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Abstract:

Information on where the eye is pointing is almost as important as the light that enters the eye. Eye position information is needed to allocate attention, to program a reach, and to attain visual stability. Consistent with this, eye position encoding has been found in many areas of the monkey brain. We investigated whether such signals exist in the human brain and demonstrate their presence in many areas of the human brain, and its dorsal part in particular. These data suggest that the lessons learned about the role of eye position signals in the monkey brain are quite relevant to understanding the human brain. Eye position signals must not only be veridical during fixation, but also updated rapidly around eye movements. We investigated this using single-cell recordings in posterior parietal areas of the macaque. We find that a modest number of cells suffice to provide a high fidelity population eye position signal during fixation. Second, this signal is rapidly updated around eye movements, such that a veridical signal is available in the typical interval between two saccades. Finally, these eye position signals anticipate the actual eye movement and, when combined with a veridical retinal input, predict the often described perisaccadic mislocalization. This suggests that these signals are not only available and useful, but that they are indeed used by the visual system..