

Individual Differences in Eyewitness Testimony

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INDIVIDUAL DIFFERENCES IN EYEWITNESS TESTIMONY

by

NOEL CAL

A thesis submitted in partial fulfillment of the requirements
for the Honor's in the Major Program in Psychology
in the College of Sciences
and in The Burnett Honors College
at the University of Central Florida
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ABSTRACT

Eyewitness testimony plays a crucial role in the justice system. Misidentification from eyewitnesses was reported in 70% of 300 DNA exonerations of wrongfully convicted individuals (Wixted et al., 2015). Similarly, many convicts can also be set free because of juror's faulty eyewitness recall during examination. Previous research indicated that females are more reliable in recall than men. However, these findings were not extensively examined with regards to time delay prior to the trial. Thus, it is important to systematically examine the various factors that influence eyewitness testimony.

The present study was designed to empirically examine the effects of gender, interview technique, and time interval on eyewitness recall. It was hypothesized that female participants would outscore male participants in both facial and detail recall. It was also hypothesized that the cognitive interview would yield more accurate details about the crime in comparison to the standard interview. It was hypothesized that recall for participants would decay as the time interval increased.

One hundred and four participants were randomly selected from a southeastern university to participate in the study. Ages of the participants ranged from 18-40 and consisted of fifty-two males and fifty-two females. They were required to complete a series of questionnaires consisting of demographics, mood measure, personality test, and standard/cognitive interviews.

The results showed a significant effect between gender, interview technique, and time interval on detail recall. In addition, there was a significant main effect for interview type. There was a significant effect of gender and time interval on facial recall. It was found that extraversion significantly predicted detail recall as did agreeableness and neuroticism. The present findings

further extend previous research examining the most effective interviewing techniques for eyewitness recall. It also indicated that females can accurately recall faces after a time delay in comparison to men.

Furthermore, these results also clearly indicate that gender and time interval play a significant role in facial recall. Finally, the findings have practical implications for the jury selection system. For example, attorneys and judges might be inclined to choose women over men for specific cases where eyewitness details may be crucial for conviction. In addition, they may also use facial shots in order to enhance eyewitness recall. Personality measures can assist detectives to determine if a suspect is suitable for an interview. If at all possible, administering personality test for jurors may help in determining certain personality types are more prone to error.

This thesis is dedicated to my mother and brother who have provided nothing but encouragement throughout the process.

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INTRODUCTION

Accuracy in eyewitness testimonies is crucial and the success and direction of criminal investigations rely heavily on the details given. Also, eyewitness testimonies have a large bearing on court decisions and the fate of people's lives. The justice system places a lot of emphasis on eyewitness testimonies, so understanding memory recall and factors possibly affecting it is important. It has been a general consensus that eyewitness testimony is highly unreliable and it tends to cause problems for many cases. This can be observed in the reported 70% of the now more than 300 DNA exonerations of wrongfully convicted individuals (Wixted et al., 2015). The goals of this study is to alleviate those problems and provide concrete answers for eyewitness testimonies. The study will explore many aspects that are taken into account in eyewitness testimony.

Many studies exploring memories, and how they are retrieved have been conducted. These studies have demonstrated that memories are constantly being formed and stored throughout the brain. Many factors have been explored in order to understand their effect on memory recall. The temperament of individuals has been linked to influence memory. Personality traits and moods can also have an effect on memory recall. The manner in which law enforcement conducts interviews can also influence someone's memory recall. Gender differences have also been found during eyewitness account reports. It is important to understand as many factors as possible pertaining to eyewitness testimonies because of the importance it holds within the justice system.

LITERATURE REVIEW

Emotional Recall

Different factors affecting gender differences have been explored, with corresponding types of memories. Studies demonstrated that individuals typically remember vividly negative experiences and are more confident about the details as well (Rimmele, et. al., 2012). Stressful events can trigger memory cues and allow for individuals to feel more confident about them as well. However, in terms of gender differences, women typically report accurate events that are emotional drawn than men do (Gryzman & Hudson, 2013). Typically, men tend to remember broad details but fail to exclusively recall events that trigger intense emotions as a crime would. A study done by Block and colleagues discovered that memory that was negative in content and self-relevant was better remembered. No significant difference in emotional tone was found (Block, Greenberg & Goodman, 2009). However, women did report higher levels of anxiety in comparison to men.

