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PROMOTING EYEWITNESS RECALL THROUGH SKETCHING IN THE SELF-
ADMINISTERED INTERVIEW

A THESIS

SUBMITTED TO THE GRADUATE FACULTY

In partial fulfillment for the degree of

MASTER OF ARTS IN FORENSIC PSYCHOLOGY

By

Christy Paramo

Oklahoma City, Oklahoma

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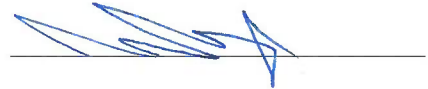
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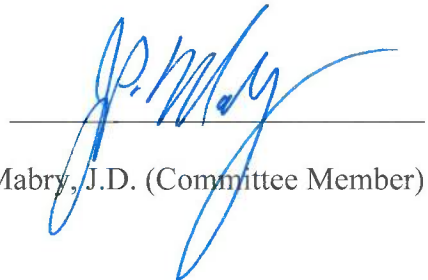
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Table of Contents

ABSTRACT	4
ACKNOWLEDGEMENTS	5
INTRODUCTION	6
Cognitive Interview	8
Self-Administered Interview.....	11
Sketching on Memory Recall.....	14
Present Research	18
METHOD	20
Participants.....	20
Materials	20
Procedure	21
RESULTS	23
Free Recall	23
Prompted Questions	26
DISCUSSION.....	27
REFERENCES	32
APPENDIX A: MATERIALS.....	40
APPENDIX B: ADDITIONAL CODING DETAILS	43

Abstract

The Cognitive Interview (CI) is a widely researched investigative method that promotes accurate and detailed recall from eyewitnesses. The Self-Administered Interview (SAI; Gabbert, 2009) is a booklet emulating the CI without the need for trained interviewers. Both the SAI and CI highlight the importance of context reinstatement, meaning that if the context of encoding is recreated at retrieval, then there will be an increase in the number of details recalled (Tulving & Thomson, 1973). The present study investigates the role of mental reinstatement of context (MRC) through sketching within the SAI. The three conditions are: MRC, MRC plus sketch, and no MRC. The current study hypothesizes the MRC plus sketch condition would recall more accurate details and fewer inaccurate details than the MRC or no MRC conditions. It was expected that drawing a sketch would serve as an external aid to working memory, allowing more cognitive effort to be available to recall additional details about a witnessed event. A total of $N = 69$ participants from the University of Central Oklahoma completed the study online by watching four convenience store security videos. Participants completed the SAI about a non-violent crime committed in one of the videos. After considering duration on task as a covariate, the results indicated there was no significant difference in accurate details recalled between any of the three conditions. Nor was there a difference in the number of memory errors between the three conditions. The hypotheses were not supported. Overall, participants recalled more accurate details about the people and actions involved in the crime compared to details about the setting or objects. The results of the current study may suggest that a sketch is not necessary to elicit accurate details after witnessing a crime. Future research should investigate this topic further in a more naturalistic setting, with longer retention intervals, and more complex crimes.

Keywords: Cognitive interview, Self-administered interview, sketching

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Introduction

Eyewitness memory has been linked to the word *malleable*. The past few decades have established this foundation that presents eyewitness' recall as being potentially unreliable. Criminal investigations rely heavily on the completeness and accuracy of eyewitnesses, meaning that interviews are a crucial step in the investigative process. However, research has shown that eyewitness' recall can be imperfect and malleable during the interviewing process (Loftus, 1975, 1979). Loftus and colleagues have repeatedly demonstrated the ability to alter participants' memories (e.g., Loftus et al., 1978; Morgan et al., 2013; Wixted et al., 2018) or create new memories altogether. (e.g., Loftus & Pickrell, 1995; Loftus, 2005; Otgaar et al., 2021). Based on how a question is phrased, participants may alter the details of the event being recalled. For example, in a study by Loftus and Palmer (1974) it was established that the way a question is phrased (e.g., hit vs. smashed being used in questions about a car accident) influenced the way participants recalled the details of the event. In another study, Loftus and Zanni (1975) discovered that even altering the smallest detail in the phrasing of a sentence could affect the answer. The researchers manipulated whether a question was asked using a definite article (*the*) or an indefinite article (*a*). The presence of a definite article implies that the object in reference is one that has already been seen or established to the reader. Therefore, those presented with the definite article were more likely to have false recognitions of the event questioned. Taken together, these studies demonstrate how the nuanced differences in questioning impact eyewitness memory.

This research has had a large impact on the way eyewitness memory is viewed within the legal system. This was particularly impactful in children's eyewitness testimony, when research found that false memories could result from suggestive interviews with children (Bruck & Ceci,

1995; Ceci, Loftus, Leichtman, & Bruck, 1994). The malleability of memories has since then been a focus during criminal investigations that rely on eyewitness recollection, with the main goal being to reduce false reports and misidentifications.

One of the main issues described in the literature is the misinformation effect. Loftus (2005) discovered that memory for an event can be altered with misinformation that is supplied in the interim between the event and recall of the event. Misinformation can take many forms including communication with others following the event, leading or suggestive questioning about the event, and portrayal of the event through media sources. Therefore, the impact of interviews plays such an important role in obtaining information from eyewitnesses. Research has studied how actions or other events that occur after a crime can interfere with memories during the delay between encoding and retrieval. If the post event information reduces the person's ability to recall the target event (i.e., the crime), this is called retroactive interference (McDermott & Roediger, 2014). This brings forth the importance of obtaining information soon after an event is witnessed. As time passes, it is likely that a memory will weaken and have a greater susceptibility of the misinformation effect. Laboratory studies showed how structured interviews, such as the Cognitive Interview (CI), can elicit not only more information but also higher accuracy of details.

