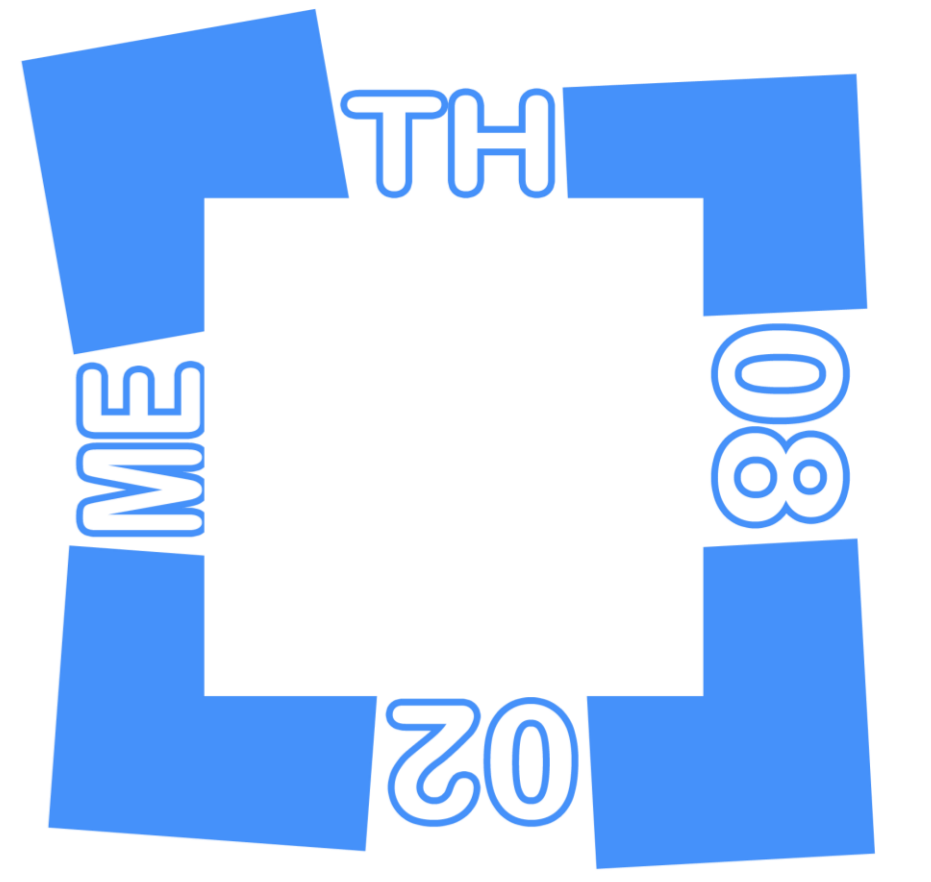




THE INFLUENCE OF SEGMENTATION ON RAPID SCENE CATEGORIZATION



Caitlin R. Mullin, Lee H. de-Wit, Hans P. Op de Beeck, Johan Wagemans, Jonas Kubilius
Brain & Cognition, University of Leuven (Belgium)

CATEGORIZATION

is **fast** (Thorpe et al., 1997; Oliva & Torralba, 2001)

and can be accounted for by **feedforward** processing (Serre et al., 2007; Krizhevsky et al., 2012) and therefore, requires no segmentation

HOWEVER,

object surfaces (Nakayama et al., 1995) or **proto-objects** (Rensink, 2000; Pylyshyn, 2001) has been proposed as a basis for categorization

