

# Testing a model of perceptual fluency/disfluency

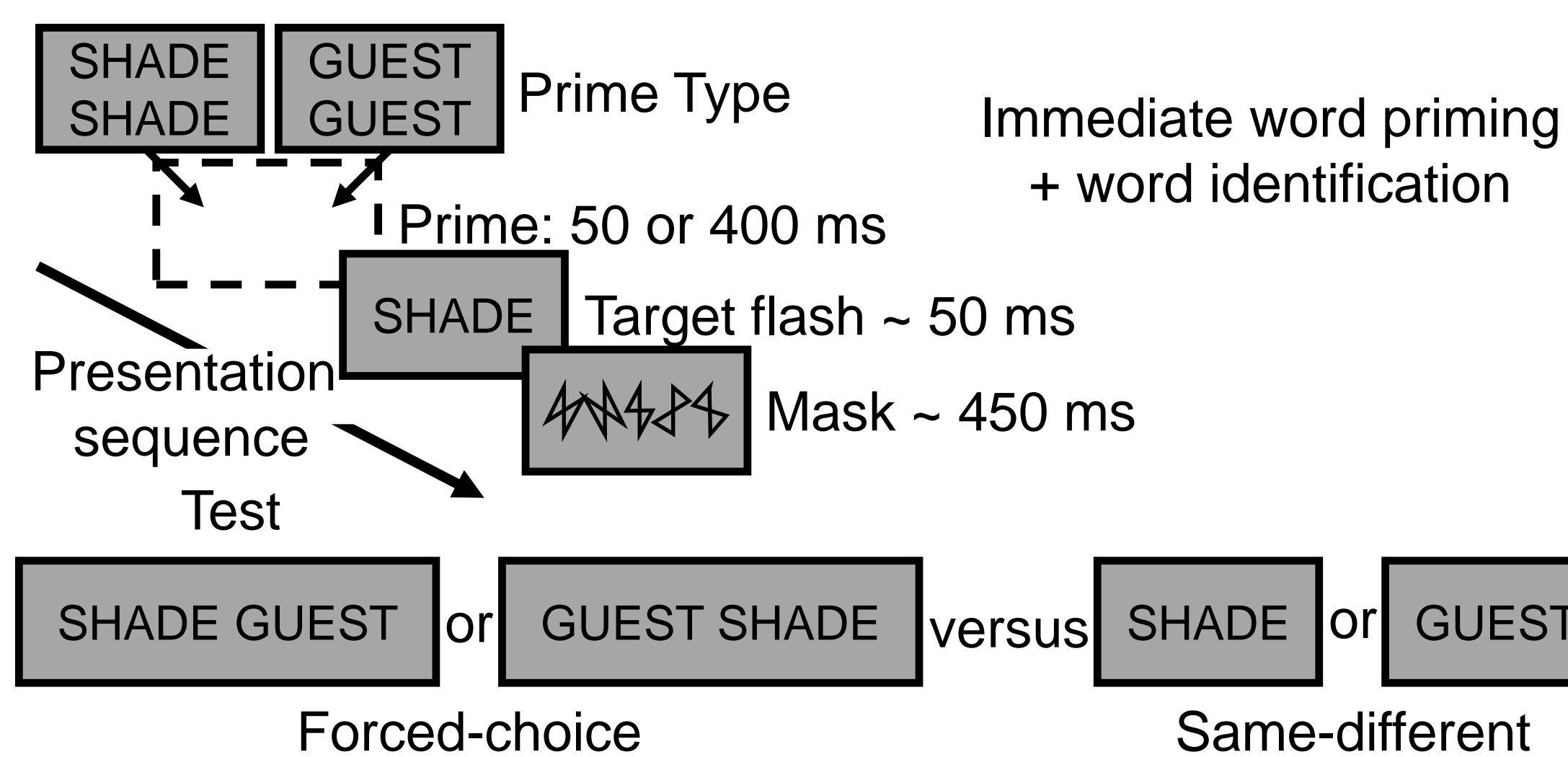
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