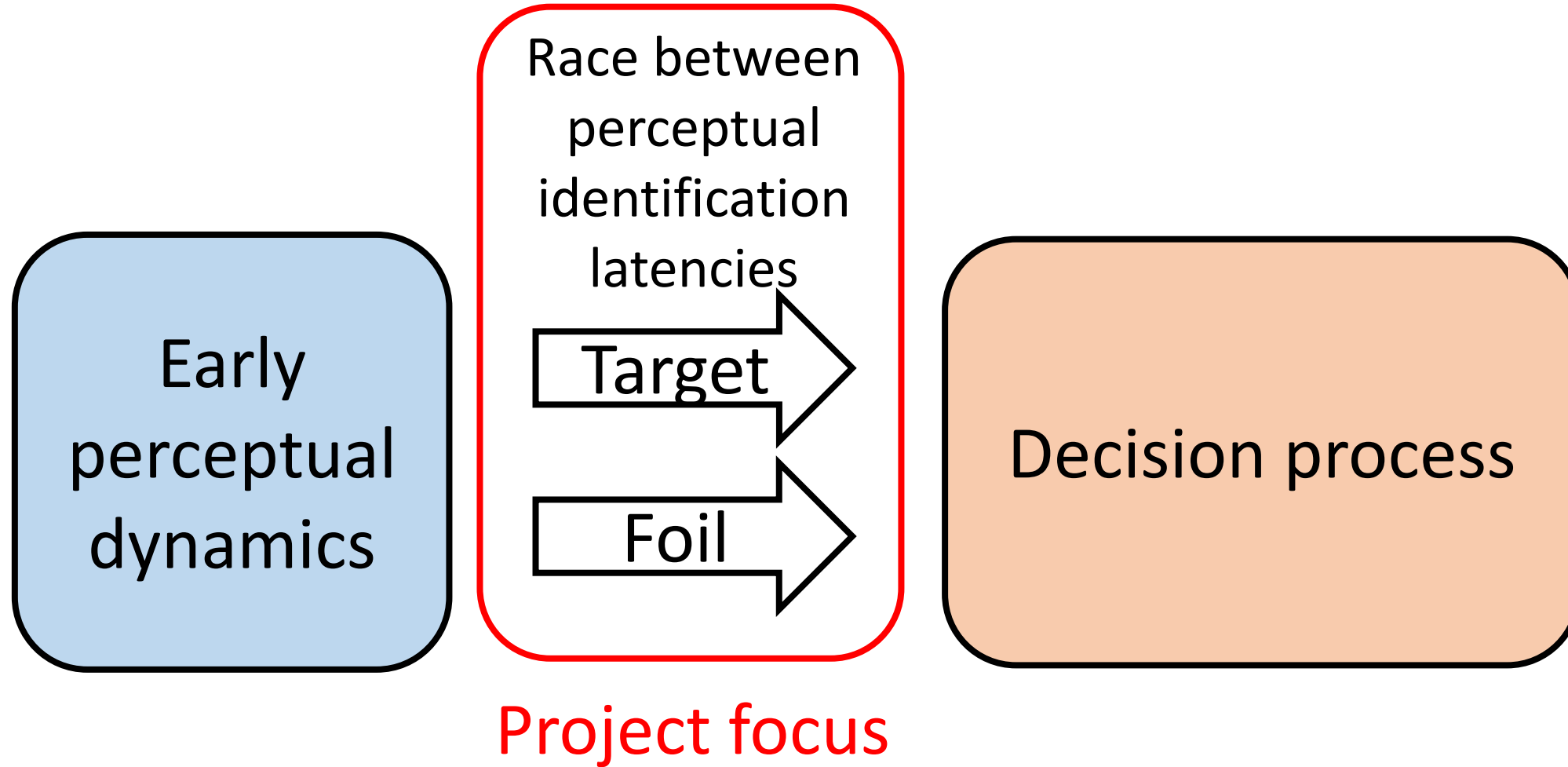
The nROUSE model



The nROUSE model



The nROUSE model



The nROUSE model

Race between
perceptual
identification
latencies

Target

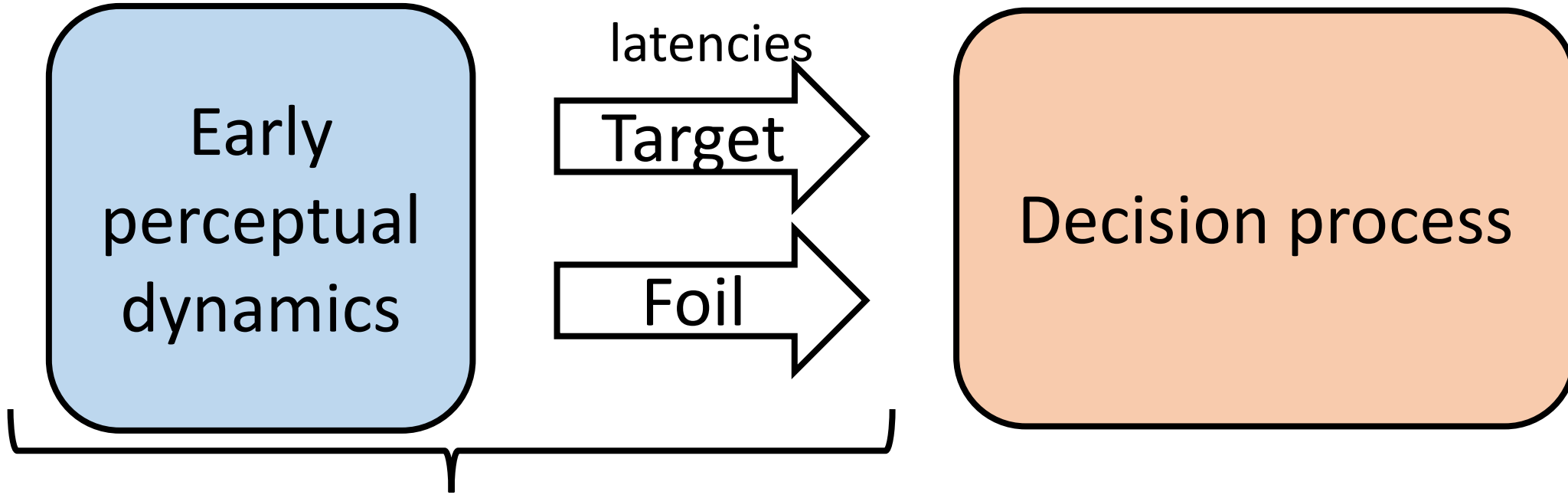
Foil

Response times?
Serial vs. parallel?
Bias?
Speed-accuracy trade-off?