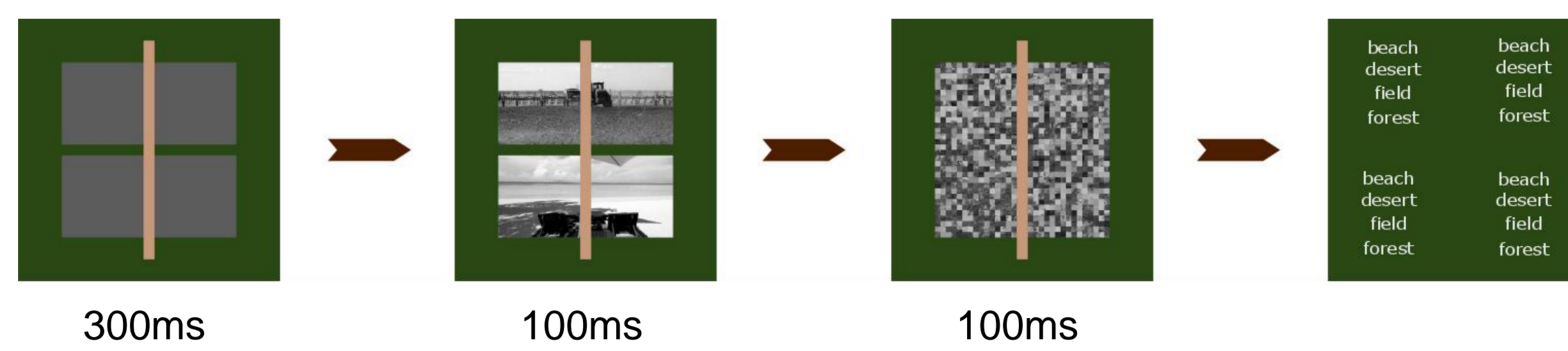
QUESTIONS

How fast is segmentation computed?
Can it occur **prior to categorization** (at least to some extent)?

DESIGN

IDEA Manipulate segmentation cues available to participants who are completing a categorization task

IF segmentation influences categorization
THEN segmentation is as fast as categorization, i.e., feedforward



SETUP

Participants presented with two images of scenes (oriented either vertically or horizontally)
The images were divided in half by an orange occluding bar

Participants were informed that there were only two different images and were asked to report their categories

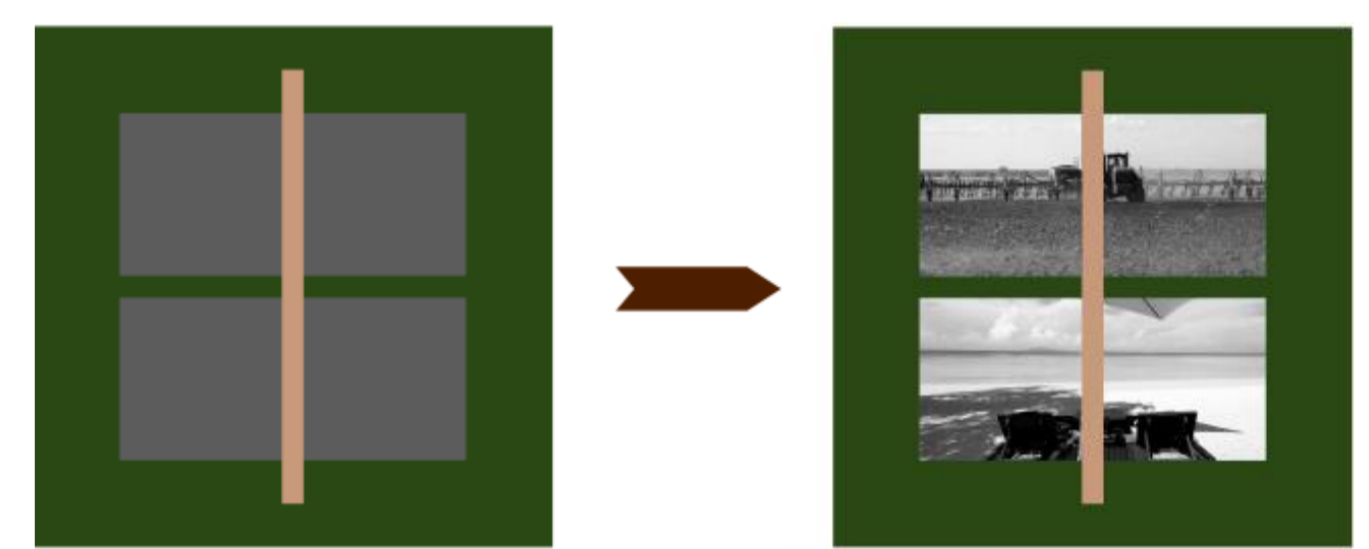
Thus, the task required to disregard any grouping cues