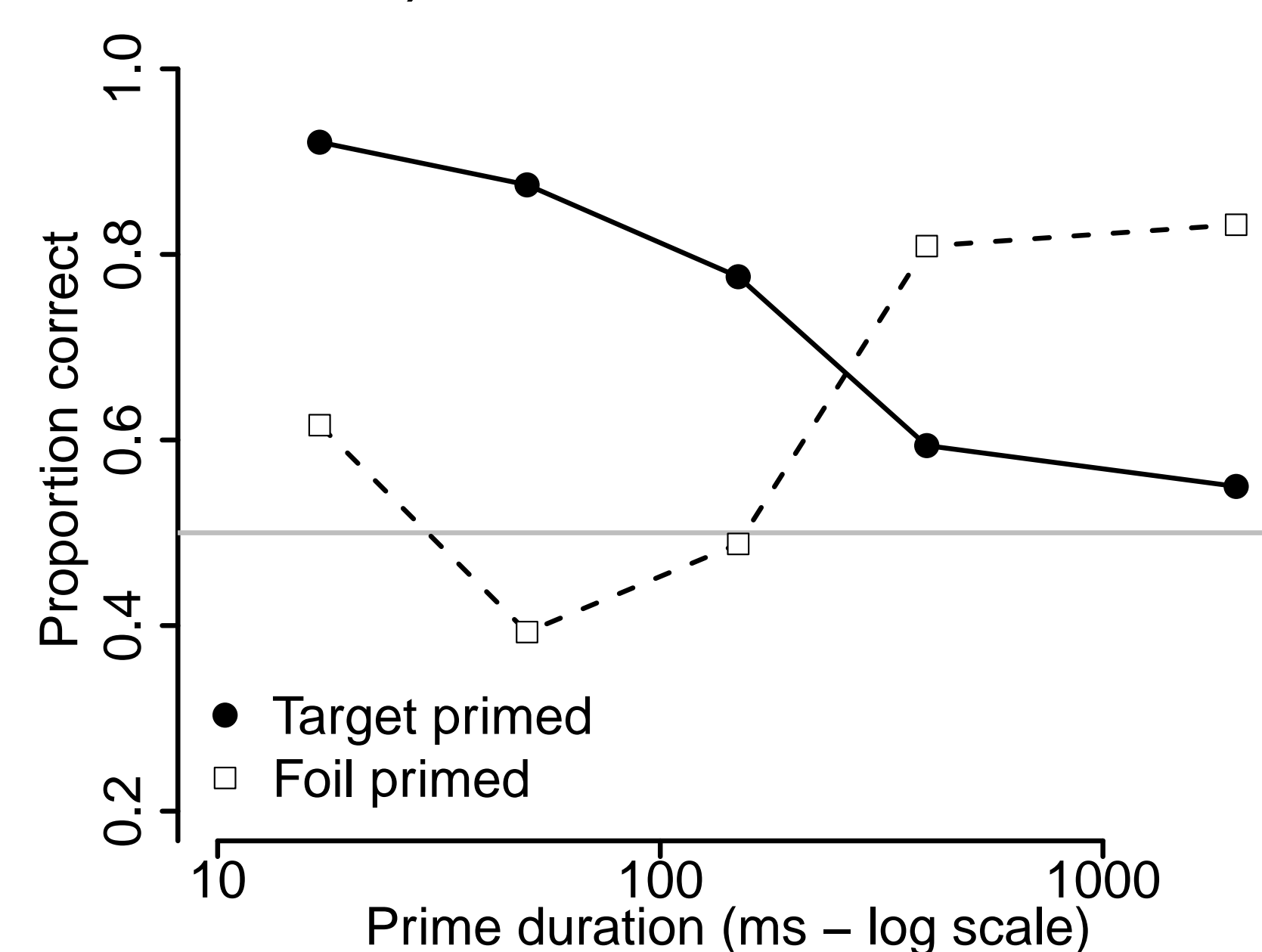
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## Introduction

