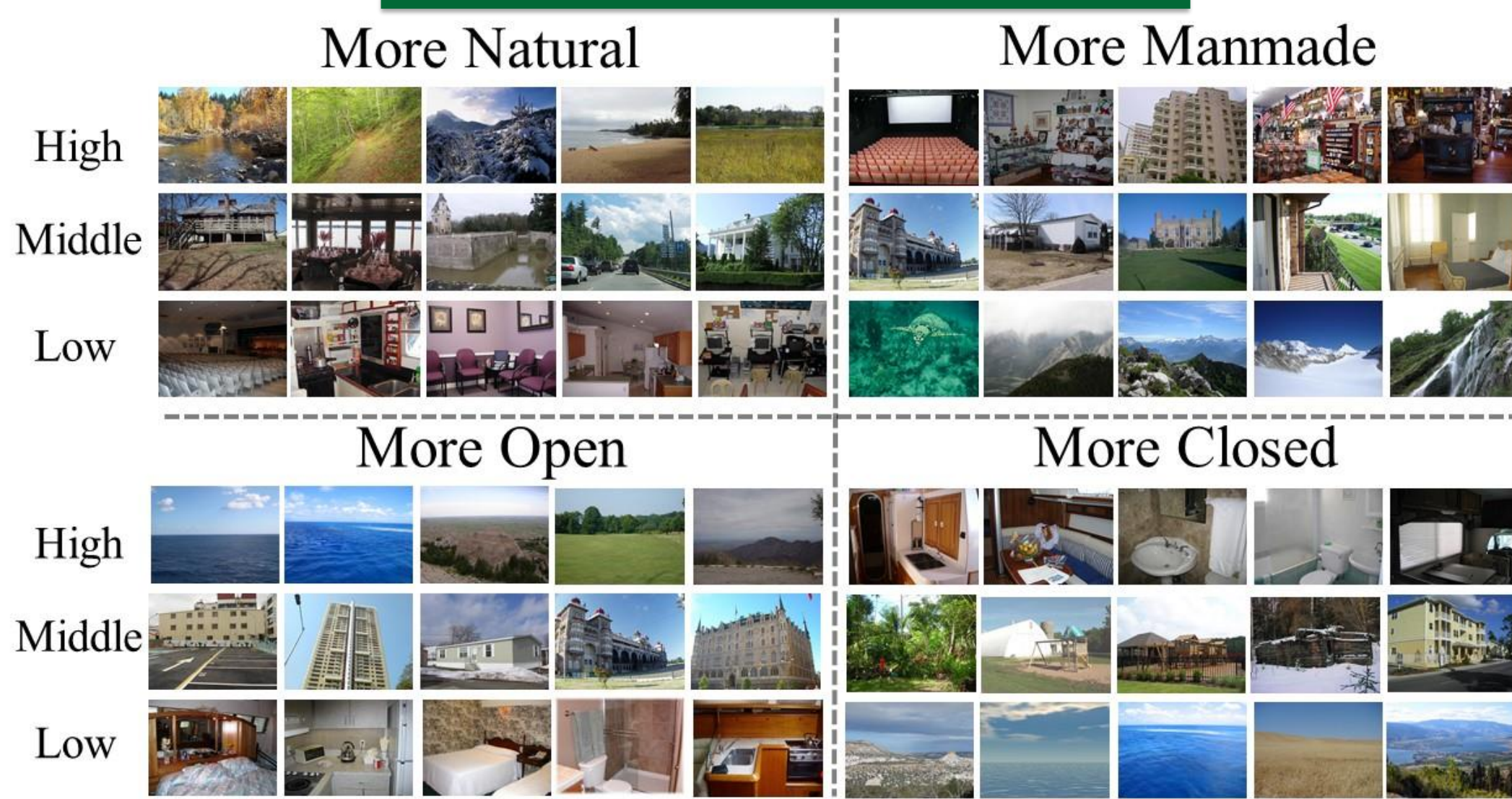


The Joint Processing of Global Properties in Scene Categorization

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Introduction



Reference ranking scales of naturalness and openness¹

- Rankings for 7035 scene images from SUN database²
- Rankings based on paired comparison responses from 1035 participants on Amazon Mechanical Turk (Mturk) analyzed with the Bradley-Terry-Luce Model³