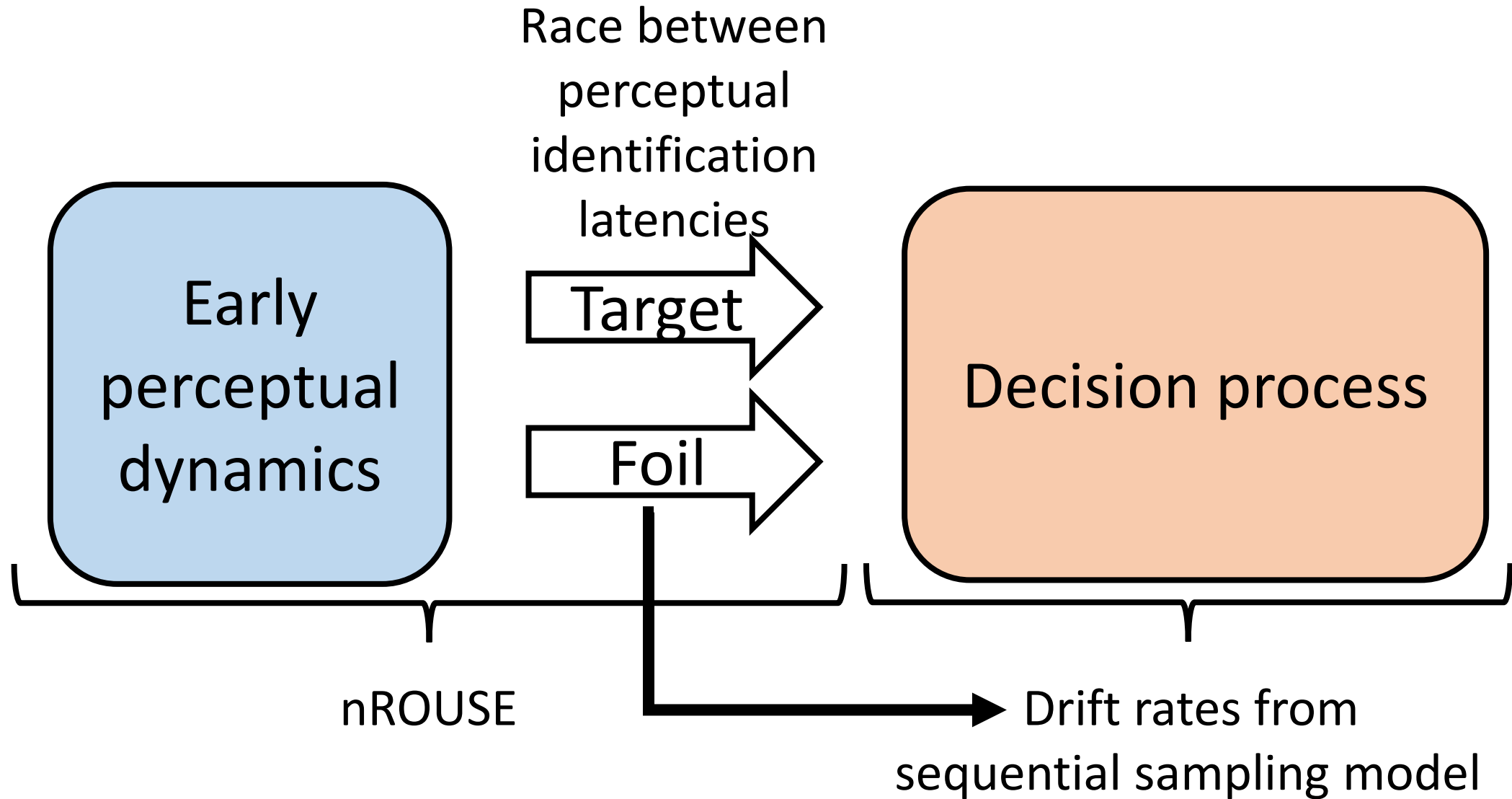
Early
perceptual
dynamics

Decision process

nROUSE
Accuracy data only



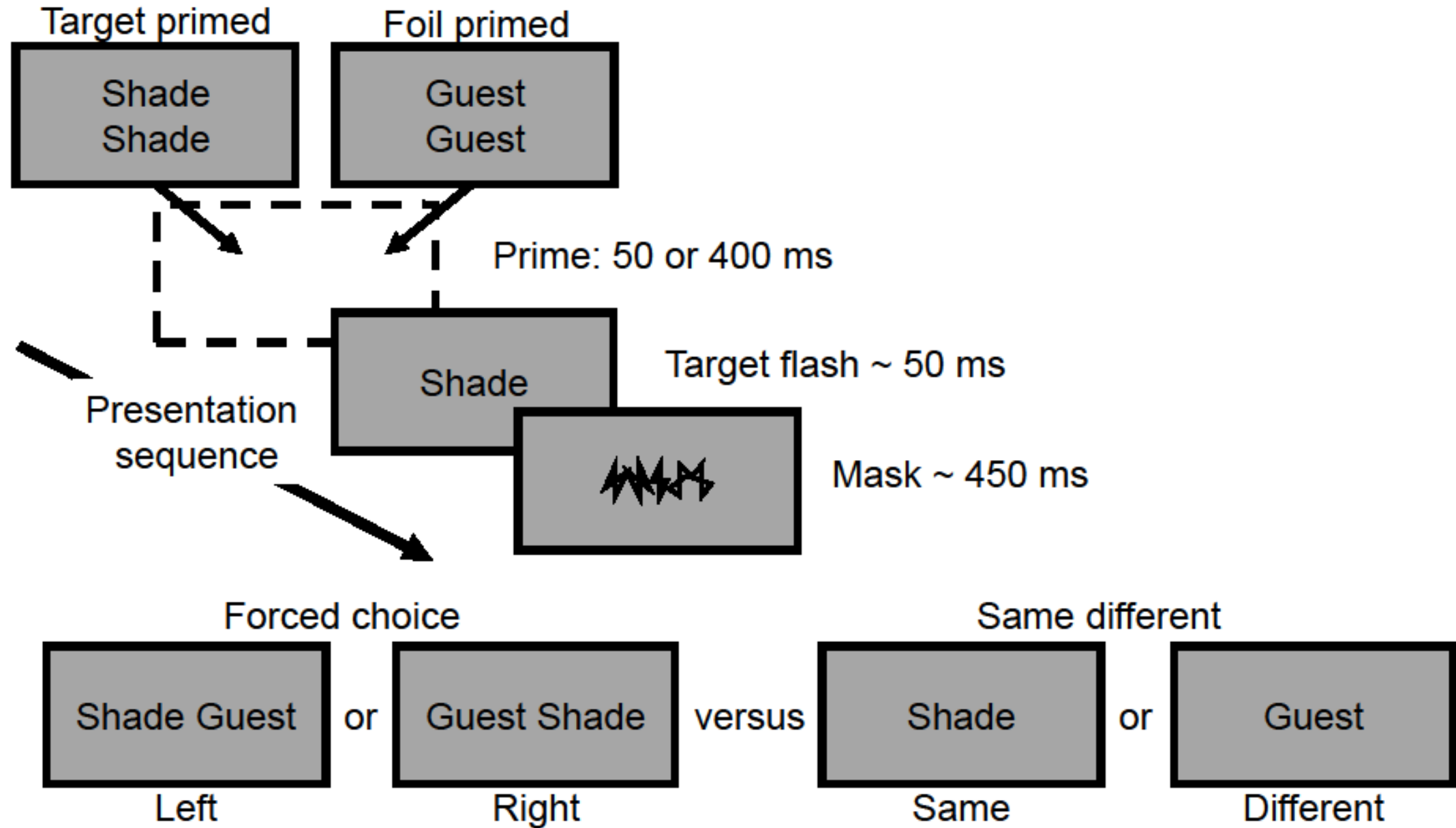
The nROUSE model



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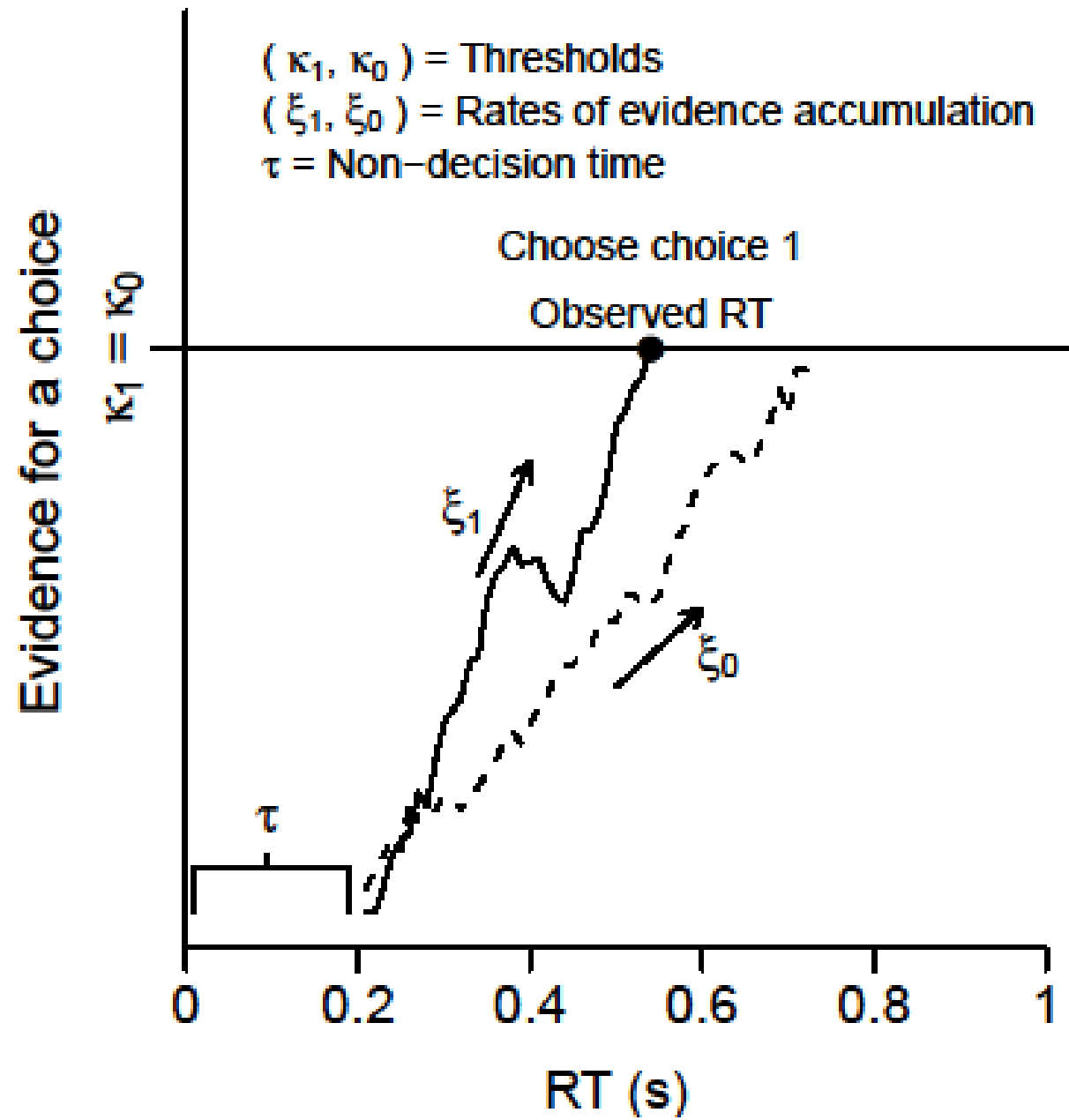
Experimental design