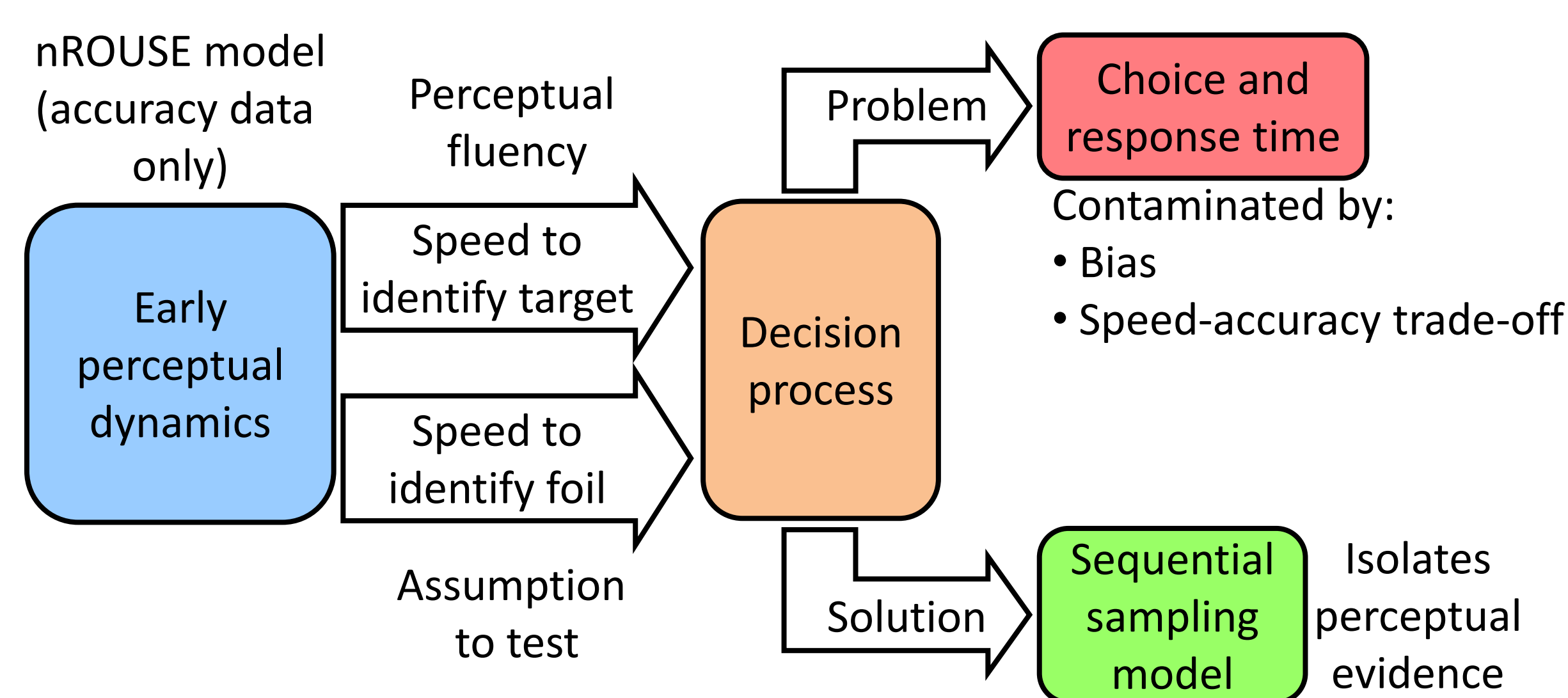
The experimental paradigm:



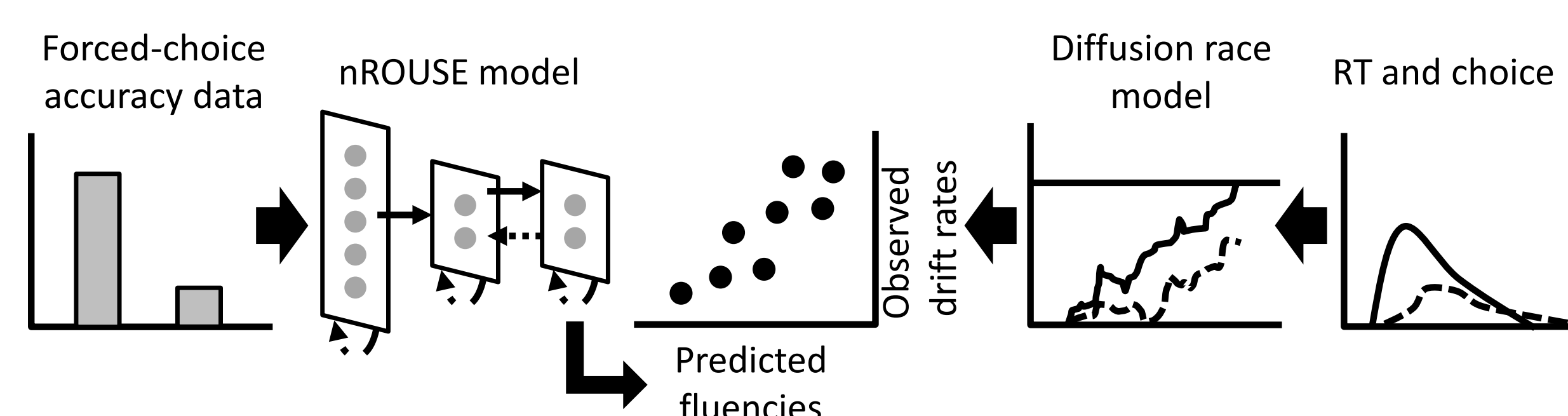
Previous data indicates that there is a cross-over interaction between prime type and duration on performance (Huber, 2008):



