Inter-subject hyperalignment of neural representational spaces

J. Swaroop Guntupalli, Andrew C. Connolly, and James V. Haxby
Dept. of Psychological & Brain Sciences, Dartmouth College, Hanover, NH, USA

INTRODUCTION

• Fine scale categorical information is present in fMRI activation patterns at fine spatial scale which can be decoded using multivariate pattern (MVP) analysis.1
• Anatomy-based alignment does an inadequate job of aligning these fine scale patterns across subjects.
• We developed Hyperalignment to align the underlying neural representational spaces across subjects.
• We further derived a common low-dimensional representational space that seem to capture the categorical information present in the VT cortex.

METHODS

Princeton (Siemens) 
N= 10      TR = 3s      2 parts
Dartmouth (Philips) 
N = 9       TR = 2.5s   8 parts

Combined similarity structure

Combined data from different imaging studies conducted at different imaging centers on different subjects.

RESULTS

Within-subject Classification
Between-subject classification (Anatomical alignment)
Between-subject classification (Hyperalignment)

CONCLUSIONS

• Hyperalignment aligns the underlying neural representational spaces and reveals a higher level of commonality in the underlying neural codes across subjects.
• A low-dimensional representational space seems to capture the information represented in VT cortex.

References