Cross Media Exposure and Visual Search

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ABSTRACT

When people are exposed to a stimulus be it consciously or unconsciously their perceptions of the stimuli tend to improve. This phenomenon has been observed in many a study and dubbed the *mere exposure effect.* The effect has been noted to influence impressions of stimuli and even influence decisions people make. The effect has proven incredibly robust positively influencing human perceptions of drawing, nonsense words, and even faces of people from other racial groups. Similarly, studies in eye gaze show that positive perception can affect unconscious and conscious eye movements. That people tend to took at items they like even when instructed to look at items they dislike this is presented in the *Gaze cascade model* and plays a small part in what is known as *gaze bias*. However, there is little documentation on if or how these phenomena work together, if the exposure effect can manipulate gaze. Furthermore, the studies mentioned focus heavily on same media exposure. Here we analyze cross media exposure's effect on gaze during a visual search. In doing so offering new insight on how exposure, positive preference, and eye gaze interact.

KEYWORDS

Mere exposure, gaze bias, visual search

1 INTRODUCTION

Visual gaze and search patterns play a vital role for many reasons today. It is important to understand how humans perceive images, media, and the world around them because the processes behind our ability to visually search can be influenced by modern practices, inward biases, and many other things. This is a well documented phenomenon. The data from prior research could be used for corporate purposes such as making advertising more eye-catching [8], determining levels of aesthetic appeal [4], or revealing racial prejudices. [9]

Exposure effects have been shown to manipulate our ability to make split second decisions, which can lead to significant consequences. In a study of how racial prejudices affect important split-second decisions, Keith Payne (2006) covered "weapon bias" by researching people's ability to recognize weapons versus other hand-held objects next to the face of either a black person or a white person. Payne stated, "In the snap-judgment condition, race shaped people's mistakes. They falsely claimed to see a gun more often when the face was black than when it was white." [9] This of course plays a significant role in systems such as police departments where quick decisions are often necessary and lives are on the line.

Understanding the effect exposure has on the ability to objectively assess media and our peers is a vital step to overcoming media and advertising influences as well as unfair prejudices conceived by what we see and hear against people and objects around us. This paper details an experiment to further benefit the existing research on mere exposure and how it affects people unknowingly. Particularly, the experiment detailed below is centered around the effect literature has on gaze bias and reactive search time.

2 BACKGROUND

2.1 Mere Exposure Effect

The mere exposure effect is a phenomenon that occurs when a person is made aware of a stimulus consciously or unconsciously. This awareness has been noted to correlate with greater perceptions of the stimulus. The effect has been found to be a robust, reliable phenomenon, producing strong results for a multitude of stimuli including; polygons, drawings, photographs, nonsense words, as well

as ideographs [3]. The mere exposure effect has been found to impact a variety of rating procedures such as; liking ratings, pleasantness ratings, and forced-choice preference judgements [3].

In other words when people are presented with a stimulus be it a shape, image, or string of letters, they tend to like and choose that stimulus more instead of having a neutral position. This effect is not limited to simplistic stimulus like shapes or photos. The exposure effect has been noted to improve participants' perceptions of whole racial groups. In one study it was found that unconsciously exposing white participants to Korean faces during an attention task led to higher likeability ratings of different Korean faces and higher feelings of familiarity to those different faces compared to likability ratings for white participants who were exposed to white faces. Within this study participants were not asked to focus on the race of the face they were looking at; in fact, they were told the study was analyzing if certain facial qualities could affect reaction time. Still when presented with new Korean faces with a variety of facial qualities their preference of and familiarity with those faces was greater than their white face test counterparts [14]. In examining different explanations for the effect one theory arose which postulated that when a person is unaware of the true source of familiarity to a stimuli (prior exposure), they may misidentify familiarity to the stimulus for fondness of the stimulus, or based on the context of the consecutive exposure to other perceptions of the stimulus including fame, truth, or duration [5].

