A MATTER OF PERSPECTIVE:

HOW CAMERA POSITIONING INFLUENCES MEMORY FOR EVERYDAY EVENTS

by

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ABSTRACT

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The current study examined how viewing an event from different perspectives (eye-level and elevated) at both encoding and retrieval changes the recognition of that event. Specifically, participants were shown various manipulations to the scenarios that they witnessed at encoding. The primary focus of the study was the participants' ability to identify old scenarios along with scenarios that had been manipulated through differences in character clothing, object placement, or temporal order of events, while still resembling the old scenario in every other way. No support was found to support the prediction that perspective at either encoding or retrieval had an effect on recognition of the scenario or the different manipulation types. An exploratory analysis revealed a trend towards significance for perspective at encoding. An eye-level perspective at encoding was more likely to result in a higher rejection rate for temporal manipulations.

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INTRODUCTION

The visual perspective that one has while viewing an event can influence later recollection of that event. Many real-world events of importance are recorded using security or traffic cameras and these cameras may subject a person to differences in their recollection due to the position of these devices. Previous research has investigated the influence of visual perspective to better understand what type of features tend to be focused on, and what kind of event details are retained (Butler et al., 2016; Kraft, 1987; Manzanero, 2009; McIsaac & Eich, 2002). The methodology of these studies involves the placement of the visual perspective through one's own mental imagery, or through footage that is presented to them, followed by free recollection of the event by participants.

Types Of Perspective

Different terms are used between these studies depending on the nature of the experiment conducted. These terms include perspectives of the first person, third person, and an observer perspective. Different perspectives represent varying levels of involvement during the presentation of footage or the representation of the event. A first-person perspective refers to a visual vantage point of a primary subject of an event who is typically directly involved with the action taking place. This perspective mimics the visual field a person would have while engaging with the scenario presented. A third

person is a dynamic, detached, and often elevated perspective that that follows one of the primary subjects of an event from a perspective that captures both their body and more of the surrounding environment. As the subject of an event navigates a scenario, so too might this perspective to better accommodate them as the primary focus of that event. Finally, an observer perspective involves the utilization of footage from a perspective other than that of a subject and can either be dynamic or unmoving. The key difference between the two former perspectives and an observer perspective is that often, the observer is uninvolved in the main sequence of events that the subjects engage in during the scenario, and does not directly or intentionally accommodate any of the subjects as a primary focus. An observer perspective often needs to be explained in a manner that reveals the exact positioning and angle by which the vantage point is placed, can be described as an elevated perspective, which is heightened and looking down, eye-level, which approximates eye level and looks straight forward, or lowered perspective, which is lowered and looking up. Other manners in which this perspective can be explained involves contextual features of the environment relative to the scenario subjects are engaging in. For example, one might explain that runners in a marathon are being observed through the window of a building that overlooks the street it is taking place in. These terms provide a framework for the types of visual perspectives that have been used to observe an event in the existing literature. (Butler et al., 2016; Kraft, 1987; Manzanero, 2009; McIsaac & Eich, 2002).

With an understanding of how specific events are viewed from different visual perspectives, it is possible to describe elements of perception and memory surrounding the event that may change with a shift in perspective, as well as the effect it has on the

retrieval and identification of old events. Currently, the focus of the literature regarding perspective and memory of events focuses on two main elements: global and character information (Butler et al., 2016; Liu, 2016). The global information focuses mainly on the general synopsis of the event in question, including specific actions that were taken by the subject of the event, while character information has to do with the particular details of the various subjects involved in an event.

Although a distinction has been made between first-person and observer perspectives, some types of observer perspectives may share many of the characteristics of a first-person perspective, whereas other observer perspectives may differ markedly. For example, a person witnessing an event from an eye-level perspective will have a perception more analogous to how they would view it if actually present when compared to that of a lowered or heightened perspective. If this eye-level perspective yields similar perceptual information to that of a first-person perspective, using that perspective may be a useful tool when comparing it to other observer perspectives. An important and practical application by which these comparisons might be important would be the placement of security cameras, which are most commonly placed from a raised perspective. In identifying differences in memory and attention due to the static placement of cameras, it would be possible to learn more about how people recall and recognize events caught on cameras from these perspectives, from incidents of crime to traffic accidents.

Currently, there are only a few studies that investigate the influence of perspective during the time of the event and its influence on recall or recognition of the event later. However, a number of studies have looked at the changing nature of perspective while

events are being remembered. The following review of the literature may inform new studies on a person's recognition of an event depending on perspective, and how memory changes depending on the placement of a perspective at the time of encoding.