Research regarding eyewitness testimony has largely focused on is the ordering and phrasing of questions asked during the interview process in order to reduce the misinformation effect. Before questioning, the eyewitness should be asked to freely recall in their own words without the influence of direct questions (Geiselman et al., 1984, 1985; Loftus, 1979). In order to keep the eyewitness free from suggestions, the specific questions should be ordered and phrased as open-ended questions. Conducting an interview in this way reduces the likelihood that a

person's memory for an event will be altered, whether intentionally or unintentionally. However, it is not just an interviewer's questions or statements that can influence a memory. The state of mind of the eyewitness can also influence how accurately they recall an event. Therefore, the purpose of the current study is to examine how interview techniques and reactivation of contexts impacts eyewitness memory; specifically, to benefit law enforcement interviews.

Cognitive Interview

The Cognitive Interview (CI) was established by Geiselman, Fisher and colleagues (1984) in response to aiding law enforcement and other legal professionals seeking to improve eyewitness memory recall. The CI was determined to elicit significantly more accurate information than a standard interview (Koehnken et al., 1999; Rivard et al., 2014). One of the main differences of the CI from a standard interview was that it transferred the control to the eyewitness. A standard police interview is set on the foundation of obtaining information by having the interviewer control the conversation. They control the order of recall as well as the style of interaction, all while having no specific aids to recall (Fisher et al., 1987). But as research has found, the phrasing and direction offered by an interviewer can unintentionally influence memory recall, so putting the control into the hands of the eyewitness should reduce outside interference. The CI therefore shifted the focus to the eyewitness. The eyewitness is handed the control and is allowed to decide the order of recall with minimal interruptions from the interviewer. There are also added aids to recall, such as context reinstatement or change perspective.

The CI is split into sections that are designed in a way that will allow eyewitnesses to recall the most information about a witnessed event. There are four sections: context reinstatement, report everything, change order, and change perspective. The context

reinstatement section involves the interviewer helping to re-establishing the environment of the witnessed event. The interviewee is asked to include personal context, which allows them to go back to how they felt at the time of the event, encouraging them to include their emotions and senses (Geiselman et al., 1985). Essentially, this section encourages the witnesses to re-experience the physical and emotional context from the time of the witnessed event. Re-experiencing the same physical and emotional context serves as additional retrieval cues to increase the number of details that can be accurately recalled. The report everything section consists of the interviewer asking the eyewitness to report everything they recall about the witnessed event even if it is partial or incomplete (Geiselman et al., 1985). The change order section is used to allow eyewitnesses to recall the events in reverse order, or from the middle, both recalling backwards and forwards. This interrupts schema activation and allows reconstruction to be more accurate instead of being told in a way that appears to make sense. The change perspective section encourages eyewitnesses to take into consideration the perspectives of others during the witnessed event. This allows eyewitnesses to adopt the different viewpoints of other witnesses in order to gain greater recall (Geiselman et al., 1985).

The CI (and the context reinstatement section in particular) was formed on the foundation of context dependent memory theory (Tulving, 1974; Collins & Quillian, 1969). This theory posits that memory has encoding specificity, meaning that if the context of encoding (when you first experience an event or piece of information) is recreated at retrieval (remembering previously experienced information), then there will be an increase in the number of details recalled (Tulving & Thomson, 1973). The assumption of this principle is that individuals encode information in conjunction with details related to the situation (e.g., your physical environment, the way you are processing the information, your internal state). Encoding specificity states that

the cues aid in the retrieval process to the extent that they help match or recreate the original experience, whether a physical location (Godden & Baddeley, 1975) or a virtual location (Shin et al., 2020). Context can be broadly defined. For example, state dependent memory relates to the emotional and physical state being the same during encoding and retrieval (Goodwin et al., 1969). Thus, these studies illustrate the impact that encoding specificity can have on memory recall. The CI was established with this in mind and aids in mentally recreating the event, reactivating many of the conditions of encoding at the time of recall.

The CI did not initially consider the social and communication aspects of the interview. The Enhanced Cognitive Interview (ECI; Fisher & Geiselman, 1992) was established in order to take these features into account through: rapport building, transferring control of the interview to the witness, witness-compatible questioning and prompted mental imagery. Rapport building consists of establishing a positive relationship with the witness. It is also portrayed through non-verbal behavior. The purpose of this procedure is to focus on the witness's well-being to increase the amount of recalled information (Fisher & Geiselman, 2010). The key component to this addition was to allow the interview to be witness-centered (i.e., allowing the eyewitness to control the conversation). This was implemented by utilizing open-ended questions that flow with the responses of the eyewitness. The goal is to allow the witness to produce information that is then questioned in line with the witness's retrieval pattern. The interviewer also asks questions based on the details provided by using a focused memory technique (i.e., allowing eyewitnesses to focus on guided mental images). This correlates to the CI's context reinstatement procedure. However, this procedure is focused on prompted imagery by asking the witness to recreate scenarios with higher details (Dando & Milne, 2009). The witness is guided with questions that target the senses. Specifically, the eyewitnesses are instructed to concentrate on mental images of

the witnessed event such as the suspect's clothing or facial features, or the sounds they heard during the event; these were used to guide the overall recall. An important factor of the ECI is the focus on recognizing that details of a witnessed event are more accessible when they originate from an eyewitness's mental images.