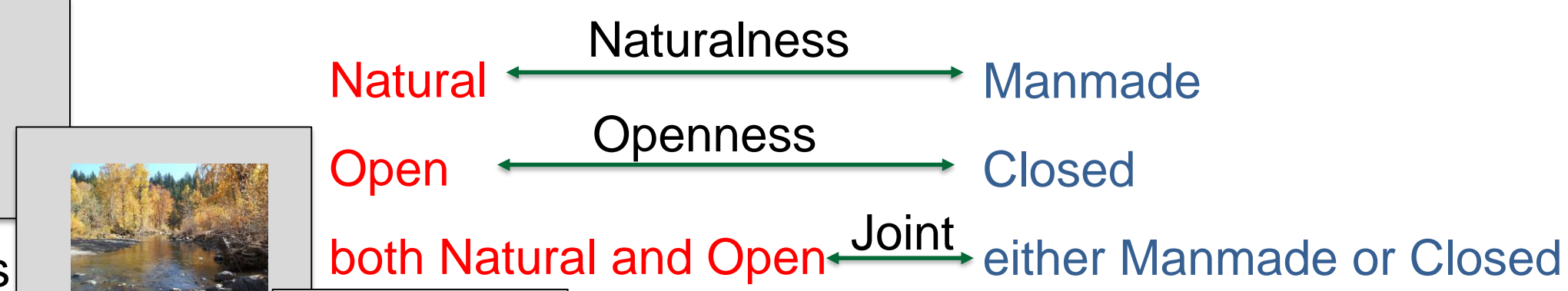
Hypothesis

- People respond faster to extreme (i.e. high, low) scene images on the reference scales.
- People are more efficient in jointly judging naturalness and openness due to the correlation between the scales.

Experiment

Task

Is the scene image more:



Stimuli

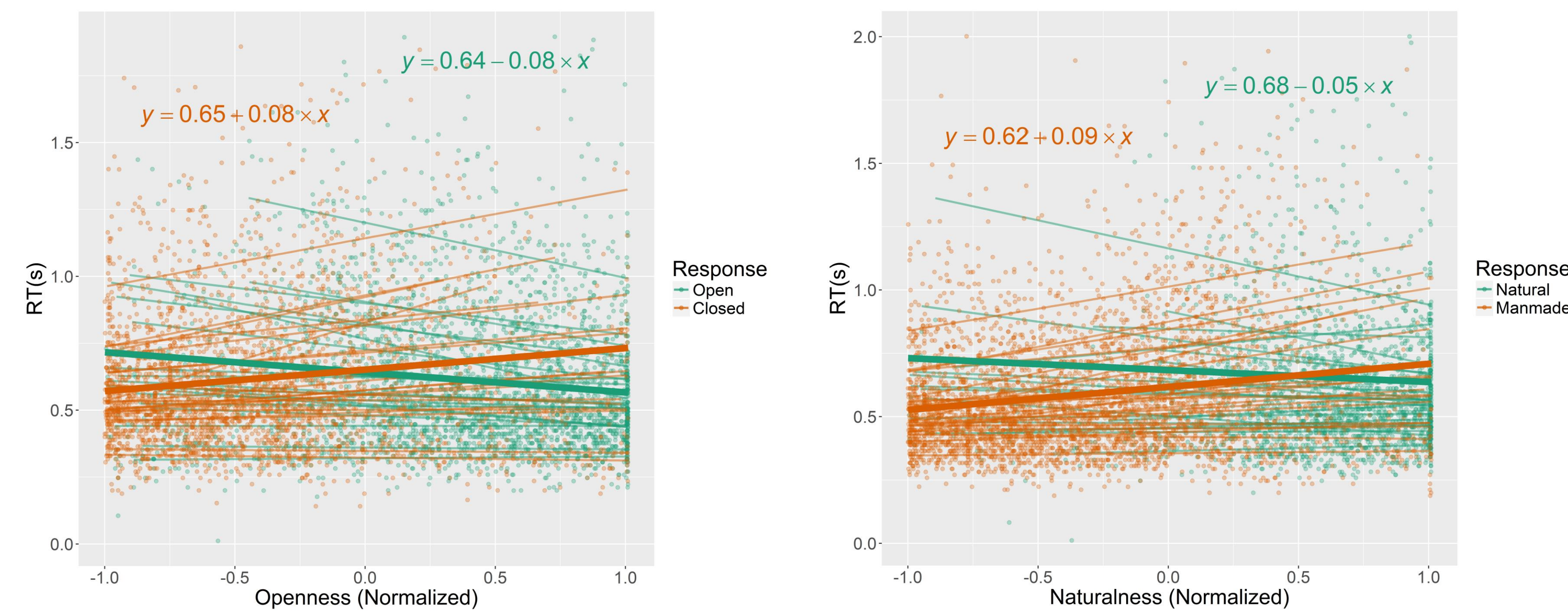
- Randomly selected image from the set of 7035
- Images were drawn specifically from the extremes of scales for feedback and catch trials.
- Feedback trials (first 10 trials/block) → followed instruction
- Catch trials (every 10th trials) → paid attention

