Largest class of neurons in the visual cortex is not reliably responsive to any of the visual stimuli

de Vries et al., (2020) A large-scale standardized physiological survey reveals functional organization of the mouse visual cortex. Nat Neurosci. 2020 Jan;23(1):138-151. doi: 10.1038/s41593-019-0550-9. PubMed

Re-interpretation by the IPL mechanism

In a recent report by de Vries et al., (de Vries et al., 2020), the authors examined firing of nearly 60,000 visual cortical neurons in response to different visual stimuli. They found that while most classes of these neurons respond to specific subsets of stimuli, the largest class is not reliably responsive to any of the stimuli. The latter finding supports the observations made by semblance hypothesis during visual perception (Vadakkan, 2016). Accordingly, the internal sensation of perception takes place at the inter-LINKed spines and is independent of firing of their neurons. Moreover, postsynaptic potentials generated by visual stimuli at these inter-LINKed spines need not necessarily add potentials to raise the summated potentials to reach the threshold level for firing those neurons (Vadakkan, 2019). Therefore, as per semblance hypothesis, the expectation is that a huge set of neurons will not be responsive to any visual sensory stimuli even when internal sensation of vision takes place. Report by de Vries et al., (de Vries et al., 2020) is in agreement with the expectations of the mechanism of visual perception provided by semblance hypothesis.

Their finding that most classes of visual cortical neurons respond to specific subsets of stimuli indicates that the propagation of stimuli to higher cortical areas is necessary for performing secondary functions such as a) “where” and “what” associative properties of visual stimuli at higher cortical areas, and b) associative learning with other sensory stimuli at different associative cortical areas. Due to extreme degeneracy of inputs in firing a cortical neuron (Vadakkan, 2016), two findings are expected. a) a specific neuron will respond to a very large number of visual stimuli if that neuron is being kept at sub-threshold activation level at the baseline state, and b) internal sensation of

perception will continue to occur at the inter-LINKed spine of a neuron even without any change in the firing status of that neuron which remains at a supra-threshold activation state.

References

de Vries et al., (2020) A large-scale standardized physiological survey reveals functional organization of the mouse visual cortex. Nat Neurosci. 2020 Jan;23(1):138-151. doi: 10.1038/s41593-019-0550-9. PubMed

Vadakkan KI (2016) A framework for the first-person internal sensation of visual perception in mammals and a comparable circuitry for olfactory perception in Drosophila. Springerplus. 2015 Dec 30;4:833. doi: 10.1186/s40064-015-1568-4. eCollection 2015. PubMed

Vadakkan KI (2019) Extreme degeneracy of inputs in firing a neuron leads to loss of information when neuronal firing is examined. Peerj Preprints. Article