# The Effects of Academic Major on Reaction Time Using a Change Blindness Paradigm

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Abstract

The failure of visual detection of an environmental change by observers is known as change blindness (Schankin, Bergmann, Schubert, & Hagemann, 2017). Schankin et. al. (2017) further states that attention is controlled by top-down processing. It is assumed that forensic science students have more top-down knowledge (i.e., experience, expectation, and context). Forensic science students are trained to be aware of their surroundings, as opposed to other majors focusing on more theoretic domains. The current study used a change blindness flicker paradigm (Rensink, O'Regan & Clark, 1997) to see if Hilbert College forensic science students react more quickly to environmental change compared to Hilbert College students in majors such as Business or English. Therefore, it was expected that faster reaction times would be seen in forensic science majors as opposed to business majors in a change blindness paradigm.

# The Effects of Academic Major on Reaction Time Using a Change Blindness Paradigm

Change blindness is the failure of visual detection when observers' attention is distracted by a visual interruption in the environment (Schankin, Bergmann, Schubert, & Hagemann, 2017). It is very important to notice scene changes quickly (especially when in law enforcement). Many people today are falsely accused of committing a crime and some people even lose their lives because of misidentification (Fitzgerald, Oriet, & Price, 2014). Steblay (1992) states that eyewitness testimony has a great impact on juries, therefore, it is important to correctly identify the criminal as the perpetrator, rather than an innocent person.

In their training and throughout their courses, it is expected that forensic science students will learn to be aware of their surroundings. They should have more top-down knowledge compared to students in a major such as business, since these students are not usually exposed to their "surroundings." Schankin et. al. (2017) states that top-down processing can help one quickly make sense of his/her environment. It is also stated that top-down knowledge controls attention, and this guides the attention toward information that is related to the individuals' goal. Many things can skew the results of data when using change blindness paradigms: motivation, contextual information, instructions given to the participants, the intentions of the participants, and prior experience (Rensink, O'Regan, & Clark, 1997). Forensic science students should be able to detect change quicker than other students because it is expected that they have more top-down knowledge.

Prior research has not compared undergraduate students in one area of study to another. Fitzgerald et. al. (2014) states that existing research suggests that change blindness can potentially have an impact on the "correct identification of criminals and on false identification of innocents." This is why it is extremely important for those who are going into the law enforcement field to have as much training as possible to combat these issues. There are many pros to more training. If law enforcement

officials are trained on their environmental surroundings, and they can adapt to these changes quickly, it may lead to lower rates of police brutality. It can also provide comfort to citizens, knowing their law enforcement officials have extensive training. Although there may be benefits, it may also be costly for these officials to go through this training and it may take a longer period of time. Prior research has taken undergraduate students, volunteers, or law enforcement officials who are already in the field and observed their reaction times and accuracies to different change blindness paradigms. (Taylor, Witt, & Pratt, 2017). It was found that holding a gun actually increases the likelihood that one will categorize other objects as guns, and this can lead to fatal mistakes. Law enforcement officials should be trained to be vigilant in order to avoid these mistakes, and that starts at a collegiate level in undergraduate training. There has been no research performed on undergraduates in specific majors.

A study performed by Fitzgerald et.al. (2014) took a video involving two actors, an innocent person and the video culprit. The video started with an innocent person walking through a building and finished with another person committing theft. The participants (180 undergraduate students) viewed this video and were asked to identify the criminal in a line-up. Only 36% of participants were aware of the person change in the video.

Another study performed by Schankin et. al (2017) created a mudsplash paradigm to assess the role of attention during change blindness. Researchers created a 9x9 matrix containing 81 dots. The dots were either light gray or dark gray, and the dot in the center was either green or blue. The stimuli showed three different matrices. S1 was the original, S2 was the original with a change (some of the dots were squares), and S3 was the original without the mudsplashes, but some of the colors of the dots had switched. Participants were asked to focus on the center green or blue dot and after the matrices were shown, participants had to state if they saw a change between matrices. Much of the change blindness research has used the classic flicker paradigm stimulus. This involves an original image “A”

that repeatedly alternates or "flickers" with a modified image "A1" with a blank screen in between images (Rensink, O'Regan, & Clark, 1999). Participants are then asked to press a button when the change is noticed.

Since there has not been much research performed on undergraduate students in specific majors, the current study can show that schools may need to alter their training for students in order to detect scene changes, which can lead to lower rates of false convictions and misidentifications. It can also increase officer and public safety.

It was hypothesized that forensic science students would have a quicker detection time (in seconds) and compared to students in majors such as business.

## Method

*Participants:*

Participants were conveniently sampled through upper level forensic science and business classes at Hilbert College. A total of thirty-three (18 business, 15 forensic science) were measured. Students were asked during the beginning of the experiment to excuse themselves if they have already seen the videos.

*Materials:*

Participants were verbally told at the beginning of the experiment that their participation was their informed consent. Students watched a flicker paradigm video until the change was noticed. A total of three videos were played to ensure students had several opportunities to detect the change. A disclaimer was provided before the videos played for those who may have been impacted by flashing or flickering lights and they were excused from the study. An airplane video (Percevingacting, 2017), a boat

video (Pinto, 2015) and a sphynx video (Perceivingacting, 2017) were all public videos on YouTube that were used as stimuli.

*Procedure:*

In order to ensure that participants would not tell other participants the expected detection, the TurningPoint clicker system was used. During class time, the flicker paradigm was played and students responded by pressing a button on a clicker when they detected the change. These results were analyzed using an ANOVA

## Results

A 2x3 factorial ANOVA was used to compare the reaction times of upperclassmen business students to upperclassmen forensic science students after a series of change blindness videos were viewed. The interaction of groups and stimuli was not significant. $F$=(2,86) = .08, $p$= .919. The main effect of major (business ($M$= 20.15, $SD$ = 14.42)) and forensic science ($M$= 24.06, $SD$= 17.44) [$F$(1,86)=1.15, $p$= .287] was not significant. The main effect of stimuli (airplane ($M$=34.22, $SD$= 24.24)), boat ($M$= 17.68, $SD$= 14.61), sphynx ($M$= 14.42, $SD$= 8.95) [$F$(2,86)= 10.91, $p$<.001] was significant. The detection time was the slowest with the airplane video, intermediate with the boat video, and fastest with the sphynx video.

## Discussion

It was hypothesized that forensic science students would have a faster detection time (in seconds) than business students while watching a series of change blindness videos. The data within this experiment is inconclusive. Both business and forensic science students average detection time decreased with each video. All participants were shown all three videos in the same order, counterbalancing was not used. It is uncertain if a change in the stimulus order would decrease

detection times due to a practice effect, or if one of the videos was more difficult than the other videos. It is possible that the students' detection times decreased due to the students experiencing multiple videos, and getting better after each video is viewed. With more testing, more participants, and counterbalancing, future researchers may be able to find out which group of students would have the faster detection time, and if it is truly due to different majors.

With the electronic clicker system used, there was no way for participants to state what the scene changes within the videos were. Students may have just pressed the clicker to get a faster detection time, and without testing the accuracy of the change, there was no was to assess if the students actually saw the scene changes. Although it was mentioned in the disclaimer, there was no way to tell for certain if the students have previously seen the videos used, since they were not original videos. There was a two minute cut-off for each video, and some students did not see the change within those two minutes, so some of the data was missing.

Another limitation was the small sample size used in the study. There were too few participants to give an accurate analysis of the data and find out whether the differences in detection were due to the different majors. Overall, change blindness is a topic that needs more research, especially when it relates to law enforcement.

Future researchers may want to study more students and assess the accuracy of the scene changes, not just detection time.

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