

Predicting the Behavioral Similarity Structure of Visual Actions

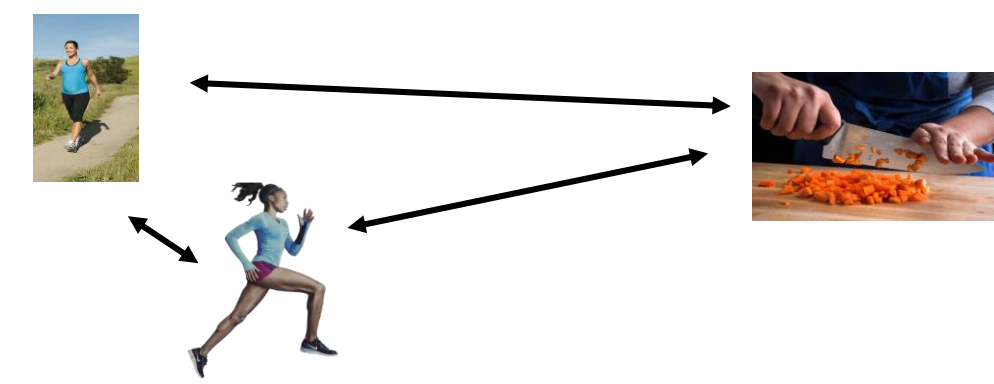
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Question

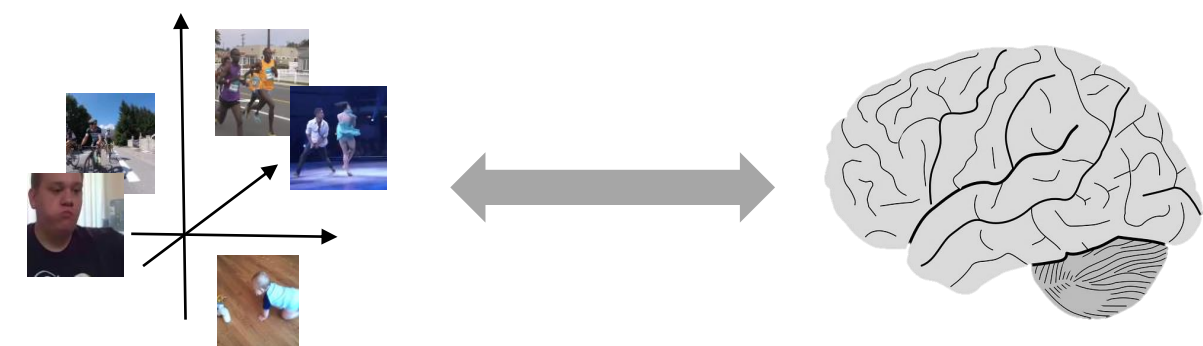
What makes some actions seem more similar than others?



Approach:

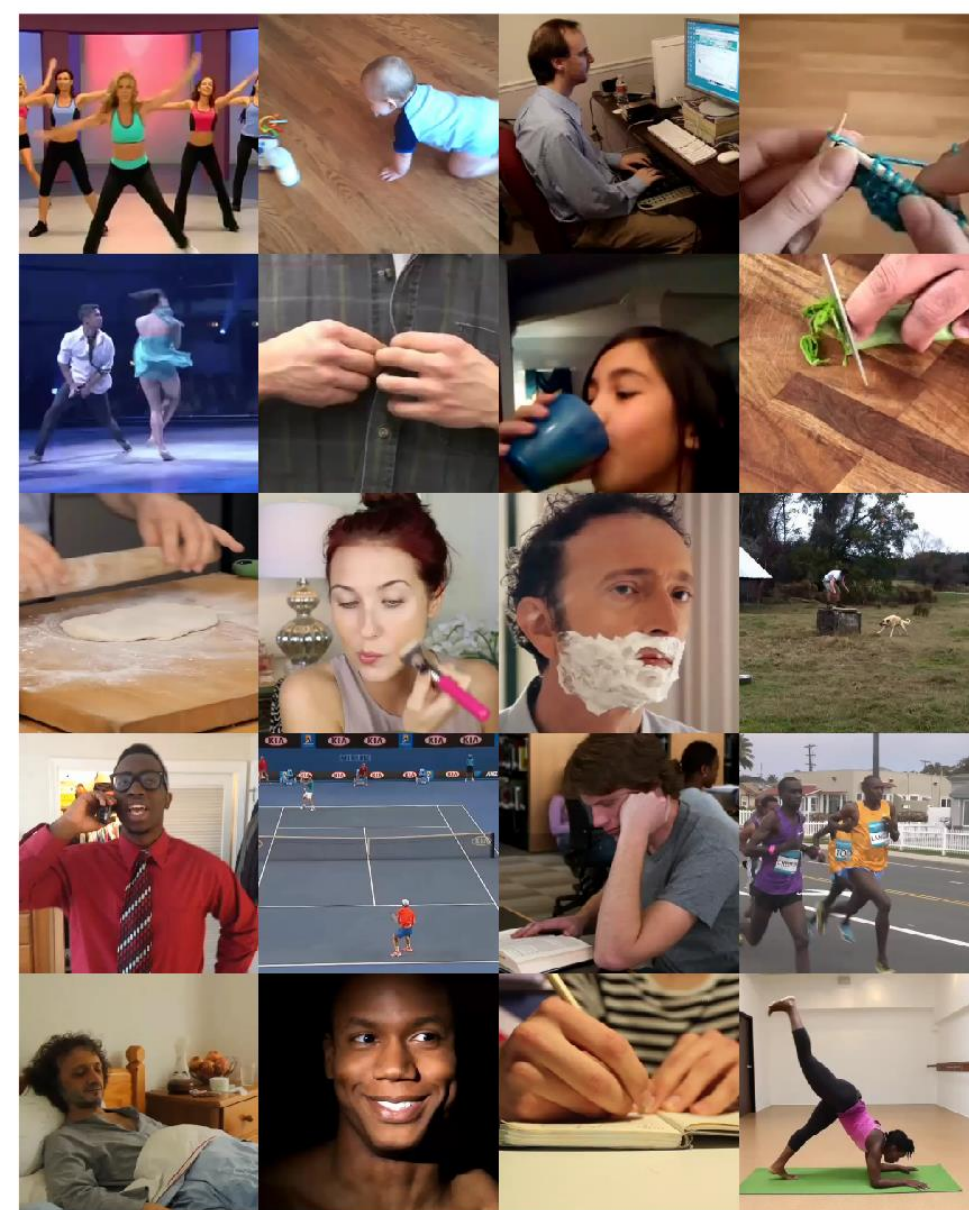
Characterize action similarity space

Relate this mental space to the brain



Stimuli

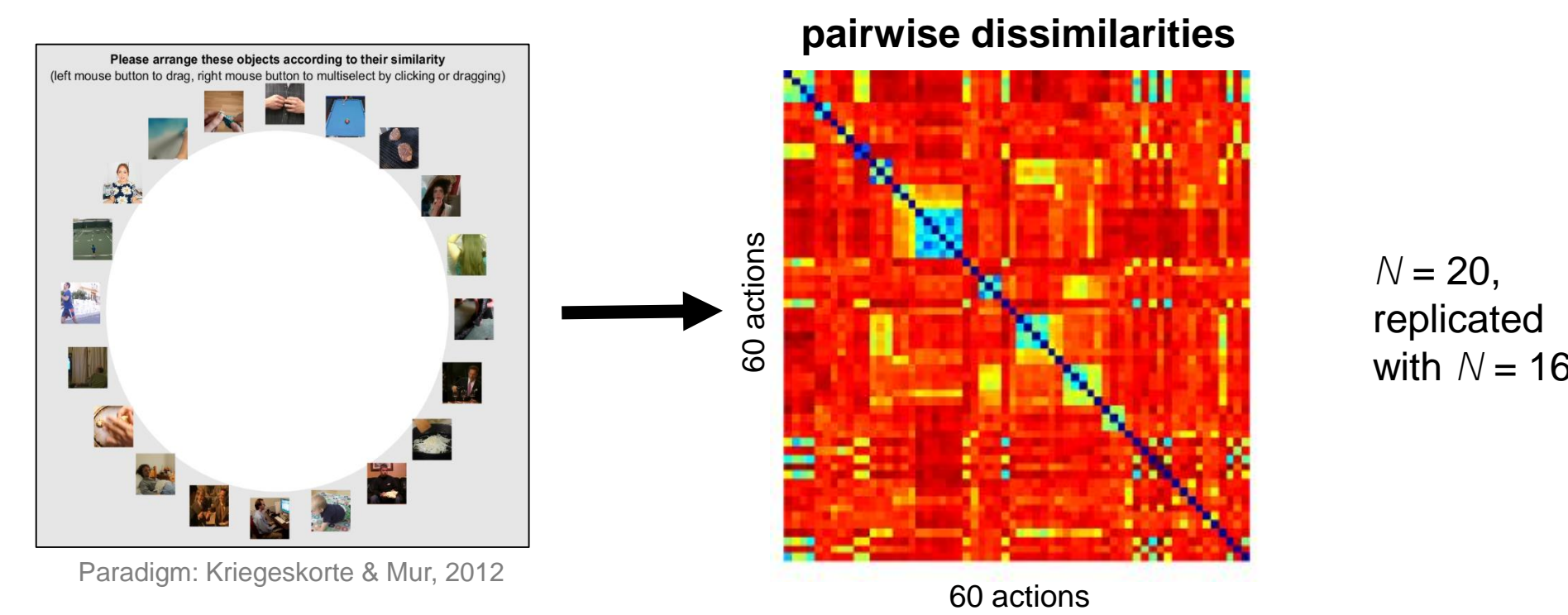
A wide sample of everyday actions