Participants

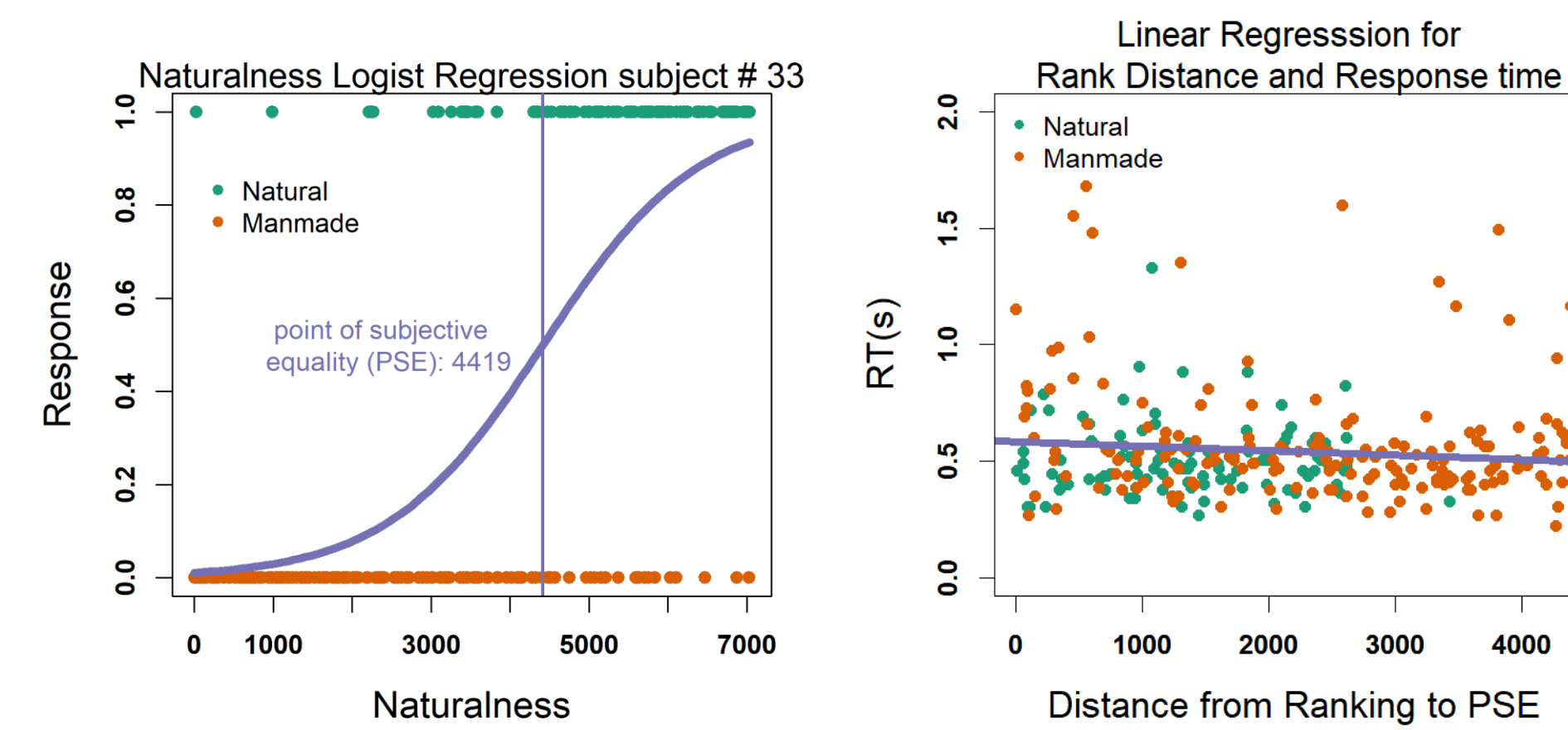
20 undergraduate students (>=80% accuracy in catch trials)

