Shared and unique fMRI responses between humans and monkeys during naturalistic movie viewing

Ma Feilong[1], Haiyan Wang[2], Guo Jiahui[1,3], Xiaolian Li[2], Royoung Kim[4], Fan Xiaoxuan[1], Jane Han[1], Qi Zhu[5], M. Ida Gobbini[6], Won Mok Shim[4], James V. Haxby[1], Wim Vanduffel[2]

[1]Dartmouth College, [2]KU Leuven Medical School, [3]University of Texas at Dallas, [4]CNIR/SKKU, [5]Université Paris-Saclay, CEA, NeuroSpin, [6]University of Bologna

fMRI Data

- *Monkey Kingdom* movie
- 5 clips × 15 min each
- 24 humans, 12 macaque monkeys
- Resampled to 2 second resolution
- 10,242 vertices per hemisphere

Multivariate variance partitioning

H, M : human/monkey data matrix (time points, subjects × vertices)

β_{HM}, β_{MH}: beta weights

R_{H}, R_{M}: residuals

$$H = M\beta_{\mathrm{MH}} + R_{\mathrm{H}}$$

$$M = H\beta_{\mathrm{HM}} + R_{\mathrm{M}}$$

Using 23 humans and 11 monkeys.

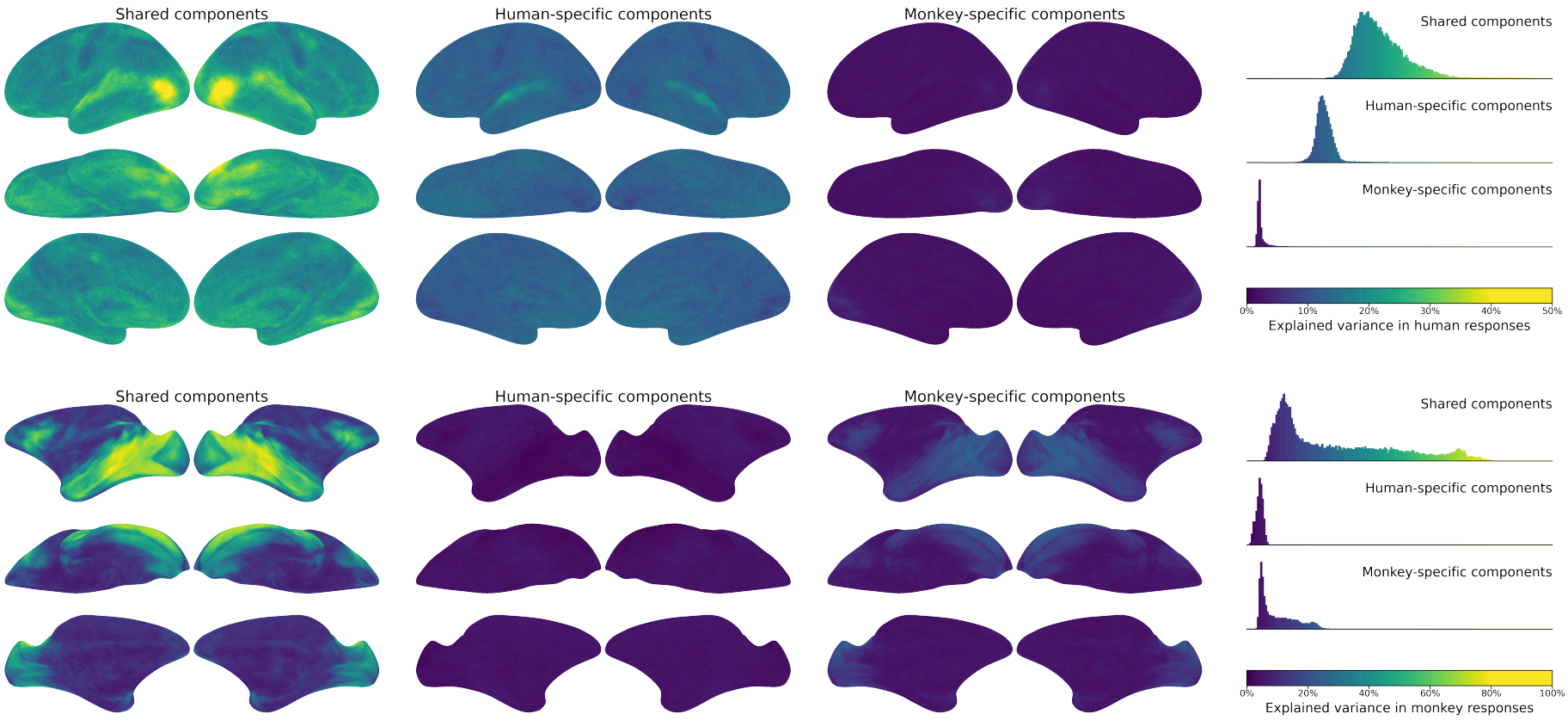
Shared components: $\mathrm{PCA}([M\beta_{\mathrm{MH}}, H\beta_{\mathrm{HM}}])$