The nROUSE model (Huber & O'Reilly, 2003) successfully accounts for this interaction by simulating early perceptual dynamics in the visual system.



We tested the model assumptions in the following manner:



If the decision rule is based on perceptual fluency, then identification latencies from the nROUSE model should predict (rates of perceptual evidence accumulation) extracted from a sequential sampling model.

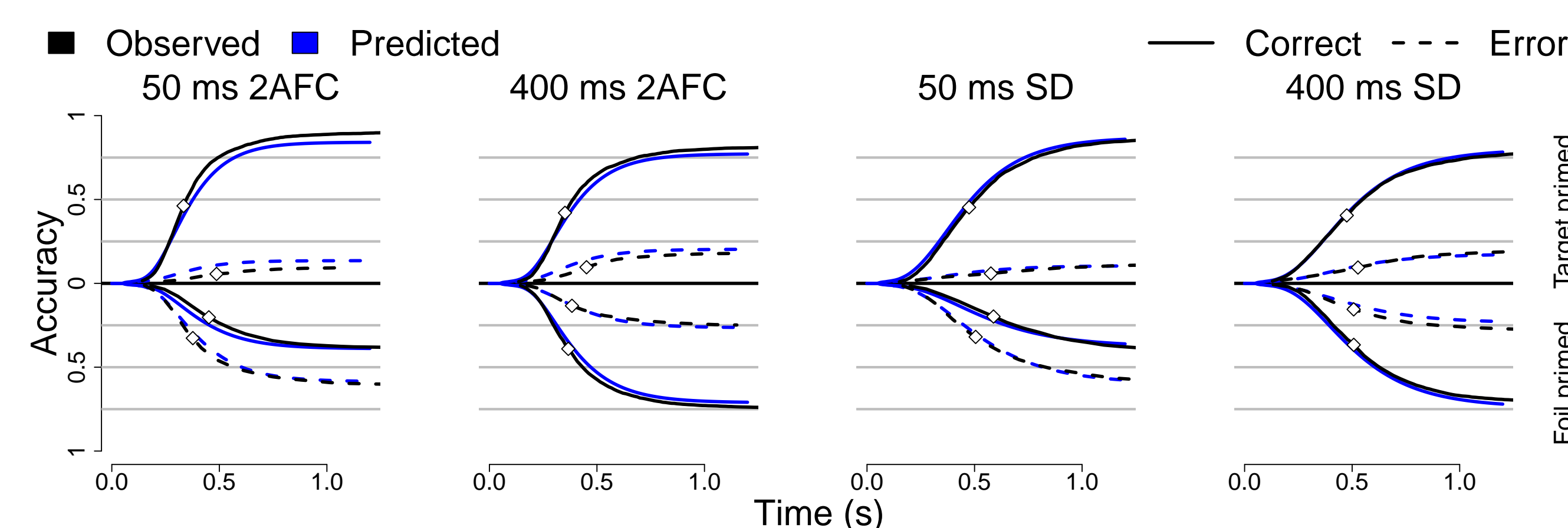
## Method

As shown in the 1<sup>st</sup> figure, subjects completed both forced-choice and same-different variants of a word identification task with immediate word priming.