Results

Responses

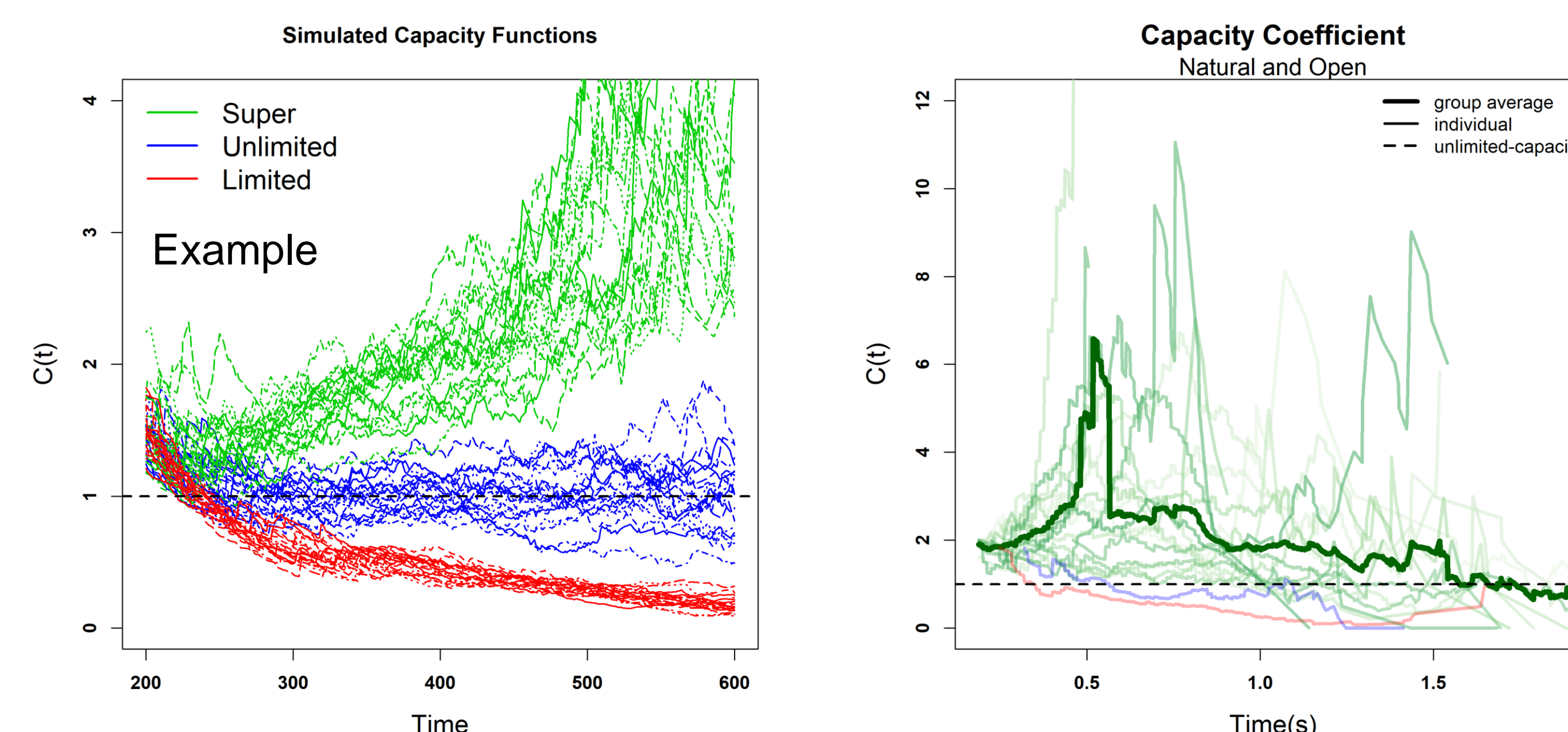
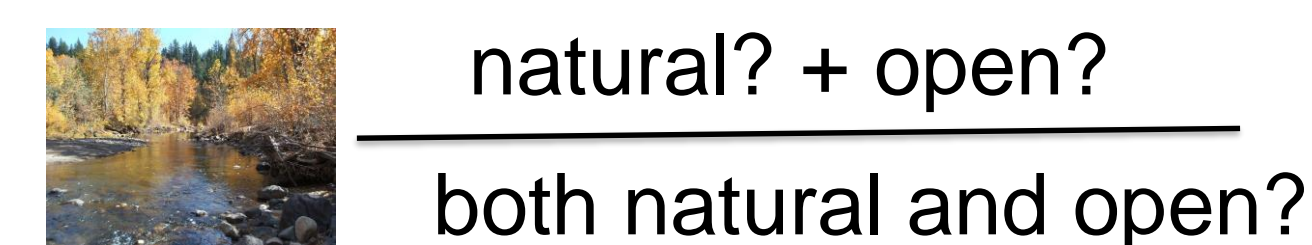


- On average, students' responses were consistent with the Mturk based rankings.
- Participants were faster when scene images rankings were more extreme.



Capacity Analysis⁴

$$C_{AND}(t) = \frac{K_{natural}(t) + K_{open}(t)}{K_{natural-open}(t)}$$



- At group level, participants are more efficient in deciding the scene image is "both natural and open" compared to the base line, z-score: [-3.19, 14], $M = 8.88$, $SD = 4.72$, $t(19) = 8.41$, $p < .001$.

Conclusion

Reference Ranking Scales

- Participants in a lab setting gave responses that were consistent with the Mturk based scales.
- Participants were faster when scene images had more extreme rankings.

Joint Processing Efficiency

- Participants were more efficient in answering joint questions than predicted by parallel, independent processing, which may due to the correlation between naturalness and openness.

Future Studies

Aftereffects

- People are adapting to global properties⁵.
- The response to current trials may be influenced by the previous trial(s).

Basic-level vs. global properties categorization

- The reference ranking scales offer possibility manipulating degree of basic-level/global properties.
- Survivor Interaction Contrast⁶ could be applied to investigating serial vs. parallel processing of scene categorization across levels.

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