Category-specific attention for animals reflects ancestral priorities, not expertise

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Visual Attention

• some areas of the visual field are selected for additional processing

• selection based on:
  – current goals
  – personal relevance
  – low-level features
Origins

• goal-derived
  – aids in voluntary visual search
  – additional attention to task-relevant objects

• ancestrally derived
  – evolutionary benefit for involuntary additional processing (environmental dangers)

• expertise-derived
Animate Monitoring Hypothesis

• ancestrally-derived
• automatic allocation of additional attention
  – humans
  – non-human animals
• important for:
  – food
  – danger (predators / human adversaries)
  – social opportunities
  – cues for other animals, plants, or humans, environment
Paradigm

• change-blindness task
  – subjects presented with color images of complex scenes
  – each scene has two versions with a change
    • presented for 250ms
    • separated by 250ms blank mask
  – repeats until subject responds yes or no
• changes occur in multiple semantic categories
Timing

Cycle repeats until participant response

Mask 250 msec
Scene A' 250 msec
Mask 250 msec
Scene A 250 msec
Fixation Cross 500 msec
Predictions

• changes to animals (incl. humans) will be detected more quickly
• changes to animals (incl. humans) will be detected more frequently (higher accuracy)
• detection advantage is not due to interest level of target
• detection advantage is not due to low-level stimulus properties of target
• detection advantage not a result of experience
Experiments

• experiment 1:
  – 70 scenes in 5 semantic categories {people, animals, plants, moveable artifacts, fixed artifacts}

• experiment 2 – duplicate of experiment 1

• experiment 3 – inverted stimuli
  – preserves low-level properties
  – disrupts recognition
Experiments

• experiment 4 – Gaussian blur
  – preserves most low-level properties
  – further disrupts recognition

• experiment 5
  – 96 scenes in 4 semantic categories {vehicles, fixed artifacts, animals, people}
Results

• experiments 1 & 2
  – animate (people and animals) targets were detected faster than inanimate (plants, moveable and fixed artifacts) targets \[p = 10^{-10}, 10^{-15}\]
  – animate targets were detected more often (higher hit rates) than inanimate targets \[p = 10^{-8}, 10^{-10}\]

• interest ratings correlate with RT, but not after controlling for animacy
Results
Results
Results

• experiment 3 (inversion)
  – lower accuracy and longer reaction times in general
  – no difference in detection speed \([p = 0.25]\)
  – inverted animate targets detected more frequently than inverted inanimate targets
    • accuracy for moveable artifacts may be anomalous
    • removing moveable artifacts from the data yields no difference in detection rates \([p = 0.21]\)
Results
sample blurred image
Results

• experiment 4 (blurring)
  – lower accuracy and longer reaction times in general
  – no difference in detection speed \([p = 0.17]\)
  – no difference in accuracy rate
Results
Results

• experiment 5
  – people and animals were detected more quickly than vehicles \([p = 10^{-11}]\)
  – people and animals were detected more often than vehicles \([p = 10^{-12}]\)

• inversion control
  – people and animal targets were detected more quickly and more often than vehicles
Results
Discussion

• experience is not a major factor
  – exposure to humans much higher than animals, but curves track closely
  – no speed advantage for people vs. animal targets

• vehicle targets detected slightly better than inanimate artifacts
  – moderate expertise effect
  – vehicles weakly evoke animate attention bias
Questions?