Self-Administered Interview

To further enhance the CI, Gabbert and colleagues (2009) developed the Self-Administered Interview (SAI). The SAI was developed as a booklet that can be provided to eyewitnesses to complete on their own. This reduced the time between the witnessed event and recall, as well as reliance on law enforcement interviewer resources. The SAI is meant to serve as a stopgap between the event and the completion of the CI. It also allows investigators to identify eyewitnesses who should then be physically interviewed first (i.e., had a better view, recalled more, etc.). One of the main advantages of using the SAI is the ability to collect information from eyewitnesses very soon after a crime is witnessed. This immediate recall is important due to the steep rate of forgetting that occurs after the target event (Ebbinghaus, 1885). The accuracy of details recalled by eyewitnesses decreases as time between a witnessed event and the recall increases (Penrod, Loftus & Winkler, 1982). In the context of forensics, research has shown that eyewitnesses who are interviewed directly after a witnessed event report more accurate details in subsequent memory recall compared to those who are not interviewed after the event (e.g., Ebbesen & Rienick, 1998) Their memory retention is superior to those who are not interviewed for up to 3-weeks (Turtle & Yuille, 1994). Not only can memory be lost due to natural decay (i.e., due simply to the passage of time), but memories are also susceptible to interference and other alterations as discussed previously, further highlighting the benefit of obtaining an immediate recall from eyewitnesses before any interference can occur.

The SAI is separated into nine sections that allow the eyewitness to record as much information about the witnessed event as possible. Section A asks participants to recall everything that they can remember from the target video to the best of their abilities without guessing about any of the information. Section B asks participants to provide as much detail about the offender as they can; again, they will be asked to answer to the best of their abilities without guessing. Section C is the sketch section that asks participants to draw out the layout of the scene in terms of spatial information. Section D asks participants to complete the section only if there were other people present who saw what happened. Section E asks participants if they have spoken to anyone about the incident they witnessed. Section F asks participants about recording and social media. Section G asks participants if there were any vehicles involved. Section H asks participants how well they were able to see the witnessed event. Section I asks participants if there is any other information that they would like to report about the witnessed event that has not yet been asked about.

One of the key components of the SAI is the incorporation of the CI's context reinstatement, which is replaced in the SAI with the mental reinstatement of context (MRC). The MRC technique, similar to the context reinstatement section of the CI, consists of having an eyewitness mentally recreate the psychological and physical environment from the witnessed event. This specifically targeted the context dependent memory theory that the CI was founded on. The SAI contains two portions that utilize MRC: section B in which they are asked to take a few moments to mentally imagine where they were, what they saw, what they were thinking and how they were feeling at the time of the witnessed event, and section C in which they are asked to sketch the scene. The benefit of the MRC in section B of the SAI was investigated by Gabbert et al., (2009) in an experiment that compared recall accuracy using the SAI compared to the CI.

Participants were shown a brief, non-violent event that involved an attempted car break-in. After witnessing the event, participants were randomly assigned to complete either the SAI, CI, or a single “recall everything” prompt without experiencing the MRC provided within the SAI. The single free recall prompt and SAI conditions were completed with pen and paper; the CI condition was conducted by an interviewer. Participants in both the SAI and CI conditions reported significantly more accurate details than participants in the single free prompt condition. This study further investigated the kinds of information reported (i.e., person, action, object and setting details). For each of the categories the number of accurate items reported was significantly higher in both the SAI and CI conditions than in the single free recall prompt condition. The only significant difference in recall accuracy between the SAI from the CI condition were in person and action details. Additionally, participants who completed the SAI or CI (immediately after the event) remembered more details after a one-week delay than those completed the single free recall prompt. The results of this study illustrate the importance to the context-reinstatement of the CI and the MRC within the SAI. Since then, many other researchers have used the SAI as a vital tool in eyewitness memory recall (e.g., Gabbert et al., 2012; Hope, Gabbert, & Fisher, 2011; Hope, Gabbert, Fisher, & Jamieson, 2014; Maras et al., 2014; Matsuo & Miura, 2017).

Another element of the SAI which incorporates MRC is the sketching section. This portion asks participants to sketch what they can remember from the event. This adds a more concrete aspect to the mental reinstatement. Dando et al. (2009) compared the effectiveness of the MRC with and without a sketch component within the context of the CI. Participants individually watched a non-violent crime film that lasted about one minute. They were then asked to come back 48 hours later for a second session where they were randomly placed in

either the No MRC, Sketch MRC, or MRC condition. All interviews were conducted by trained CI interviewers. Both the Sketch MRC and MRC interview conditions elicited significantly more recalled details than those in the No MRC condition. There were also fewer *confabulated* details recalled in the Sketch MRC condition than both the No MRC and MRC conditions. Additionally, those in the Sketch MRC condition also recalled fewer *false* details than those in the MRC or the No MRC condition. The Sketch MRC interviews were also 17% shorter than the traditional MRC. The study indicated both the Sketch MRC and MRC interview conditions were better than the No MRC condition, and that the Sketch MRC would yield similar results as the original MRC within less time.

Sketching on Memory Recall

Sketching has been linked to mental imagery, a quasi-perceptual experience that is similar to perceptual experience without the need for external stimuli (Thomas, 2014). Research has shown that mental imagery is composed of both *object imagery*, which is the visualization of details of an individual object (e.g., shape, color, brightness, texture, etc.), and *spatial imagery*, that focuses on the visualization of an object's location, movement, and/or transformation (Blazhenkova, 2016). Mental imagery has been associated with enhanced memory performance. There is a positive impact in processing a stimulus when participants are given mental imagery instruction; participants who have been instructed to mentally imagine recall stimuli better (McCauley et al., 1996; Mattison et al., 2014). Bower (1972) found that when participants were instructed to memorize pairs of word by either imagining a visual scene in which the two words interacted or just by memorizing the relationship between the two words. Those in the imagery group performed about 30% better than the controls on both immediate and delayed recall tests. Other studies have also shown similar results that by giving participant imagery instructions they

yield higher number of correctly recalled items (Oliver et al., 2016) and less false memories (Foley, 2012). These theories are used now by police in cognitive interviews by asking eyewitnesses to describe the context of the event they witnessed in order to enhance their recall of the event.

