

## Abstract View

### **LINEAR SUMMATION OF BOLD RESPONSES IN AWAKE BEHAVING MACAQUES.**

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Awake behaving monkey fMRI studies have used block-designs to overcome the low signal-to-noise ratio of the BOLD signal. However, in block design studies the neural activity related to disparate events within the blocks is averaged together. Rapid event-related functional MRI experimental designs, in contrast, permit the separation of the activity for each event, albeit with lower signal-to-noise and statistical power.

However, due to the sluggishness of the hemodynamic response, the responses to temporally adjacent events overlap. If overlapping responses sum linearly, then they can be dissociated using a general linear model (GLM). This is the case in humans, with the non-linearities in response properties becoming significant only at interstimulus intervals (ISIs) of 2 seconds or less (Huettel & McCarthy 2000, Boynton et al 1996, Miezen et al. 2000).

To determine whether BOLD responses sum linearly in awake behaving macaques, we compared the BOLD response to a single 500ms presentation of an 8Hz flickering checkerboard while the monkey was fixating to the response to a second flickering checkerboard presentations presented 1.5, 3, or 4.5 seconds later. A GE-EPI sequence was used to obtain whole brain coverage (TR=3s, 1.5mm isotropic voxels). The GLM was used to estimate the response to the first and second checkerboard presentations, and to a single checkerboard presentation. The resulting responses in V1 were similar in both the peak magnitude and the latency-to-peak, even at the shortest ISI of 1.5s, validating the use of rapid event-related designs in awake behaving macaques.

Furthermore, reliable timecourses for events can be extracted with as few as 140 stimulus presentations at 3T, making the use of an event-related design feasible in monkey fMRI studies.

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