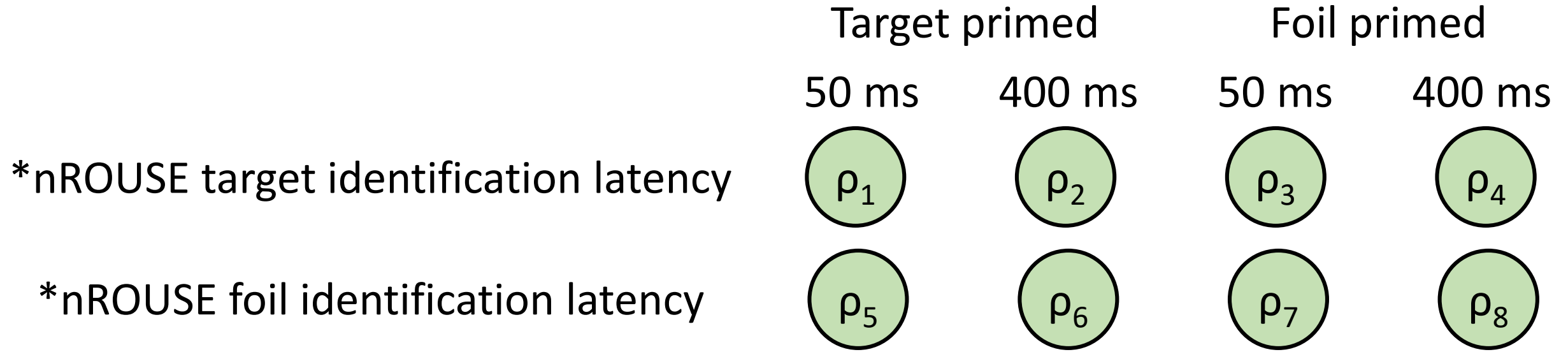
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Diffusion race model