Imagined Perspective and Memory

Studies that have evaluated participants' recall for events in first, third and observer perspectives tend to come to a general consensus that there are specific qualities of first-person perspective that are focused on during both presentation and recall (McIsaac & Eich, 2002; Manzanero, 2009; Butler et al., 2016). These qualities involve sensory descriptions of a particular event. Butler et al. (2016) found that participants describe their memory of an event with more sensory descriptors if they recreate it in a first-person perspective compared to a third person perspective. It was also found that participants had a tendency to switch to an imagined third person perspective over multiple imaginings of the same instance. Furthermore, switch to third person imagined perspective from first person results in the overall loss of these unique aspects of first-person descriptions (Butler et al., 2016; McIsaac & Eich, 2002). The third person perspective preserved global information and retained a relatively stable preservation of information relevant to actions taken, but lost many of the visual elements of the first-person memory. A switch to third person imagined perspective from first resulted in the overall inability to switch back to an imagined first-person perspective.

Task Memorization and Navigation

There are several studies that focus on the memorization and comprehension of several procedures that require an understanding of sequence and order of operation.

These studies have found that a video utilizing first-person perspective is a more effective method of teaching tasks than a traditional student-classroom observer perspective during tasks in which the learner must use tools and remember the specific order of steps required to complete it (Fung, 2015; Fiorella, 2017). A study by Lindgren (2012) replicated these findings in a virtual reality environment with similar results. Participants were instructed to perform several assembly tasks in a virtual factory environment, as well as navigate the virtual facility in a correct order. Participants who were given a first-person perspective while experiencing the virtual reality were more effective than those who were given a dynamic third person perspective at navigating the facility and performing the assembly tasks. Lindgren (2012) proposes that is potentially due to the shift in attention from the tasks and navigation in the first-person perspective to the character avatar afforded in the third person perspective, which could act as a potential distractor. These studies demonstrate the importance of observing aspects of attention that can influence an observer at encoding depending on what is afforded to them through their visual perspective. If it is the case that a shift in perspective encourages changes in active attention, it may be able to explain differences in identifying elements of past events.

Observer vs. First-Person Perspective

Manzanero (2009) evaluated differences in visual perspective by showing a car accident in either an involved first-person perspective or from an uninvolved observer perspective. Specifically, the first-person perspective was that of a passenger in the accident and the observer perspective was that of a bystander on the sidewalk adjacent to the accident. After viewing the car accident in one of these perspectives, participants

were asked to recall the event in their own words as accurately as possible. Recall for the event was then sorted by response type into relevant event information, information that was irrelevant to the event, and statements that reflected the participants identification with the character in the scenario. While initially, participants that viewed the crash through an observer perspective retained more event relevant information compared to a first-person perspective, after a weeklong delay, the retention of this information was worse than the first person involved perspective. The retention of event irrelevant information was greater in the observer perspective group. Additionally, the first person involved perspective resulted in a higher number of statements that reflected identification with the subject through which the perspective was viewed. Overall, this study by Manzanero (2009) provides evidence that a filmed perspective from different vantage points may lead to a difference in both the attention of certain elements of an event, as well as the ability to recall specific details after a delay.

Photographs And Camera Angle

While Manzanero (2009) demonstrated a difference in the free recall of a specific filmed event both immediately and after delay, Kraft (1987) demonstrated differences in the ability of participants to identify changes to the perspective of certain still images of an event, as well as the changes in the content of the image. The study utilized 3 cameras, each capturing images of an actor performing an action at the same time. An objective of the experiment was to observe the participants' ability to identify a change in perspective, content, and the participants ability to provide a description of their perception of the actor (e.g., the actor's motivation or intentions). It was found that participants provided the most objective descriptions of an event when they viewed that event from an eye-

level perspective. Additionally, while the descriptions of events changed with a shift in camera angle, participants were less likely to correctly identify a change in angle compared to a change in content.

The Proposed Study

The aim of the current study is to expand on previous research involving memory for events viewed and recalled at different perspectives. Extant literature has established that there are differences in memory for an event between both an involved and observer perspective, as well as the various height-dependent subcategories of an observer perspective. However, prior research utilizes an involved and observer perspective with vastly different placement. When these placements are similar, pictures seem to be the only presentation used. The current study attempted to compare an elevated and eye-level perspective that will be placed in a more controlled and stationary format, recorded and presented with the use of a video format. Because we expected the visual presentation of an eye-level perspective to be more analogous to that of a first-person perspective, observing how specific manipulations are recognized may provide insight into how we remember an event. We may also learn what we pay attention to in an initial viewing of an event compared to a follow up presentation that has either a congruent or shifted perspective. Additionally, because of the similarities between an eye-level and first-person perspective, an investigation into whether it is possible replicate the results of studies that used first and third person through an imagined perspective could contribute to the literature on how memories stabilize depending on perspective (Butler et al., 2016, McIsaac & Eich, 2002). It is possible a switch to a third person perspective from first will help with the consolidation of memory related to the events themselves, while a switch to

first person from third will make it more difficult to discern any changes; a potential reflection of results indicating it is difficult to imagine a real event in first person after remembering it from third person.