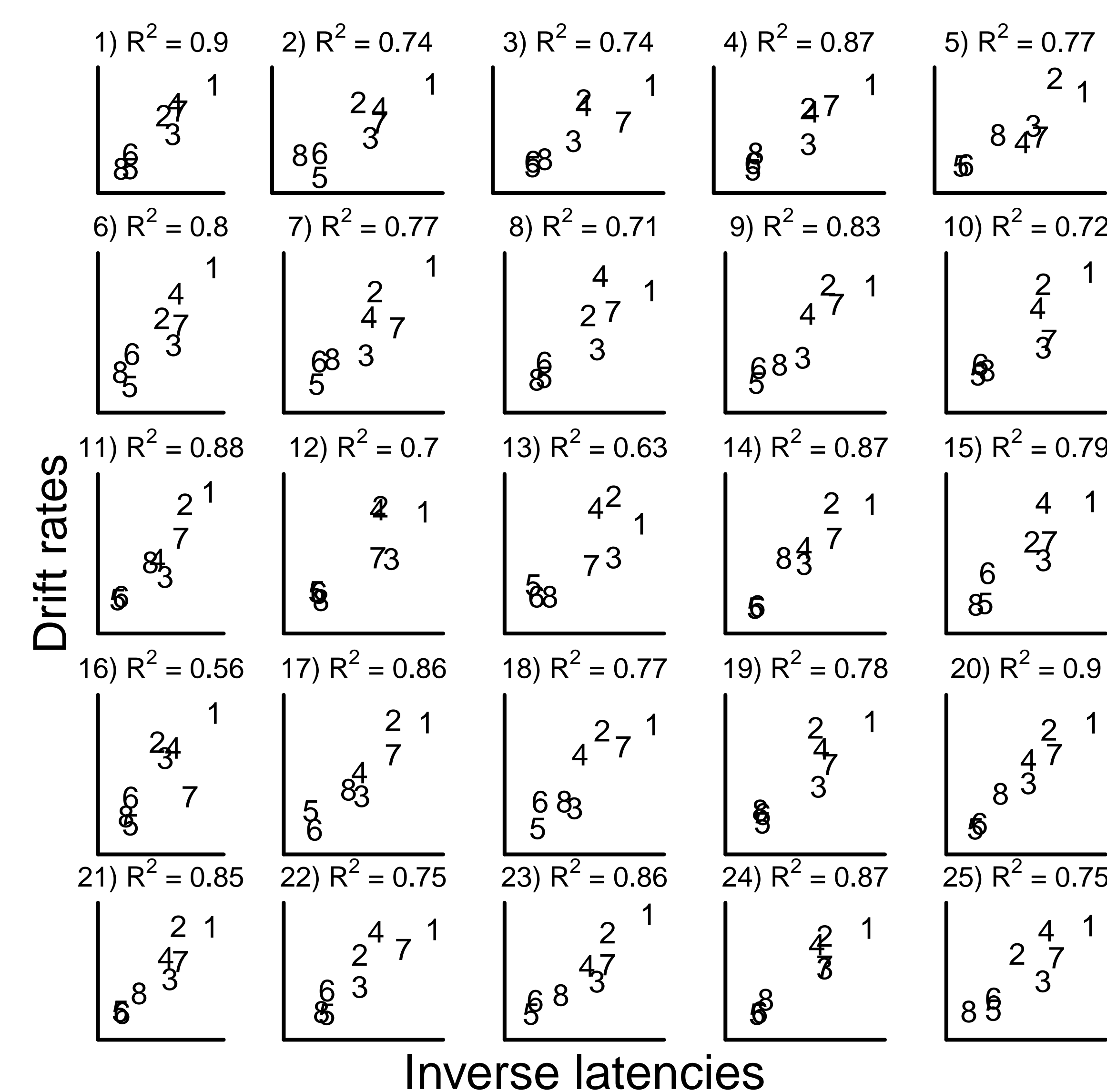
- o There was usable data from 25 subjects (from a sample of 42).
- o There were 80 trials per each of the 16 conditions.

