

Supplementary Note:

Gamma-band synchronization in visual cortex predicts speed of change detection

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The correlation between reaction times and neuronal activity is consistent across the two monkeys and it is not explained by a general effect of time-in-trial.

In principle, there might be a general effect of time-in-trial on both behavioral reaction times and neuronal activity that results in a correlation between those variables. This would not affect our conclusions. The finding that enhanced gamma-band synchronization results in rapid reaction times is physiologically most plausibly interpreted as a mechanistic link, irrespective of the source of the trial-by-trial variability in gamma-band synchronization. Furthermore, our data suggest that the correlation between reaction times and neuronal activity is actually not explained by a general effect of time-in-trial. A general effect of time-in-trial should affect reaction times and neuronal activity similarly and in both monkeys. However, we found that reaction times showed weak but opposite trends in the two monkeys. While reaction times decreased slightly with time-in-trial in one monkey, they increased slightly in the second monkey (Supplementary Figure 1). We then analyzed the z-scores for the correlations between reaction times and gamma-band (40 - 72 Hz) power, gamma-band spike-field coherence and firing rate for the time period between the change event and 75 ms thereafter (Supplementary Figure 2). The Supplementary Table provides an overview of average correlations for all measures and both monkeys separately for the gamma-frequency band (40-72 Hz) and for the alpha/beta-frequency band (8-16 Hz). In both monkeys, the distribution of z-scores for the gamma-band is strongly biased towards negative values, both for gamma band power and spike-field coherence. Thus, while the two monkeys showed weak but opposite trends regarding the dependence of reaction times on time-in-trial, they both showed similar patterns of correlation between reaction times and spectral power and coherence.