Now You See It, Now You Don't:
Effects of Change Blindness on the Ability to Detect Change

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Abstract

Everyday changes often go unnoticed, a concept known as change blindness. Change blindness was evaluated in the present study using a slideshow of images with one of three types of change – something added, something removed or no change. Participants (n=85) also rated their own and others ability to detect changes. They were asked to rate themselves before and after seeing the slideshow. Results showed that individuals recognized when something was removed from an image more often than other types of change. Participants did not overestimate their ability to detect change, but did significantly underestimate others' ability to detect change.

Change Blindness

- Change blindness is simply the failure to detect changes.
- Simons and Ambinder (2005) noted four core conclusions about change blindness:
  - Change blindness will occur when attention is taken away from the visual stimulus that is undergoing change
  - Changes that happen to objects at the center of attention will be detected easier
  - Attention is necessary to detect change
  - Observers also need to be able to identify both images (before and after change) and compare them to identify change
- The present study focuses on the last conclusion, but attempts to make sure all others are present

Detecting Types of Changes

- In an experiment by Cole, Kentridge, Heywood (2004) participants looked at images of shapes. They then saw an alternate image that contained either one extra object or one less object. They found that 79% of their participants responded correctly to an object being added while only 71% responded correctly to an object being removed. Throughout all of their experiments they found that objects that were added are more likely to be detected than objects that are removed.

Detecting Types of Changes Continued

- Rensink, Regan, and Clark's (1997) study was similar to the present study. Participants viewed images from everyday life separated by blank slides. Each question showed the image twice before a change occurred, they continued to alternate until the participants saw the change and then they pressed a button.
  - This flicker effect (placing the blank screen between images) masks the change. The purpose is to mask the signal produced by change as it happens so when the participants flip from slide to slide they can't watch the change happen (Simon & Ambinder, 2005).

Estimating Ability to Detect Change

- One study examined participants' likelihood of overestimating change detection. Participants read scenarios that showed two images – before change and after change. Afterwards they were asked to tell whether or not they would have recognized the change and how confident they were about it. 83% of participants said they would have detected the change. They overestimated their own ability to detect change (64%) and rated other's ability significantly lower (21%) (Levin, Momen, Drivdahl, & Simons, 2000).

Hypotheses

- The present study tested the effects of change blindness and the flicker paradigm on individuals' ability to detect change (when some thing is added, removed, or neither in an image). It also assessed how individuals viewed their own and others' ability to detect these changes. It was predicted that:
  - There would be a main effect of the detection of change in an image such that the participants would be more likely to recognize when something is added than when something is removed from the image.
  - Participants would be more likely to overestimate their ability to detect change when they are asked before viewing images
  - Participants would be more likely to underestimate others' ability to detect change compared to their self ratings

Participants

- Participants:
  - 85 undergraduate introduction to psychology students
  - 18 male students, 61 female students, 6 did not report their sex
  - Age ranged from 18-21, M = 19.20, SD = .64
  - 78 were Caucasian, 4 were African-American, 2 were Hispanic, and 1 reported to be of a different ethnicity
  - 8 were freshmen, 59 were sophomores, 17 were juniors, and 1 was a senior
  - All 85 participants were single

Methods

- An experimental design was used. Participants viewed a slideshow using Microsoft PowerPoint. They were each given packets including three questions, 15 answer spaces, and a demographics page.
  - **Detecting Change**: A slideshow consisted of 15 sets of 3 slides – one slide had the original image, followed by a blank slide, followed by the image with either something added, something removed, or no change
    - There were 5 sets of slides that had something added, 5 sets that had something removed, and 5 with no change.
    - The original image was viewed for 10 seconds. The blank slide was shown for 4 seconds to create a masking effect. The changed original image was shown for 15 seconds.
    - Example: Slide 1 is an original picture of a living room, next slide is blank, and then the next slide is the same picture of the living room but a lamp is missing.
  - **Estimating Detection of Change**: Three questions regarding their estimates of their own accuracy and others accuracy in detecting change were included in the answer packet. Participants answered the first question prior to viewing the slideshow. They were asked how many they thought they would answer correctly out of 15. The same question was asked again after viewing the slideshow, along with being asked how many they thought others would answer correctly.

Methods Continued

- Data was recorded on the answer packet given to each participant.
  - There were 15 spaces to record their answers for each image. Answer spaces were set up where it said " Image x had: something added, something removed, or no change." After checking one of those there was a space next to it to write in what exactly changed. The answer to the above example would be checking "something removed" and writing "the lamp".
  - Demographics page was also included.
  - All participants were given informed consent forms to fill out and were given a debriefing statement after the experiment.

Results

- SPSS Analysis
  - The data for detecting change within the slideshow was analyzed using a single factor ANOVA, using a within subjects design. The dependent variable was the number of changes of each type correctly detected.
  - The data for the questions involving self and others' ability to detect change was analyzed using a paired samples t-test.
- There was a significant effect of type of change.

$$F = (2,168) = 52.17, p = .000 *$$

- However, the effect of type of change was not what was predicted. Participants were less likely to detect change when something was added (M = 2.15, SD = .92) than when something was removed (M = 3.53, SD = 1.11) or there was no change at all (M = 3.60, SD = 1.05).
- There was not a significant effect of participants overestimating how well they thought they would detect change compared to how well they actually did.

$$t(82) = .80, p = .424 *$$

- There was a significant effect of participants underestimating others' ability to detect change in comparison with their estimations prior to the experiment.

$$t(82) = 7.02, p = .000 *$$

$$*\alpha = .05$$

Discussion

- The results of the present study did not support the previous findings such that participants did not detect change of something added more often then something removed. They did however support previous research studies regarding the participants overestimating their ability to detect change and underestimating others' ability to detect change. There was only a significant effect of participants underestimating change.
- After looking at other research and conducting my own, I agree with Simons and Ambinder's 2005 study where they found the four core conclusions of change blindness. I think that in order to conduct a valid study it needs to assess all components of change blindness and have each be a factor within the experiment, because you do need all four to be accurate.
- In everyday life, changes occur everywhere we look, but in order to point out and mentally process these changes we must pay attention. The present study was not in a distraction free environment, which could have caused some participants difficulty while watching the slideshow. Even though this could be a limitation, everyday life is not a distraction free environment.
- During my slideshow, the original image was only displayed for 10 seconds, followed by the blank slide for 4 seconds and then the changed image for 15 seconds. In this time span, participants had to check the change they saw and write down what it was. In future studies of change blindness I would probably set the slideshow up more similar to Rensink, Regan, and Clark (1997) where participants flipped back and forth till they saw the change. This helps eliminate participants guessing what kind of change occurred.
  - When analyzing my data, I disregarded the written down responses of what exactly changed because there was a lot of missing data. Only analyzing the checked answers could have affected the results due to participants' guessing.