Value-Driven Attentional Capture is Modulated by Approach and Avoidance Movements

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Background

- Visual selection can be guided by an integrated priority map of top-down goal, bottom-up saliency, and selection history.
- It has been known that reward history guides visual attention such that a visual feature that was previously associated with a high monetary reward prioritizes visual selection (value-driven attentional capture).
- Previous studies reported a tight coupling of reward and action history interactively guide visual attention. No prior study examined how reward and action interactively guide visual attention.
- High or low reward was given based on color of the character. Identical to Study 1.

Study 1: visual search task

- Task: push or pull a joystick according to the orientation of a tilted line.
- A high or low reward was given based on color of target containing circle (80% chance).
- Visual features that were associated with action prioritizes visual attention (value-driven approach).

Study 2: replication of study 1 with the cueing paradigm

- Task: push or pull the joystick based on identity of the colored character.
- A high or low reward was given based on color of the character (80% chance).
- Visual features that were previously associated with action prioritizes visual attention.

Key manipulation

Color x Reward x Action Contingency (counterbalanced)

Result: testing phase

- High-value color captured visual attention when it was obtained by approaching movement.
- Low-value color captured visual attention when it was obtained by avoiding movement.
- Visual features that were associated with high-reward/approaching and low-reward/avoiding pairs captured visual attention.

Conclusion

- Reward and action history interactively guide visual attention.
- Visual features that were previously associated with action and reward pairs that share the same motivational states prioritize visual attention.
- The finding suggests that not only the value of reward but how it was physically earned plays an important role in value-driven attentional capture.

References


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Would the way in which a given reward was physically earned influence how the reward-related visual feature guides visual attention?