The study on mere exposure and racial attitudes seems to suggest that the exposure effect changes people's perception of the stimulus as well as any new similar stimulus. Still these studies focus on stimulus that is of the same type; a photo of a face compared to a photo of a face or a shape compared to a shape. What of cross type exposure; a written word compared to a photo or a sound compared to a shape. J.R. Stroop (1935) found that if a color name, a word, was printed or written in a different color than the word itself, it was harder for subjects to identify the actual color of the writing than it was to read the word. Moreso, subjects did not have as hard of a time identifying the color of the writing when the word was unrelated to color. [12] Our study seeks to examine such a relationship, that of the written word of a color and its visual representation, or order to better understand the nuance of the exposure effect and with the aid of eye tracking software examine how the phenomenon affects conscious and unconscious behavior.

2.2 Gaze Bias

Eye movements offer insights into higher cognition and task performance making them vitally important when studying such actions as visual search, coordination of motion, and usage of information [1]. We can discern much from a person's eye movements and what items spend a particularly long amount of time under someone's gaze. Eye movements and eye fixations have strong correlations with a person's interest and attention in relation to their environment. In fact a person's eye movements about a scene have been reported to influence their interests. Thus there is a great deal of evidence to suggest that eye movements and fixations can be key tools for discovering a person's interest and area of attention. Though this observation can be muddled when a person is performing a task without looking at said task or when a person looks at an item unrelated to any tasks they are currently attending to, on the whole when a person is paying attention to something the eye's gaze is a good indicator for interest and attention [2].

The human eye is a reasonable tool for finding and understanding cognitive attributes and those attributes seem to be able to affect the eye as well. The relationship between relationship between a person's thoughts and feelings and the actions of their eyes are nuanced but give us a greater understanding of how our perceptions manipulate and shaper our actions. When presented with a choice people ultimately tend to spend more time looking at the item they end up choosing. This is the result of several factors; "however, the contribution of gaze becomes important in preference decisions because a gaze bias leads to increased exposure to one of the stimuli, which translates into increased preference. Preference in turn drives the gaze, thus continually reinforcing the attractiveness percept and leading to the conscious decision" [10]. Gaze plays such an important role in preference decision making that one can use gaze alone to infer preference. We expect people to look at things they like and regularly make the assumption that when a person looks at an item for an extended period of time that the item has caught their interest in some fashion. Schotter et al (2010) studied the relationship between gaze and preference and found that "people tend to look longer at a photograph that they like when their decision is based on liking an item - a liking effect. When their task is to select the liked item, selective encoding works with the liking effect and there is a large gaze bias effect. However, when the goal is to choose the disliked item, the gaze bias effect is attenuated by the tendency to

look at the liked item* the liking effect competes with selective encoding" [10].

Simply put our perceptions have an effect on our behavior, often in ways that we are unaware of and cannot fully control. Though these tests were about eye gaze it is not unreasonable to believe that other bodily functions could be manipulated in similar ways. We must also consider how this data justifies other behaviors; why is it so easy for something you like to distract you from a task? The answer these studies seem to suggest is that your eyes are naturally drawn to things you like even when you are meant to focus on another task. Since eye gaze enhances exposure which enhances interest and likability a distracted person may literally be battling against a constant loop of attention grabbing. Still how strong is this pool and what sorts of tasks are affected by it.

The studies mentioned to feature gaze bias as a manipulator of behavior are based around likeability. In a trial centered around choosing images based on color content likability was not found to affect gaze bias. This was explained by hypothesizing that choosing an image based on likability and choosing an image based on color content may require different cognitive functions. The data suggested that during tasks differences in behavior occurred because depending on the criterion for the tasks people encoded information differently. That this process of encoding specific information for specific tasks resulted in unique early eye movement measures [10].

Schotter et al (2010) explained that it was not unusual for one's eyes to glance at something he/she is familiar with when given the task of making a decision. Information that the eye gathers must be encoded and for the brain to evaluate as useful or not before the subject can make an informed decision about his next action. However, the likability of an object cannot be the only factor. In decision making tasks that had no color content or prior likable content to the subject, it was determined that users often looked at the object they had selected while formulating a response opposed to the object that they did not select.