MANIPULATION

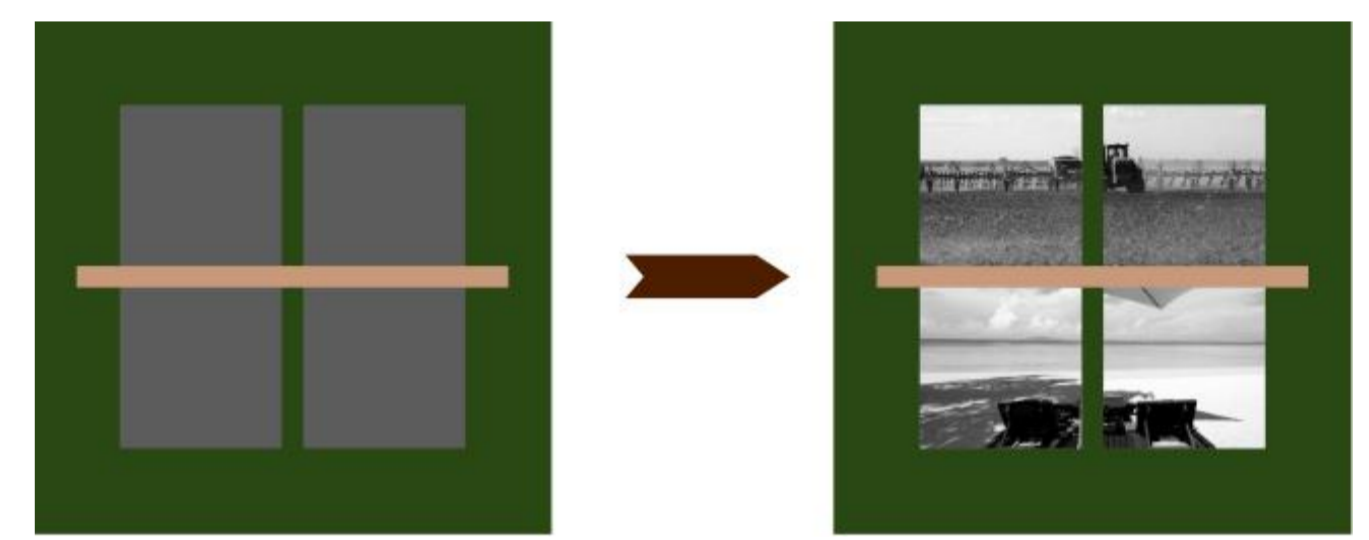
Pre-segmentation cues and an occluding bar either support the correct grouping of the image halves or not

Do these cues influence participants?

