



Glutamatergic Neurotransmission in the Dorsolateral Striatum Regulates Clock Speed for Reward-Related Timing

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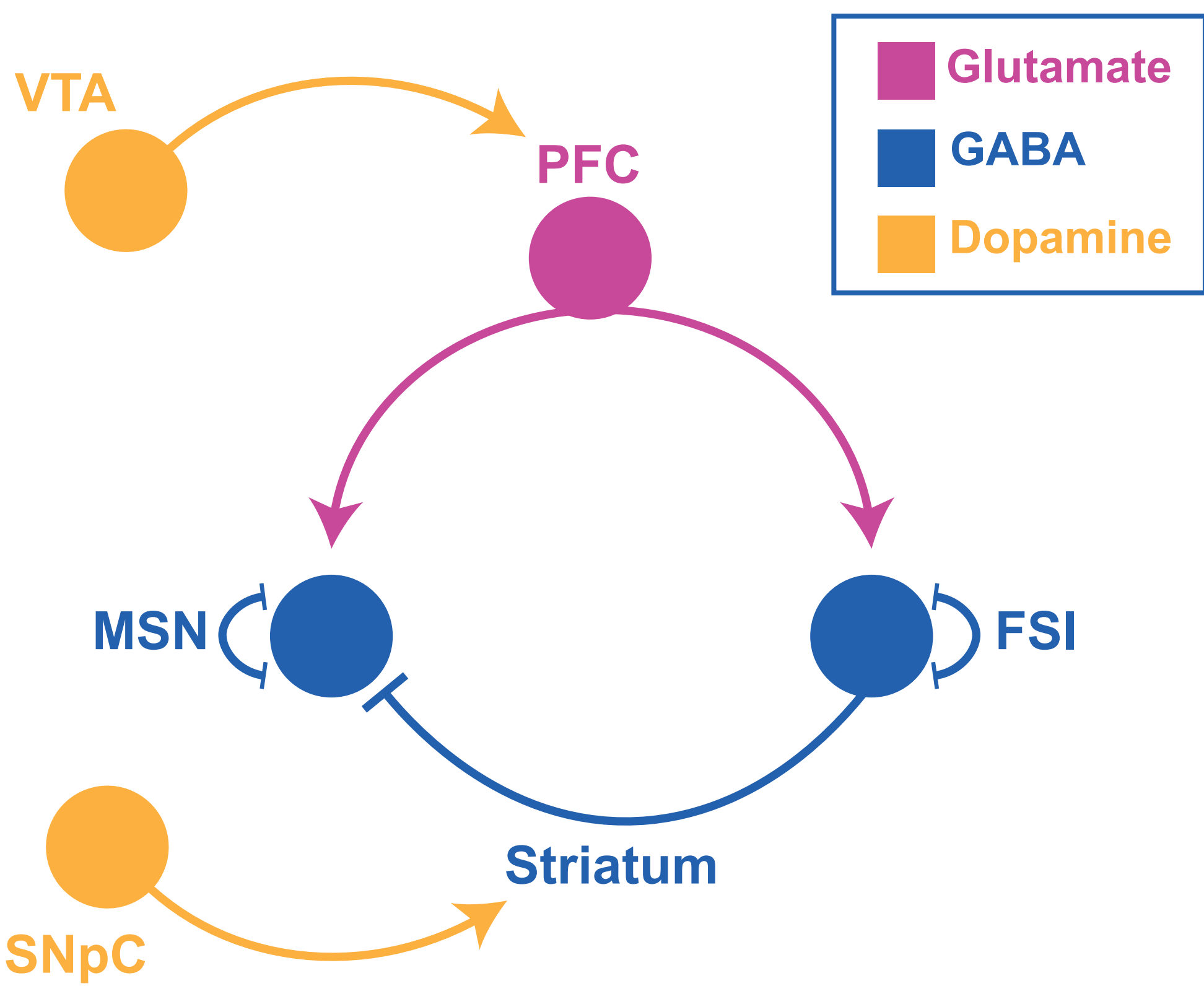
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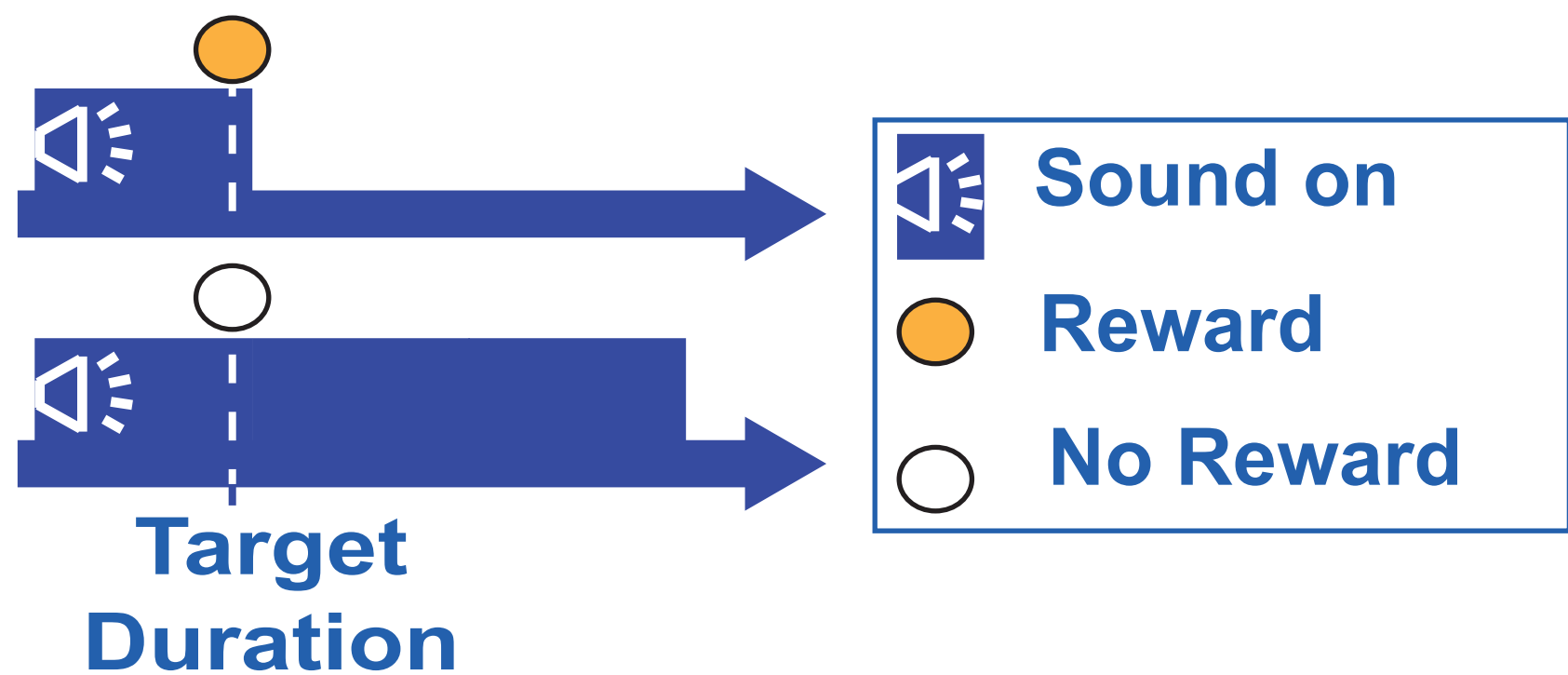
1 Introduction

