Neuronal responses in area V4 of macaque are modulated by spatiotemporal predictions of moving attended items.

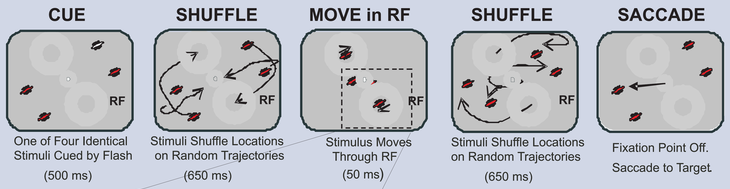
JJ7

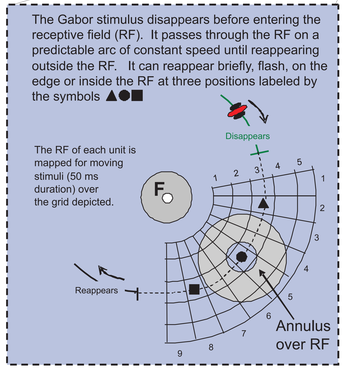
Jude F. Mitchell, John C. Curtis & John H. Reynolds

173

Object tracking task:

Monkeys tracked 1 of 4 identical items. Stimulus color and orientation were matched to the preferences of a V4 multi-unit site. During tracking, an attended or distracter item passed behind an annulus centered over the unit's RF. At the end of each trial, the monkey indicated which item was tracked by making a saccade to it.



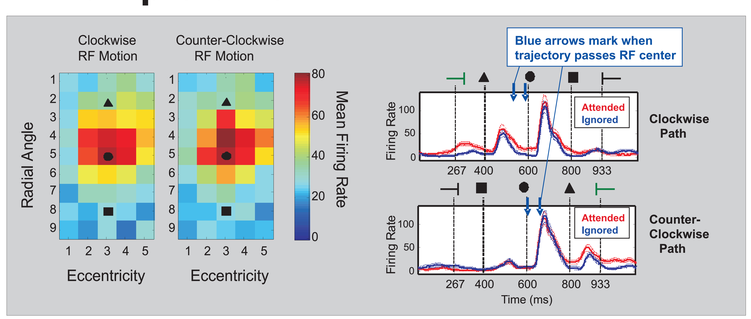


Stimulus-evoked flash conditions:

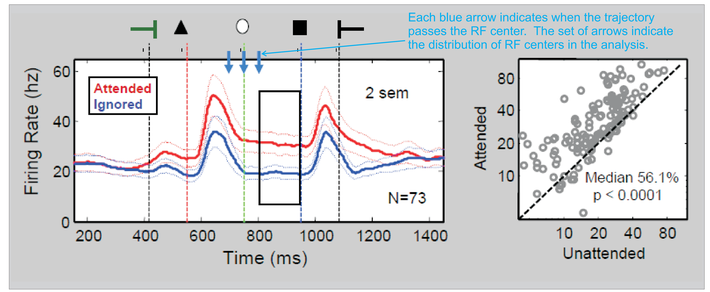
Trial Type	Early Context	Early Flash	Mid Flash	Late Flash
1	⊣	▲	●	■
2	⊣	▲	●	□
3	⊣	△	●	■
4	⊣	△	●	□
5	⊣	▲	○	■
6	⊣	▲	○	■
7	⊥	▲	●	■
8	⊥	▲	●	■

* Dark filled symbols indicate flash event was present in trial

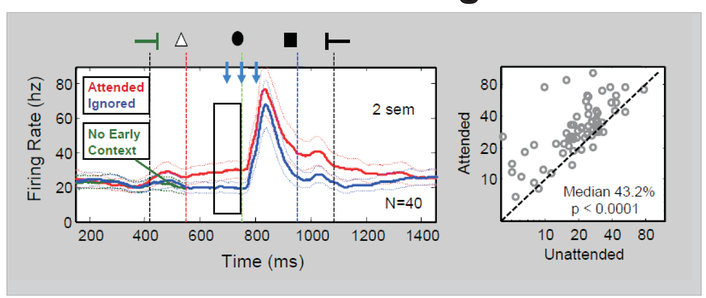
Example unit:



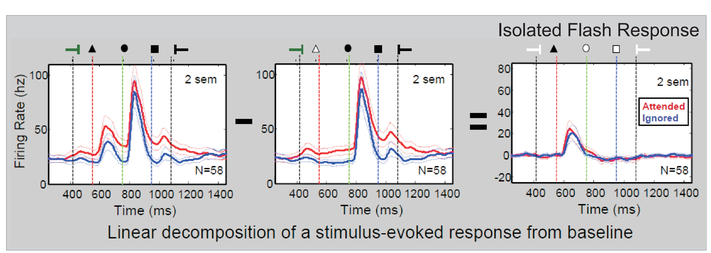
Responses persist for attended items moving behind occluders



Prestimulus activation predicts attended items moving into the RF

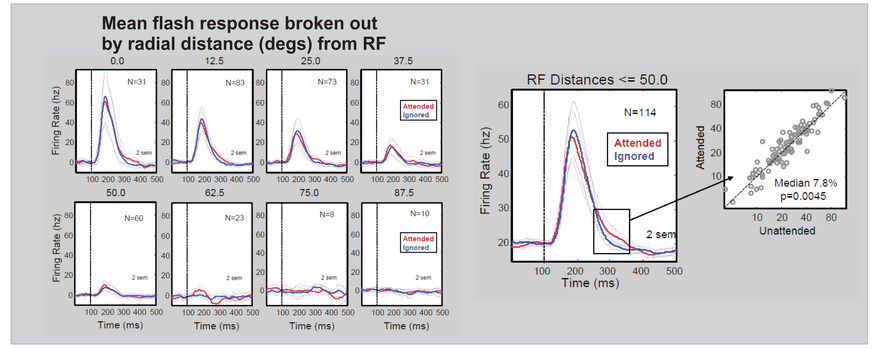


After subtracting baseline, there is no modulation of the stimulus-evoked response

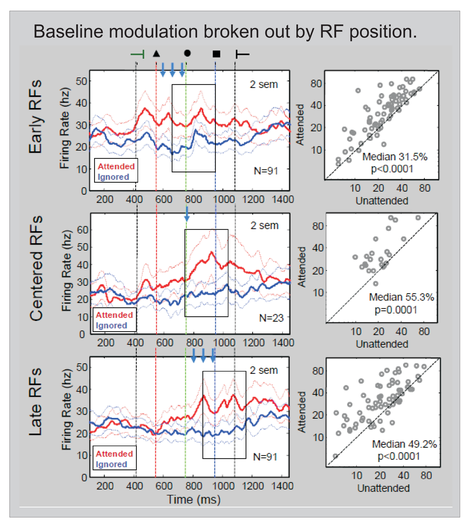


Systems Neurobiology Laboratory, The Salk Institute for Biological Studies. Funding provided by Swartz Foundation (J.M.), NIH Training Grant (J.C.), and NEI grant 1RO1EY13802 (J.R.).

Negligible stimulus-evoked modulation across different positions in the RF



Baseline modulation follows RF profile:



Conclusions

1) **Spatial attention in the tracking task causes strong changes in the baseline firing rate that encode the location of the tracked stimulus, even as it is occluded.**

2) **The modulation of the stimulus-evoked response is negligible, regardless of position in the RF.**

3) **Future work must address when attention modulation is additive, as here, or multiplicative.**

References

1. Pylyshyn ZW and Storm RW (1988) Tracking multiple independent targets: evidence for a parallel tracking mechanism. Spat Vis. 3(3):179-97.
2. Sears CR and Pylyshyn ZW (2000) Multiple object tracking and attentional processing. Can J Exp Psychol. 54(1):1-14.
3. Mitchell JM, Sundberg KS, Reynolds JH (2007) Differential attention-dependent response modulation across cell classes in V4. Neuron 55: 131-41.
4. Luck SJ, Chelazzi L, Hillyard SA, Desimone R (1997). Neural mechanisms of spatial selective attention in areas V1, V2, and V4 of macaque visual cortex. J Neurophys. 77:24-42.
5. Assad JA, Maunsell JH (1995). Neural correlates of inferred motion in primate posterior parietal cortex. Nature 373:518-21.
6. Pooresmaeili A, Poort J, Thiele A, Roelfsema PR (2010). Separable codes for attention and luminance contrast in the primary visual cortex. J Neurosci. 30:12701-11.