CONGRUENT

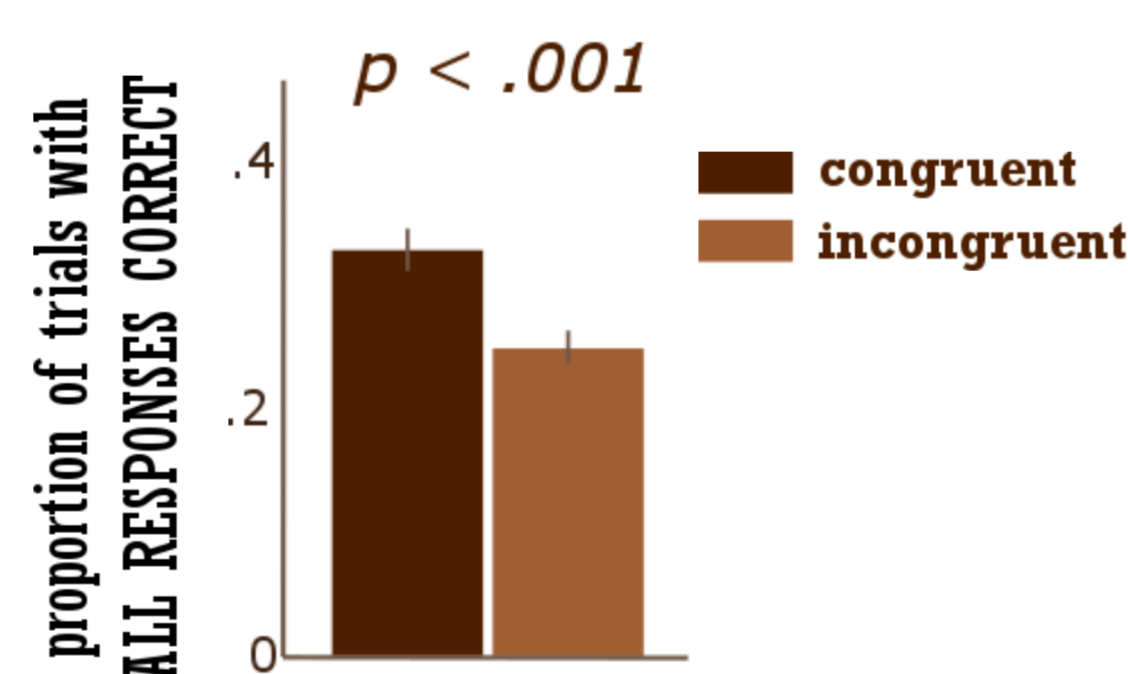
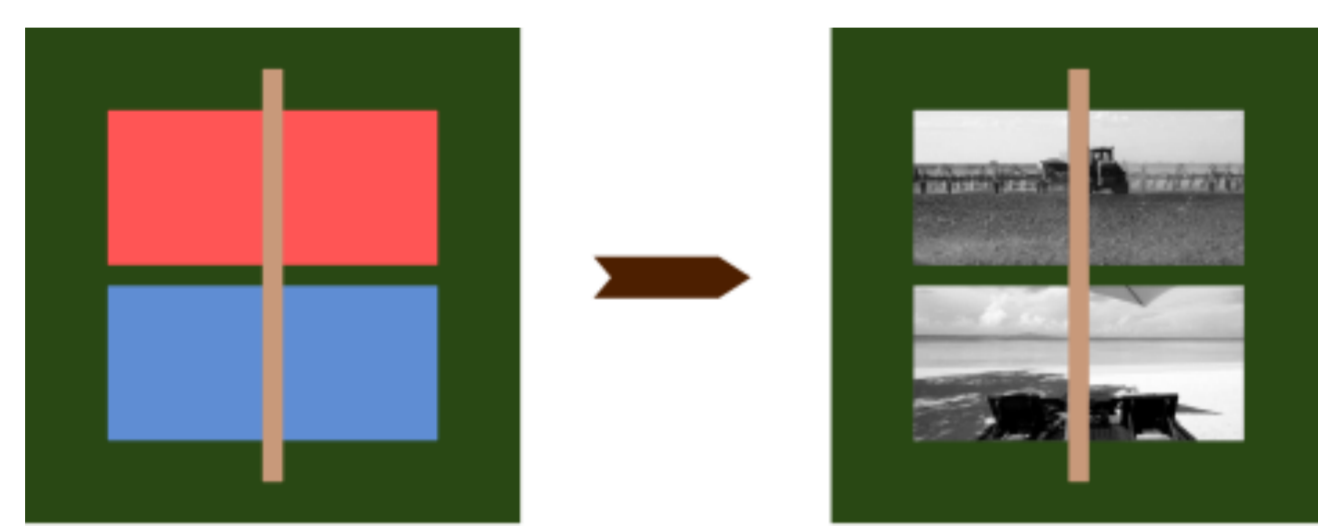