This study also evaluated the effects of visual perspective on participants' ability to correctly identify several types of manipulations imposed on the event that they viewed in a recognition task given after a delay period. This was done through the presentation of several videos depicting everyday household scenarios in an encoding phase. After a short delay period, participants were shown more videos in a recognition task. The videos shown in the retrieval phase were either a different video depicting the scenario presented at encoding as closely as possible, or a video containing the same general scenario, but a manipulation is present. The three main manipulations were a change in the character, object, and temporal order of the sequence of actions. The character and object manipulations at retrieval involved the exclusion of unique items (clothing and background objects) in the scene. Temporal changes presented at retrieval manipulated the order of actions that an actor in the scenario performed at encoding. These three types of manipulations provided a framework to observe changes in both the selective attention of the participant during the viewing of an event, as well as their ability to recognize specific elements of the scenario that are subject to change after a delay.

A further observation regarding the recognition of manipulated footage was evaluated through the use of a change in camera perspective during the recognition task. We observed how a change (or lack of change) in the perspective of the footage between the encoding phase and the recognition task influences a participant's ability to correctly

identify manipulations. We expected that if a difference in memory is observed between conditions utilizing the same camera angle at encoding and time of retrieval compared to conditions that changed visual perspectives between encoding and time of recall task, then this difference could be indicative of relative prominence of the details changed after encoding. Furthermore, previous findings indicate that specific elements of event memory are lost with changes from a first- to a third-person perspective (McIsaac & Eich, 2002, Butler et al., 2016); therefore, a change in visual perspective between encoding and retrieval may make participants more susceptible to a manipulation of particular elements of the events (e.g., changes in temporal order, character or object). The same studies that investigate changes in memory after switch from first person to third person perspectives also seem to agree that there is an overall consolidation of memory regarding a general synopsis of the event (McIsaac & Eich, 2002, Butler et al., 2016). Informed by these findings, we predicted that a switch from an eye-level perspective to an elevated perspective may facilitate better memory of the event than a switch from elevated to eye-level.

The present study utilized previous methodologies presented in the literature regarding perspective and memory, while also introducing novel manipulations to allow the analysis of memory for specific elements of the events. While Kraft (1987) and Manzanero (2009) both present events from different perspectives in their studies, the design of both studies could be improved regarding the vantage of the camera, as well as the content of the event. Kraft (1987) experienced a ceiling effect when presenting a change in content to the participant, and this could be in part due to the smaller amount of information presented to the participant in one picture, compared to that of a video.

Manzanero (2009) used 2 visual perspectives and had a stationary and dynamic vantage point with differing levels of information present throughout the course of the video. We predicted that combining elements of both of these methodologies could provide more insight on how perspective changes attention and memory through different camera angles. We also expected that an increased amount of information presented in video format would provide participants with several opportunities to focus on different elements of the scene with the potential to be selective and influenced by changing perspectives, while having each camera's position stationed on a similar vertical axis would ensure that differences in the content available to the participant will be relatively unchanged. Furthermore, Kraft (1987) and Manzanero (2009) both used free responses from participants during recall which were later categorized. The present study utilized a recognition task during the retrieval phase, meaning participants will be able to provide yes or no responses. This will allow for the evaluation of the participant's ability to recognize manipulations at retrieval and allow an analysis of switched perspectives between initial presentation and time of test. The predictions we made for this study were as follows: (i) an elevated perspective at encoding and retrieval will lead to an increased recognition of object manipulations, while an eye-level perspective will lead to an increased recognition of character (clothing) manipulations and temporal manipulations, both of which will result in a lower number of "yes" responses to manipulated scenarios. Additionally (ii) a switch from eye-level perspective at encoding to an elevated perspective at retrieval or vice versa will lead to a decreased identification of manipulated scenarios overall. Furthermore (iii), a switch to eye-level from elevated will result in a decreased identification of manipulations than vice versa. Lastly, (iv) a switch from eye-

level at encoding to elevated at recall will result in worse recognition of object manipulations, and a switch from elevated to eye-level will result in worse recognition of temporal manipulations and character (e.g., clothing) manipulations.