So perhaps not all tasks could be affected by likability, if that is the case the question becomes which ones could be and which ones could not. It is understandable that finding colors isn't a task that is influenced by how much you like something, but what about the simple task of searching in and of itself. People tend to specifically search for things they like and in the case of exposure it is usually easier to find something you have either seen or even heard of before than something you have never encountered.

3 HYPOTHESIS

We hypothesized that there was such a connection, that exposure and gaze bias could affect simple search ability. We also hypothesized that this effect would not be limited to same media exposure, i.e. a person seeing an image and then seeking to find the same image. Thus we set up our experiment seeking to evaluate these core assumptions.

1. Participants exposed to a poem featuring the word purple multiple times will produce different test speeds than participants not exposed to the poem.
2. Participants exposed to a poem featuring the word purple multiple times will produce different eye movements during visual searches for a purple ball and a non-purple ball than participants not exposed to the poem.
3. Exposed participants will have more instances of looking at the purple ball.
4. These differences will persist regardless of if the search is for a purple ball or for a non-purple ball.

4 METHODOLOGY

We tested participants (n=31) with a series of visual searches. Participants were randomly split into two groups of exposed testers and non-exposed testers. Participants were given instructions via slides to look for either a purple ball aka a Target(T) search or a non-purple aka ball aka a Non-Target(NT) whose color was chosen at random out of a pool of 15 other possible colors. Participants were then presented with a circular dial of 16 colors among which the ball mentioned in the previous slide could be found. Once a participant had found the ball they would continue to a new search for either a purple or a non-purple ball and repeat the test for a total of 10 separate searches, 5 Target and 5 Non-Target. The order of the searches was randomly chosen before the experiment. During the experiment eye tracking data was recorded via a Gazepoint GP3 tracker, Figure 2.

4.1 Participants

Thirty-one individuals (19 male, 12 female) from Clemson University were recruited to participate in this study via email, flyers, and announcements during classes. Participants were between ages 18 and 30 with 87% reporting to fall in between the age range of 18-24. Of our participants 77.4% self-identified as White/Caucasian, 12.9% as Asian / Pacific Islander, 9.7% as Black / African

American, and 3.2% as Hispanic / Latino and Indian, Figure 1.

Participants were screened for normal or corrected to normal vision and color blindness. Participation was entirely voluntary and no participants received compensation of any kind for taking part in the study. Once the study began participants were randomly assigned one of two groups: Exposed vs Non-Exposed with 16 participants ending up in the Exposed group and 15 participants in the Non-Exposed group.

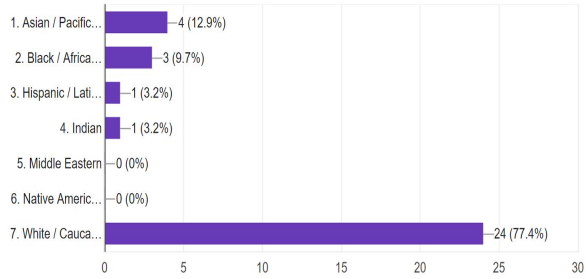

Figure 1: Report of Racial/Ethnic Demographics

4.2 Aparatus

Eye movements were gathered using a Gazepoint GP3 corneal reflection eye tracker with a sampling rate of 60Hz and an angle of accuracy of about 1°. Eye movements were tracked in real time and recorded on a Dell Optiplex 9020 computer. The eye-tracker was placed underneath a 22 inch Dell Professional P2213t LCD display with a resolution of 1680x1050 pixels. Participants were required to sit about 60cm from the screen, and were instructed, per the manufacturer's instruction, through a calibration procedure before the main experiment began. A visualization of the setup is shown in Figure 2. Analysis was gathered using Gazepoint Analysis v3.1.0.

4.3 Stimuli

Stimulus for each participant consisted of a poem, a set of instructions and 10 images in a slideshow format. The poem was a short poem about the color purple, Figure 3. Participants in the Exposed group read the poem, and participants in the Non-Exposed group did not.

Participants began the study with a tutorial slide in which they were instructed to find a number which had been placed in a blank circle. Once a participant saw the circle they pressed the spacebar to go to the next page. Once made familiar with the system participants either viewed the poem based on whether or not they were in the Exposed on Non-Exposed group.