Facial Recall

Women also typically remember faces more accurately than men do. In particular, women remember faces of the same gender more often than men do. Women have also demonstrated a gender bias for women, while men typically do not demonstrate a gender bias (Rehman & Herlit, 2007). Women also tend to remember happy faces in comparison to men. In one study Wang found out that women recalled happy faces more frequently than males, but angry faces were equally remembered by both genders (Wang, 2013). The reason why women tend to remember women's faces more often than men is yet unclear. However, a later study by

Lovén, Herlitz, & Rehnman (2011) suggests that women have an advantage in successfully remembering details of female faces. This advantage can be explained in how women typically tend to notice more features in females. Another possible reason is that women are more empathetic which allows them to identify with the victim more closely in comparison to men, therefore observing features more clearly.

Detail Recall

Recalling intricate details of a crime is incredibly important for law enforcement. A small detail that is overlooked can lead to being wrongful identification or not finding a perpetrator at all. Research done on gender difference in eyewitness testimony has shown varying results. A meta-analysis done by Loftus and colleagues (1987) found that women recalled more details about women in a scenario and that men recalled more details about men. Although the meta-analysis did not find any significant difference in overall accuracy of details between males and females, it did indicate a possible difference in recall between males and females (Loftus, Banaji & Schooler, 1987). Studies have demonstrated that women remember more intricate details than men do (Areh, 2011). The study done by Areh required participants to watch a video of a mock violent crime and report events of the video. The results were in support of previous research in which women would remember more details. A study by Wang (2013) demonstrated similar results. Wang found that women were able to more accurately recall details of events that were more emotionally intense. However, Wang also provided a new alternative in explaining the difference in pressing events. Wang theorized that women may consolidate information more efficiently during or shortly after an ongoing event. This would then generate an easier access to event information. (Wang, 2013). This adds a new layer that a neurological difference in how

memory is encoded exists between males and females. This is something that can be explored further in future research.

Interview Style

Differences in gender and interviewing styles are two factors that research suggest may affect answers given by witnesses in interviewing and questioning. Open ended questions have produced more accurate accounts of events than specific questioning (Poole & White, 1991). This is a typical interviewing mistake done by law enforcement. Instead of allowing witnesses to explore and attempt to recall the events, law officials intervene and obstruct. Eyewitness memory research has demonstrated that post event information and leading information can affect recall. A study done by Powers and colleges (1979) found that witnesses exposed to suggestible information about an account were likely to change correct details in their testimony. The results suggest that interviewing techniques being implemented by law enforcement can be easily affected by unintentional wording which is inefficient. The standard interviewing techniques used by law enforcement have also been proven to be unsuccessful. Previous research showed that the cognitive interview yielded more facts than the standard interview (Rounding, Jacobson & Lindsay, 2014). Cognitive interviewing is a technique that allows the individual to relive the events of the environment and recount the events in a narrative manner. Standard interviews are structured and specific questions are asked. A study by Ginet & Py (2011) explored a cognitive interviewing technique and found out that witnesses recalled more events in comparison with a standard law enforcement interviewing technique. Individuals recalled more events due to the free recall approach of the cognitive technique because it allows them think more openly, rather than answering questions that are misleading.

Time Factor

The passage of time in reference to eyewitness testimony has been a factor that has not been fully explored. Two theories have been established in explaining the passage of time and memory: decay theory and consolidation. Consolidation theory states that if an event happens, leaving a memory trace, over a period of time and nothing happens then the memory trace will strengthen. Decay theory offers an alternative prediction; stating that the memory trace would weaken thus impairing recall (Hunt & Worthen, 2012). However, these theories have yet to be tested in an eyewitness setting. A survey research of experts done by Kassin, and colleagues (1989) found out that there is a general consensus between testimony experts that memory recall for eyewitness fades over time. However, the claims were never tested. Thus, the general consensus needs further research. Interestingly, a study done by Loftus (1975) found out that questions asked immediately after an event can cause a new reconstruction of recall that is not necessarily correct. This study is in direct opposition with the popular consensus of most eyewitness experts. Not much research has been done because it is generally believed that as time goes by, memory fades which is not always the case.