INCONGRUENT

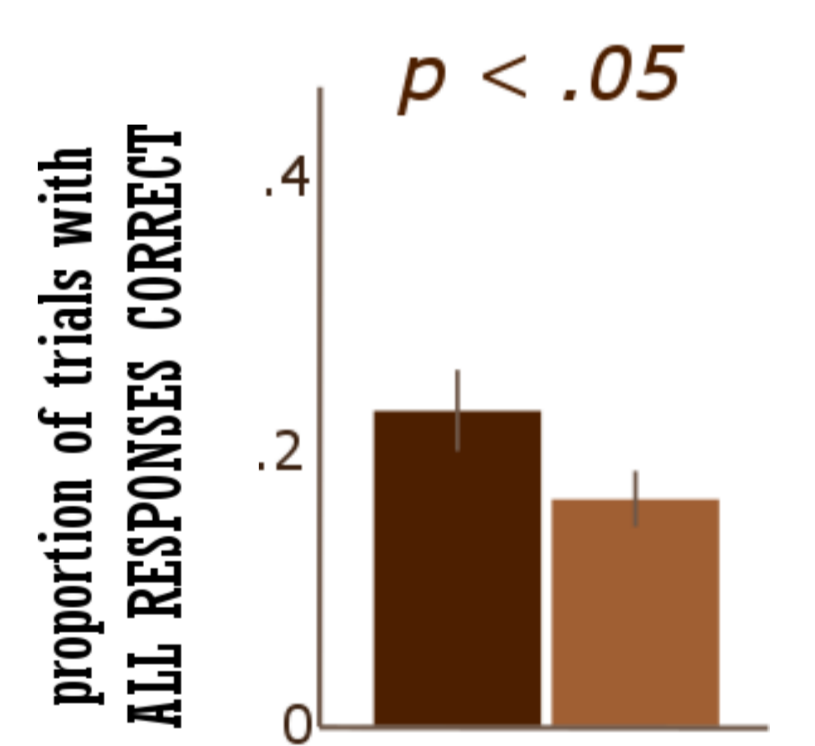
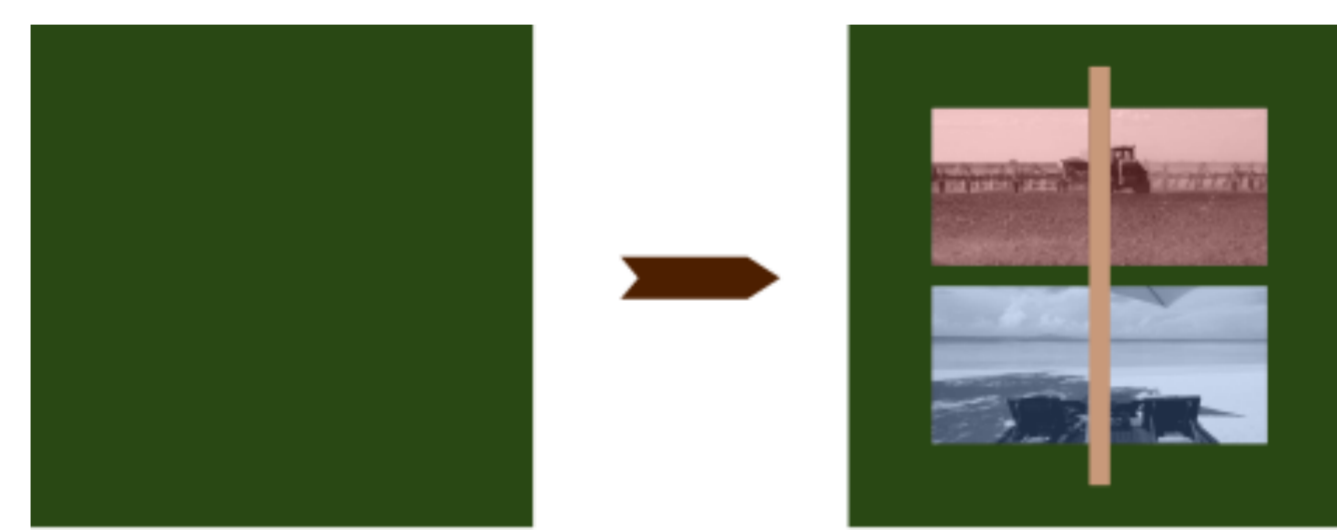