120 2.5s videos of 60 actions sampled from the American Time Use Survey

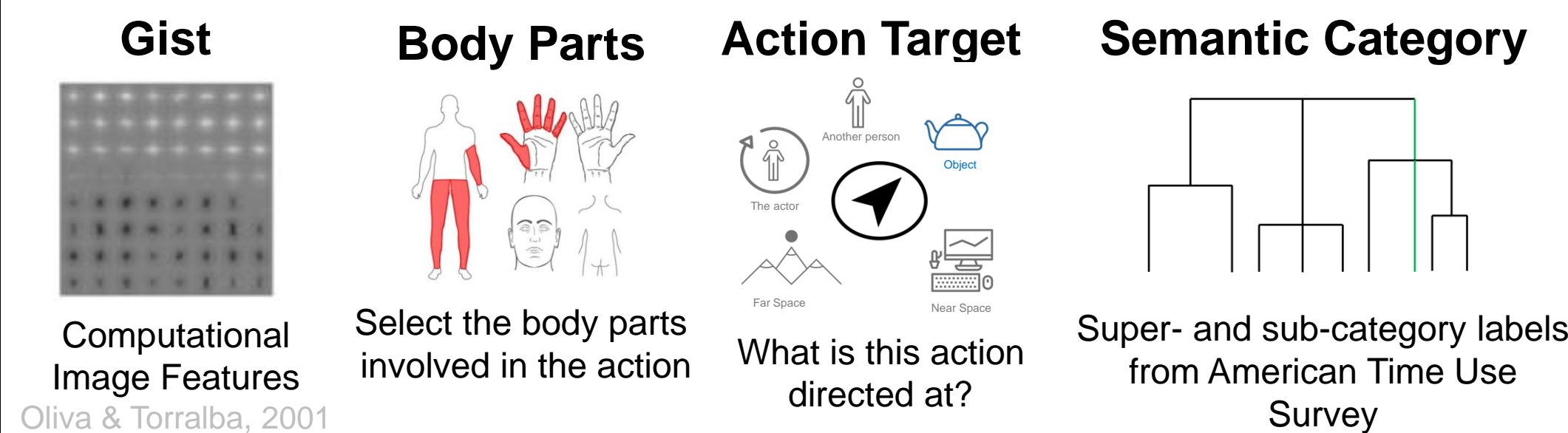
E1: Measure Action Similarity Space

