Using Stimulus Detail and Response Bias to Influence Recognition Without Awareness

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This study extended Recognition without Awareness (RWOA) to pictorial stimuli and manipulated response bias, stimulus detail, and stimulus consistency across encoding and retrieval. Results showed increased recognition and RWOA for photos (compared to outlines), suggesting encoding detail drives RWOA. Further, recognition and RWOA increased when conservative responding was encouraged.

BACKGROUND

Voss, Baym and Paller (2008) demonstrated RWOA using kaleidoscopic images. More recently, Craik, Rose and Gopie (2015) extended RWOA to word stimuli. In the present study researchers demonstrated RWOA using meaningful pictorial stimuli (i.e. images of ever day objects).

In their 2015 article, Craik et al. proposed two factors affecting RWOA: the amount of stimulus detail present at encoding and whether context at encoding matches context at retrieval. However, they argued mainly that RWOA "will occur when item representations are strongly present (or are processed fluently), but contextual representations are weak or absent" (Craik et al, 2015, p.1279). These researchers did not experimentally test this hypothesis, so a second aim of the present study was to formally assess the driving mechanism of RWOA.

Additionally, Craik et al. (2015) replicated a previous finding from Voss and Paller (2010) showing higher rates of RWOA when participants had a more liberal response bias. In contrast, an earlier study by Starns, Hicks, Brown, Martin (2008) found higher rates of RWOA in participants with a conservative bias. Given the divide in the current literature, a third aim of the current study was to manipulate response bias and measure the effects on rates of RWOA.

HYPOTHESES

Regarding Mechanism

- If encoding detail enhances RWOA, stimuli presented as photos will have highest rates of RWOA when participants see outlines of those stimuli during retrieval.
- If encoding specificity enhances RWOA, stimuli presented as outlines will have the highest rates of RWOA when participants see outlines of those stimuli during retrieval.

Regarding Criterion Shift

- If RWOA is enhanced by a liberal criterion, rates of RWOA will be higher when false alarms (guesses) are encouraged and lower when misses (confident responses) are encouraged.
- Accuracy (d') is will be higher when false alarms are encouraged because the criterion is shifted to the left (more liberal).

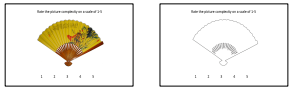
METHODS

Participants

- 48 female undergraduate students who received course credit for participation.

Study Phase

- Participants viewed 80 images (40 outlines and 40 photos) and rated visual complexity of each on a scale from 1 to 5 to ensure they were attending to the presented images.

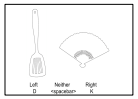


Retention Phase

- Participants attempted Sudoku puzzles for 15 minutes between the study phase and the retention phase.

Retrieval Phase

- Participants saw 120 outline pairs in a two-alternative forced choice format (80 trials with old stimuli and 40 with new foils)
- Participants read instructions leading them to believe that there were either few new foils (encouraging false alarms) or many new foils (encouraging misses).



- Participants identified which stimulus was old and rated their confidence in that answer
- Participants made a best guess if they reported neither was old
- Participants received feedback regarding correct answers, false alarms and misses
  - Participants in the false alarm group received the following feedback after each miss and false alarm respectively:

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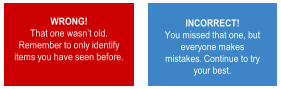
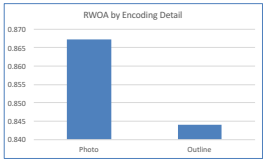


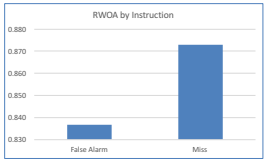
  - More critical feedback was given for the unwanted error in attempt to prevent the participant from making that error, while more accepting feedback was given for the desired error to encourage that error and shift response bias.

RESULTS

Recognition without Awareness

- Rates of correct guessing (85.6%) significantly greater than chance ($p<0.001$)
- Rates of RWOA were significantly higher ($z=2.049$, $p= 0.040$) for photos (86.72%) than outlines (84.40%).
- Rates of RWOA were significantly higher ($z=-3.178$, $p=0.001$) in the MI group (87.29%) than the FA group (83.69%).





Signal Detection Differences by Encoding Detail

- Hit rates were significantly higher ($z=-3.113$, $p=0.002$) for studied photos (78.8% - inconsistent context between study and retrieval) than studied outlines (74.91% - consistent context between study and retrieval).

Instruction Manipulation and Criterion Shift

- Significantly higher number of FAs in FA group ($z>6$, $p<0.001$) indicated that our manipulation was effective.
- Mean accuracy (d') significantly higher ($t=-2.49$, $p=0.016$) in MI group (1.736) than FA group (1.279).

False Alarm Instructions

	Participant Response	
Stimulus	Old	New
Old	74.6%	25.4%
New	**29.4%**	70.6%

d' = 1.279
c = -0.090

Miss Instructions

	Participant Response	
Stimulus	Old	New
Old	72.1%	27.9%
New	**15.9%**	84.3%

d' = 1.736
c = 0.132

* $p < .01$

Correlation between RWOA and Miss and FA Rates

- No correlation was found between miss rate (number of misses) and RWOA.
- As an individual makes more FAs, they tend to demonstrate more RWOA.
- This trend was stronger for individuals in the FA group.

CONCLUSIONS

This study demonstrated that RWOA occurs with meaningful pictorial stimuli. It was also found that RWOA appears to be a function of encoding detail, rather than encoding specificity since hit rate was higher overall for images that were seen as photos during study even though their context differed at retrieval when selecting outlines.

The current study successfully shifted response bias to be more liberal as demonstrated by increased numbers of FA's in the false alarm condition. However, miss rate was similar in both groups suggesting that the instructions and feedback did not successfully encourage more conservative responding. Additionally, the data replicated the Starns et al. (2008) finding that higher rates of RWOA are observed when participants are encouraged respond confidently (miss condition) and not guess. This finding was further supported by the fact that participants in the miss group correctly identified more stimuli at retrieval than those in the false alarm group. Perhaps encouraging guessing results in faster response times that outpace the process of RWOA. Interestingly, however, there was no correlation found between rate of RWOA and number of misses or false alarms.

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