The benefits of implementing sketching into an interview may be due to the sketch freeing up working memory capacity for recall or the sketch itself strengthening the memory. Previous research has shown that externalizing ideas or thoughts into sketches, notes, or models has been correlated to improving problem solving ability and reducing memory demands (Sachse et al., 2004; Zhang and Norman, 1994). There is evidence that shows that these external problem representations put less load on the cognitive process (Pearson, Logie et al., 1999; Pearson, Naselaris et al., 2015). Externalizing aids in freeing up working memory by storing the visuo-spatial information outside of the mind. Other studies have shown that the visuo-spatial working memory becomes limited when the focus is on only using mental imagery (Ballard et al., 1995; Phillips and Christie, 1997). Bilda and Gero (2005), therefore, concluded that externalizing visual imagery is necessary in off-loading the visuo-spatial working memory. In their study, participants were first asked to engage in an architectural design process while being blindfolded. They were then asked to return for another session where they were allowed to sketch. The researchers measured the participants 'cognitive activity' through a series of possible perceptual (e.g., creating or editing a relationship between two components of the sketch), functional (e.g., creating or editing the function of a component), and evaluative actions (e.g., resolving a functional conflict or questioning design issues). These actions were coded based on audio recorded think-aloud procedures and video recorded sketching activity. After the first 20 minutes, the cognitive activity in those in the blindfold session had dropped. There was an

overall significant difference between the sketch and blindfold conditions in the variance of the cognitive activity after the first 20 minutes. The sketch condition participants' cognitive activity rate was not slowing down because of the externalization aiding in reducing cognitive load, concluding that sketching off-loads the visuo-spatial working memory. With this reduction in cognitive load, it's possible that participants have more resources available for replaying an episodic memory and recalling details from the event.

During active sketching there are potential cognitive processes that include activation of previous knowledge, increased overall attention, and better subsequent recall due to new information being integrated into long-term memory (Wetzels et al. 2010). Research has suggested that drawing aids in memory recall by encoding the information through multiple processes, and that even preparing to draw without the act of drawing will enhance memory (Wammes et al., 2018; 2019). The more avenues through which information is encoded, the stronger it tends to be in memory. The three avenues of encoding identified in the act of sketching are generative, motor, and visual. The generative or semantic process is when an individual engages in determining how to sketch an item, the motoric process is when the drawing utensil is placed to paper to produce the image, and the visual process includes the analysis after drawing (Wammes et al., 2017). Essentially, the creation of an image improves memory recall because the trace that is encoded contains great amounts of contextual information that aids in the formation of a detailed memory, which is then more easily retrieved (Wammes et al., 2017). It may be that by sketching the memory, the memory itself becomes more detailed and more stable.

Regarding eyewitnesses, sketching has been utilized as alternative aid in memory recall. Specifically, determining if there is a difference in eyewitnesses composing a sketch or being

shown the targeted information. Jack et al. (2015) sought to determine the role of sketching and photographs on memory recall. Their focus was to specify which aid had a positive effect on participants' recall in relation to a forensic setting. They showed each group of participants a series of non-violent short films that showed a crime. The participants were then required to give a free recall of the witnessed event, and then randomly allocated to one of four conditions: 1) self-generated sketch condition which consisted of another free recall using a self-produced sketch, 2) provided sketch condition in which participants were provided a sketch of the witnessed event and used this to free recall again, 3) photograph condition in which participants viewed a provided photograph of the witnessed event during their free recall, and 4) control condition which included a free recall without the use of a visual aid. They examined the amount and accuracy of new information provided with each condition. The results showed that participants in all three visual aid conditions reported significantly more correct details than those in the control condition. However, there were some distinctions in the type of information recalled between each of the visual conditions. Participant who constructed their own sketch reported more accurate details about *people* than participants who were given a sketch. Similarly, participants who constructed their own sketch also reported significantly more details *about surroundings* than participants who were given a sketch or a photograph.

Research has also identified that sketching is not always a consist positive aid in eyewitness recall. Vrij et al. (2019) asked participants to write down the information they wanted to discuss during the interview prior to being introduced to the sketch manipulation. This resulted in no significant effect of sketching. Later, Vrij et al. (2020) found a benefit of sketching with the addition of narrating, showing sketching as a tool to enhancing narration; they concluded that it was due to five reasons. The first is that sketching reinstates the context of the

witnessed event which enhances recall. Second, sketches are visual outputs that are in a format that is compatible when recalling visually experienced events. Third, sketching is a time-consuming activity that allows eyewitness to take their time to search their memories to enhance recall. Fourth, sketching one aspect of a witnessed event leads to recall of another aspect. Fifth, sketching provides spatial information of the witnessed event; contrastingly to verbal descriptions that do not always provide spatial information of an event. This study also discovered that sketching could play as an efficient tool in interviewing because it showed that truth tellers reported more details than liars when they were asked to sketch during the interview. Results of these studies could indicate that a sketch manipulations efficacy is affected by the temporal placement during the interview process. In other words, sketching done prior to recall may benefit, but after recall may not. The current study will investigate the role of the sketching component prior to recall of the event within the SAI. Similar to the Dando et al. (2009) study, the current work will compare sketching to mental imagery. While that research was conducted within the CI, as of yet this comparison of sketching to mental imagery has not been conducted within the context of the SAI.

Present Research

The current research is a continuation of determining the effects of sketching on eyewitness memory recall by taking into consideration the underlying effects that have been previously established by various research. Specifically, the context reinstatement in the CI that was replaced in the SAI with the MRC. Additionally, analyzing the MRC with the incorporation of a sketching component as a memory aid. Similar to Dando et al. (2009), the focus of this study is to determine if the sketch component plays a significant role in memory recall compared to visual imagery without sketching. However, unlike the Dando et al. research, the current work is

investigating sketching specifically within the SAI and controlling for the time on task statistically, in order to isolate the effect of the MRC compared to MRC plus sketch,

The current research will compare the number of details recalled from a non-violent crime video between three conditions: MRC, MRC plus sketch, or no MRC. Based on previous research regarding context dependent memory (Tulvig, 1974; Collins & Quillian, 1969), reinstating the context of the event should aid in recall. Including a mental reinstatement of context (i.e., visualizing/ replaying the event in your mind) should lead to better recall of details from the event compared to not reinstating/ reminding the participant about the context of the event. Using a sketch could allow participants to become more engaged with the mental imagery. Sketching also offers an externalized visual image, which can off-load working memory and free up resources for retrieving and verbalizing event details.