Sort the actions according to their similarity

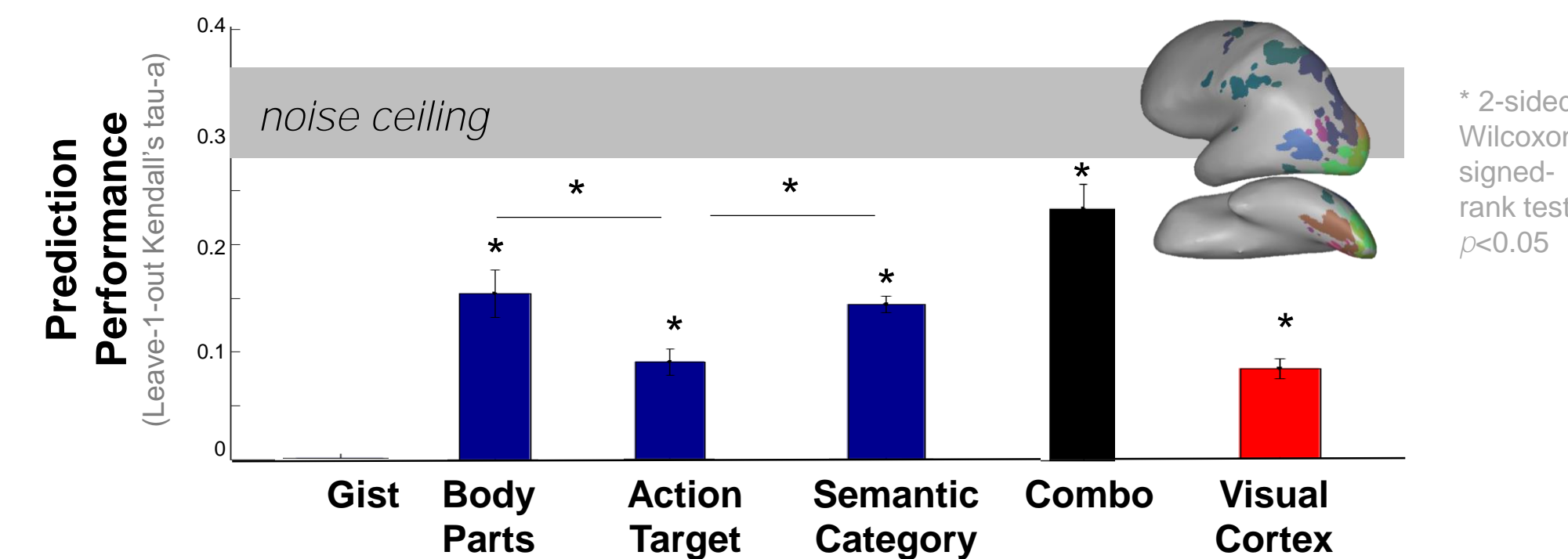


Modeling Results

Which features might predict similarity judgments?



How well can these models predict behavior?