Gender Stereotype

A factor that can influence in which individuals recall events is stereotypical traits from the perpetrators. Men are typically connected to committing violence crimes such as murder and rape. Women tend to commit more subtle crimes such as larceny of theft (UCR, 2015). These predisposed notions can affect individuals when being interviewed. A study demonstrated that male perpetrators were perceived as being more violent in comparison to women perpetrators

even when both perpetrators committed a non-aggressive crime (Ahola, 2012). This is an important factor to note since it can influence the way events of a crime are recalled. The focus on weapons have also produced gender stereotypical errors. A weapon such as knife and gun are typically associated with males. Whenever a female holds a such weapon, then the focus is more on the weapon rather than on the individual which can cause memory error (Pickel, 2009). The relevance to law enforcement is extremely helpful because the presence or absence of a weapon can be used as an advantage. Individuals would be more inclined to give accurate accounts if weapon attainment is associated with perceived gender stereotype. Another study was also attempting to find out about gender stereotypes and how that affects memory recall. The study explored this by displaying multiple perpetrators. The study consisted either of a male-perpetrator condition, female-perpetrator condition or male-female perpetrator condition. Interestingly, the results showed no significant differences on the gender stereotypes. Rather, the study showed that the main problem was interpreting multiple perpetrators at once. The attention of the individuals shifted thus impairing memory recall (Megreya & Bindemann, 2012). This study suggests that when more than one perpetrator is involved, then more than likely the accounts for recall will be prone to error because twice as much detail needs to be recalled.

Temperament

Moods during attempting to recall events is a factor that has been explored as well. The results by Forgas, Laham, & Vargas (2005) demonstrate that positive mood display can increase recall whereas negative mood display can reduce accurate recall. Individuals tend to react differently when it comes to the level of stress induced immediately after the crime has occurred.

However, research has shown that stress can alter memory. A study done by Morgan and colleagues (2004) found out that whenever a crime is highly stressful, it can often lead to error in recall. Participants performed significantly better in the low stress condition in comparison to the high stress condition. This is especially relevant since most crimes can often produce stress and can influence mood as well. Dysphoric individuals have also showed an inability to accurately recall events. Individuals with stable moods tend to report more details and accurate accounts (Rounding, Jacobson & Lindsay, 2014). The finding is consistent with other studies that demonstrate individuals with dysphoric tendencies are prone to recall error.

Personality traits have also merged as an important aspect of memory recall. A longitudinal study by Klaming and colleagues (2016) found out that individuals with high scores in mastery of a task and self-efficacy were more likely to score high on a memory measure. However, individuals with high neuroticism scores were more than likely to score low on a memory measure. Personality traits did not affect the rate of memory decline over time. Another study by Areh (2007) found similar results in which high extraversion was more reliable in memory recall. Similar to Klaming's study, neuroticism was linked with poor memory recall. The data seems to suggest that individuals with more self-confidence tend to recall more accurately in comparison to individuals who are not. The reason behind this can be because individuals with neuroticism are more prone to stress, which has been linked to cause error in memory recall.

Ethnicity/Race

Ethnic stereotype in terms of the perpetrators can result in misidentification. Eyewitnesses often tend to associate specific ethnic/racial criminals with certain features. In addition, individuals are also more likely to correctly identify perpetrator faces of the same ethnic group

(Horry, Wright & Tredoux, 2010). Stereotypes are also another issue with misidentifying perpetrators. In a study done by MacLin & Herrera (2006), participants typically reported different ethnic groups with the stereotype associated with them. However, these features are not universal for every ethnic group. Having a predisposed notion of ethnic groups can lead to bias in identifying possible suspects. Height is another stereotype that factors into ethnic bias. A study by Lee & Geiselman (1994) attempted to find height stereotypes and how it would affect the accounts reported by eyewitnesses. It was reported that eyewitnesses attributed height stereotypes in the reports. Asian and Hispanic perpetrators were reported as shorter when in fact the perpetrators were taller than the average. Caucasian perpetrators were reported as taller, even though the perpetrators were shorter than the average.

THE CURRENT STUDY

The original experimental trials done by Cal, Machecha, Cervantes and Dwire (2015) explored two variables, question type and gender. One of the main problems of the study was that the sample was skewed. The sample included 151 UCF undergraduate students (64% female and 36% male). The length of the experiment was also short and mismanaged. Several mistakes were made during the experimental sessions, but the study continued due to the time constraints. It was hypothesized that there would be a relationship between various individual factors in eyewitness recall. The results produced a significant effect for only question type. These findings indicate that the way the questions were framed did mislead participants.