For the free recall portion of the SAI, I predict that after controlling for the differences in the amount of time each condition takes, those in the MRC and MRC plus sketch conditions will recall more *accurate* details and fewer *inaccurate* detail from the event than those in the no MRC condition. Furthermore, those in the MRC plus sketch condition will recall more *accurate* details and less *inaccurate* details than the MRC condition. I also predict that those in the MRC plus sketch condition will recall more details about *person* and *setting* details than *object* and *action* details in their free recall responses than those in the MRC condition and no MRC condition.

For responses to the relevant promoted questions of the SAI, I make similar predictions. After controlling for time on task, I predict those in the MRC and MRC plus sketch conditions will recall more *accurate* details and fewer *inaccurate* details. Additionally, I predict those in the MRC plus sketch section will recall more *accurate* details and less *inaccurate* details than the MRC condition.

Method

Participants

Seventy-nine participants completed the survey, as distributed through a university-wide email. The study was also specifically advertised in summer psychology and forensic science classes. Participants were not compensated, and no demographic information was collected. Three participants were removed due to not following instructions and one participant was removed due to a technical error. Five additional participants were removed from all data analysis due to having a time in survey more than three standard deviations above the mean of their condition, resulting in a total of $N = 69$ participants.

Materials

The survey was created and distributed through Qualtrics, an online survey creation software that can be used within research. The survey included informed consent, a non-violent crime video, distractor videos, the SAI, and debriefing. In the no MRC (i.e., control) condition, a filler task of a “personality survey” was also included. This survey consisted of 34 5-point Likert items describing the participant’s personality (e.g., I feel little concern for others, I am relaxed most of the time, etc.). All materials are included in Appendix A. The non-violent crime video was the “event” that participants were asked to recall details about. This video consisted of two individuals, one stealing a wallet from behind the counter in a convenient store/gas station through CCTV footage. The video displayed the two individuals entering the store while other customers are also present. One of the individual approaches the front register to distract the owner as the second goes around the counter to retrieve the wallet from the owner’s bag. There are a total of six individuals throughout the whole incident lasting one minute and seven seconds. The video ends with the suspect getting away without being apprehended or noticed by the

victim (Ahmed, 2019). There were three additional videos used as fillers. These videos were similar in that they contain a CCTV view of a convenient store, with multiple people walking in and out of frame, but there were no crimes committed in any of the filler videos. All three videos were about one minute in length. All three videos were obtained through YouTube creative commons (*Chris Watts, 2019*)

Procedure

The study was a between-subjects experimental design. The independent variable was context reinstatement aid, comprised of three conditions: MRC, MRC plus sketch, and no MRC. The participants were randomly assigned to one of the three conditions. The dependent variable was memory measured by the number of *accurate* and *inaccurate* details recalled in free recall and prompted questions. Free recall data was further analyzed based on the type of detail being recalled (person, object, setting, or action; see scoring details in results section). The entire study was conducted online through Qualtrics and took participants an average of approximately 25 minutes to complete.

Upon receiving an email invitation to participate, participants were directed to the informed consent. After agreement of the informed consent, the study began by informing the participant to acquire a blank sheet of paper and a black ink pen. They were instructed to use these materials at a later time ONLY if they were instructed to do so (i.e., those in the sketch condition), otherwise the materials were not used. After continuing, the participant was notified that they would watch a series of videos and would be asked to recall details about one or more of the videos afterward. Participants viewed one filler video, then the non-violent crime (i.e., target) video, then the second filler video, then the third filler video. The videos were labeled as Video 1, Video 2, Video 3, and Video 4. The purpose of the additional filler videos was to

reduce the amount of attention to detail to each individual video and to create a minimal amount of interference. Since participants were not informed ahead of time which video they will be questioned on, the chances of a ceiling effect in recalling details from the target video would be reduced. This also made the situation more comparable to real life, in which a person would not be scrupulously attending to every detail, knowing they would be asked to recall those details later.

After watching all four videos, participants were told that they were going to be questioned about Video 2 only. Participants were then randomly assigned to either the MRC, MRC plus sketch, or no MRC condition. These conditions are meant to replace the first part of section A of the SAI (which pertains to the Context Reinstatement of the CI). Those in the MRC condition were prompted to close their eyes and take a few moments to picture in their minds where they were, what they saw, what they were thinking and how they felt at the time of witnessing the video. This was done for mental graphical representation of the general layout of the scene. Those in the MRC plus sketch condition were given the same instructions as those in the MRC and are then asked to generate a sketch of the witnessed scene in the target video. They were told that this to remember spatial information. Those in the no MRC condition were given a distractor task (personality quiz) to roughly equate for the time spent by those in the sketch condition as estimated through pilot testing.

Participants then completed the SAI, including the beginning instructions, second half of section A (recall everything), section B (describe the offender), section D (describe other witnesses at scene), section E (have you spoken with others), section G (describe vehicles), section H (viewpoint questions) and section I (additional information not yet reported). For the purposes of this experiment, Sections C and F were altered or removed. Section C was the sketch

component, which was replaced with the experiment's manipulation and placed at the start of the SAI. Section F asked about recording the event and posting on social media, which was not applicable to the present research. For the purpose of the current study, Sections B, D, and only two questions from Section H were analyzed as prompted questions. Those in the sketch condition were then be prompted with a screen instructing them to upload a picture of the sketch they illustrated earlier (as a manipulation check). They could choose to upload directly through Qualtrics or to email the researcher; both options were kept confidential. Lastly, the participants were prompted with a debriefing and informed on the true purpose of the study.

