An Informative Yet Succinct Title

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Detecting changes in our environment is crucial for human navigation. To do so, our perceptual systems must integrate visual inputs over time. If this integration is not successful, important environmental features, such as a pedestrian crossing a street, may be missed. It is largely unknown what the mechanism behind this temporal integration is, or what might cause it to fail.

A system called iconic memory has been previously found to retain visual input after the input is initially seen (Sperling, 1960). This brief storehouse of visual information may therefore be the key to how temporal integration is achieved. However, if a visual interruption is presented after the initial stimulus, iconic memory may be erased (Mewhort et al., 1969). If our ability to integrate information over time is reliant on iconic memory, then a visual interruption may lead to a failure in detecting change.

Here, we test the hypothesis that iconic memory is the mechanism behind change detection by introducing visual masking to interrupt iconic memory. Briefly, participants will see images alternating on a screen. There will either follow each other immediately (no flicker condition) or there will be a light grey mask following each image (flicker condition). If iconic memory is the mechanism behind change detection, participants should be slower on the flicker condition compared to the no flicker condition.

**Methods**

Five individuals (20% male, mean age 32.25) were recruited from a California State University, Fullerton (CSUF) dormitory hall. Four were native English speakers and one was a native Spanish speaker. All participants accessed the experiment on CogLab via a 17 inch MacBook Pro.

Each participant was given a total of 16 trials. Each trial consisted of two images alternating on a screen. Each image was 4 inches high by 2.75 inches wide. On half of the trials, the two images were exactly the same. Participants were asked to determine whether or not the images differed. Pressing the “J” key indicated a change and the “F” key indicated no change. Each trial continued until the participant made a decision. Participants had no time limit in which to complete each trial. For each change condition, the image switch included either a flicker or a no flicker condition. In the flicker condition, a light grey screen appeared for 200 ms each time the images switched. In the no flicker condition, there was no break between the images when they were switched.

**Results**

Our primary interest is in reaction time between the flicker and the no flicker conditions. In this experiment, we found that there is a significant difference (Mflicker = 10599, Mno flicker = 5976, t = 5.1016, df = 135, p = 1.118e-06) between the two conditions. Because we also have data for change versus no change, we included in our analysis a two-way analysis of variance (ANOVA) to examine the effects of flicker condition and change condition on reaction time. Here, there was a significant difference for the flicker condition (F = 10.171, p = 0.0016) and for the change condition (F = 29.350, p-value = 1.35e-07). Their interaction was non-significant (F = 1.512, p-value = 0.2199).

**Discussion**

A significant difference between the flicker and non-flicker conditions was found, supporting our hypothesis that iconic memory is necessary for change detection. Our findings also suggest our ability to detect change relies on uninterrupted visual input, which has far reaching implications such as drivers missing a pedestrian after glancing at their phone.

It is however possible that there are other mechanisms behind our current findings. For example, ganglion cells in the retina have been found to contain residual visual information after stimulus onset and may be susceptible to masking (Nelson, 2001). Further research is needed to explore this possibility.