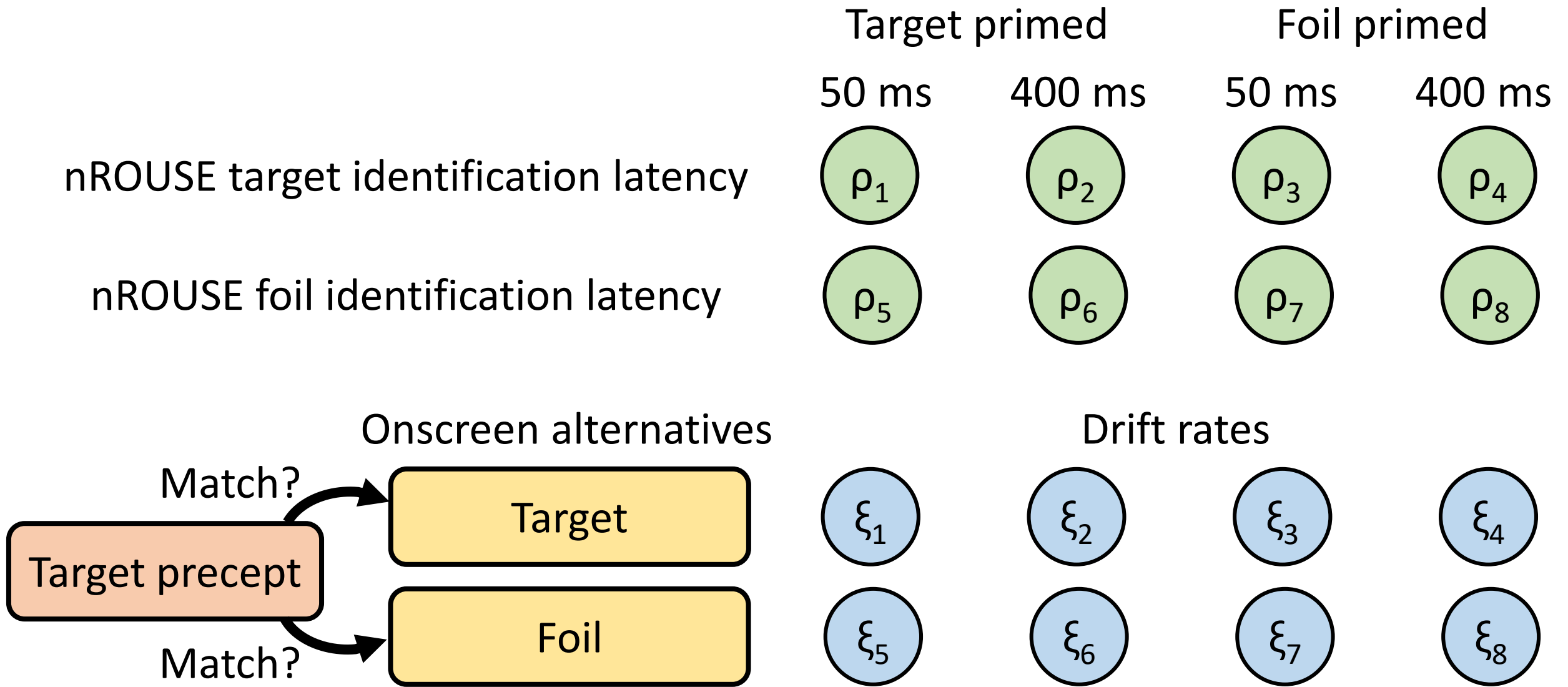


Diffusion race model

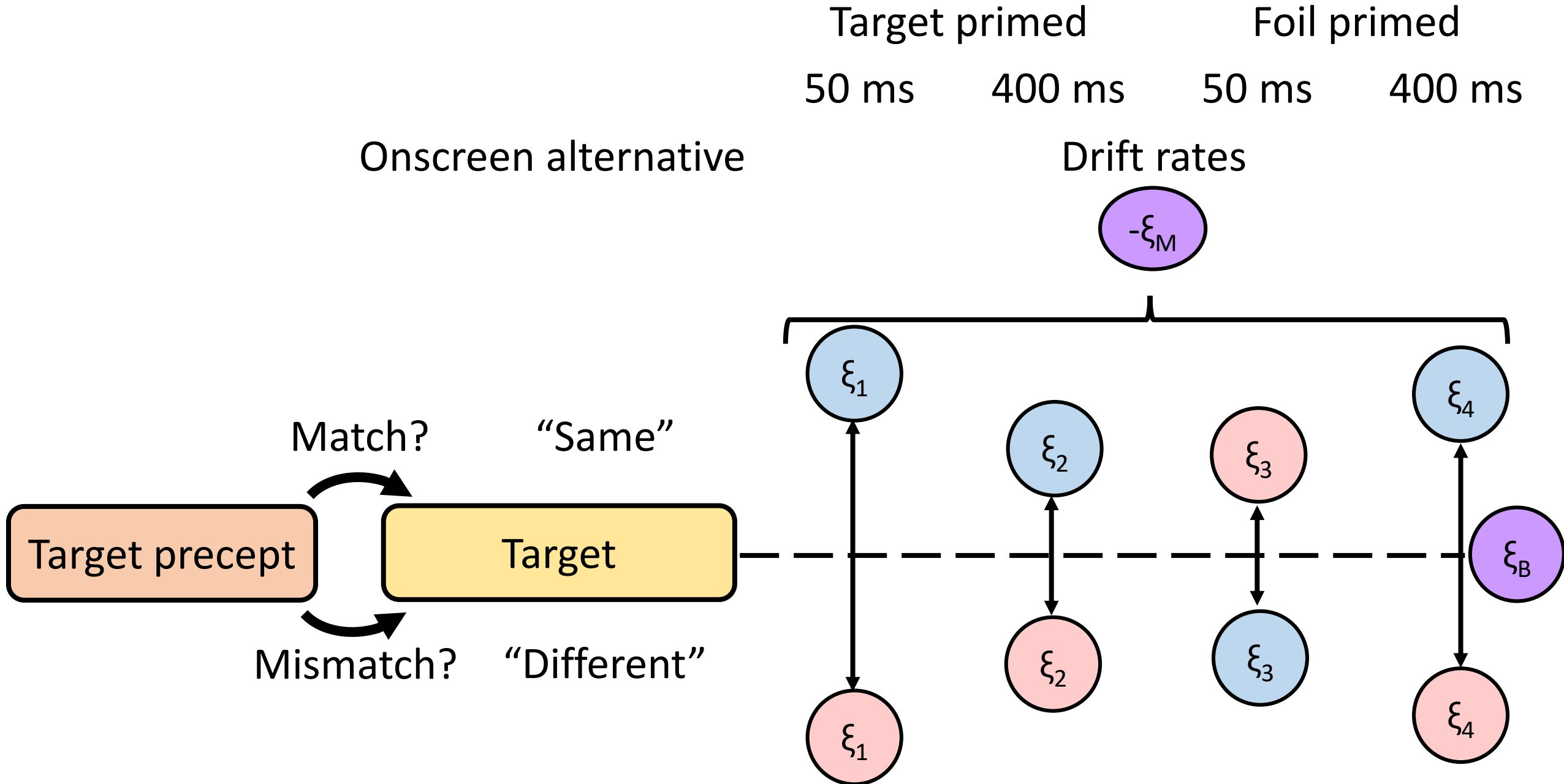


*Fit nROUSE separately to each subject's forced-choice accuracy data and extracted latencies

Diffusion race model



Diffusion race model

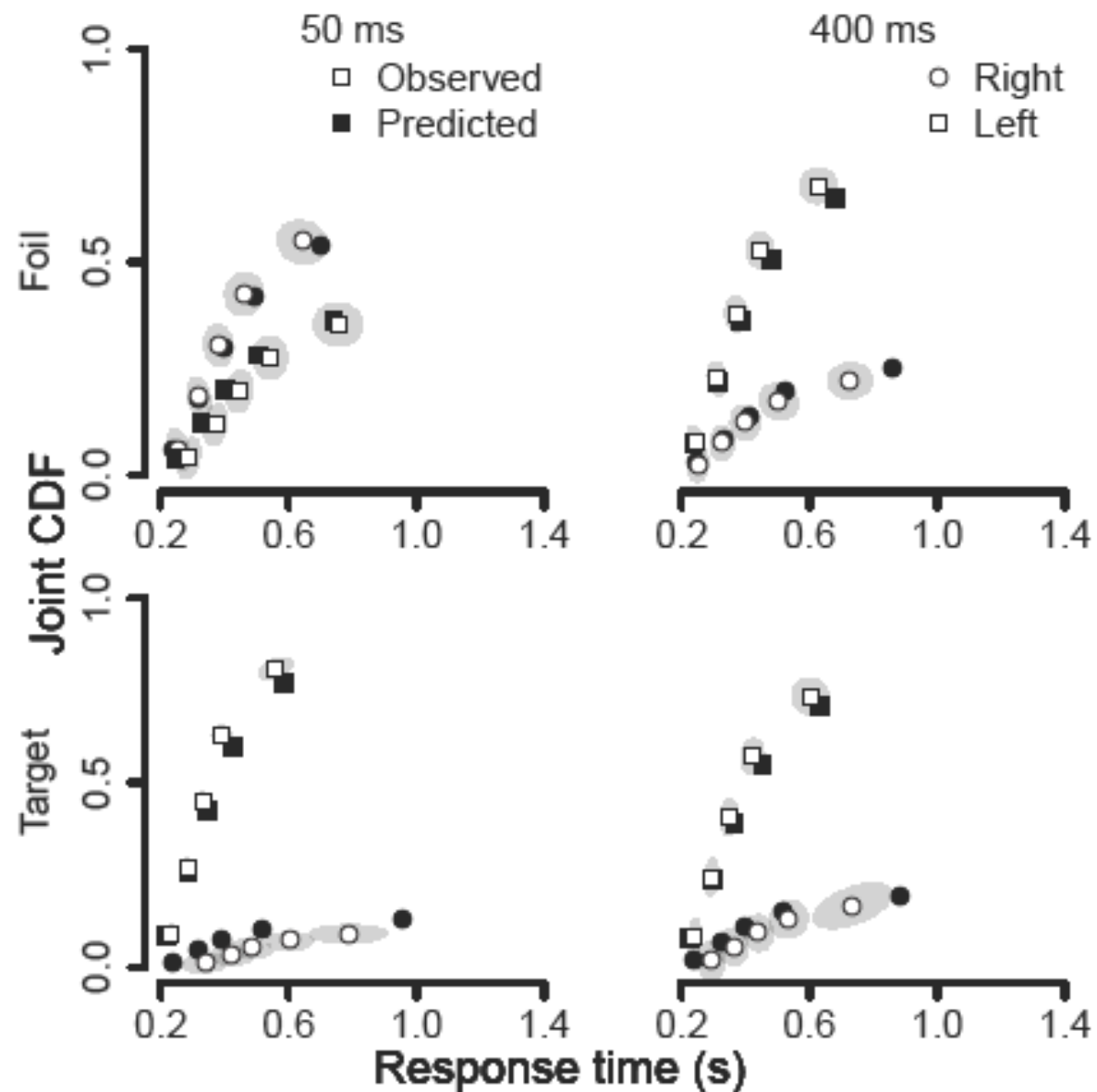


Outline

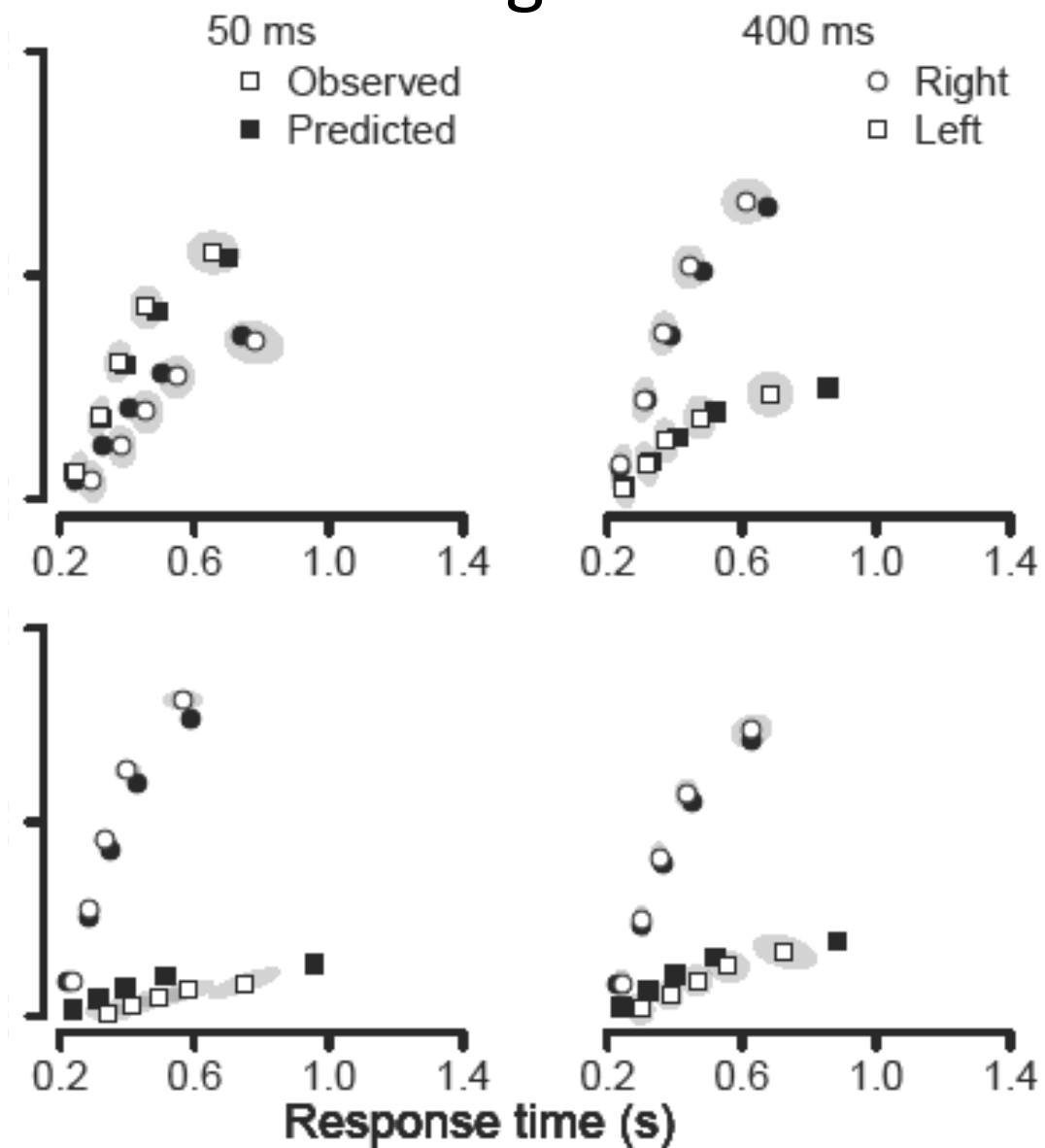
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Modeling results