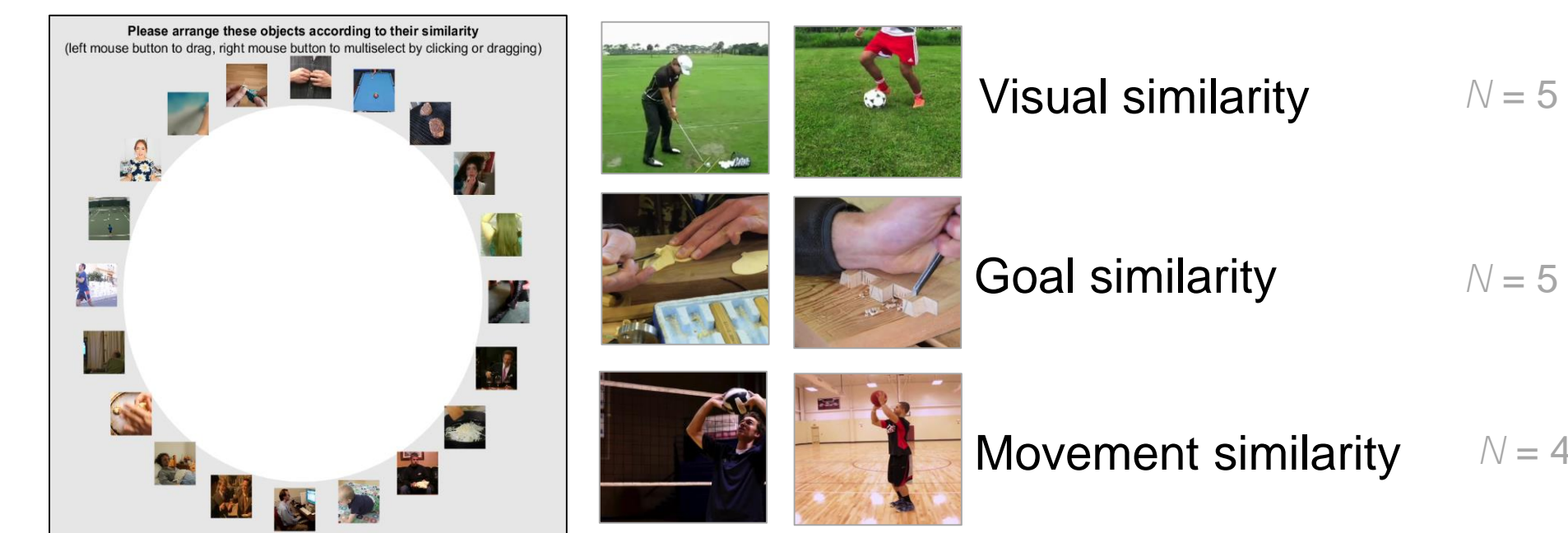


Semantic structure and body part features predict action similarity judgments well

Low-level gist features and visual areas of the brain do poorly

E2: Measure Other Similarity Spaces

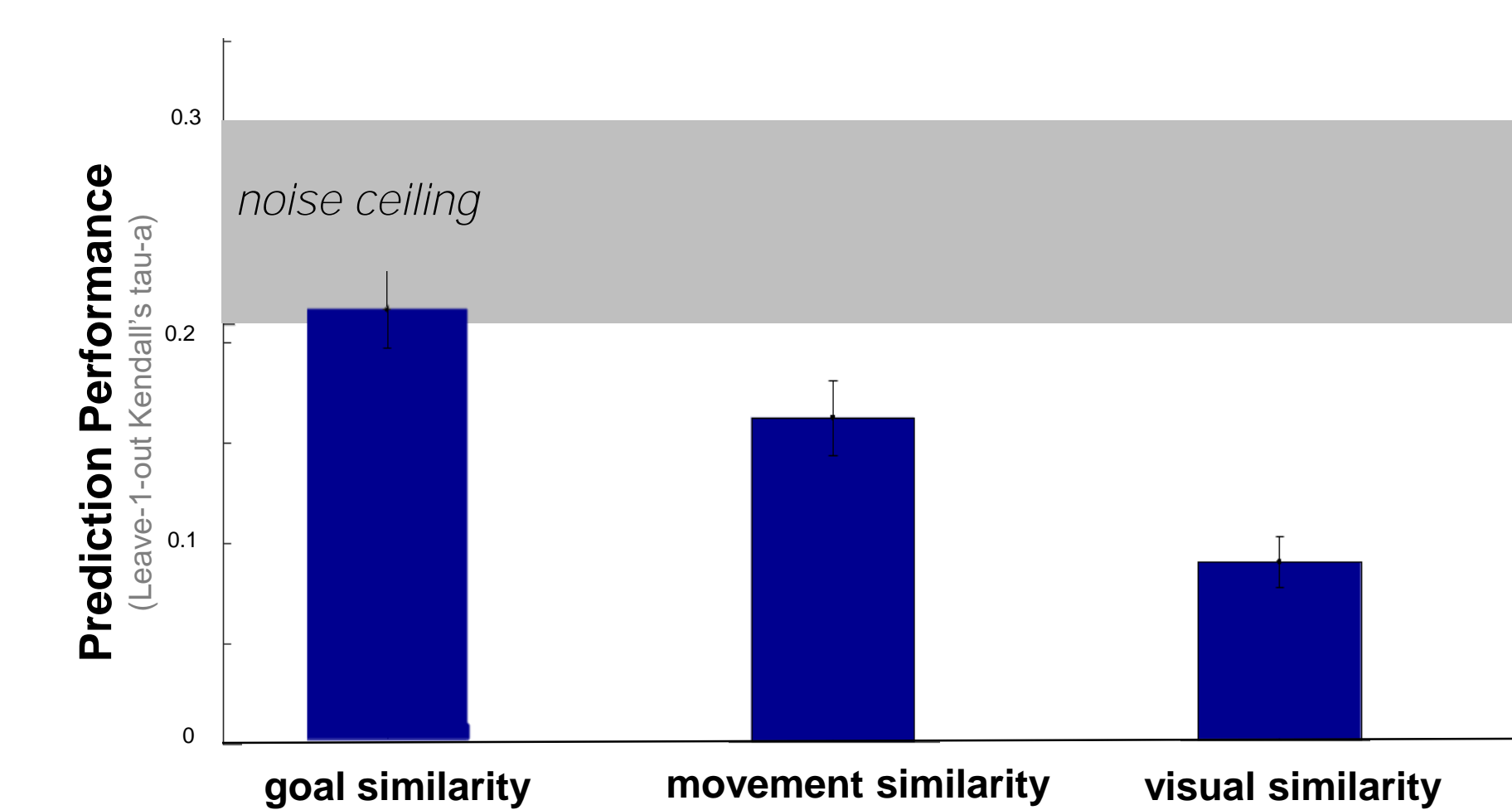
Sort the actions according to...



