Encoding models of body stimuli reveal 2D key points like representation in extrastriate body area.

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Introduction
The extrastriate body area (EBA) (Downing et al. 2001, Peelen and Downing, 2005) is currently considered to be a ventral cortex object category area, selective for body stimuli. Despite the current view, several studies have shown how stimulus features or body attributes are encoded in EBA.

Objective
What is less clear is the role played by EBA in bridging the gap between low-level features of body stimuli (i.e. kinematics) and the high-level semantic information conveyed by the body (i.e. emotion, action). Therefore, understanding how whole-body postures are encoded in EBA is crucial to disentangle its role in body perception.

In this fMRI study we used fully parametrized body stimuli and we tested several encoding models in order to determine which one could best predict fMRI BOLD responses in EBA.

Methods
Stimuli: 324 images of body postures (108 unique poses from 3 viewpoints) generated using Vposer (Pavlakos et al. 2019).

Participants: 20 volunteers (9 males) right-handed.

Experimental design: Two 7T fMRI (12 experimental runs in total) mixed block/fast event-related design (localizer: block design; main experiment: fast event-related paradigm).

Encoding models:
- **kp3d**: 2D key points (joints coordinates) extracted during stimulus creation.
- **kp2d**: 3D key points (joints coordinate)
- **Gabor**: pixel space representation. (Nishimoto et al. 2011).

ROI definition: EBA was defined using the localizer contrast: Body> [Houses + Tools].

Models fitting: Banded ridge regression (Nunez-Elizalde et al. 2019; Dupré La Tour et al. 2022) in which the regularization parameters are learnt in crossvalidation.

Models’ assessment: Pearson’s correlation between predictions obtained by each model separately and left-out testing data.

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References

Results

Whole-brain analysis:
- **Gabor** model explains more variance than kp2d and kp3d in early occipital areas.
- **kp2d** explains more variance in high-level visual cortex.

Conclusion
These results suggest that bodies may be represented in EBA as key points, namely the relative distance between the joints is driving the response. This representation is bidimensional and thus viewpoint specific.