Left

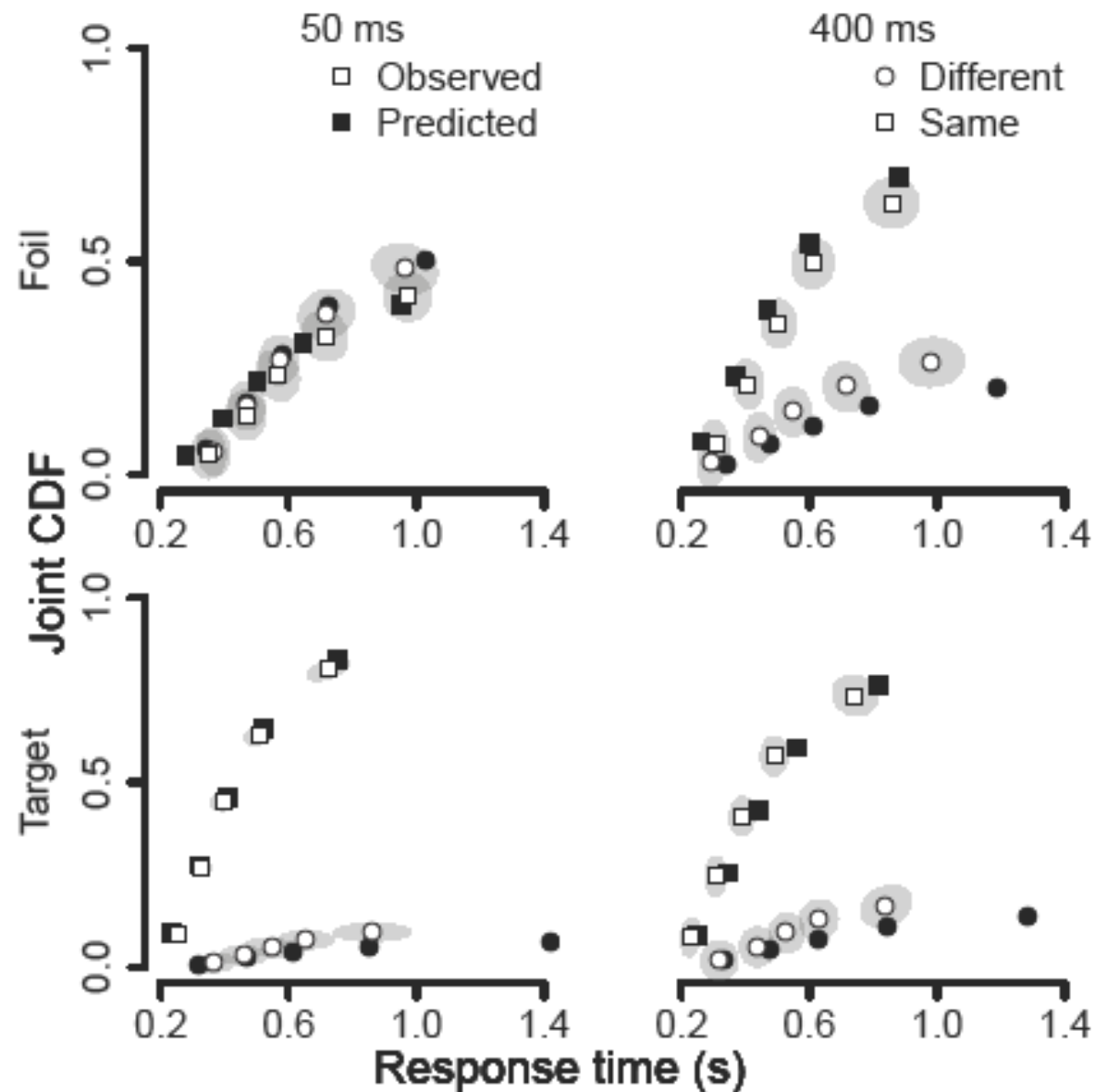


Right

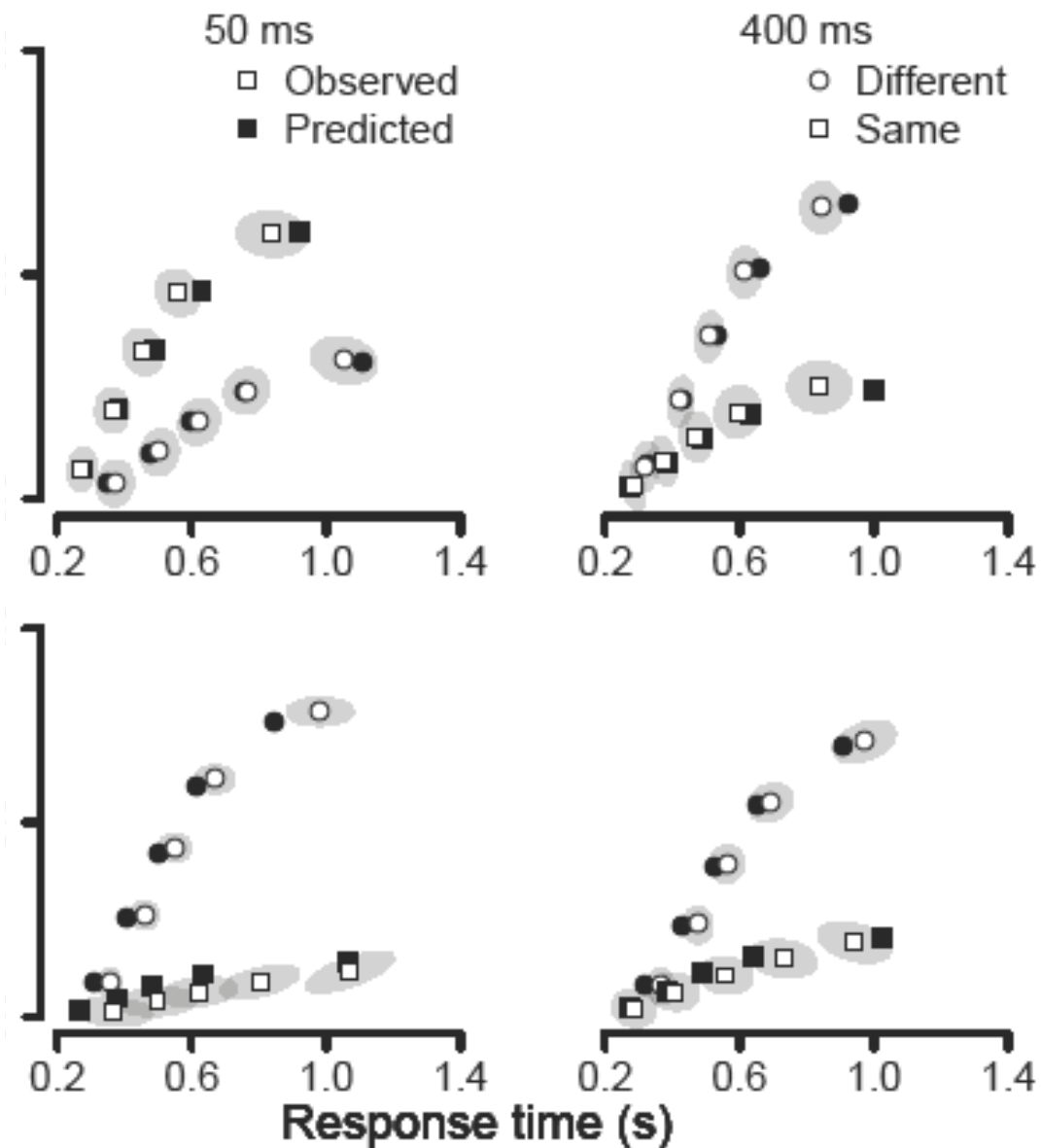


Modeling results

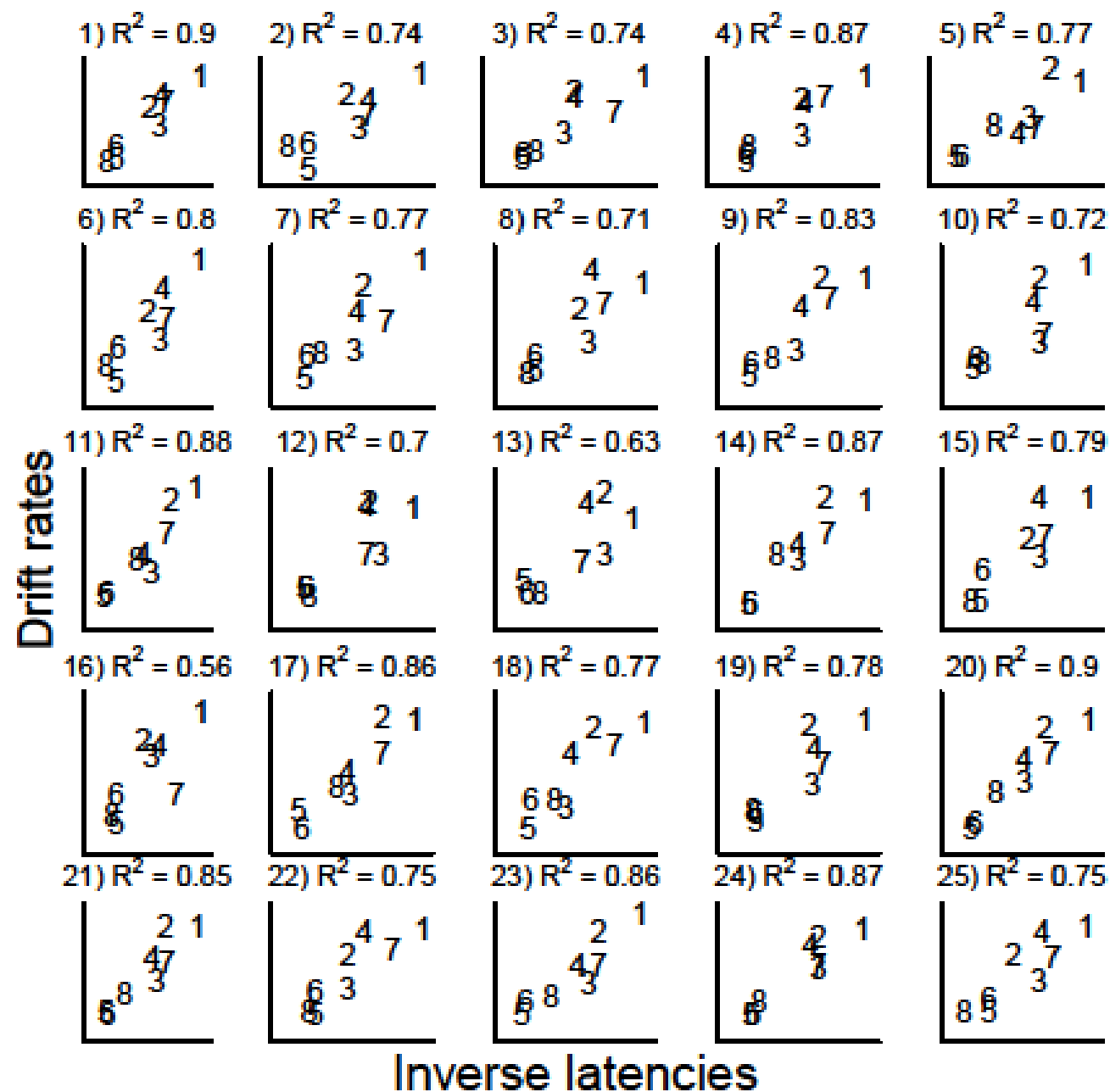
Same



Different



Modeling results



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Discussion

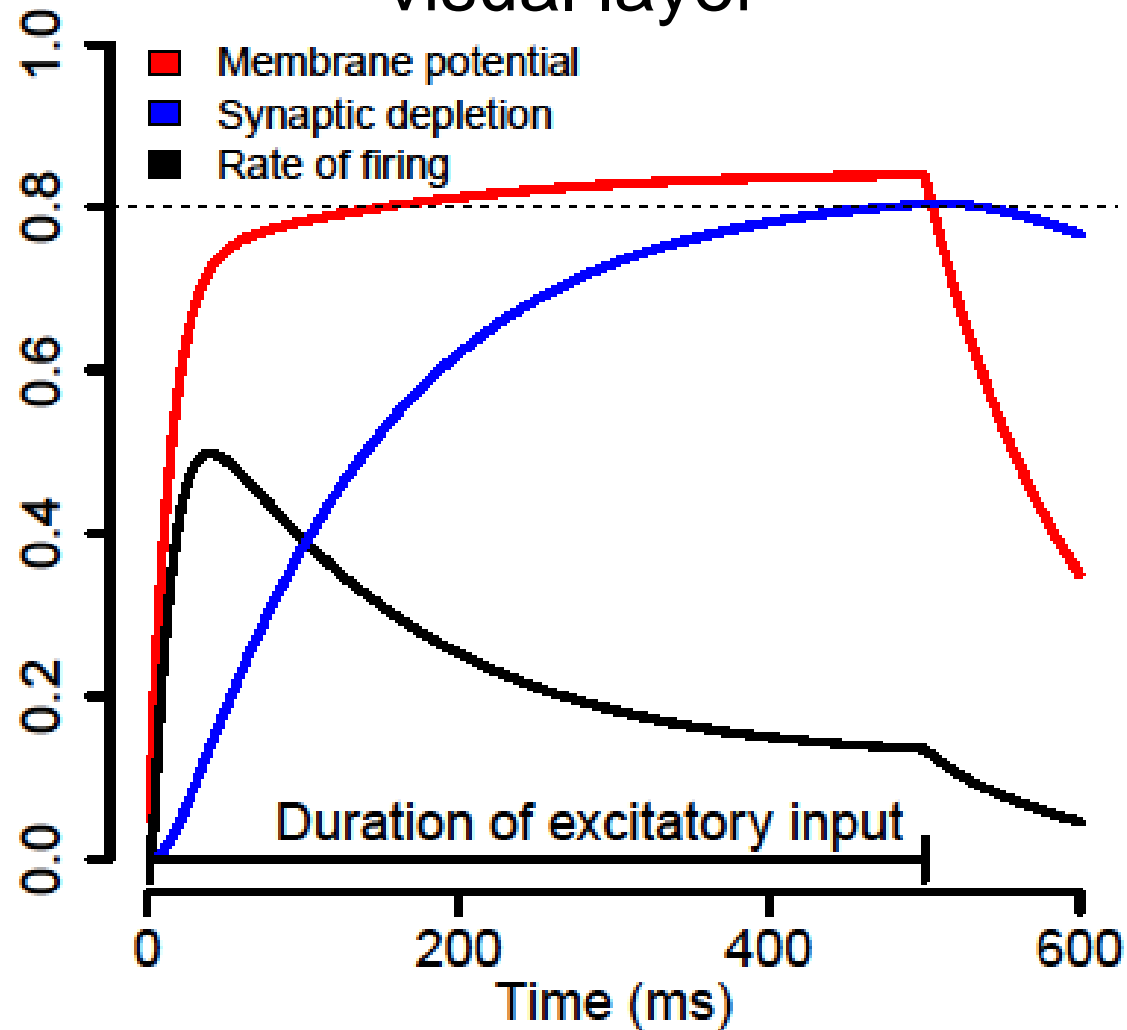
- Despite independent estimation, there was sizeable convergence between the diffusion race and nROUSE models.
- Supports the assumption that decision is based on perceptual identification latencies.
- Assumption of mirroring effect proved effective in linking performance between forced-choice and same-different tasks.