- Reward-related timing involves learning the temporal contingencies between stimuli and rewards.
- Medium spiny neurons (MSNs) in the dorsal striatum play a major role in encoding temporal information.
- MSNs receive glutamatergic and dopaminergic input from prefrontal cortex (PFC) and substantia nigra pars compacta (SNpC), respectively.
- Here, we investigated the role of glutamatergic neurotransmission in timing accuracy by modulating clock speed. Glutamate agonists decrease and antagonists increase clock speed.

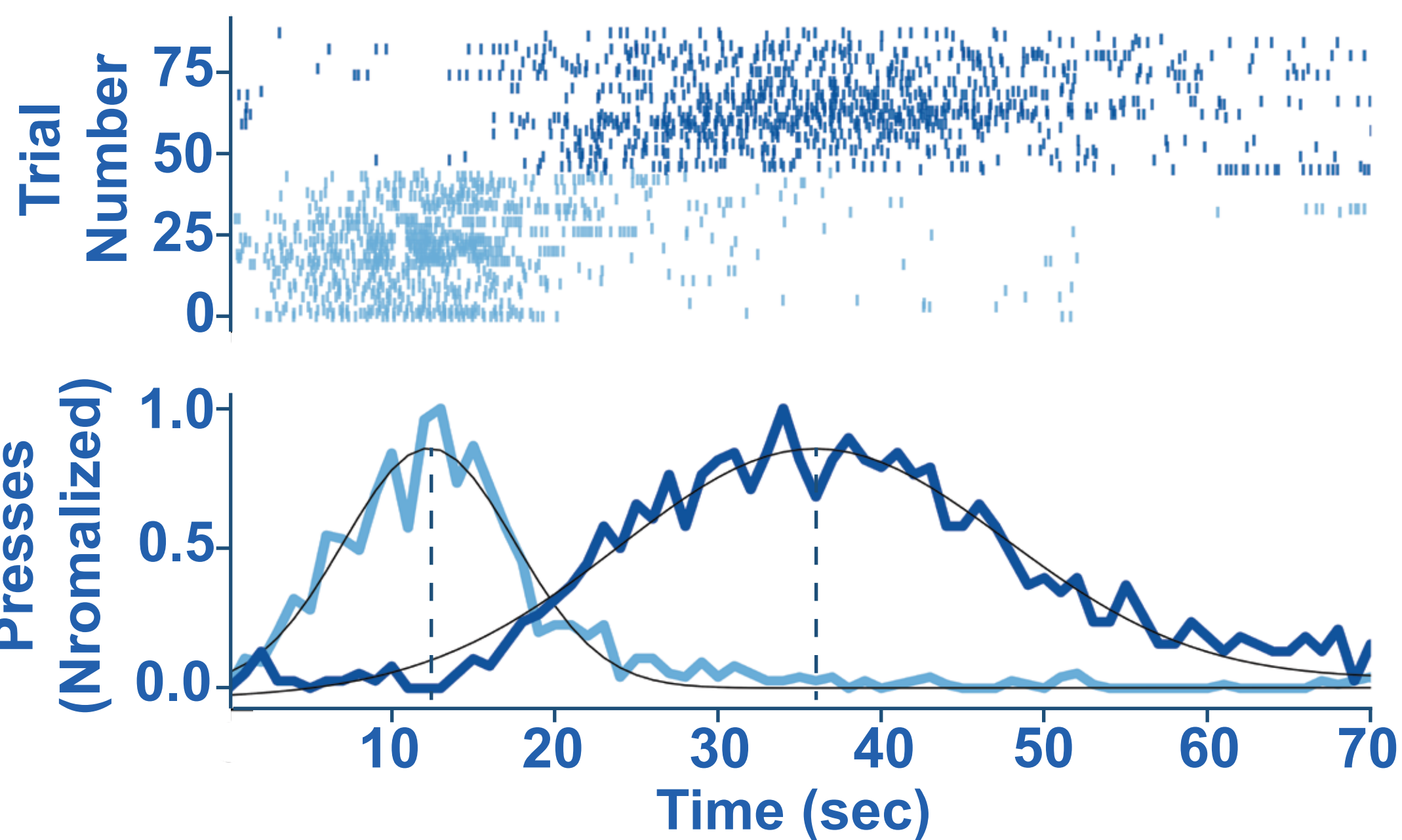
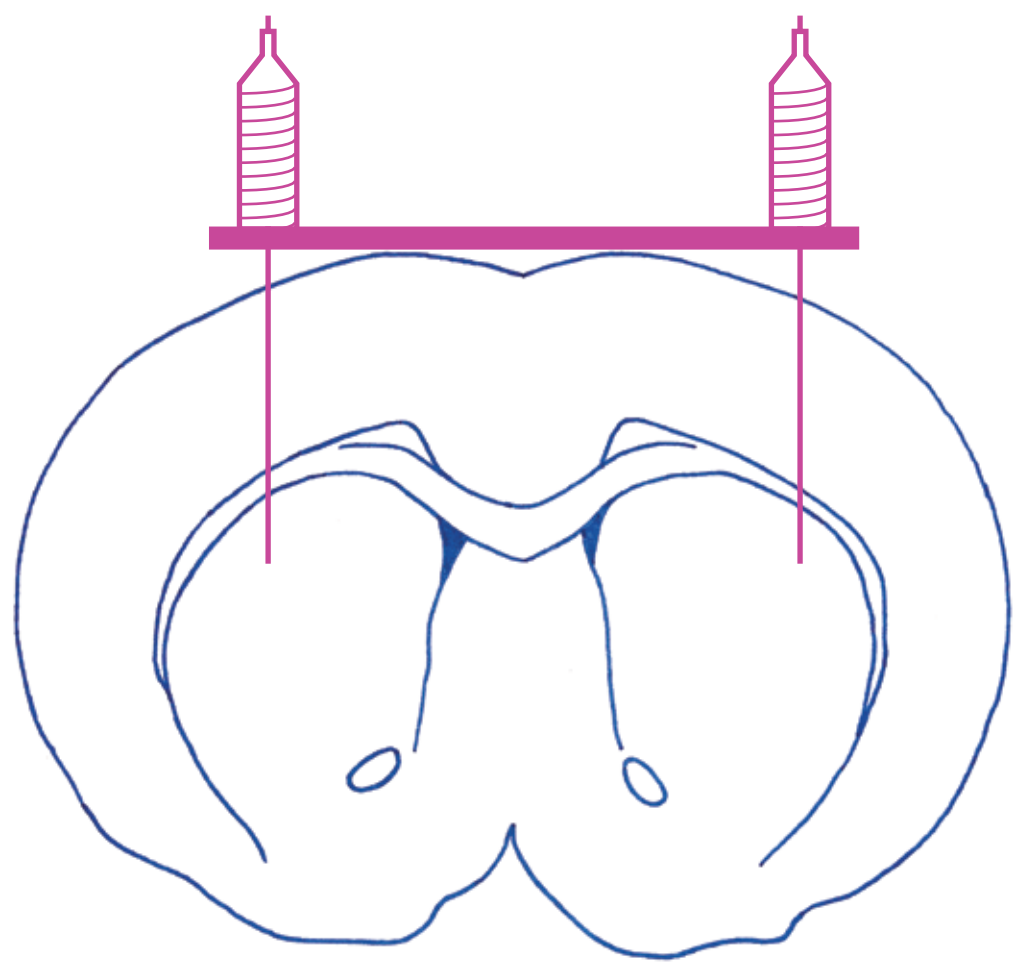