## Modeling results

The diffusion race model captured the observed effects:



There were strong correlations between the inverse of the predicted identification latencies and the drift rates:

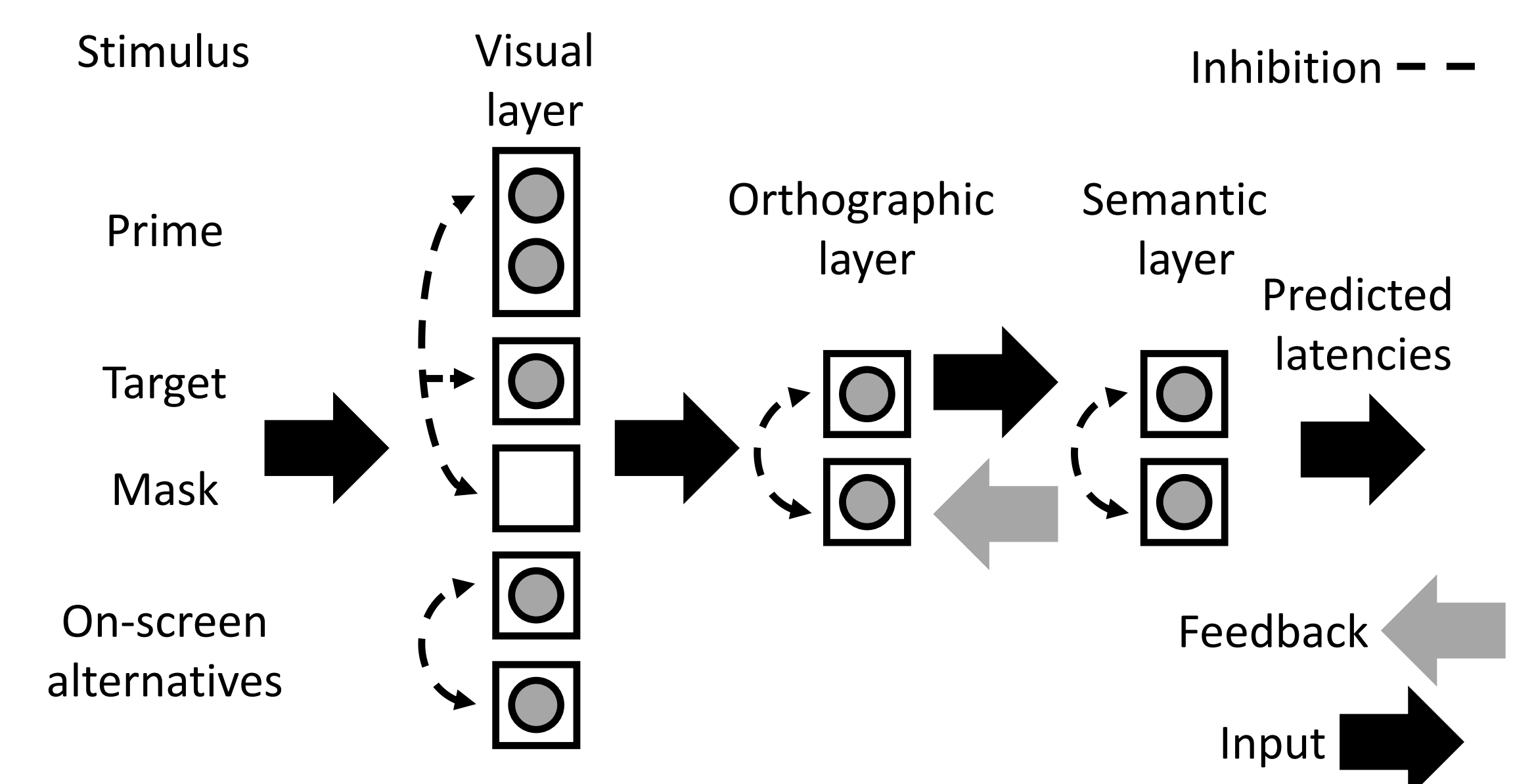


## Discussion

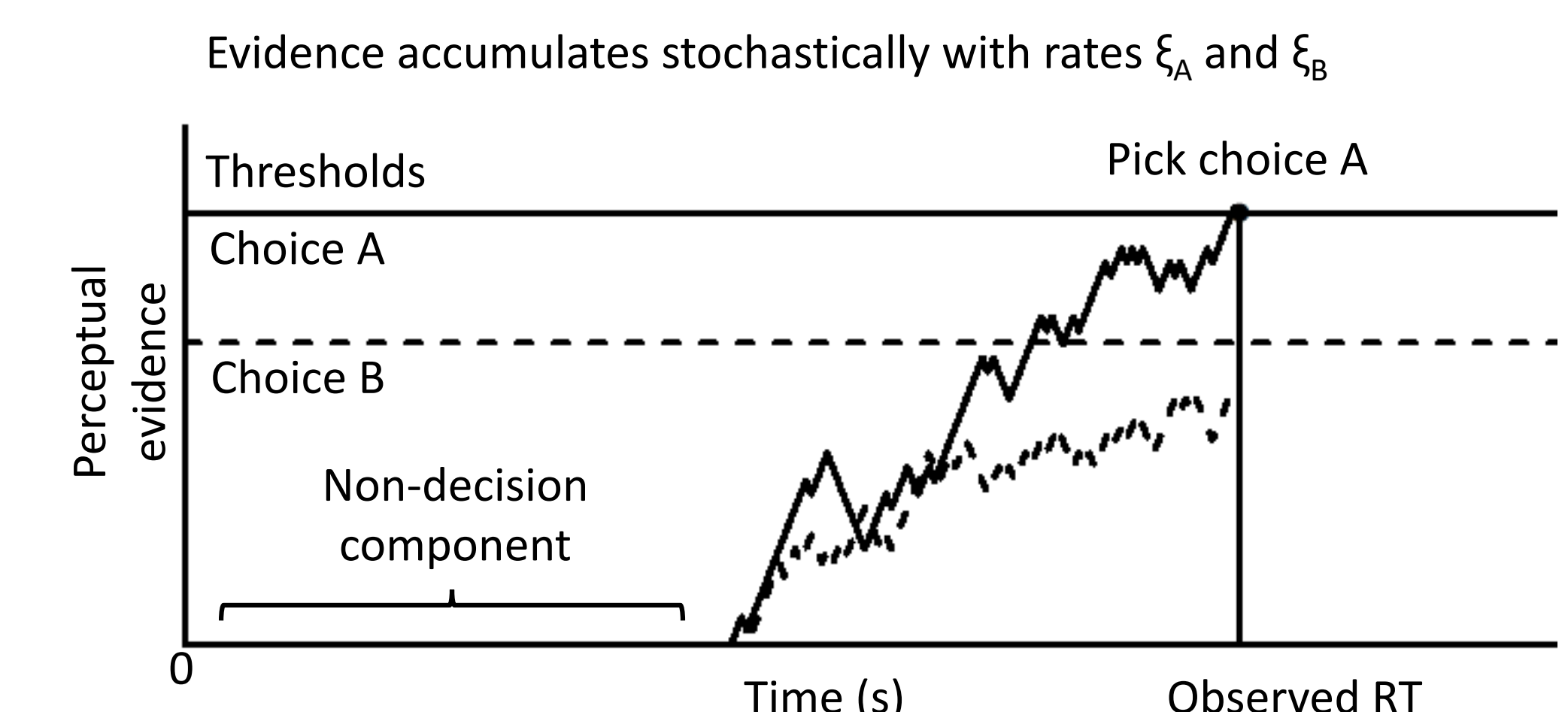
- 1) Despite independent estimation, there was sizeable convergence between the diffusion race and nROUSE models.
- 2) Supports the assumption that decision is based on perceptual identification latencies.

