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## Implicit Encoding Explored Through the Flankers Task

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# Implicit Encoding Explored Through the Flankers Task

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## Introduction

The world presents humans with too much information. Yet, among all the noise in one’s environment, one still has the capacity for learning. This suggests the presence of a mechanism that filters the “task irrelevant” information from the “task relevant” information in one’s environment. This is often referred to as selective attention. The current research is concerned with the role selective attention plays in memory encoding for different types of memories.

The two types of memory being examined in the current experiment are explicit and implicit. Explicit memories are declarative or easily described. Implicit memories cannot be declared – such as memories of how to ride a bike. It has been found that implicit memories, even though one does not have conscious awareness of them, do have the power to affect performance. This means that even when one’s selective attention filter is marking information as “irrelevant”, the irrelevant information alters the way one responds on a task. Interestingly, the “irrelevant” information that often affects responding is un-reportable by the participant.

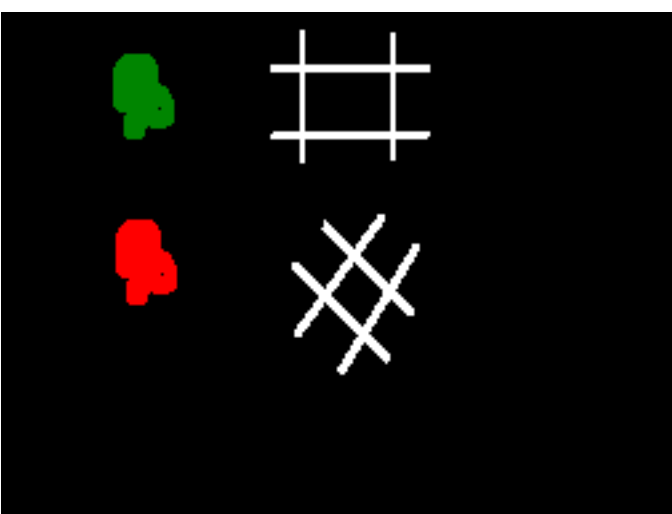
One task that has been used previously to examine selective attention is the flankers task, which consists of three items with the center item being the item that requires a response - the target. The two items on either side of the target are the “irrelevant” flankers. The correlated flanker effect is the difference in reaction time between the trials in which the flankers that are correlated with the correct response are present (congruent) and trials in which the flankers correlated with the opposite response are present (incongruent). Participants are about 30ms faster to respond on congruent trials than incongruent (Miller, 1987).

The current study sought to further understand the mechanisms behind this selective attention task by asking, is incidental (implicit) learning of irrelevant information encoded in memory differently than intentional (explicit) learning? If so, what is the fate of the implicit “irrelevant” information?

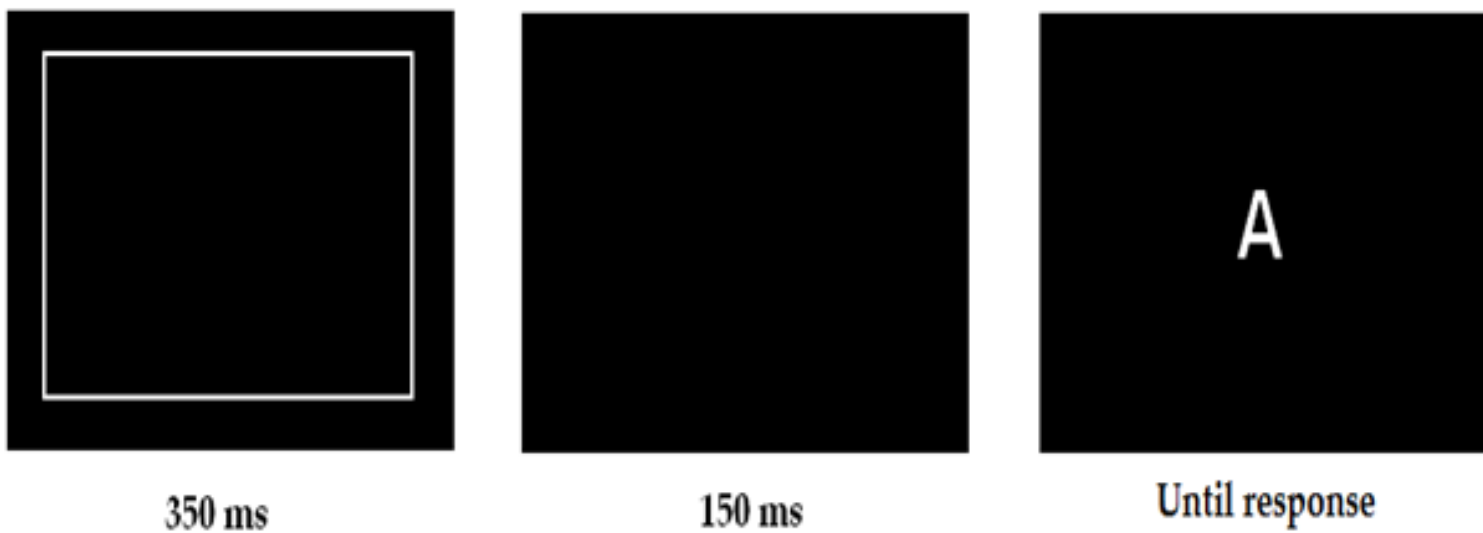
## Experimental Design, Procedure, and Results