Preliminary Modeling Results

What features do subjects consider when judging actions?

Predict **unguided** similarity judgments using guided similarity judgments



Without explicit guidance, subjects sort actions based primarily on the actors' goals

Upcoming Questions

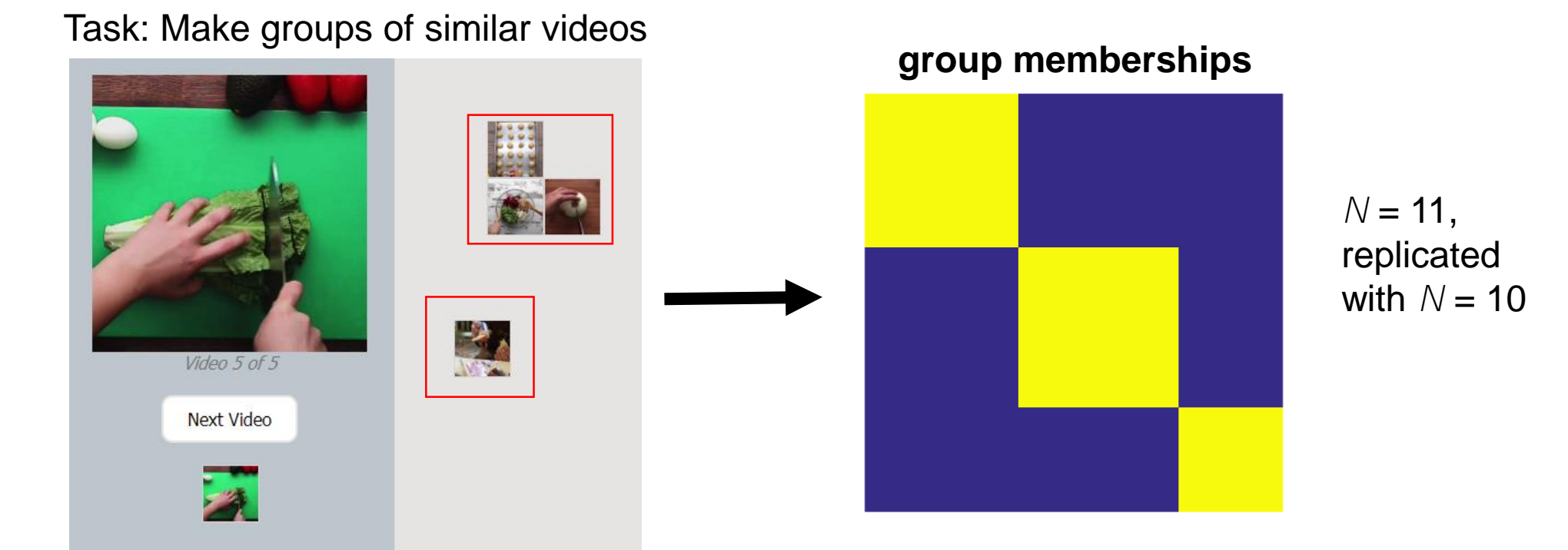
Which similarity spaces are housed in visual cortex?

Are noise ceilings higher with explicit instructions?

How do these guided similarity judgments map onto our hypothesized feature spaces?

