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We thank the authors for choosing our recent manuscript (Wanat et al., 2010) for critical review. They provide an excellent summary of the findings from our study and we would like to extend the discussion by commenting on a couple of statements made in the review.

The authors note that cue-evoked dopamine release was unaffected by escalating response costs in our study, but can be sensitive to cost comparisons in other paradigms (Day et al., 2010). They suggest that this discrepancy is due to the experimental difference of a single cue denoting reward availability with changing costs (Wanat et al., 2010) versus distinct cues signaling different costs associated with earning rewards (Day et al., 2010). We should note that an earlier study (Gan et al., 2010) that used a similar paradigm to Day et al. (2010) found that cue-evoked dopamine release can be sensitive to response costs under specific conditions such as when costs are atypically low and novel, but during stable goal-directed behavior response costs were not encoded by dopamine. Thus, the presence of an additional lever is not sufficient to account for apparent discrepancies between our work and Day et al. (2010), but more rigorous studies delineating specific feature of the paradigm will likely be necessary resolve these differences.

Additionally, the authors of the review suggest that phasic dopamine release is likely not involved with motivated behavior, as mice with genetically impaired dopamine neuron burst firing did not differ from control mice in a PR lever-pressing task (Zweifel et al., 2009). We agree that this study may challenge existing theories on the role of phasic dopamine in motivation; however, we also note that subsequent work found that phasic dopamine release is attenuated but still evident in these genetically altered mice (Parker et al., 2010), tempering definitive conclusions on the topic. Therefore, we feel that based on the available evidence, it may be premature to dismiss a role for phasic dopamine release in motivated behavior and agree with the review authors that further experiments using genetically targeted approaches to elicit dopamine transmission will help to elucidate this controversy in the future.

References

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