2 Methods

- Bi-Peak procedure (12 and 36 sec)

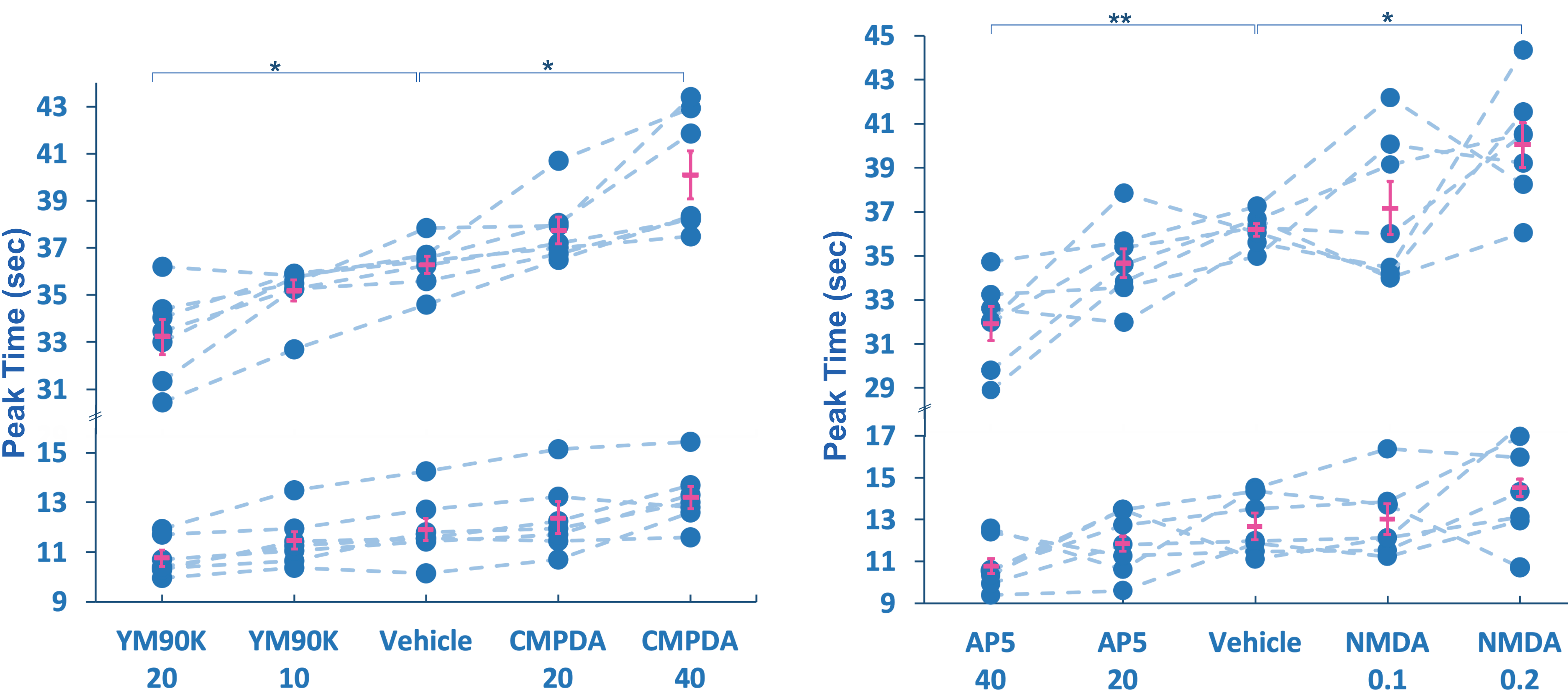
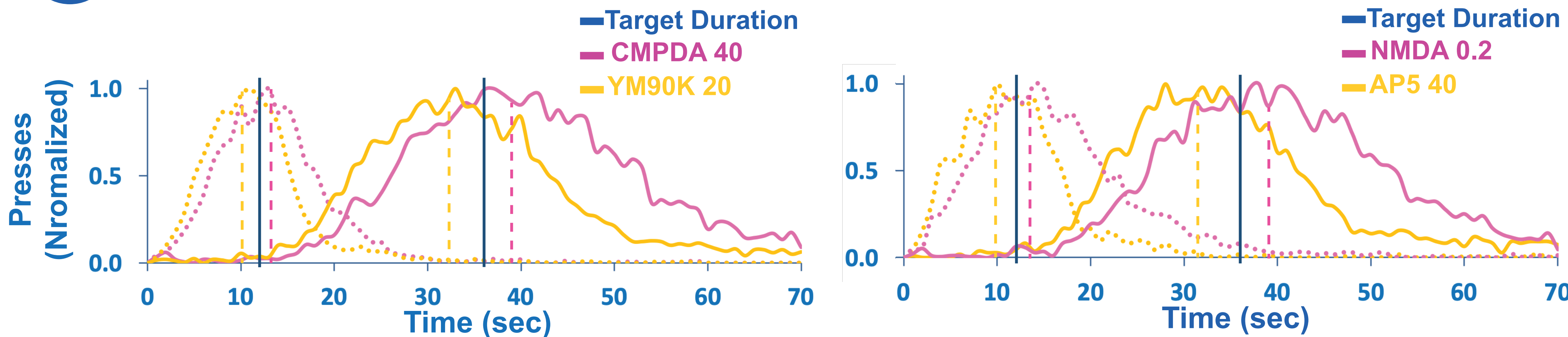