List of references

- Huber, D. E. (2008). Immediate priming and cognitive aftereffects. *Journal of Experimental Psychology: General*, 137 , 324 – 347.
- Huber, D. E., & O'Reilly, R. C. (2003). Persistence and accommodation in short-term priming and other perceptual paradigms: Temporal segregation through synaptic depression. *Cognitive Science*, 27 , 403 – 430.
- Logan, G. D., Van Zandt, T., Verbruggen, F., & Wagenmakers, E.-J. (2014). On the ability to inhibit thought and action: General and special theories of an act of control. *Psychological Review*, 121 (1), 66 – 95.

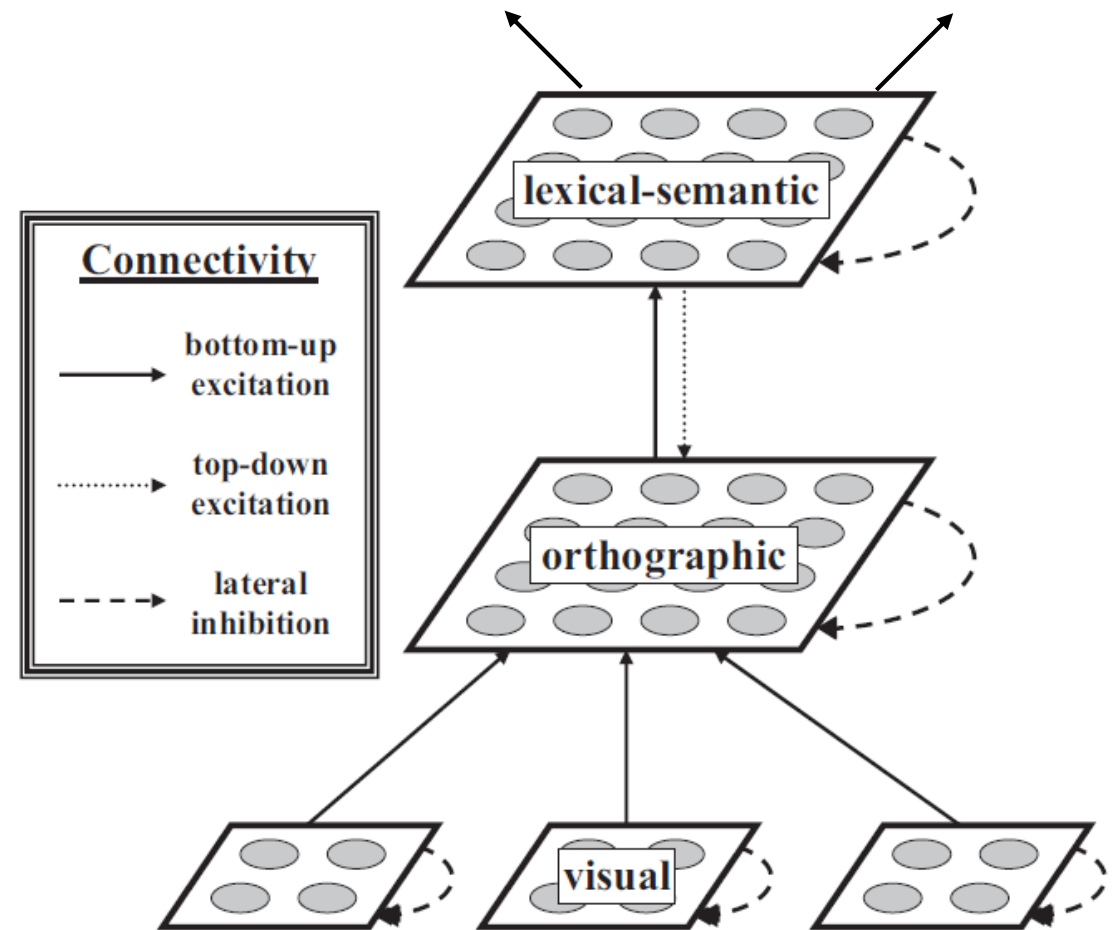
The nROUSE model

Simulated neuron in visual layer



Fastest determines observed choice

Identification latency (Target) Identification latency (Foil)



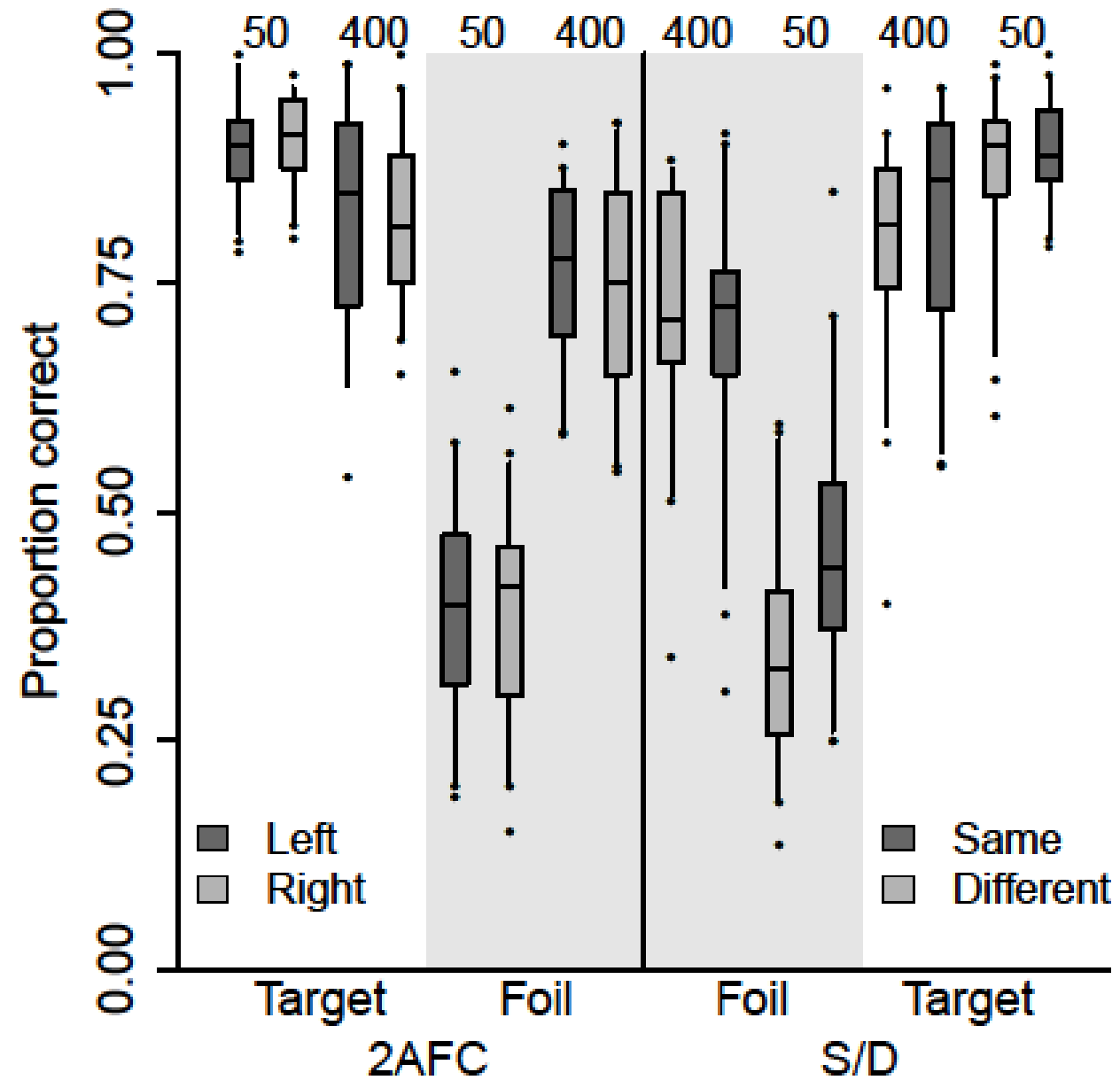
Diffusion race model

Correct choice	Prime	Duration (ms)	Left racer			Right racer		
Left	Target	50	τ_1	K_1	ξ_1	τ_1	K_1	ξ_5
		400			ξ_2			ξ_6
	Foil	50			ξ_3			ξ_7
		400			ξ_4			ξ_8
Right	Target	50			ξ_5			ξ_1
		400			ξ_6			ξ_2
	Foil	50			ξ_7			ξ_3
		400			ξ_8			ξ_4

