Drift in the set of neurons in the primary olfactory cortex that fire in response to an odour. Schoonover et al., (2021) Nature. 594(7864):541-546. Article

Re-interpretation in terms of the IPL mechanism

Several studies have observed correlation between odorants and specific sets of neurons that fire in response to them. Continuous recording from these neurons show that this correlation is lost after several weeks (Schoonover et al., 2021; Marks and Goard, 2021; Deitch et al., 2021). Authors suspected that this instability reflects the unstructured connectivity of piriform cortex. What property of the circuitry will cause such a drift? It further leads to more fundamental questions such as “What is a percept?” “Where is it formed?” It was possible to explain a framework of a mechanism of perception based on the IPL mechanism (Vadakkan, 2011). During associative learning events, new IPL are formed in the cortices. Even though olfactory stimuli propagate directly to the hippocampus without propagating to an intermediate association cortex (Zhou et al., 2021), outputs from the hippocampus can generate IPLs in the cortex. Insertion of new neurons in the pathways (in the granule layer of hippocampus) through which signals from associatively learned items/events propagate, along with exposure of the system to new associative learning items/events that share elements of the previously associated items/events, will lead to continuous formation of new IPLs in the cortices (Vadakkan, 2010; 2016). This will lead to changes in the summated potentials arriving to the neurons in the olfactory cortex. Hence, firing property of neurons in the primary olfactory cortex during perception of the same stimulus is expected to show continuous drift.

Based on the semblance hypothesis, when perception is viewed as first-person internal sensations, it was possible to find a framework of a mechanism for perception (Vadakkan, 2015). Accordingly, internal sensation of a percept is formed by integral of all perceptons, unitary mechanisms of perception. Large number of redundant perceptons are expected to form. Hence, the net integral of all perceptons remain almost same, even with changes in the locations from where

perceptons are formed. Furthermore, extreme degeneracy of attenuating input signals in firing a neuron (Vadakkan, 2019) indicates that perceptons are generated at the input level. Correlations with neuronal firing will only be true for those neurons that are being held at sub-threshold activation state and receive additional potentials through inter-postsynaptic functional LINKs (IPLs) at the time of perception. Hence, internal sensation of perception continues to take place even when the set of neurons that fires changes over time due to changes in the circuitry.

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