

Characterizing the Spatiotemporal Neural Representations of Perceived Similarity Using Implicit and Explicit Tasks.

Peter Brotherwood¹, Simon Faghel-Soubeyrand², Jasper van den Bosch¹, Ian Charest¹

1 - cerebrUM, Département de Psychologie, Université de Montréal;

2 - Department of Experimental Psychology, University of Oxford



cerebrum

Université
de Montréal



UNIVERSITY OF
BIRMINGHAM

NSERC
CRSNG

erc
Charest
Lab

Introduction

Linking neural and behavioral activity is crucial for understanding and replicating the mechanisms behind visual stimulus recognition. Perceived similarity judgments have become increasingly popular in visual experiments, providing behavioral representations that strongly correlate with visual system activity^{1,2}. Representational similarity analysis (RSA) facilitates identification of commonalities between neural and behavioral activity representations by comparing dissimilarity between all pairwise combinations of stimuli³. For large stimulus sets, the multiple arrangements (MA) task⁴ has been instrumental in successfully relating explicit behavioral information about stimuli to representational geometries of brain activity patterns^{5,6,7,8} in both space and time^{5,7}, owing to its efficiency in collecting pairwise similarity judgments. However, explicit similarity judgments may not fully reflect representational geometries across the entire visual cortex⁹. Here, we aim to investigate how implicit and explicit similarity judgments capture complementary aspects of brain-behavior relations. By relating data from three tasks with varying levels of processing to recorded neural responses, we explore how they associate with the spatial (fMRI) and temporal (EEG) unfolding of object representations encoded in the ventral stream.

Methods

Explicit Pairwise Similarity Judgments: The Multiple Arrangements Task

Arrange these images according to their similarity.

Implicit Pairwise Similarity Judgments: The Same-Different Task

Stimuli	Blank	Dynamic Mask	Response
+			
~ 17 ms	~ 34 ms	~ 200 ms	Max. 2 sec

Time

Were the stimuli the same or different?

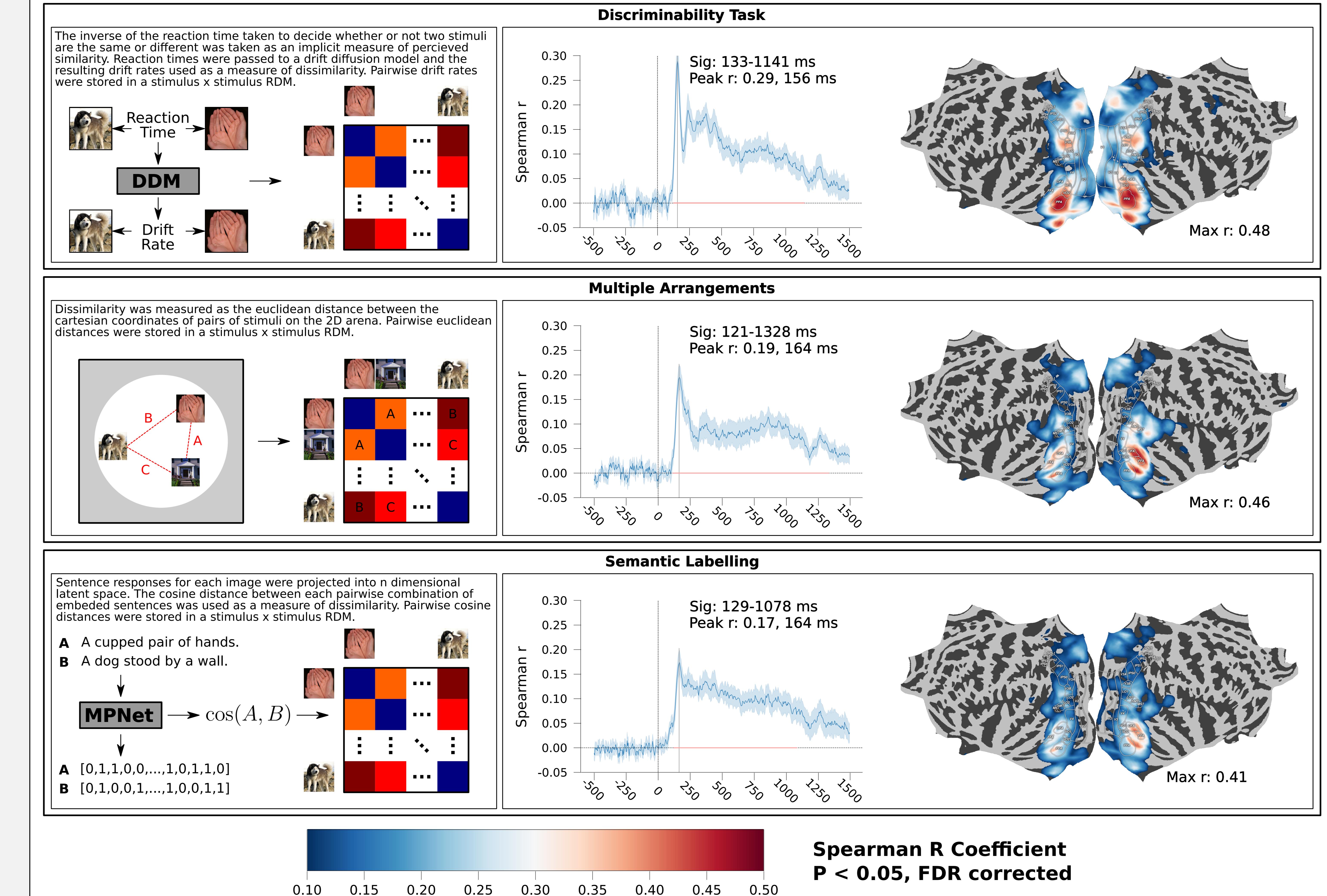
Press 1 if they were the same.

Press 2 if they were different.

Highly Explicit Stimulus Descriptions: The Image Captioning Task

Describe each of the following images in a sentence.

Results



Discussion

References

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