Diffusion race model

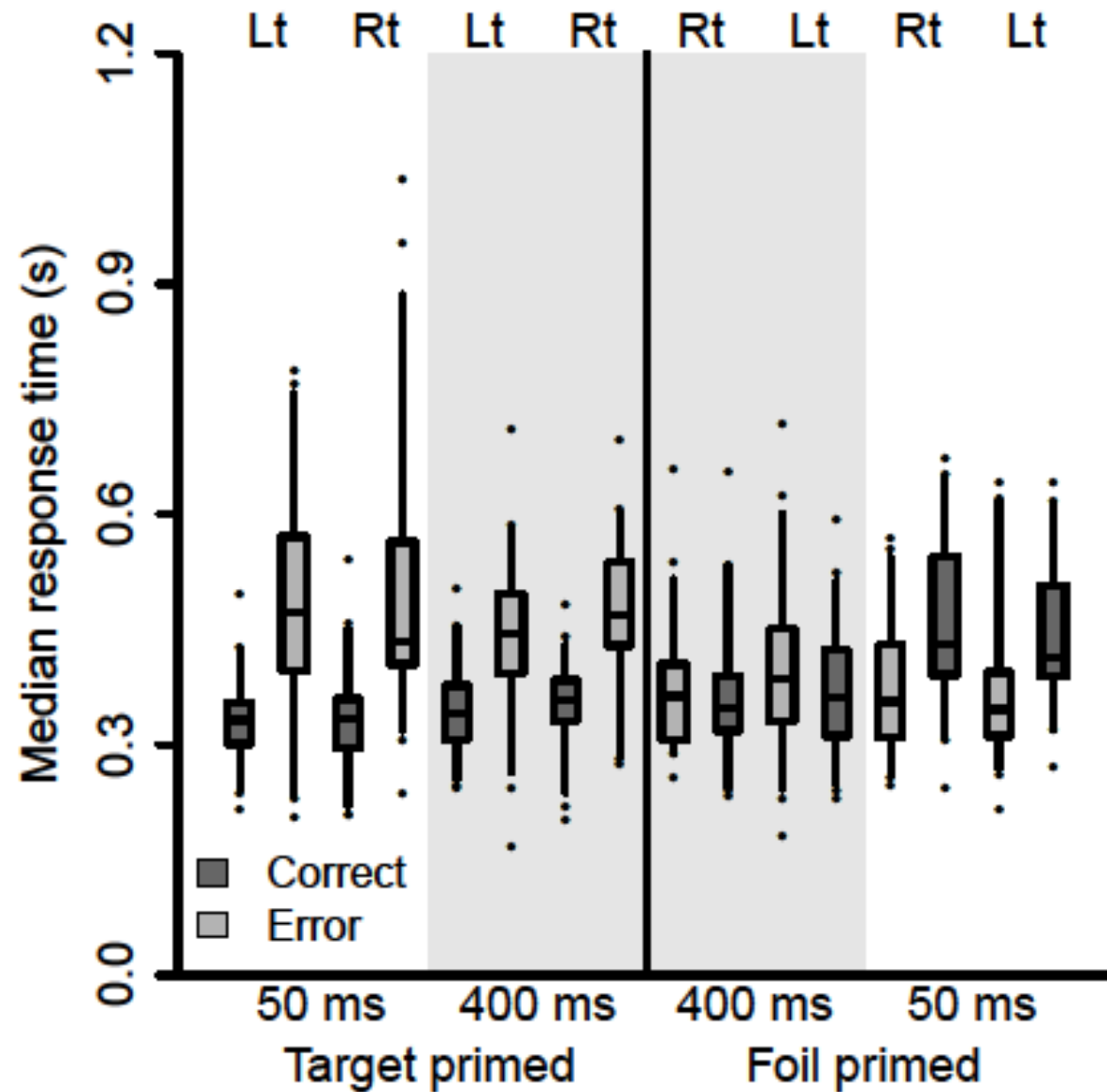
Correct choice	Prime	Duration (ms)	Same racer			Different racer		
Same	Target	50	τ_2	κ_2	$\xi_1 - \theta_M$	τ_2	κ_3	$2\xi_B - \xi_1$
		400			$\xi_2 - \theta_M$			$2\xi_B - \xi_2$
	Foil	50			$\xi_3 - \theta_M$			$2\xi_B - \xi_3$
		400			$\xi_4 - \theta_M$			$2\xi_B - \xi_4$
Different	Target	50			$\xi_5 - \theta_M$			$2\xi_B - \xi_5$
		400			$\xi_6 - \theta_M$			$2\xi_B - \xi_6$
	Foil	50			$\xi_7 - \theta_M$			$2\xi_B - \xi_7$
		400			$\xi_8 - \theta_M$			$2\xi_B - \xi_8$

Descriptive statistics

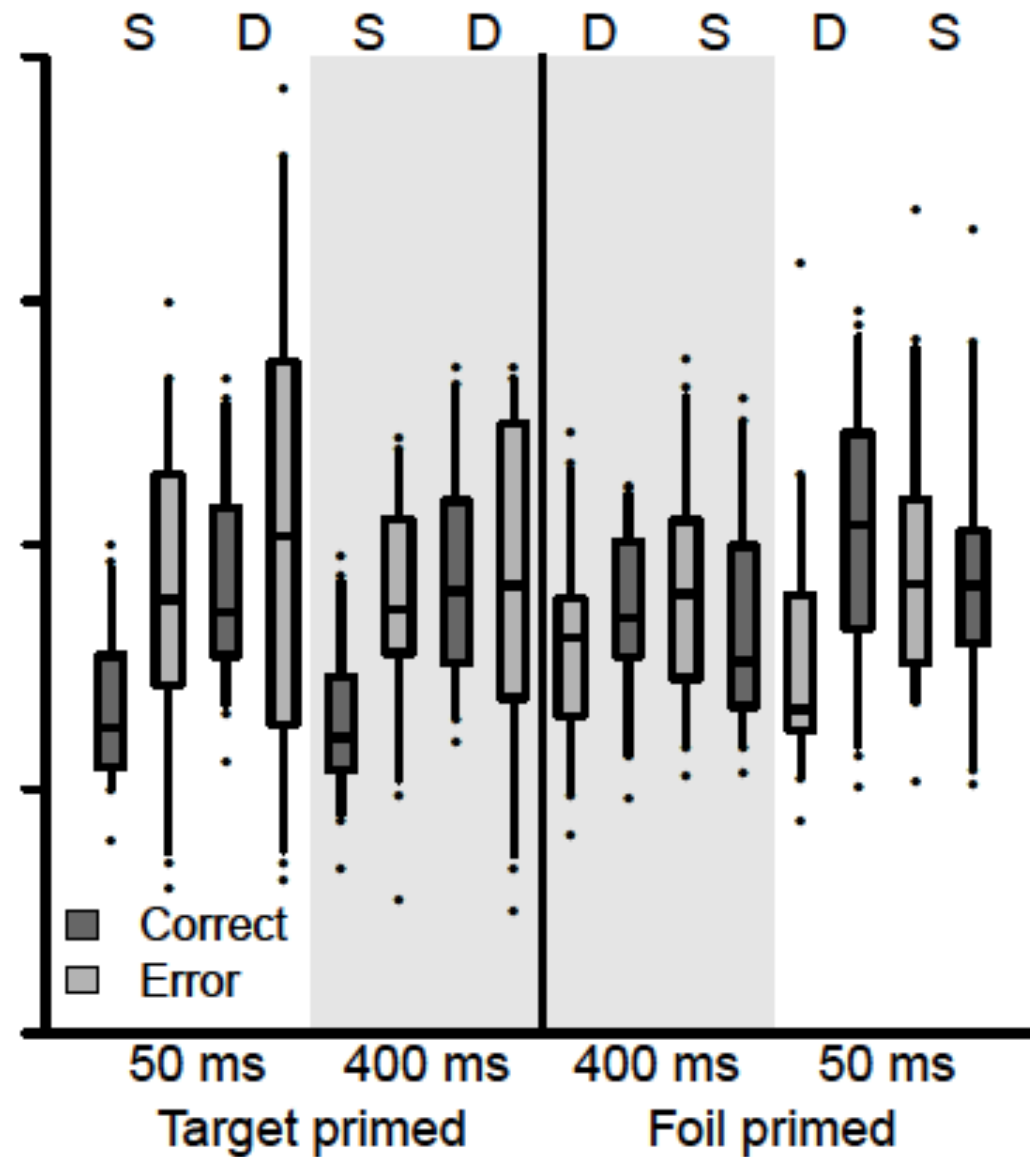


Descriptive statistics

2AFC



S/D



Acknowledgements



David Huber



Chris Donkin