RESULTS

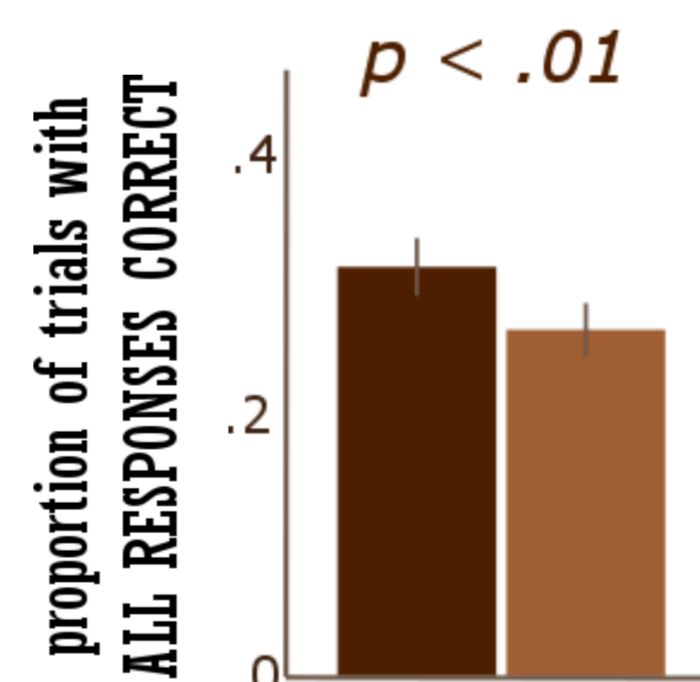
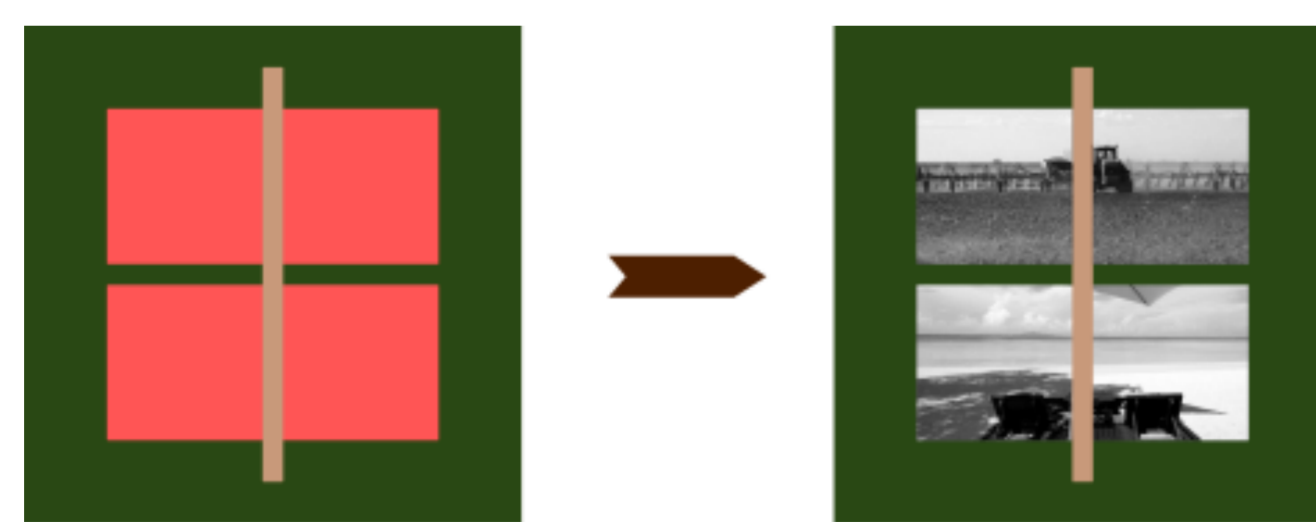
Experiment 1 Red/blue pre-segmentation cues



