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Striatal dopamine and the temporal control of behavior

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Declarations of Interest:

None

Highlights

1. Striatal dopamine modulates how behavior is guided by the passage of time
2. Dopamine tunes striatal output via D1 and D2 type dopamine receptors
3. We show that striatal D1 vs. D2 receptor blockade differentially impacts timing behavior
4. Effects were larger in the dorsomedial striatum, relative to the dorsolateral striatum

Abstract

Striatal dopamine strongly regulates how individuals use time to guide behavior. Dopamine acts on D1- and D2- dopamine receptors in the striatum. However, the relative role of these receptors in the temporal control of behavior is unclear. To assess this, we trained rats on a task in which they decided to start and stop a series of responses based on the passage of time and evaluated how blocking D1 or D2-dopamine receptors in the dorsomedial or dorsolateral striatum impacted performance. D2 blockade delayed the decision to start and stop responding in both regions, and this effect was larger in the dorsomedial striatum. By contrast, dorsomedial D1 blockade delayed stop times, without significantly delaying start times, whereas dorsolateral D1 blockade produced no detectable effects. These findings suggest that striatal dopamine may tune decision thresholds during timing tasks. Furthermore, our data indicate that the dorsomedial striatum

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