# The Mirror Effect within Perception: Not another Recognition Memory Study

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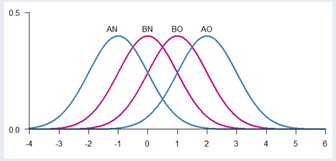
## Introduction

Signal detection theory has been applied to study Recognition Memory, providing a method to describe subjects' ability to discriminate between stimuli that have previously been presented (old stimuli) from a new set of stimuli (Wixted, 2007). Within this field, a consistent pattern of responses -identified as the Mirror Effect- has shown that when we compare the hit and false alarm rates obtained for two different sets of stimuli, where one is known to be more easily recognized (A) than the other (B), this difference in the discriminability of each group of stimuli is reflected in the identification of both, old and new items, suggesting a particuclar organization of the distributions involved over the decision axis (Glanzer, Adams, Kim, 1993).




Evidence in favor of the Mirror Effect has been reported across a wide range of variables influencing stimuli recognition and several SDT-alike procedures:
In typical Yes/No tasks, the Mirror Effect appears as:

$$FalseAlarms(A) < FalseAlarms(B) < Hits(B) < Hits(A) \quad (1)$$

The pattern also appears when participants are asked to valuate how confident they felt while answering to each trial, giving the following mean confidence-rating pattern for Affirmative answers (a.k.a. -Yes, I've seen it before-).

$$R(AN) < R(BN) < R(BS) < R(AS) \quad (2)$$

Surprisingly, evidence for the Mirror Effect has only been collected within Recognition Memory studies and so, most theories and models proposed to explain it tend to do it in terms of high-level processes engaged in the study phase, (DeCarlo, 2007, Glanzer et. al, 1993). The main goal of the present study was to explore the existence of the Mirror Effect outside Recognition Memory to test the assumption that it depends on high-level processing differences engaged during a study phase. Therefore, we constructed a detection task that involves perception only, and uses a largely studied optical illusion, the Ebbinghaus circles, to design to levels of discriminability.

## Method

Two levels of perceptual discriminability were constructed according to the literature on the variables involved in the Ebbinghaus illusion, (Massaro, 1971).

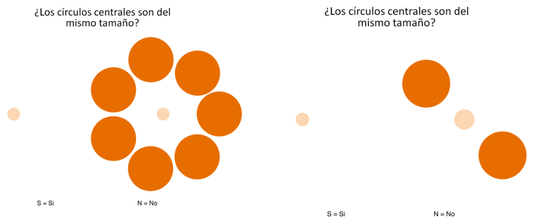
- High accuracy (A): Ebbinghaus illusions with 2 or 3 surrounding circles.
- Low accuracy (B): Ebbinghaus illusions with 7 or 8 surrounding circles.

Detection task: Are the two central circles of the same size?
Confidence Rate Task: On a scale from 1 to 3, how confident are you of your response?
Two experiments:

- Experiment 1: Just the right circle to compare is shown part of an Ebbinghaus illusion.
- Experiment 2: Both circles were constructed as Ebbinghaus illusions.

Technical details:
Experiment 2 consisted of a single Ebbinghaus illusion-circle that had to be compared with an aisle, constant, reference circle. Both experiments included underestimation and overestimation-inducing Ebbinghaus illusion. Each experiment included a total of 640 trials (320 trials for each class of stimuli, A or B, with 120 signal and noise trials respectively) presented at random. On each trial, stimuli were shown for only 1.5 seconds to prevent habituation to the illusion. Participants could enter their response ('Yes, circles are the same size' or 'No, they're not') either before or after stimuli disappeared from screen. After the first response was given, a scale containing numbers from 1 to 3 was presented to indicate participants to grade how confident they were from their previous response by pressing one of the three possible response keys, (1-Low, 2-Medium, 3-High). However, the program registered these responses as part of a larger continuum going from 1 to 6, distinguishing 'yes' from 'no' responses: a) If participants chose 'No' and pressed 3, it would be registered as 1 (Very sure noise), and so on. b) If participants chose 'Yes' first and pressed 3, it would be registered as 6 (Very sure signal), and so on. Participants had to press the space bar to indicate that they were ready to move from trial to trial. Response time was also registered.

## Procedure




## What did we find? (Spoiler alert!)

In both experiments, the pattern of responses identified as the Mirror Effect was found on at least 85% of the participants.

## Classical Data Analysis

Nam quis odio enim, in molestie libero. Vivamus cursus mi at nulla elementum sollicitudin. Nam quis odio enim, in molestie libero. Vivamus cursus mi at nulla elementum sollicitudin.

$$E = mc^2 \quad (3)$$

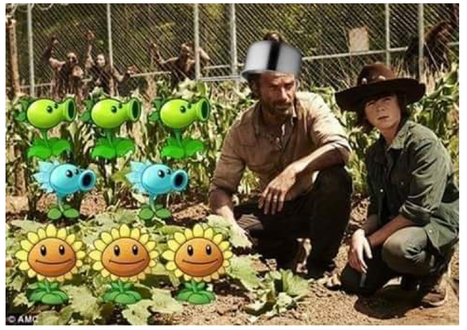
Nam quis odio enim, in molestie libero. Vivamus cursus mi at nulla elementum sollicitudin. Nam quis odio enim, in molestie libero. Vivamus cursus mi at nulla elementum sollicitudin.

$$\cos^3\theta = \frac{1}{4}\cos\theta + \frac{3}{4}\cos 3\theta \quad (4)$$

Nam quis odio enim, in molestie libero. Vivamus cursus mi at nulla elementum sollicitudin. Nam quis odio enim, in molestie libero. Vivamus cursus mi at nulla elementum sollicitudin.

$$\kappa = \frac{\xi}{\sigma} \quad (5)$$

## Results



## Conclusion

The present study is the first to show evidence for the existence of the Mirror Effect patterns of response, on a signal detection task that does not involve recognition memory. The perceptual task here presented lacked of a pre-experimental phase where participants had the chance to manipulate how powerful the illusions included in each condition were, contradicting what has been proposed within recognition memory studies. The fact that the Mirror Effect was found on a perceptual task, with accuracy conditions designed specifically in terms of the signal that participants are asked to detect, may suggest that there's a much more basic principle regulating the patterns of response observed.

## Additional Information

Maecenas ultricies feugiat velit non mattis. Fusce tempus arcu id ligula varius dictum.

- Curabitur pellentesque dignissim
- Eu facilisis est tempus quis
- Duis porta consequat lorem

## References




## Acknowledgements

First of all,

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