The following experiments were designed to look at the effect of implicit learning on implicit and explicit memory tasks. Participants completed the correlated flankers task consisting of 2 practice blocks and 8 experimental blocks. After completing the experimental condition, participants were given the implicit and explicit memory tasks – order being counterbalanced across participants.

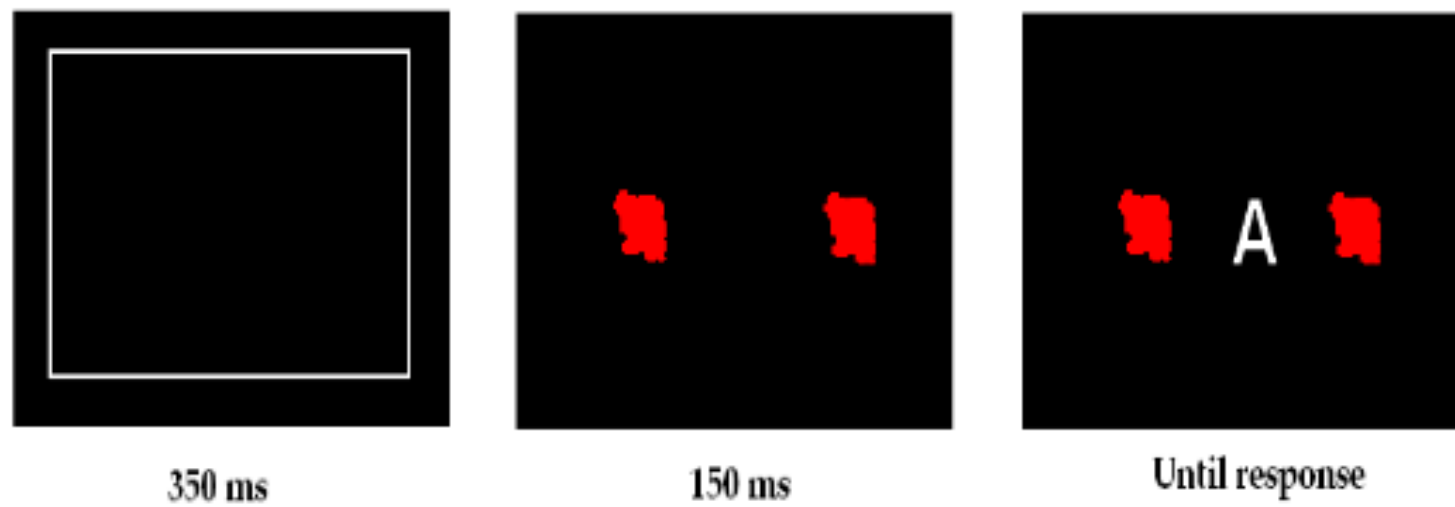
Possible stimuli



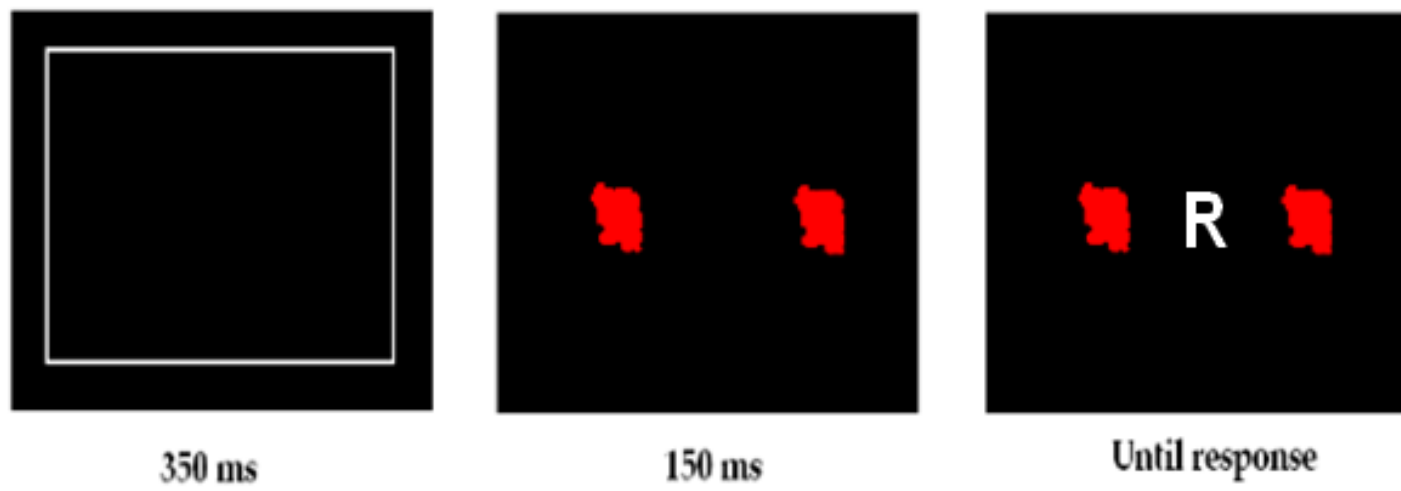
Trial sequence for practice blocks



Trial sequence for experimental blocks



Example of Implicit Task



| Findings            | <i>t</i> and <i>f</i> values | Significance    |
|---------------------|------------------------------|-----------------|
| Effect of Prompt    | <i>f</i> = 0.13              | <i>ns</i>       |
| Order of Tests      | <i>t</i> = 2.18              | <i>ns</i>       |
| Flanker Effect      | <i>t</i> = 1.33              | <i>ns</i>       |
| Explicit Assignment | <i>t</i> = -2.80             | <i>p</i> = .007 |
| Implicit Accuracy   | <i>t</i> = 2.18              | <i>p</i> = .034 |

## Discussion

The present research began as an examination of the underlying mechanisms involved in selective attention of implicit versus explicit memory. The correlated flankers task was used as a tool to induce implicit learning in order to examine that mechanism. The results of the main experiment yielded no flanker effect, meaning participants did not have shorter response times for congruent correlated trials as compared to incongruent correlated trials. This is in direct contrast with results of the flankers task in the prototype studies (Miller, 1987; Schmidt & Dark, 1998) used to develop the methodology used in the current experiment.

The results seem to indicate that the implicit information was effectively ignored, based on the response time similarity between the incongruent and congruent trials. However, the participants were better than could be expected by chance in their performance on the implicit memory task. This could be due to actual learning of the implicit relationships between the targets and irrelevant flankers that participants were not able to explicitly report.

