SI Text

Constituents of relative postswitch duration

Our measure of relative post switch duration has 3 constituents: absolute postswitch duration, absolute preswitch duration and the divisive normalization by the sum of both. To dissect their effects, we measure the correlation of each of these factors to pupil dilation separately. First, we notice that relative postswitch duration is - as one would expect from its definition - anti-correlated to absolute preswitch duration ($r = -0.35$; $P = 9.8 \cdot 10^{-33}$). When considering only the plaid stimulus, there is a trend to a correlation between absolute postswitch and pupil dilation: the *p*-value remains below 0.05 at all time points 900ms preceding the switch ($p_{min} = 0.004$ at $t = -513$ms) and does withstand a correction to FDR = 0.1 ($p_{thresh,FDR = 0.1} = 0.016$). In contrast, even without correction, pupil dilation shows no significant correlation to the preswitch duration ($P > 0.11$) or the normalization factor ($P > 0.14$) at any time-point preceding the switch. For the pooled data, normalization seems more relevant, but neither of the absolute durations nor the normalization factor reaches significance. Hence, pupil-dilation predicts absolute postswitch duration to some extent, and the prediction of relative duration cannot be explained on the basis of normalization alone. We furthermore note that global normalization schemes, such as normalizing to session averages, did not show a similar improvement in prediction (data not shown). Therefore a likely reason for the improvement of prediction through normalization to preswitch duration is an additional, slower source of within trial variability. In this view, pupil dilation primarily predicts changes in duration that happen on a local time-scale (from the preswitch period to the post switch period), while additional mechanisms may be responsible for large scale fluctuations and inter-observer variability of either measure or both.