Reply to Hupé et al.: The predictive correlation of pupil dilation and relative dominance durations in rivalry is not a statistical artifact

We are encouraged by Hupé et al.’s (1) independent replication of our findings (2) and the fact that our data per se stands uncontested. Hupé et al. argue against our interpretation of these results, based on removal of short dominance durations from the analysis. Although it is no surprise that selective removal of data points can reduce the significance of any correlation, we appreciate the theoretic basis of their concern: Because pupil dilation persists for 1–2 s, short preswitch dominance durations may be disproportionately affected by the pupil dilation accompanying the previous switch event (figure 1F in ref. 2). This was indeed the primary motivation for our “replay” condition, with unambiguous stimulus-driven switches matched exactly to the time course of reported rivalry switches. The absence of any statistically predictive relationship in replay (figure 2A in ref. 2), despite a striking similarity in response magnitude and duration (figure 2C in ref. 2), rules out that our predictive effect in rivalry was an artifact of the time course of the pupil response or of the inherent variability in rivalry switch intervals. Furthermore, we do find—at least for the plaid stimulus—some correlation between pupil diameter and the absolute post-switch dominance duration (supporting information in ref. 2), which cannot be confounded by the concerns raised in ref. 1. A related concern mentioned in ref. 1 is that our correlation could be caused by a systematic tendency for longer durations to follow shorter durations. This effect apparently is observed in Hupé et al.’s own data but is absent from ours: if anything, the opposite is the case—median dominance durations (<3 s as defined in ref. 1) tend to be shorter. Finally, we do not deny the involvement of the overt (motor) response in late phases of pupil dilation. We can, however, rule it out as the sole contributor to pupil dilation by performing the “counting” control and by the very correlation analysis that Hupé et al. are contesting.

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The authors declare no conflict of interest.

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