Results

Free Recall

Scoring

Similar to Gabbert et al. (2009), the details recalled in the free recall portion will be coded using Wright and Holliday's (2007) scoring template that classifies each detail of information from the video as Action (A), Person (P), Object (O), or Setting (S). For example, a detail about a "customer at the counter purchased an ice cream cone" will be coded as 'customer (1-P) at the counter (1-S) purchased (1-A) an ice cream cone (1-O). Additional details regarding coding instructions are available in Appendix B. To assess interrater reliability, 20% of the free recall responses were randomly selected and coded by two independent scorers. The number of accurate and inaccurate details of each type were coded by both raters. The ratings between the two raters were highly correlated for each detail type (all r 's > .75). Table 1 contains a correlation matrix. Based on this analysis, interrater reliability was considered acceptable for the free recall scoring and the author continued as the sole rater.

Table 1*Pearson r Correlations for Interrater Reliability of Free Recall Details*

Accurate				Inaccurate			
Action	Person	Object	Setting	Action	Person	Object	Setting
.95	.94	.89	.94	.97	.95	.92	.77

Note. All p 's < .001, except for inaccurate setting details for which $p = .001$.

Accurate Details

A 3 (condition: MRC, MRC plus Sketch, no MRC) x 4 (detail type: Action, Person, Object, Setting) mixed analysis of covariance (ANCOVA) was conducted to compare differences in the number of *accurate details* generated in the free recall portion, using duration on task as a covariate. The average times on task per condition are provided in Table 2 below. Levene's test indicated that the assumption of homogeneity of variances was met for all four detail types (all p 's > .10). Mauchly's test indicated that the assumption of sphericity was violated, $p < .001$. Due to this violation, the within-subjects ANCOVA results are reported with Greenhouse-Geisser correction.

There was no significant effect of the covariate, $F(1, 65) = .34, p = .56$, nor was the interaction between the covariate and condition significant, $F(2.37, 154.29) = .58, p = .59$. The average amount of time (in minutes) spent on task per condition was MRC ($M = 1.29, SD = 1.32$), MRC plus sketch ($M = 4.49, SD = 3.46$), and no MRC ($M = 4.02, SD = 3.34$). There was no significant effect of condition, $F(2, 65) = .02, p = .98$. There was no significant interaction between detail type and condition, $F(4.75, 154.29) = 1.67, p = .15$.

There was a significant effect of the detail type, $F(2.37, 154.29) = 23.83, p < .001$, partial eta-squared = .27. revealed that participants recalled the most accurate details regarding actions

($M = 9.07$) and people ($M = 7.90$), followed by objects ($M = 4.83$) and setting details ($M = 3.55$). Bonferroni post hoc tests indicate that all differences were significant (p 's $< .001$) except for the difference between action and people details ($p = .32$). Complete descriptive statistics are provided for each detail type based on condition in Table 2.

Table 2

Means and (Standard Deviations) for Accurate Details in Free Recall

Condition	Detail Type			
	Action	Person	Object	Setting
MRC	9.61 (5.73)	8.30 (5.30)	4.57 (2.97)	3.96 (2.53)
MRC plus Sketch	9.57 (4.84)	6.70 (4.25)	5.09 (3.99)	3.65 (2.19)
No MRC	8.04 (5.73)	8.70 (6.93)	4.83 (2.15)	3.04 (2.46)

Note. $n = 23$ for all conditions.

Inaccurate Details

A 3 (condition: MRC, MRC plus Sketch, no MRC) x 4 (detail type: Action, Person, Object, Setting) mixed ANCOVA was conducted to compare differences in the number of *inaccurate details* generated in the free recall portion, using duration on task as a covariate. Levene's test indicated that the assumption of homogeneity of variances was violated for object ($p = .05$) and setting details ($p = .03$). Mauchly's test indicated that the assumption of sphericity was violated, $p < .001$. Due to this violation, the within-subjects ANCOVA results are reported with Greenhouse-Geisser correction.

There was no significant effect of the covariate, $F(1, 65) = .53, p = .47$, nor was the interaction between the covariate and condition significant, $F(1.21, 78.57) = 0.5, p = .87$. There was no significant effect of condition, $F(2, 65) = 2.15, p = .12$. There was no significant

interaction between detail type and condition, $F(2.42, 78.57) = .72, p = .52$, nor was there a significant effect of detail type, $F(1.21, 78.57) = 3.15, p = .07$. Complete descriptive statistics are provided for each detail type based on condition in Table 3.

Table 3

Means and (Standard Deviations) for Inaccurate Details in Free Recall

Condition	Detail Type			
	Action	Person	Object	Setting
MRC	0.12 (0.34)	0.91 (1.78)	0.26 (0.54)	0.09 (0.29)
MRC plus Sketch	0.04 (0.21)	0.43 (0.79)	0.17 (0.49)	0.04 (0.21)
No MRC	0.09 (0.29)	0.39 (1.08)	0.09 (0.29)	0.00 (0.00)

Prompted Questions

Scoring

Participants were asked all questions within the SAI except for Section F, but only those relevant to the experiment were analyzed. For example, non-relevant SAI items included whether the participant had spoken with anyone about the crime, how long it had been since the crime occurred, and whether they had posted on social media about the crime. The prompted questions used in data analysis therefore included the following three items: provide details about the person(s) who committed the crime, provide details about any person(s) present who saw the crime, and identify the time of day the event occurred. The prompted questions were all coded for accurate and inaccurate details collaboratively by the same two raters used for the free recall data.