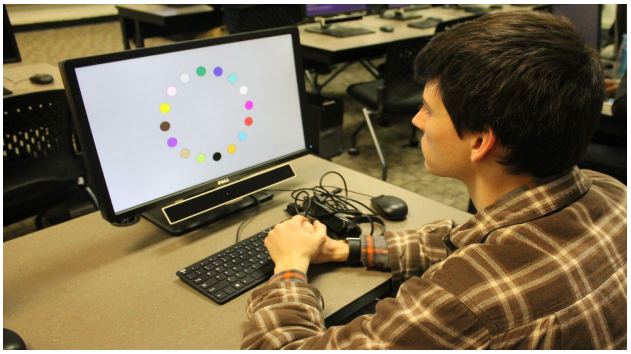

Figure 2: Researcher in front of the Gazepoint GP3 eye tracker looking at a stimulus image

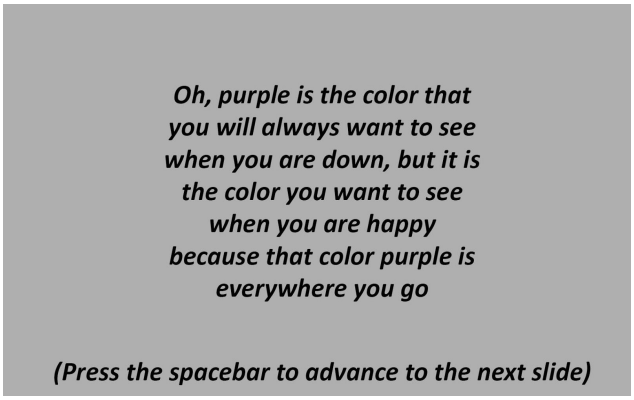

Figure 3: Poem stimulus shown to the exposed group

Participants then viewed a slide that instructed them to either find a purple ball(Target/T) in an image to be presented on the next slide, or find a different colored randomly selected ball (Non-Target/NT) in the same type of image search wheel. Whether or not a subject was searching for a Target ball or a Non-Target ball was also determined at random.

Search slides contained a ring of colored balls with each ball 75 pixels in diameter and the entire circle 700 pixels in diameter, Figure 4. The design was adapted from the Zhang and MacKenzie (2007) eye track evaluation test article [14]. Each image displayed a unique randomly generated order for colored circles arranged in a circle around the center of the screen. There were 16 balls each with a unique color identified as such:

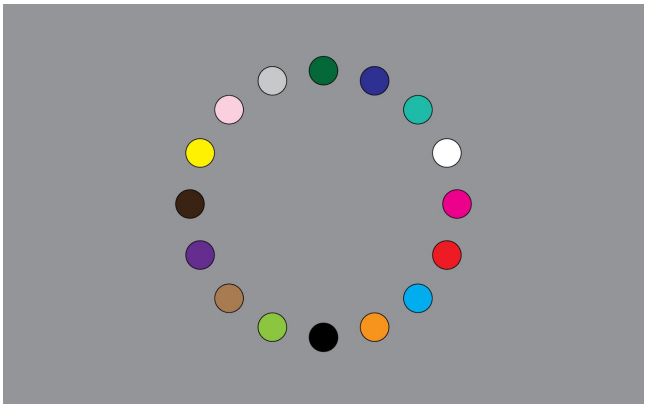

Figure 4: Modified color dial. sphere diameter: 75 pixels dial diameter: 700 pixels

Colors and Respective Hexadecimal RGB Values:

1. Black (000000)
2. Dark Blue (2e3192)
3. Light Blue (00aeef)
4. Teal (1fbba9)
5. Dark Green (056839)
6. Light Green (8cc63f)
7. Yellow (fff200)
8. Orange (f7941e)
9. Dark Brown (3b2313)
10. Light Brown (a97b50)
11. Red (ed1c24)
12. Light Pink (fad0df)
13. Magenta (ec008c)
14. Purple (662d91)
15. Grey (c7c8ca)
16. White (ffffff)

