

Functional diversity in dorsomedial posterior parietal neurons using single-unit fMRI mapping

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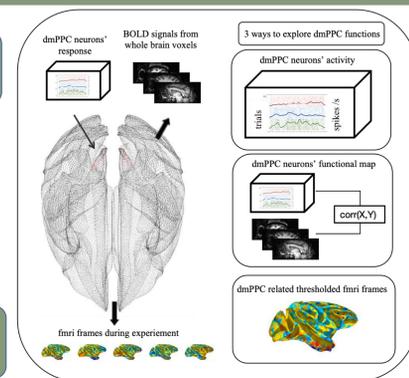
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Introduction

- Dorsomedial posterior parietal cortex (dmPPC) neurons in the primate are known to process episodic details at perception and take part in episodic memory retrieval. However, we have not been able to relate the neuronal response profiles to the whole-brain activation context. One way to tackle this is to compute whole-brain correlation maps based on the shared time course between neurons and each of the voxels, an approach which called 'single-unit fMRI mapping'.



Study 1: During episodic processing

Fig 1. Whole-brain functional mapping for each individual neuron during natural viewing paradigm

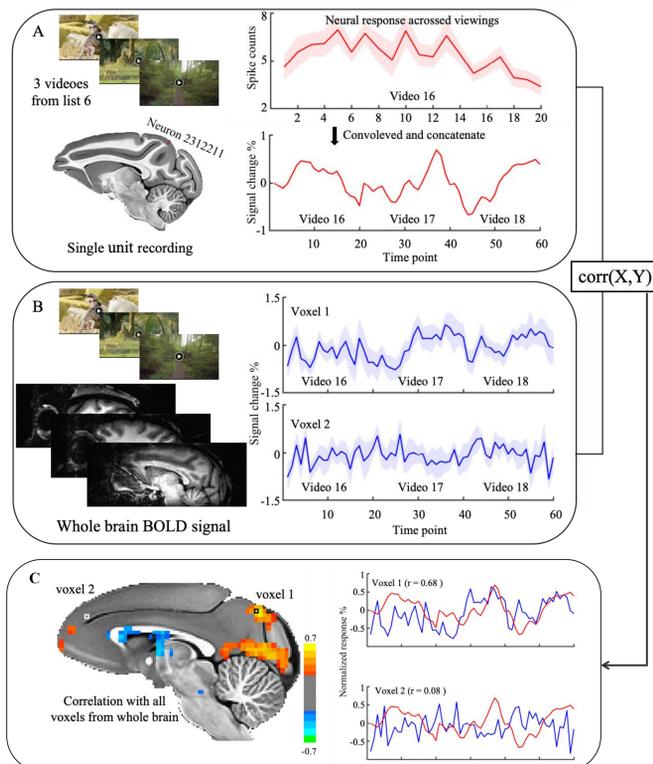
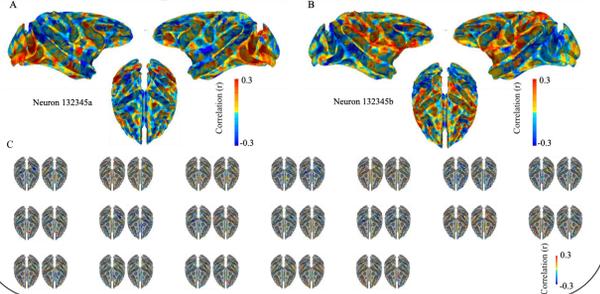


Fig 2. Neighboring neurons show markedly different pattern with distant areas



- 375 dmPPC neurons' data were collected on 3 monkey
- 9 sessions of fMRI data scanned on 2 monkeys were collected.

Fig 3. Similarity differences revealed by functional maps, spiking and fMRI frames

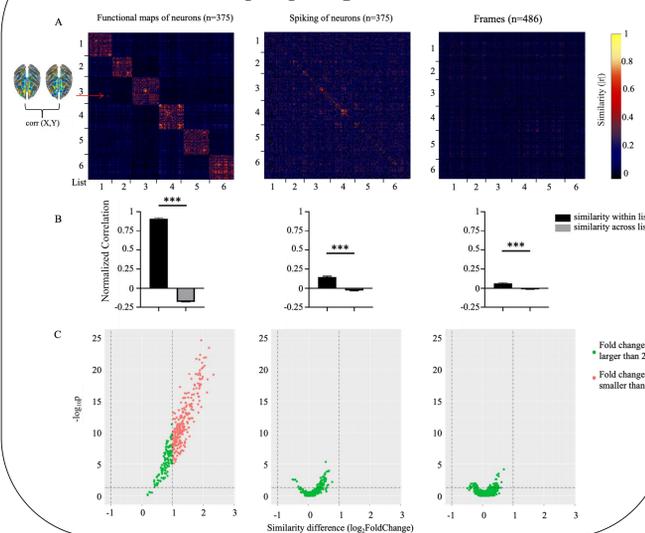


Fig 4. The correlation matrix of neurons' functional maps under separate 18 video clips

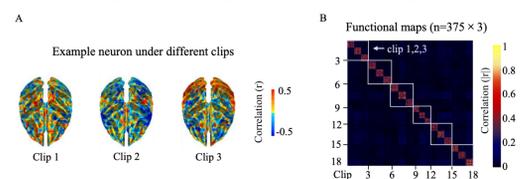


Fig 5. Subpopulation of neurons in 18 video clips based on neurons' functional maps using Kmeans algorithms