Accurate Details

A one-way ANCOVA was conducted to compare differences in the number of *accurate details* provided in the four prompted questions, using duration on task as a covariate. Levene's test indicated that the assumption of homogeneity of variances was violated ($p < .001$). There was no significant effect of the covariate, $F(1, 65) = .47, p = .50$, nor a significant effect of condition, $F(2, 65) = 1.31, p = .28$. The MRC condition had an average of 8.52 ($SD = 5.63$) accurate details in their prompted questions, the MRC plus sketch had 8.48 ($SD = 4.72$), and the no MRC condition had an average of 6.78 ($SD = 2.32$).

Inaccurate Details

A one-way ANCOVA was conducted to compare differences in the number of *inaccurate details* provided in the four prompted questions, using duration on task as a covariate. Levene's test indicated that the assumption of homogeneity of variances was violated for all four details, $p < .10$. There was no significant effect of the covariate, $F(1,65) = .14, p = .71$. There was also no significant effect of condition, $F(2, 65) = .95, p = .39$. The MRC condition had an average of 1.61 ($SD = 1.20$) inaccurate details in their prompted questions, the MRC plus sketch had 1.09 ($SD = .90$), and the no MRC had an average of 1.52 ($SD = 1.95$).

Discussion

The purpose of the study was to determine the role of mental reinstatement of context (MRC) on eyewitness memory recall through sketching withing the Self-Administered Interview (SAI). It was hypothesized the MRC plus sketch condition would recall more accurate details and fewer inaccurate details than the MRC or no MRC condition, based on research suggesting that sketching can be used as an external aid to free up visuo-spatial working memory (Pearson

et al., 1999). It was further predicted that the MRC plus sketch condition would elicit more details specifically about people and setting than the MRC (or control) conditions.

In order to isolate the effect of the MRC compared to MRC plus sketch, the time on task was controlled for statistically. This means that any variation in performance would be due to the task itself (either mentally imagining the scene or drawing a physical sketch of the scene) rather than the amount of time participants spent doing said task. Contrary to what was predicted, there were no significant differences in accurate or inaccurate details recalled between the three conditions in either the free recall or prompted question portion. Regarding the types of details recalled, although there was no difference in detail type based on the condition (as predicted), there was an overall difference in the types of details participants recalled in the free recall. Specifically, participants recalled more accurate Person and Action details compared to Setting or Object details during free recall. This is comparable to research by Jack et al. (2015), which also found that participant who constructed their own sketch reported more accurate details about *people* than participants who were given a sketch.

The results of the current study revealed that sketching did not illicit a greater number of recalled details from a witnessed event, therefore suggesting that sketching does not play a vital role in memory recall. The results go against the theory that immediate recall supported through sketching may help maintain episodic memory (Anderson, 1983). The findings of the current work, similar to Jaeger et al. (2018), go against the growing literature that has demonstrated sketching as a beneficial tool in learning and memory.

The lack of an overall effect of sketching could be due to the scene not being easily “sketchable.” This would imply that participants could not determine how to represent certain information in a visual way. In reference to sketching reducing cognitive load, situations where

there is no clear instruction could hinder cognitive resources for the integration phase, which refers to the concept that memories for related experiences are overlapping representations in the brain (Leutner and Schmeck, 2014). This would consume a large amount of the resources focusing on how to create the sketch, as opposed to allowing those resources to focus on including important details within the sketch. This would further suggest to law enforcement officials that a sketching component at the beginning of the interviewing process could be considered a time hindrance in gathering initial eyewitness memory if not administered with clear instructions.

The current study yielded other limitations as well. One concern was the unrealistic setting of participants having to view the non-violent crime through a video online. In a real-life scenario, an eyewitness would have a different view of the scene and have more than just an on-screen visual experience. The video format allows for more information to be viewed, while a real-life experience might limit certain viewpoints. Another limitation of the current work is the potential for ecological validity. The participants were asked to mentally recreate the psychological and physical aspects of the witnessed event; however, there would have been no physical environment to be recreated since the entire study was conducted online. This suggests the importance of having experienced the physical environment to further allow the MRC to be effective, which would further support the theory of encoding specificity. Time was also a limitation within the current study. There were two filler videos seen after the crime video, each lasting approximately one minute. That means there was only a two-minute retention interval between the crime being witnessed and the first part of the SAI being filled out. In certain scenarios (e.g. bank robberies) this time interval may be more realistic; however, in some cases there is a much longer time interval between witnessing an event and memory recall. Although

one of the main benefits of the SAI is that it can be completed very soon after witnessing a crime, in some cases it may not be readily available. We may see different results with a longer, more realistic retention interval for the specific witnessed crime.

Despite the limitations of the current work, further research may be beneficial to get a more complete understanding of the role of sketching within the SAI. The most important suggestion for future research would be using a more naturalistic setting, with longer retention intervals, and more complex witnessed crimes. Future research could investigate how generating a sketch immediately after witnessing an event would potentially impact *delayed* memory recall. This would better equate to what we would see in a real-world setting. A person would witness a crime, fill out the SAI (including a sketch), and at some later point in time be called in for police questioning. It's possible that the benefit of a sketch is not in the amount of accurate information recalled at the same time as the sketch, but that it benefits *longer term* retention of details. It's possible that sketching immediately after the event could strengthen the memory, making it less susceptible to misleading post-event information. With this set up, future research could analyze the consistency between initially reported information and information from a delayed interview/recall. It's possible that those completing a sketch immediately after the event could retain the information longer than those who do not generate a sketch. This sketch could serve as an added "node" in the network of memory from the witnessed event.

It could also be important for future research to further examine the quality of the sketch participants produce and how that impacts future recall of the witnessed event. A poorly constructed sketch could potentially hurt future recall, based on the theory that recalling an incomplete subset of information from an episodic memory can hinder recall of the rest of the

details later (Koutstaal et al., 1999). Therefore, it's possible that only a sketch that is of high enough quality would benefit the eyewitness's memory.