4.4 Experimental Design

The experiment consisted of 31 subjects who each participated in 10 trials. In each trial, subjects were instructed to find a ball of a specified color. About half of the subjects (16) in the Exposed group read the purple poem first, and the other half in the Non-Exposed group (15) did not. Whether a subject read the poem first was determined randomly. For 5 trials, participants searched for the Target color which was purple, and for the other 5 trials, participants searched for a Non-Target color which was a randomly selected color also present in the stimulus image. Aside from the Target color, once a color was used in a search, it was not used again. Whether the participant was instructed to find the Target colored ball or a Non-Target colored ball was determined at random. This gave the experiment a 5x2x2 mixed factorial design, where priming is between-subjects, and search and trial are both within-subjects.

4.5 Procedure

Participants were contacted about taking part in the study. When a participant accepted the invitation, they were given a time and a place to meet the investigators in a computer lab where the eye-tracking apparatus was configured. Participants were greeted by the investigators before being offered a seat in front of the computer and monitor they would be using during the study.

Before the data collection took place, the investigators informed the subjects of all possible risks involved in the experiment and provided them with an informational form. Participants were then asked to fill out a brief survey to inform the investigators whether or not the subject had any visual impairments, and whether or not the participants spoke any languages other than English. Color blind participants could take place in the experiment, however their data was not deemed useful for the purposes of this experiment, and was therefore discarded.

The investigators proceeded to guide the participants through a calibration process and instructions for the eye-tracker. After the calibration procedure, participants viewed a slide with numbers on it to better understand how to control the software, then the experiment began.

For the experiment, half of the participants read a poem about the color purple and half of the participants did not. This was decided at random. Participants then were instructed to find a target colored ball within an image of colored balls. After finding the target, subjects could advance the experiment by pressing the spacebar on the keyboard.. For 10 trials, 5 of the trials would be looking for the purple target, while the other 5 trials would be looking for another, randomly selected colored target, Whether or not a participant was looking for a purple target or a target of another color was determined at random.

Upon completion of all 10 trials, the investigators thanked the participants for their time. No other action from the participant was necessary, and they were free to leave the lab. Participants were given an email address to contact the researchers in case the had follow-up questions. Access to the email server was restricted to group members only via password protection.

5 RESULTS

For each of the ten tests taken by our 31 participants data was processed so that the the overall duration, captured frames, and frames of glances at specific areas of interest (AOI), here the colored balls, could be calculated. The number of frames of recognized glances at AOI and overall captured frames were used to calculate the percent of the test the participant spent on a specific AOI.

5.1 Time

We used a simple linear regression to test our original hypothesis that exposure to the poem featuring multiple lines about the color purple would result in different test speeds between exposed and non-exposed participants. We found no significant effect for exposure on either the participant's total times of Target search tests or total times of Non-Target search tests. We then ran a two-way ANOVA using test sequence (Test1-Test5) and exposure to predict participant test speeds. However, no significant relationship between test sequence and either search test speed could be found. Thus we were not able to reject our null hypothesis and state that exposure to the poem would result in different test speed times between exposed and non-exposed participants.

5.1 Accuracy

In order to judge accuracy we analyzed both the number of frames of recognized glances at a test's stated AOI and the number of frames of recognized glances at a test's stated AOI divided by the overall number of captured frames from the test. For example if the test asked participants to find the orange ball we looked at the number of frames of recognized glances at the orange ball and the number of frames of recognized glances at the orange ball divided them by the total number of frames. This was done so that we could compare differences in the number of frames of recognized glances at a test's stated AOI on its own and standardized.

These tests were used in part to test our original hypothesis that participants exposed to a poem featuring the word purple multiple times would produce different eye movements during visual searches for a purple ball and a non-purple ball than participants not exposed to the poem. We used simple linear regression to examine the effect of exposure on total number of frames of recognized glances at a test's stated AOI and total number of frames of recognized glances at a test's stated AOI divided by the overall number of captured frames from the test and found no significant effects for either Target or Non-Target tests. We then ran two-way ANOVAs incorporating test sequence into the models. No significant relationships could be found in any of the new model thus in terms of accuracy there was no significant difference between exposed and non-exposed groups and this factor could not be used to provide evidence to reject our null hypothesis and claim that participants exposed to a poem featuring the word purple multiple times would produce different eye movements during visual searches for a purple ball and a non-purple ball than participants not exposed to the poem.