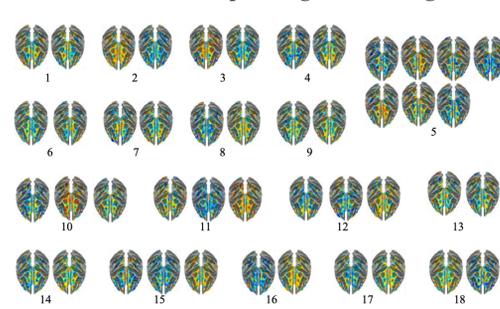
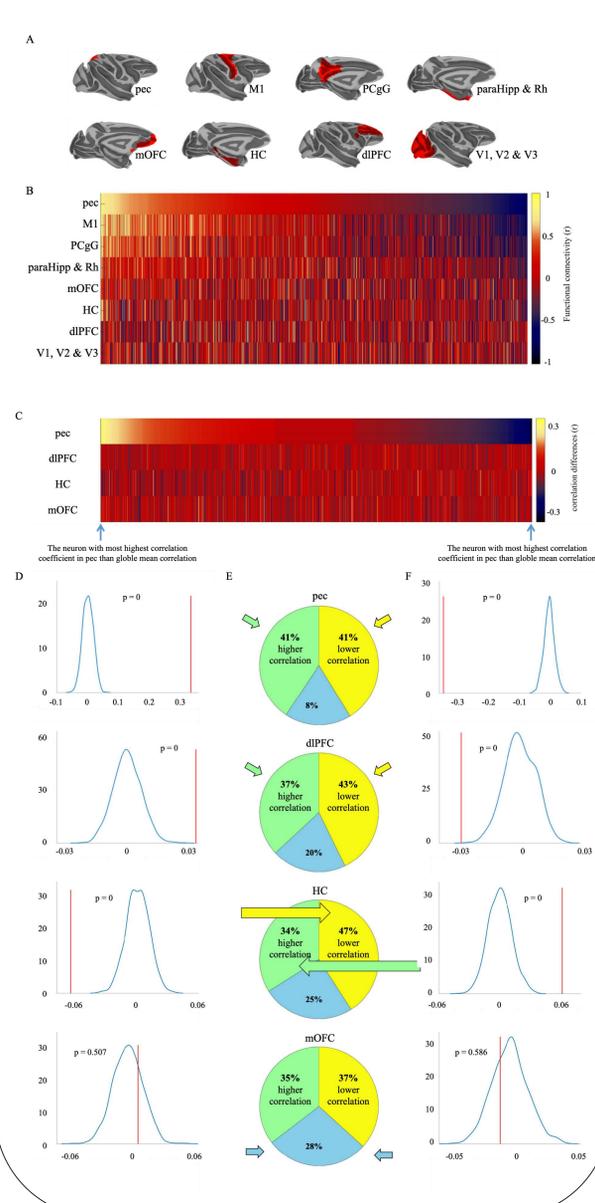
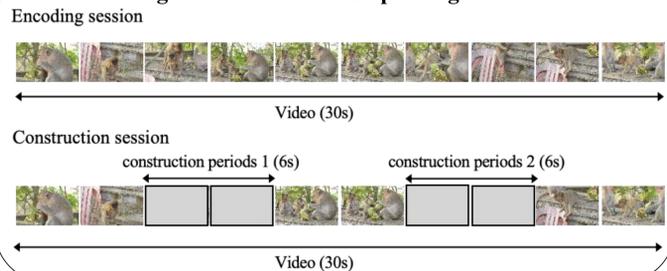


Fig 6. Functional connectivity pattern of neuron with dmPPC related ROIs



Study 2: During episodic memory construction

Fig 7. New construction paradigm



- 103 dmPPC neurons' data were collected on 1 monkey
- 51 sessions of fMRI data scanned on 2 monkeys were collected.

Fig 8. Decoding accuracy of dmPPC neurons in episodic memory construction

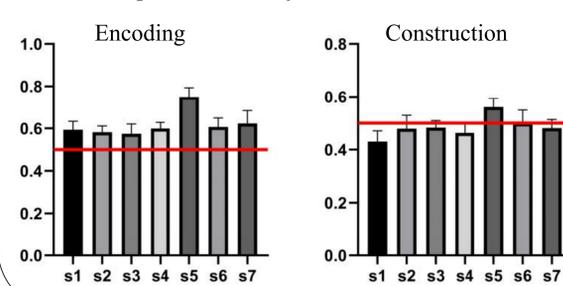
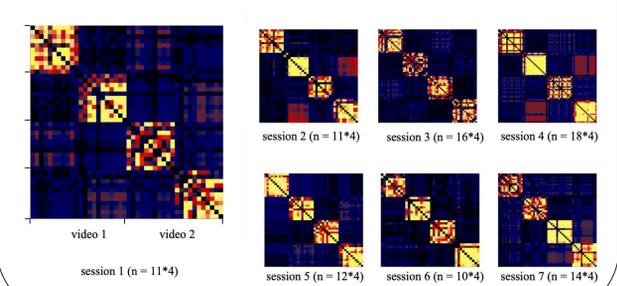


Fig 9. Correlation matrix of neurons' functional maps under different experiences and conditions



Conclusion

Our results revealed functional diversity within a neuron population in the dmPPC and the neurons' varied - and task-dependent - functional relationship to the entirety of the brain in both encoding/perception and memory domains.



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