Goals of the Study

The goals of the study are to explore relationships between the factors being measured (mood, personality, gender stereotype, susceptibility to be misled, emotional recall, and memory decay) and eyewitness recall. Contributing to the already existing body of research is important and this study will provide new data to the literature. Another goal of this study is to define the best interviewing technique in terms of collecting the most accurate details of a crime. Adding new data of the effects of the passage time and eyewitness memory is also important. The existing literature has conflicting results in relation to this factor.

Research Question

Gender is a factor that the study will explore in relation to other possible individual differences (mood, personality, gender stereotype, susceptibility to be misled, age, ethnicity, recall score) factors. Only a few studies have previously examined the effect of time intervals for eye-

witness testimony and the results have so far been conflicting. Questions asked immediately after an event can be prone to error (Loftus, 1975), which is directly contradictory to the general consensus of memory recall. Thus, it is important to systematically explore how much the passage of time affects witnesses' recall. The current study was designed to further explore which interviewing technique would be the best for law enforcement. The interview yielding the most accurate information would present as the best option to use therefore providing the data for this is important. Which personality type is more inclined for error in terms of accurate recall will also be an element that will be explored.

Hypotheses

This research is designed test the following four hypotheses:

H₁: Gender would affect eyewitness recall

H₂: Time factor would affect eyewitness recall

H₃: Temperament would affect eyewitness recall

H₄: Interview style would affect eyewitness recall

METHODOLOGY

Participants

A sample of 104 participants were randomly selected from a southeastern university through the SONA system. Qualtrics was used as the host domain for the present study and various questionnaires were uploaded on this. The experiment was labelled as an evaluation of mood during short films. This deception is necessary in order to avoid participants anticipating that the ability to recall events will be tested. Participants included an equal number of males (50%) and females (50%). They ranged between 18-40 years. All participants were informed of the ethics and research guidelines.

Tasks and Materials

Participants were required to complete a series of questionnaires consisting of demographics items that included gender, age, and race/ethnicity, among other factors. In addition, all participants were required to fill out a Profile of Mood States measure (McNair, Lorr & Droppleman, 1971). This measure consisted of adjectives being rated from “not at all” to “extremely” in correspondence if it was related to how they felt. They then completed the Five Factor Model Test, consisting of 41 questions. Finally this was followed by the Symbolic Racism Scale (Henry & Sears, 2002) and the Social Dominance Orientation Questionnaire (SDO) (Pratto et al., 1994). Following the completions of these surveys, participants were then presented with a short video, lasting about two minutes. After the video was viewed, participants were presented with a series of faces gathered on Google images. These faces included the two suspects and other decoy faces. The faces were males that ranged in ethnic background. After the participants

selected a perpetrator then the interview was administered. The interview was either a cognitive interview or a standard interview.

Design

Participants were randomly assigned in one of eight possible experimental conditions. The design of this study consisted of a 2X2X2 completely between-subjects factorial design involving gender (male or female), interview type (standard or cognitive), and time interval (immediate or delayed testing). The various manipulated conditions included the following 8 experimental conditions.

(1) male/cognitive interview/immediate interview, (2) male/cognitive interview/one day interview, (3) male/standard interview/immediate interview, (4) male/standard interview/one day interview, (5) female/cognitive interview/immediate interview, (6) female/cognitive interview/one day interview, (7) female/standard interview/immediate interview and (8) female/standard interview/one day interview.

The dependent variables resulted from the following measures as previously described above:

- (1). Profile of Mood States measure
- (2). The Five Factor Test
- (3). Social Dominance Questionnaires

Procedures

Participants completed a demographics questionnaire prior to watching the simulation crime video. After the demographics questionnaire was completed, a mood validation question-

naire was presented immediately. The conclusion of the mood measure was followed by the personality test. Then both the Modified Modern Racism Scale (MMRS) and Social Dominance Orientation Questionnaire (SDO) were administered. Participants were presented with the simulation crime video. In the immediate conditions, participants were presented with a series of faces and had to choose the suspects which was then followed by the interview. However, in the one day condition, the presentation of the video concluded the first portion of the experiment. Participants needed to return to SONA for the interview portion one day after. Also, depending on which condition the participants got determined the type of interview (cognitive or standard). Upon logging in, the interview started immediately. Before the interview was completed, participants were asked to identify a suspect via the screenshot of faces. After that process, then participants were debriefed and told the true goal of the study.