5.1 Instances Looking at the Purple Ball

Similarly to our accuracy test we used both the number of frames of recognized glaces at the Target (purple) AOI and the percent of frames of recognized glaces at the Target (purple) AO out of the total captured frames. These tests were used to test our original hypotheses that (1) participants exposed to a poem featuring the word purple multiple times would produce different eye movements during visual searches for a purple ball and a non-purple ball than participants not exposed to the poem. That (2) Exposed participants would have more instances of looking at the purple ball. Finally, that (3) these differences would persist regardless of if the search was for a purple ball or for a non-purple ball.

A simple linear regression test of the effect of Exposure on the total number of frames of recognized glaces at the Target AOI and the percent of frames of recognized glaces at the Target AOI out of the total captured frames for both Target and Non-Target searches was conducted. None of the tests were found to be significant; however, the Non-Target search tests both produced p-values < .10. The total number of frames of recognized glaces at the Target AOI during a Non-Target search test had the higher p-value ($t(29) = 1.784$, $p = 0.0849$, adjusted $R^2 = 0.0678$). While the standardized test of the percent of frames of recognized glaces at the Target AOI out of the total captured frames had a p-value right on the cusp of .05 ($t(29) = 2.034$, $p = 0.0512$, adjusted $R^2 = 0.09463$). The regression slope for the tests were positive, showing that in our data set an Exposed participant was estimated to have 11.475 more total Target AOI frames in their Non-Target searches, a 0.03149% increase compared to the Non-Exposed group.

Once again two-way ANOVAs incorporating test sequence into the models were conducted. For the total number of frames of recognized glaces at the Target AOI the main effect of Exposure was significant in predicting the total number of frames ($F(1, 145) = 4.582$, $p = 0.034$) as was the main effect of test sequence ($F(4, 145) = 2.546$, $p = 0.042$). In each test the Exposed group(1) had more Target AOI frames in their Non-Target searches than the Non-Exposed group(0), Figure 5. As for the percent of frames of recognized glaces at the Target AOI only the main effect of Exposure was found to be significant in predicting the percent of frames ($F(1, 145) = 7.920$, $p = 0.00557$), Figure 6.

Thus, there was evidence to reject two of our null hypotheses and claim that (1) participants exposed to a poem featuring the word purple multiple times would produce different eye movements during visual searches for a purple ball and a non-purple ball than participants not exposed to the poem. There was also enough evidence to suggest that (2) Exposed participants would have more instances of looking at the purple ball. However, as none of the Target search tests, even those incorporating test sequence, were found to be significant we could not reject the null hypothesis for the claim that (3) these differences would persist regardless of if the search was for a purple ball or for a non-purple ball.

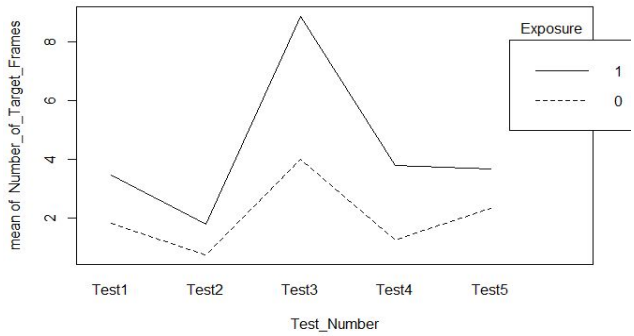

Figure 5: Exposure x Test Sequence interaction for the total number of frames of recognized glaces at the Target AOI during Non-Target tests

5.1 First Trial Effects

Lastly, we also recorded and analyzed the results of each participant's first test, in order to ascertain if there was the presence of a drop off effect. The results of the first slide were all tested to see if Exposure had a significant effect on the time, accuracy, number of Target frames, and percent of Target frames out of total frames. Two-way ANOVAs incorporating search type, aka Target vs Non-Target, were conducted and none of the tests were found to be significant.