## The models

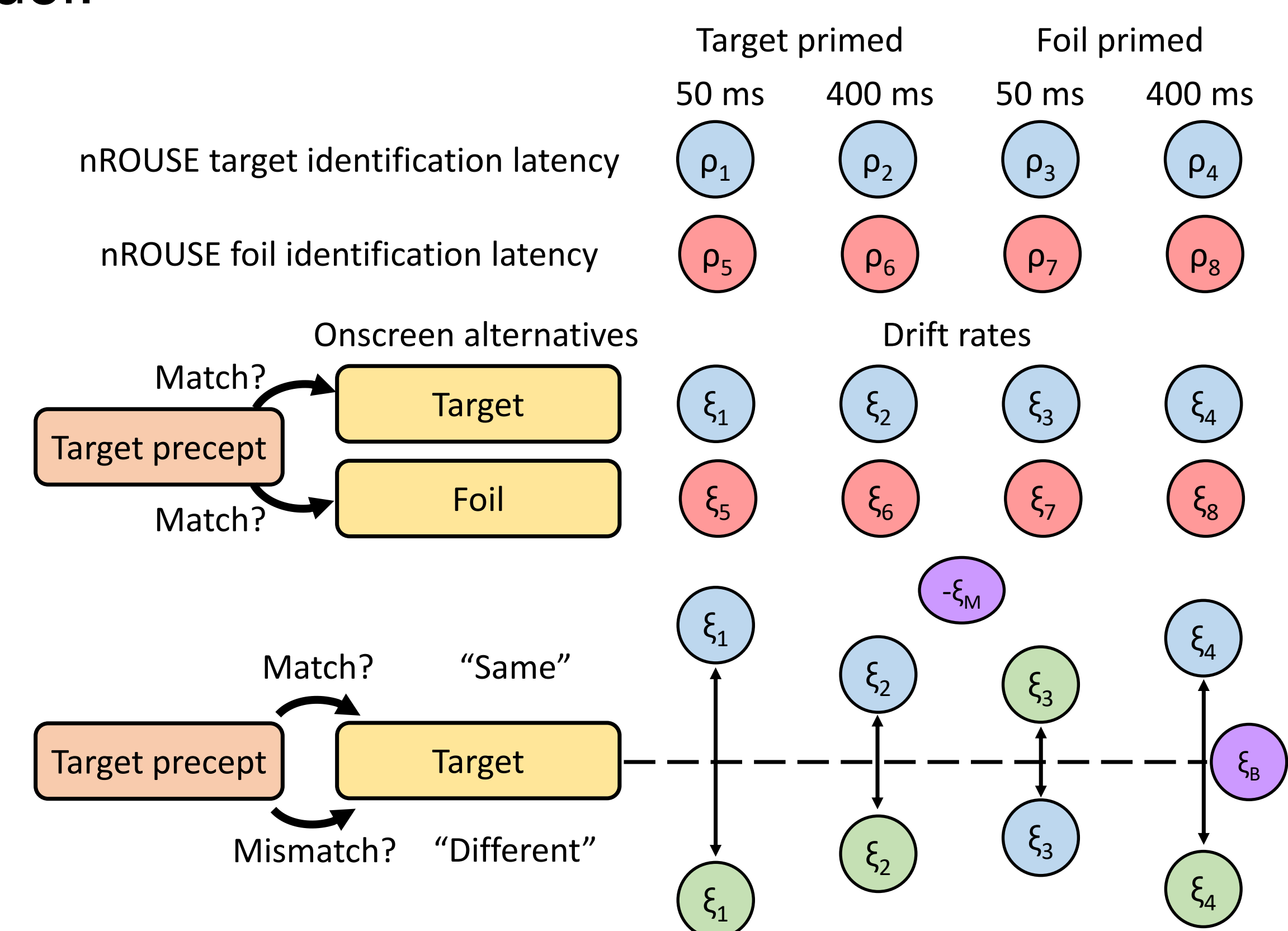
The nROUSE model is a 3-layer neural network for perceptual features:



The diffusion race model (Logan et al., 2014) is a sequential sampling model where 2 one-boundary Wiener processes race each other towards separate thresholds:



We constrained the diffusion race model in the following manner to match the structure of the nROUSE model:



## Acknowledgments

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## 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.