- Cannulation and infusions (Dorsolateral striatum)



Receptor	Drug	Effect	Dose
AMPA	CMPDA	Positive modulator	20 mM
	YM90K	Antagonist	40 mM
NMDA	NMDA	Agonist	0.1 mM
	AP5	Antagonist	20 mM

3 Results



4 Conclusion

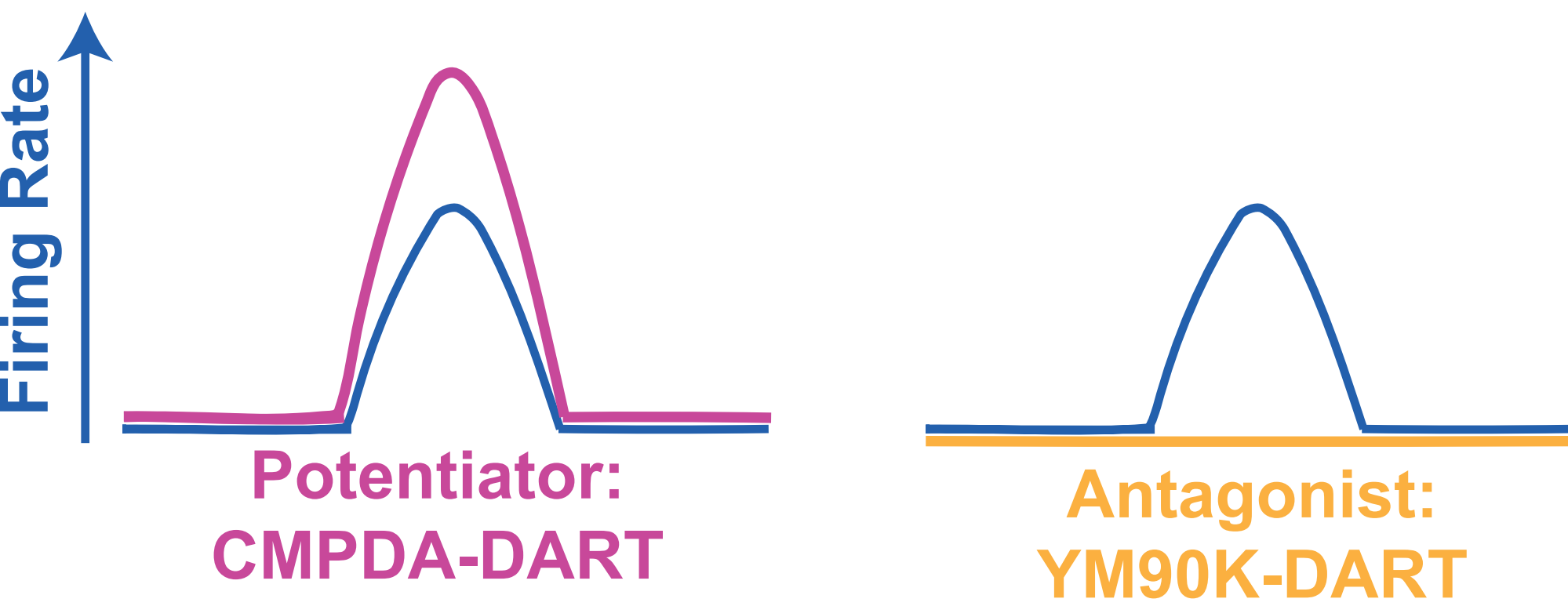
- AMPA and NMDA receptor activation and deactivation causes proportional under-estimation and over-estimation of target durations, respectively.
- Glutamatergic neurotransmission in the dorsolateral striatum regulates clock speed.

5 Future Directions

- Drugs Accutely Restricted by Tethering (DART) provides concurrent cell-type and receptor-type specificity.



- This manipulation scales with the natural timing of the cell response.



6 References

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Merchant, H., Harrington, D., and Meck, W. H. (2013). Annual Review of Neuroscience, 36(1), 313-336.
Shields, B. C., et al. (2017). Science, 356, eaaj2161.