6 DISCUSSION

The overall focus of this study was to determine if literary exposure could affect a person's performance on a search based task. Our results indicate that such exposure can indeed affect participants conscious and unconscious eye movements, but only under specific circumstances. There was no significant data to suggest that exposure to the poem resulted in differences during Target searches.

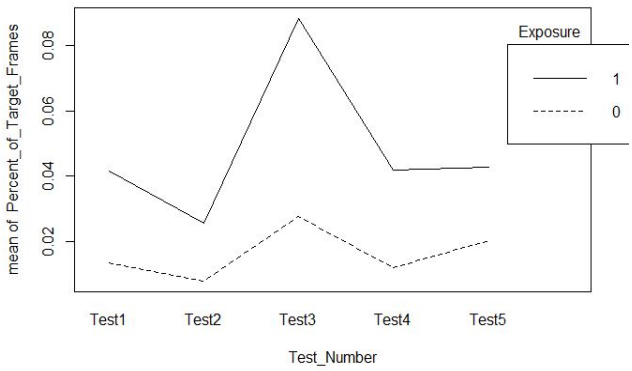

Figure 6: Exposure x Test Sequence interaction for percent of frames of recognized glaces at the Target AOI out of the total frames during Non-Target tests

Exposure was also not found to affect the time of searches or a participants accuracy. Thus, we cannot advise literary exposure as a means of improving search times or accuracy in search tests, and in the case of a Target or same type search (exposure to the word purple and a search for a purple ball) literary exposure does not seem to produce significant effects on any aspects of the search be it time and accuracy or the amount of glances a participant spends on the Target item.

However, it does appear that during Non-Target searches literary exposure resulted in different conscious and unconscious eye movements. Specifically, literary exposure seems to increase the amount of glances a participant gives the Target stimuli during a Non-Target search. Though this increase is rather small with only a few hundredths of a percent difference between exposed and non-exposed groups this difference was found to be significant and to change over the number of tests taken. In fact test number was also found to be a significant predictor for the total number of glances at the Target stimulus during a Non-Target search with the effect peaking at the third test and then dropping off during the next few tests.

As the order of our tests were completely randomized this was a particularly interesting find as it suggests that if a person were to conduct a number of different searches where the search for a particular item took up half of the total number of searches and that item was present in every search that the person would either consciously or unconsciously look at the item more and more during searches for other items with the effect peaking and dropping off around the middle point. The data also suggests that these conscious or unconscious glances

would be increased if the person had experienced literary exposure to the repeated stimulus before performing the searches. This makes sense, as there were 5 searches for purple balls, while the remaining searches were for 5 unique colors meaning the mere exposure effect likely influenced participants regardless of their exposure group, due to the text on the instructional slides as well as their searches for purple balls. The data seems to suggest that a participant's gaze appears to pick up the Target the most during the middle test this seems to be the key point to test for the effects of gaze bias and other exposure related changes in behavior such as increased liking ratings and higher forced-choice preference judgements.

Still, we do not know if this bell curve like effect is repeated to form a sine curve like pattern over time or if the curve would simply expand with more tests. That is, if we doubled the number of tests with 20 searches, 10 Target, 10 Non-Target, would this affect peak at the third and eight tests at equal strengths or would the fifth and six tests show the greatest amount of target glances with the number dropping off after. It is also possible that the effect would simply stabilize after the fifth test with the third remaining the peak. Further research would be advised to test this phenomenon. As too would more research on the main exposure effect as there were many factors in the study which may have increased or decreased the effects strength in our data pool. Afterall, while most of the results from our experiment initially seemed insignificant, this could in part be due to several oversights with the initial run of the experiment.

Firstly, the number of participants was initially smaller than we had hoped. After doubling the results obtained from Gazepoint Analysis, the results showed evidence that a larger sample size might create more significant statistic results. Given more time to conduct the experiment, we would have gathered data from more participants, which could produce different results. This is particularly an important thing to note, because the exposure effect has been shown to have a relatively small effect on people, and is only significantly evident in large sample sizes.