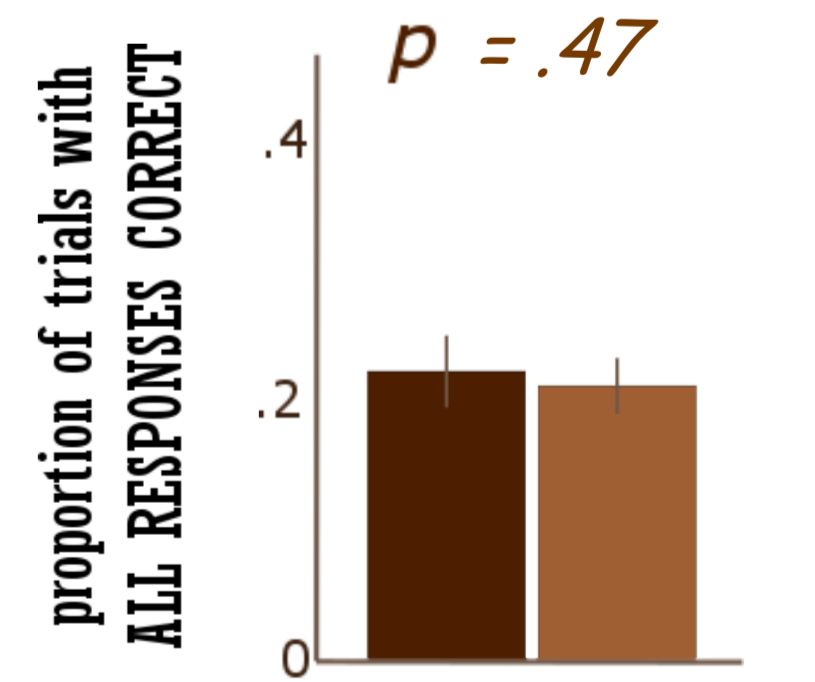
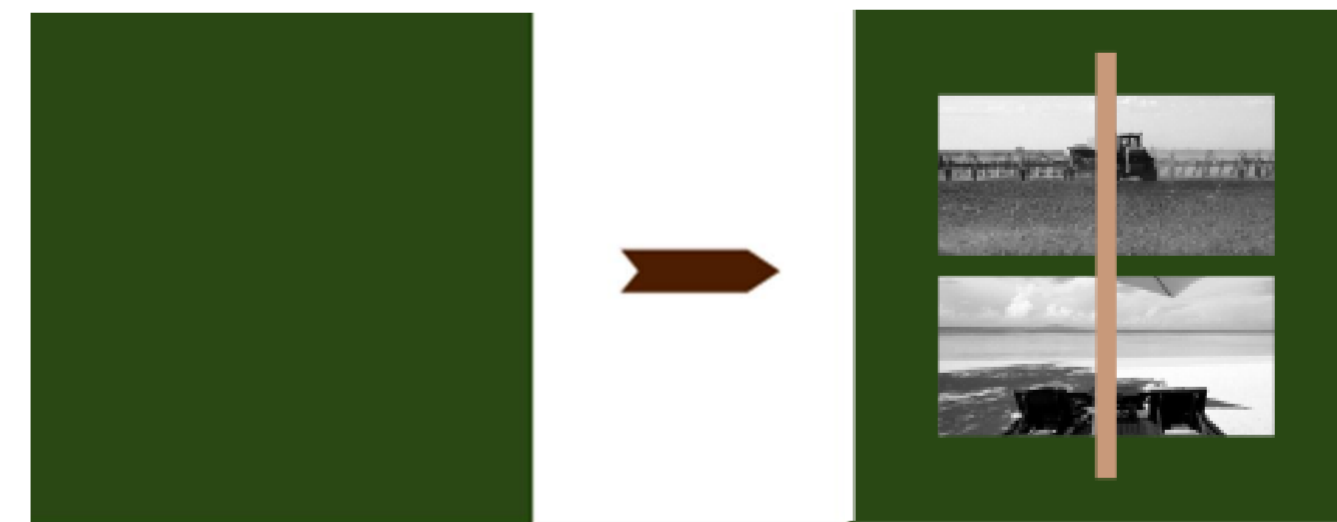
Experiment 3 No pre-segmentation cue but stimuli slightly tinged



Experiment 2 Identical pre-segmentation cues



Experiment 4 No pre-segmentation cue



When observers categorize all four images correctly, that means they correctly parsed the display into two vertical or horizontal patches irrespective of segmentation cues

These plots show the proportion of trials they could do so. It is harder to ignore segmentation when it is acting against categorization (i.e., incongruent trials).

CONCLUSIONS

- 1) Grouping cues can influence scene categorization
- 2) Some grouping is performed as fast as categorization
- 3) Compatible with feedforward processes of segmentation
- 4) Simultaneous grouping and categorization requires stronger cues