METHOD

Participants

Ninety-seven undergraduate students were recruited from the psychology subject pool at Florida Atlantic University and received course credit in exchange for their participation.

Materials

Three hundred and twenty videos were used to present 32 unique scenarios to the participant. These videos were 15-45 seconds in duration and depicted two distinct actors completing ordinary household actions, such as doing laundry or working on a computer. Each scenario yielded 10 total videos. Five videos for each scenario were taken from an eye-level perspective (i.e., five feet and four inches off the ground) and the other five were taken from an elevated perspective which has a vantage point of ten feet and four inches off the ground and two feet behind the eye-level perspective. The five videos that comprise a scenario depicted (1) a base video with no specific type of manipulations, (2) a second base video, which attempts to replicate the original as closely as possible, also without any manipulations, (3) clothing manipulations, in which unique clothing items added to one of the characters' outfits, (4) temporal manipulations, in which the order of events in the scenario was changed, and (5) object manipulations, in which unique background objects were placed into the scenario.

Procedure

Participants completed a consent form before their participation in the study. Afterwards, participants were seated at a computer where they were shown 32 of the videos depicting ordinary household scenarios. After a brief delay, they were shown the same general scenarios that were presented at encoding. However, there were 24 videos that had the manipulations mentioned in the video stimuli section, whereas eight contained the same scenario as presented at encoding. Of the 24 manipulated videos, eight of these manipulations had the removal of a unique clothing item. Eight had the removal of a unique object placement. Eight had a different temporal sequence of events. Participants were informed that the scenarios would have the same overall format, but may contain specific differences that make them incongruent with the one presented at encoding. The participant was then tasked with indicating whether they had seen the same scenario as when they had first observed it, or if there were any differences in the scenario by pressing one of two buttons on the computer's keyboard. Additionally, the participant was informed that there may be a switch in perspective, but that they should indicate whether the scenario is different, not the perspective. After completion of this task, the participant was debriefed, and the purpose of the experiment was explained.

Statistical Analysis

A 2x2x4 ANOVA was used for this analysis. The independent variables of this analysis were perspective at time of encoding (eye-level, elevated), perspective at time of test (eye-level, elevated), and manipulations at time of test (base, clothing manipulation, object manipulation, temporal manipulation). The dependent variable was the proportion

of “yes” responses given during the recognition task. The ANOVA also evaluated two-way interactions between the three variables, as well as the three-way interaction.

RESULTS

The proportions of "yes" responses to the different types of test items are presented in Table 1. A 2x2x4 ANOVA revealed a main effect of item type on proportion of yes responses, $F(3, 279) = 34.67$, $p < .001$. No other main effects or interaction effects were found in the analysis. Paired samples t-tests were conducted in order to understand the main effect of item type. A Bonferonni correction was applied to account for multiple comparisons, yielding a critical alpha level of .0083. The proportion of yes responses for old items did not differ significantly when adjusting the alpha level for multiple comparisons from clothing manipulations, $t(96) = 2.02$, $p = .046$, and object manipulations, $t(96) = 1.67$, $p = .099$. However, there were significant differences between temporal manipulations and old items, $t(96) = 8.56$, $p < .001$. This means that participants were able to distinguish temporal manipulations from old items, but were not able to distinguish object and clothing manipulations from old items. Additionally, proportion of yes responses for temporal manipulations also differed significantly from clothing manipulations, $t(96) = 8.12$, $p < .001$, and object manipulations, $t(96) = 10.50$, $p < .001$, meaning temporal manipulations were most likely to be rejected by the participant as something they had not seen before among the manipulated scenarios.

Because there was no evidence that participants were sensitive to clothing and object manipulations, we ran a second analysis comparing old items just to temporal manipulations, in order to test whether changes in perspective specifically affected the ability to distinguish these two item types. While we did still find a main effect of item

type, $F(1, 93) = 75.30$, $p < .001$, we did not find anything significant for the interaction between item type and perspective at encoding, $F(1, 93) = 2.54$, $p < .114$. However, this interaction did trend towards significance. An independent samples t-test revealed a trend for those who viewed a scenario from eye-level at encoding to be less likely to accept temporal manipulations ($M = 0.385$, $SD = 0.254$) than those who viewed them from an elevated perspective ($M = 0.446$, $SD = 0.228$), $t(95) = 1.25$, $p = 0.213$. In contrast, participants who viewed a scenario at eye-level at encoding ($M = 0.677$, $SD = 0.228$) performed quite similarly to participants who viewed a scenario from an elevated perspective ($M = 0.647$, $SD = 0.196$) with the old items, $t(95) = 0.687$, $p = 0.49$). It is possible that because there was not a substantial difference in performance between item types except for temporal and old items, there may still be potential observe an effect of perspective on performance if item types became easier to discern