Secondly, Gazepoint Analysis provided some challenges regarding the accuracy and consistency of the data. When we first began running the experiment with real participants, we noticed that despite the calibration utility reporting accurate results, all eye data was shifted to the left by a significant amount. This prevented the program from registering when a user was looking at a particular color. To counter this downfall, we made the AOIs surrounding each color larger, however this created some overlap. This was reflected in our data when Gazepoint Analysis reported that a user was fixating on more than one color at a time.

Thirdly, due to the previous error in accuracy, as well as a desire to know the particular non-target color a user was intended to look at on each slide (which was not recorded in the exported data), it was necessary for each of the participants' data to be parsed by hand. Of course, as with any amount of data handled by men, we must factor in a small amount of possible human error. While it is not believed that the results reported were skewed much by this particular downfall, it is worth noting that this task would be harder with more participants, and that in future runs of the experiment, a method of machine parsing would be recommended.

Finally, it must be noted that no attempt was made to disguise the nature of our study from participants and thus it is possible that the Hawthorne effect may have skewed our data. That is, it would have been very simple for exposed participants, upon reading the poem and then being presented with a colored search, to surmise our hypothesis and consciously modify their actions to mirror the effect they believed we were looking for. While the nature of the searches was meant to mitigate this as participants were asked to complete searches as quickly as possible; thus, focusing their attention to task completion above all else. The presence of the effect can not be ignored. Still, if an exposure effect were present past studies indicate that unconscious exposure would result in effects of even greater significance than conscious exposure [3].

What’s more, while conscious action was present in our study the human eye is not an organ a person has full control over. The eye is never truly still, even when a person perceives it to be. Vision is a collection of sudden rapid movements which combine to form a steady image. This is not like the slower more deliberate movements of the hand where most movement is under the person’s control. When a person fixates on an item it is far more natural for the eye to jump madly about a scene, despite a user generally believing they are steadily looking at a single object. Most people are not consciously aware of these miniscule shaky movements meaning they have little control over them [6]. For these reasons while we are not dismissing the possibility that participants went out of their way to produce the results they believed we were seeking we are skeptical that enough participants would be able to consciously focus on controlling their eyes to seek out the Target item during searches to produce a significant effect.

Especially while simultaneously striving to complete the search with a high degree of accuracy in as short a time period as possible. We propose that further study needs to be conducted accounting for this and several other factors.

A proposed next step for the study would be to set up an experiment where literary exposure was hidden from participants either occurring in a situation seemingly unrelated to the study or in a manner too fast for participants to process. The new experiment would also seek to correct the errors made in this experiment, and study the effect over a larger amount or time. Our data suggests that the number of purple balls participants look at could be drawn as a bell curve, with the strongest influence in the center, however the data is only sampled from 10 trials. While it may be more tedious for the participant, data from the same experiment with 100 trials could demonstrate a drop off similar to a sine wave, or a right-skewed curve. There is no way to tell the effects of exposure over a larger amount of time with only 10 trials. Further research in this area could include tests wherein there is only one purple search, to isolate the particular effect the poem had on the participants from the effects that the numerous purple instruction slides and purple searches possibly had on participants in this experiment.

A larger sample size would help confirm that even if the effect of mere exposure on unconscious viewing habits is small, its presence is evident. This information would prove valuable to people such as advertisers, whose target audience is large enough, that a percentage of influence as small as 2% could significantly boost the amount of people looking at a product.

7 CONCLUSION

The mere exposure effect has been documented to have influence over conscious and unconscious eye movements in gaze bias. Our experiment was designed to determine if there was a correlation between mere exposure from literary media and the performance of participants asked to carry out a search. From this initial experiment, there was evidence to support the claim that the literary mere exposure effect had a influence over participants' eye movements. However, this was only found to be true in Non-Target searches. Still, due to error within the study from various sources, it's worth noting that the experiment can be improved upon. Continued research in this field with a larger sample size and more trials is necessary to better determine literary mere exposure's effect on visual searches and the amount the influence that it has on a person's gaze.

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