Participants collectively had a 3% error rate. This indicates that participants were conscientious in responding to the experiment. When participants are conscientious responders, they often choose more carefully how they will respond, taking less risks, and leading to higher response times and more time spent viewing the target. One may be able to attribute the lack of a flanker effect to careful responding by our specific group of participants.

### Experimental Comparisons

|                                    | Miller (1987)  | Schmidt & Dark (1998)   | Sullivan (2012)  |
|------------------------------------|--|---|--|
| Number of Participants             | Experiment 1 - 24<br>Experiment 2 - 46<br>Experiment 3 - 27<br>Experiment 4 - 25<br>Experiment 5 - 24<br>Experiment 6 - 40                               | Experiment 1- 48<br>Experiment 2 - 26<br>Experiment 3 - 28                    | Experiment 1 - 48  |
| Blocks / Total Experimental Trials | Experiment 1 - 2 / 384<br>Experiment 2 - 2 / 384<br>Experiment 3 - 3 / 240<br>Experiment 4 - 3 / 168<br>Experiment 5 - 3 / 192<br>Experiment 6 - 8 / 768 | Experiment 1 - 6 / 320<br>Experiment 2 - 6 / 320<br>Experiment 3 - 6 / 224    | Experiment 1 - 8 / 384   |
| Criterion for Elimination          | RT over 2s.  | Experiment 1 - Accuracy below 90%.<br>Experiments 2 & 3 - Accuracy below 85%. | Accuracy below 90%.  |
| Mechanism of Responding            | Standard English Keyboard employing a left and right key.  | Standard English Keyboard employing buttons "Z" & "/"                         | Standard English Keyboard employing buttons "Z" & "/"                                  |
| Average RT                         | M= 768ms for Valid Trials.<br>M= 803ms for Invalid Trials.   | M= 530ms for Valid Trials.<br>M= 541ms for Invalid Trials.                    | M = 591ms for Congruent / Valid Trials.<br>M = 602ms for Incongruent / Invalid Trials. |

## References

Miller, J. (1987). Priming is not necessary for selective-attention failures: Semantic effects of unattended, unprimed letters. *Perception & Psychophysics*, 41(5), 419-434.

Schmidt, P. A., & Dark, V. J. (1998). Attentional processing of “unattended” flankers: Evidence for a failure of selective attention. *Perception & Psychophysics*, 60(2), 222-238.