The Joint Processing of Global Properties in Scene Categorization

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Introduction

Reference ranking scales of naturalness and openness
1. Rankings for 7035 scene images from SUN database
2. Rankings based on paired comparison responses from 1035 participants on Amazon Mechanic Turk (Mturk) analyzed with the Bradley-Terry-Luce Model

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: (Three blocks with different questions)
- Natural
- Open
- Both Natural and Open
- Other Manmade or Closed

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 Analysis

Capacity Analysis

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

- Natural? + Open?
- both natural and open?

Future Studies

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.

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

References