DISCUSSION

While there were no substantial results supporting our hypotheses regarding perspective manipulations and changes to these perspectives, this study was able to produce differences between manipulations to the scenarios presented to the participant. Temporal manipulations were the most likely manipulations to be recognized as something the participant had not seen before. This is most likely due to the amount of information changed between encoding and retrieval. A person moving along a different path over time and generating movement may present a higher amount of information that is incongruent when that movement changes. It is possible that the other manipulations (object and clothing) did not differ from one another because the amount of information that changed between old and manipulated scenarios is static from start to finish, while movement over time can compound to create larger informational discrepancies between old and temporally manipulated scenarios.

There exist limitations to the study that may be improved upon for future investigations. Firstly, it is possible that the differences in perspective (eye-level and elevated) are too subtle when compared to an involved first-person perspective and a static observer perspective, and that using these perspectives in favor of the ones used in the study might still produce significant results. Kraft (1987) did note that despite substantial changes in static perspective (low-to-high, eye-level, high-to-low) participants did not accurately remember which perspective they saw a scenario from at encoding

during retrieval. When this is compared to other studies with more substantial differences between perspectives at encoding (Manzanero, 2009) it may be possible that, in order for substantial differences in memory to occur, a shift in elevation and angle may not be sufficient. Additionally, when participants in the present study received instructions about the criterion for a yes/no response, they were told that slight changes in the scenario did not necessarily warrant a rejection of the video. Instead, the participants were told that so long as the scenario was the same, they could indicate that they had seen it before. This may have led to confusion while participants were responding, despite noticing differences in the scenarios presented. The reason we took this approach was to control for the minute differences in performance between the manipulated scenarios and the videos shown at encoding. However, if participants noticed details like clothing and object manipulations and still indicated that they had seen the scenario because of these instructions, it is possible that this study may be improved upon by just asking participants to judge whether the video is identical to one seen at encoding or whether it has changed in any way.

Future directions for this study may include the use of involved first-person perspectives and static uninvolved observer perspectives. While the amount of information presented in footage of these types would be disparate, it is likely that there will be differences in fixation patterns and recall between environmental surroundings and the actions or objects presented to the subject. Manzanero (2009) observed free recall in participants, and coded information type (global, local, etc.). An investigation involving recognition tasks for the same event in a manner such as the one presented in this study may be helpful in determining whether a three-way interaction exists between

perspective at encoding, retrieval, and manipulation type. This would be especially helpful in determining whether an observer perspective and a dynamic, first-person perspective also exacerbates the differences found between manipulation types.

This study explored a novel design regarding recognition of events. Presenting videos of events with relatively similar amount of information between perspectives has not been practiced in the existing literature, although it may be helpful insofar as it has potential reveal differences in memory depending on perspective while also keeping inconsistencies in setting, actions, and characters minimal. This may better our understanding of memory for these events without presenting vastly different interpretations of them. Altogether, our investigation of perspective and its effect on memory can ultimately be improved upon. There is still potential to examine the effects of perspective on the recognition of these events. With extant literature suggesting the subtlety of camera position (Kraft, 1986) and a difference in recollection for the scenarios, a reexamination of our methodology may be necessary to properly observe the research questions presented in this paper.

APPENDICIES

Appendix A: Tables

APPENDIX A: TABLES

Table 1

Means, Standard deviation, and paired sample t-tests for item type

	M	SD	Old	Clothing	Object	Temporal
Old	.661	.211	--	2.018	1.667	8.560**
Clothing	.602	.224	--	--	-.877	6.777**
Object	.622	.193	--	--	--	8.191**
Temporal	.417	.241	--	--	--	--

Note. $N = 97$. ** indicates a p value of less than .001

Table 2

Means and standard deviations for proportion of yes responses for manipulation types by position at encoding

	Old		Clothing		Object		Temporal	
	M	SD	M	SD	M	SD	M	SD
Eye-level	0.677	0.228	0.625	0.242	0.622	0.223	0.385	0.254
Elevated	0.647	0.196	0.581	0.207	0.623	0.163	0.446	0.228

Table 3

Means and standard deviations of % yes responses for manipulation types by retrieval

	Old		Clothing		Object		Temporal	
	M	SD	M	SD	M	SD	M	SD
Eye-level	0.660	0.186	0.603	0.231	0.653	0.188	0.442	0.228
Elevated	0.662	0.237	0.601	0.219	0.590	0.195	0.391	0.255

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