Human-specific components: $\mathrm{PCA}(R_{\mathrm{H}})$

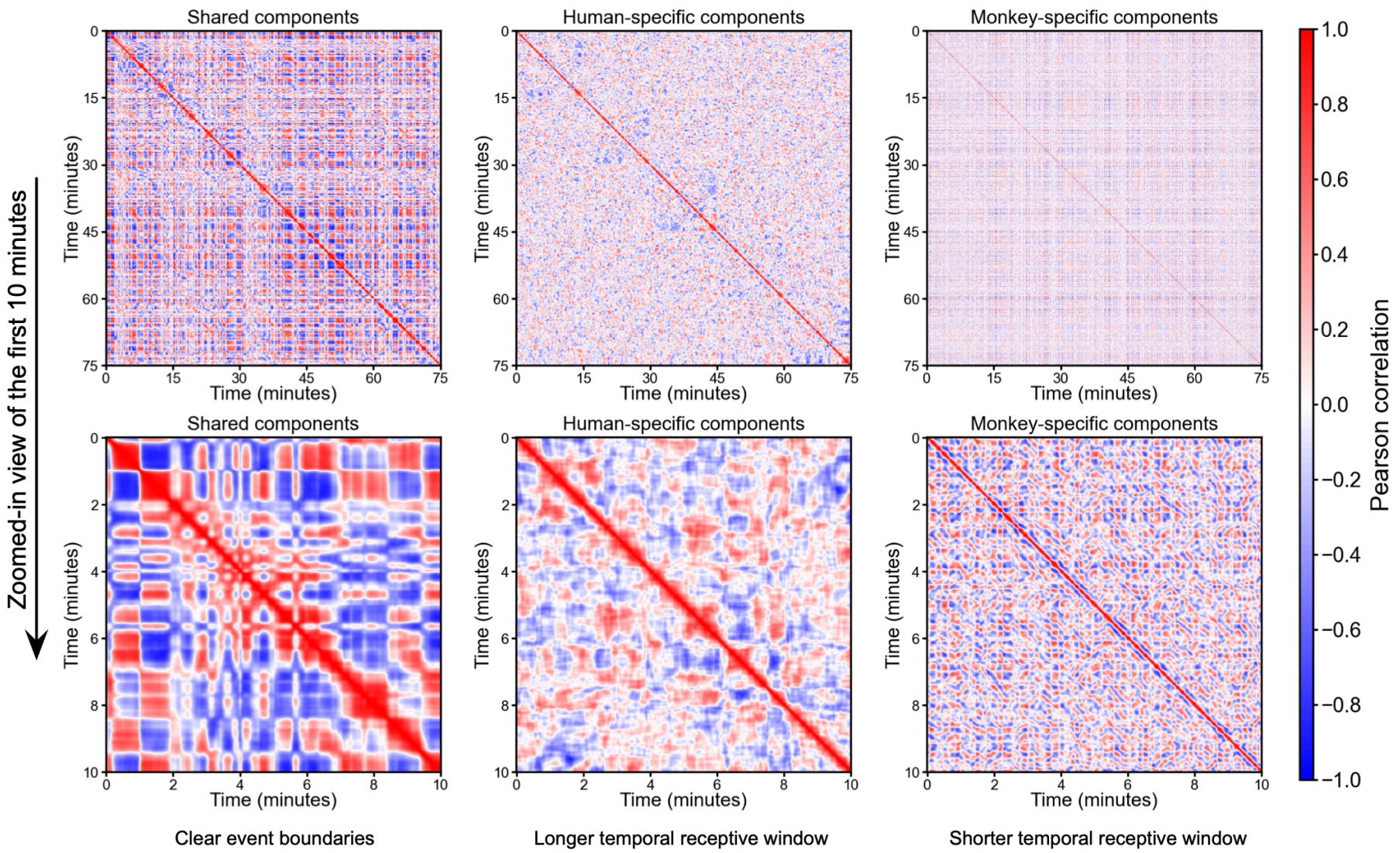
Monkey-specific components: $\mathrm{PCA}(R_{\mathrm{M}})$

We used the first 30 components of each kind.

Variance explained by shared and species-specific components



Response pattern similarities based on shared and species-specific components



This work was supported by NSF grant 1835200 to M.I.G., NSF grant 1607845 to J.V.H., NIMH grant 5R01MH127199 to J.V.H. and M.I.G., and grant IBS-R015-D1 to W.M.S.