DATA COLLECTION

Data was collected on various measures such as mood, personality, gender stereotype, susceptibility to be misled, emotional recall, and memory decay. All data was coded and entered into an SPSS file for further statistical analyses. A series of multiple regression analyses were computed to determine whether there are any relationships between the various predictor independent variables (mood, personality, racial bias) and dependent measures (recall score). In addition, the study examined the effects of gender, question type, and time interval on the memory recall using a series of multivariate statistics.

Expected Results

The study hypothesizes four outcomes:

1. It is expected that a significant relationship between gender and eyewitness recall will be obtained. Females would more likely recall more accurate details than male participants.
2. Also, the participants who were interviewed immediately were expected to recall more accurate details than at later time periods. It was anticipated that the recall details would diminish as the time interval gets longer.
3. It was expected that individuals with higher extraverted and self-efficacy scores would recall more accurate events in comparison with individuals who score higher on the neuroticism measure.
4. It was predicted that the cognitive interviews would yield more accurate details than the standard interview.

RESULTS

A three-way ANOVA was conducted to examine the effects of gender, interview type and time interval on eyewitness recall. There was also a significant main effect for interview type $F(1,96)= 33.61, p < .000$, partial eta squared= .014. Participants in the cognitive conditions produced more accurate details about the crime in comparison to the standard conditions. The means of the conditions are shown on Table 1. Females also outperformed males in every single condition except on the standard-immediate condition.

Gender	Interview Type	Interval	Mean	Standard Deviation
Male	Standard	Immediate	4.13	1.96
		One-Day	3.08	1.16
	Cognitive	Immediate	4.23	2.31
		One-Day	6.40	1.58
Female	Standard	Immediate	3.67	1.05
		One-Day	3.83	1.47
	Cognitive	Immediate	6.60	2.56
		One-Day	6.10	2.13

Table 1: Means and Standard Deviations for Detail Recall Scores

In addition, there was a significant three-way interaction between gender, interview type and time interval $F(1,96)= 6.66, p < .011$, partial eta squared= .065 on detail recall. Tests of simple effects indicated that females in the cognitive-immediate group ($M=6.60, SD=2.56$) performed significantly better than males in the cognitive-immediate group ($M=4.23, SD=2.31$). Males in the one day-cognitive group ($M=6.40, SD=1.58$) performed significantly better than males in the one day-standard group ($M=3.08, SD=1.16$). Females in the immediate-cognitive ($M=6.60, SD=2.56$) group performed significantly better than females in the immediate-standard

($M=3.67$, $SD=1.05$) group. Females in the one day-cognitive ($M=6.10$, $SD=2.13$) groups also performed significantly better than females in the one day-standard ($M=3.83$, $SD=1.47$) group. Males in the cognitive-one day ($M=6.40$, $SD=1.58$) group performed significantly better than males in the cognitive-immediate ($M=4.23$, $SD=2.31$) group.

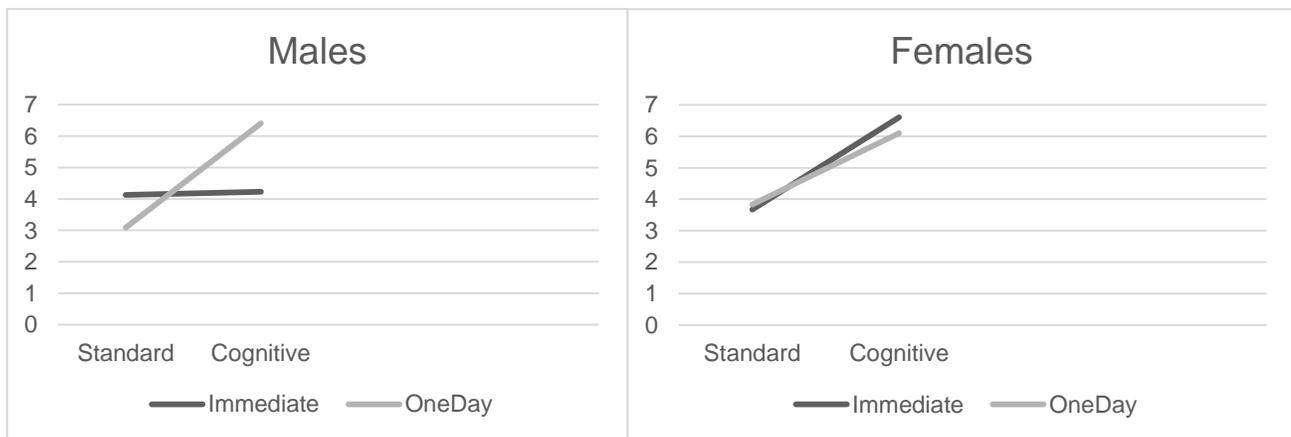
Similarly, another three-way ANOVA analysis was also conducted to examine the effects of gender, interview type, and time interval for facial recognition. The results showed a significant main effect for gender $F(1,96)= 7.90$, $p<.006$, partial eta squared= 0.76 ; and for time interval $F(1,96)=14.05$, $p<.000$, partial eta squared= $.128$. Females out-perform males on every condition for facial recognition except for the immediate-cognitive condition. The mean and standard deviations can be observed in Table 2. Females' scores also increased from the cognitive-one day condition in comparison to the immediate condition. This suggests that women have a higher memory consolidation rate in comparison to males.