In conclusion, the current study indicated that sketching as an externalized memory aid did not significantly enhance recall. Although there is various support in the literature for sketching as a means of improving recall, the conditions in which the sketch is administered should be carefully considered. If sketching is to be a beneficial memory aid, it may need more explicit instruction or support to direct attention to important information in order to create a mental model of the scene. It is also possible that the sketch does not offer any additional benefit beyond recreating the context mentally. Especially given that it takes less time to enact a mental reinstatement of the context, relying only on that mental imagery may be sufficient within the SAI. This would benefit law enforcement officials to further enhance the SAI in removing the section or altering it further. It could be suggested that sketching the offender in addition to the scene might illicit more important accurate details. This is supported by previous research suggesting that facial composite sketches have been useful to law enforcement in assisting to identify suspects involved in a crime (Jain et al. 2012). As mentioned earlier, it could also be suggested that allowing eyewitnesses to have an outline of what is expected to be incorporated in the sketch could allow cognitive resources to focus on the important details rather than the externalized visualization of the details.

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Appendix A

Materials

Informed Consent

For scientific reasons, this consent form does not include all the information about the research question being tested. The researcher will give you more information when your participation in the study is over.

- A. Researcher (s): Christy Paramo
- B. Procedures/treatments involved: A collection of videos followed by sets of different activities.
- C. Expected length of participation: 10-15 minutes
- D. Potential risks or discomforts: No more than minimal risk. Please note that participation may require you to upload (or email) an image and use a blank sheet of paper with a black pen.
- E. Medical/mental health contact information (if required): UCO's Psychology Clinic located in room 307 of the Education building on UCO's campus. The phone number is 405-974-2758. The website is <https://www.uco.edu/ceps/centers-and-clinics/psychology-clinic/>
- F. Contact information for researchers: cparamo@uco.edu / (405)408-5754
- G. Contact information for UCO IRB: irb@uco.edu / 405-974-5497
- H. Explanation of confidentiality and privacy: For the convenience of participation, we are allowing participants to send an email with information instead of uploading directly; therefore, all information that is chosen to be emailed will be kept confidential. If participant does not choose to submit via email, then no identifying information of the individual will be collected or stored. Surveys are submitted anonymously and cannot be connected to your identity.
- I. Assurance of voluntary participation: Participation in this study is completely voluntary. The participant may withdraw from the study at any point by contacting the principal investigator, Christy Paramo.

AFFIRMATION BY RESEARCH SUBJECT I hereby voluntarily agree to participate in the above listed research project and further understand the above listed explanations and descriptions of the research project. I also understand that there is no penalty for refusal to participate, and that I am free to withdraw my consent and participation in this project at any time without penalty. I acknowledge that I am at least 18 years old. I have read and fully understand this Informed Consent Form. I sign it freely and voluntarily.

If you would like a copy of this consent to keep, print this page before proceeding.

Videos

VIDEO 1



VIDEO 2



VIDEO 3



VIDEO 4



Personality survey

Please rate how much you agree or disagree with each of the following statements (1: Strongly disagree – 5: Strongly agree)

1. I sympathize with others' feelings.
2. I seldom feel "blue."
3. I am not interested in abstract ideas.
4. I start conversations with people I do not know.
5. I am not interested in other peoples' problems.
6. I get chores done right away.
7. I have excellent ideas.
8. I have little to say.
9. I have a soft heart.
10. I often forget to put things back in their proper place.
11. I get upset easily.
12. I enjoy meeting new people.
13. I like helping people.
14. I sometimes make mistakes.
15. I am easily disappointed.
16. I enjoy repairing things.

17. I enjoy trying new activities.
18. I consider other people's feelings before speaking.
19. I am prepared to tell people if they are mistaken.
20. I have highly original ideas.
21. I am modest about what I have achieved.
22. I often conceal my feelings.
23. I tend to get nervous before big events.
24. I review my work critically.
25. I enjoy setting long term goals.
26. I usually feel relaxed.
27. I prefer to work by myself compared to working in a group.
28. I want to take my time on tasks that involve others.
29. I enjoy working with experts that can help me enhance my knowledge.
30. I do not want people to make a big fuss if I do something well.
31. It is important to me to stand out among my peers.
32. I enjoy being in a position of power within a group of people.
33. I appreciate receiving feedback on my work.
34. It is important to me that I push my boundaries.

Debriefing

The purpose of this study was to determine the significance of mental visualization in comparison to sketching after witnessing an event. The event that was witnessed within this study was not real.

If you were in the 'Sketch' condition and need to email your sketch to the experimenter, please include your ID in the email. Your ID is: #####.

If you did not use the sheet of paper, it means you were not in the 'Sketch' condition.

Please do not inform others about the true purpose of this study.

If you feel as though this experience has caused you any psychological harm, please visit the Psychology Clinic on campus. The clinic is located in Room 307 of the Education building on UCO's campus. You may also contact them via phone: 405-974-2758 or visit the website at <https://www.uco.edu/ceps/centers-and-clinics/psychology-clinic/>.

Additionally, if you have any questions regarding this study, please contact me at cparamo@uco.edu.

Appendix B

Additional Coding Details

A detail was marked correct if it was present within the video and described correctly and marked incorrect if it was present in the video but described incorrectly or if it was not present in the video at all. Each detail was counted only once if mentioned multiple times within the free recall. Any detail (e.g., clothing, marks, hair) or adjective that is used to further describe a person, is coded as a Person detail (e.g., the girl (P) had a green (P) shoe (P)). Any detail that is described vaguely then again described with additional detail was coded twice (e.g., he purchased (A) something (O); the ice cream (O) he purchased.) Additionally, in differentiating setting and object, items that could be physically moved were classified as objects. For example, cash register would be coded as an Object detail and counter would be coded as a Setting detail. A detail mentioning “side of the counter” and “behind the counter” were coded as being two Setting details. Vague or more general items were also coded (e.g., someone (P) grabbed (A) something (O)). A detail describing a lack of action was still coded as an Action detail (e.g., did not run (A)).