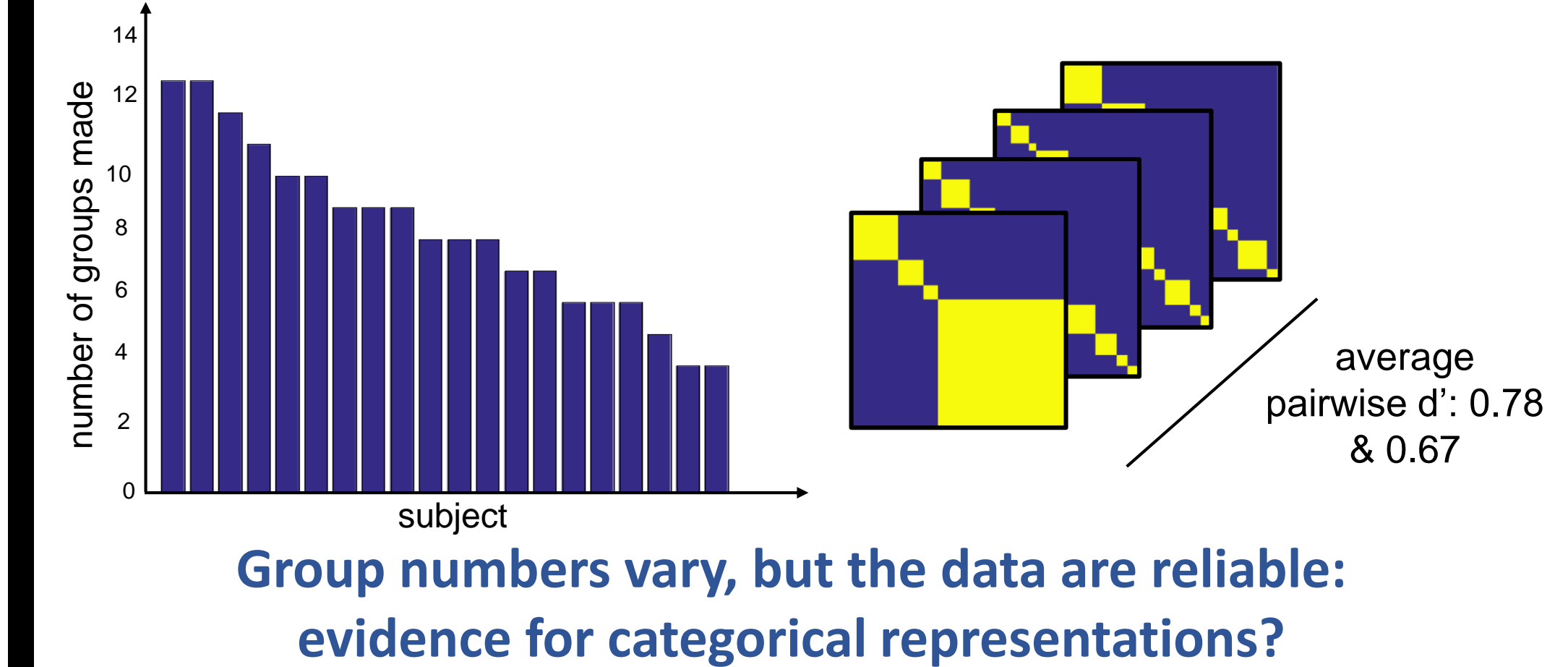
E3: Measure Action Groups

Is the mental action similarity space categorical?



Results

How many groups do people make? Are they consistent?

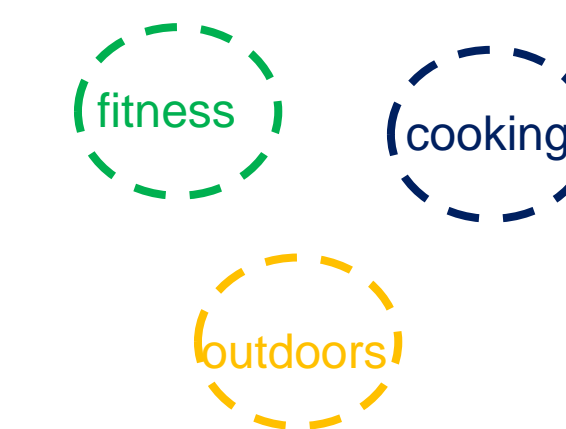


Conclusions

Action similarity judgments are best predicted by higher-level properties that describe **what they do**, not how they look

These judgments **do not** draw directly on visual system representations

Jozwick (2017), Groen (2017)



Instead, they may draw on **categorical** representations housed elsewhere in the brain