Also, there was a significant two-way interaction between interview type and time interval $F(1,96)= 5.81$, $p<.018$, partial eta squared= $.057$. Test of simple effects indicated that females in the standard-one day group ($M=.58$, $SD=.29$) performed significantly better than males in the standard-one day group ($M=.25$, $SD=.26$). Females in the cognitive-one day ($M=.70$, $SD=.35$) group performed significantly better than males in the cognitive one day ($M=.40$, $SD=.32$) group. Males in standard-immediate ($M=.77$, $SD=.26$) condition performed significantly better than males in the standard-one day ($M=.25$, $SD=.26$) group. Males in the cognitive-immediate condition ($M=.63$, $SD=.30$) performed significantly better than males in the cognitive-one day ($M=.40$, $SD=.32$) group. Females in the standard-immediate ($M=.83$, $SD=.31$) condition performed significantly better than those in the standard-one day ($M=.58$, $SD=.29$) condition. Finally, there

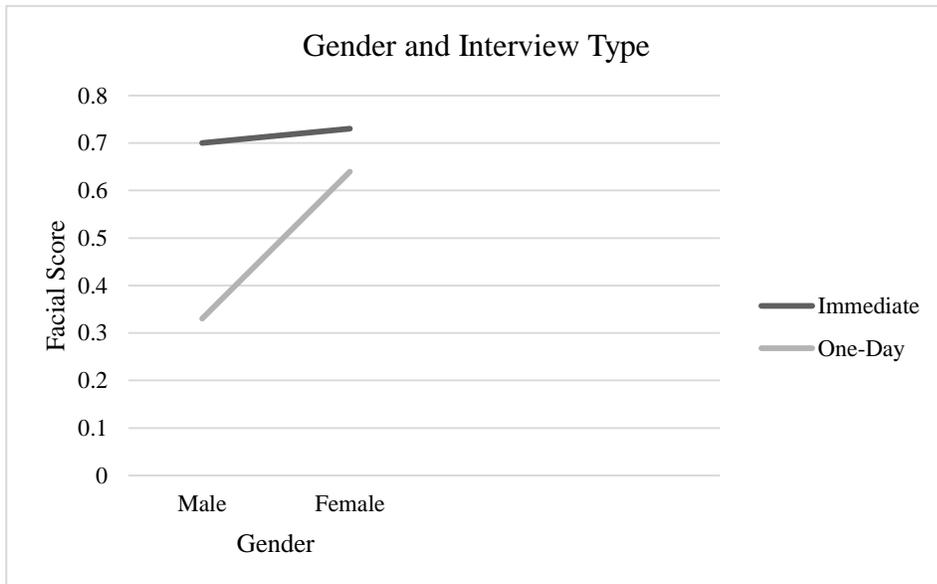
was a significant effect of gender and time interval $F(1,96)= 5.18, p<.025$, partial eta squared=.057. There was no significant interaction between gender, interview type and time interval $F(1,96)= .018, p<.05$.

Gender	Interview Type	Interval	Mean	Standard Deviation
Male	Standard	Immediate	.77	.26
		One-Day	.25	.26
	Cognitive	Immediate	.63	.30
		One-Day	.40	.32
Female	Standard	Immediate	.83	.31
		One-Day	.58	.29
	Cognitive	Immediate	.63	.40
		One-Day	.70	.35

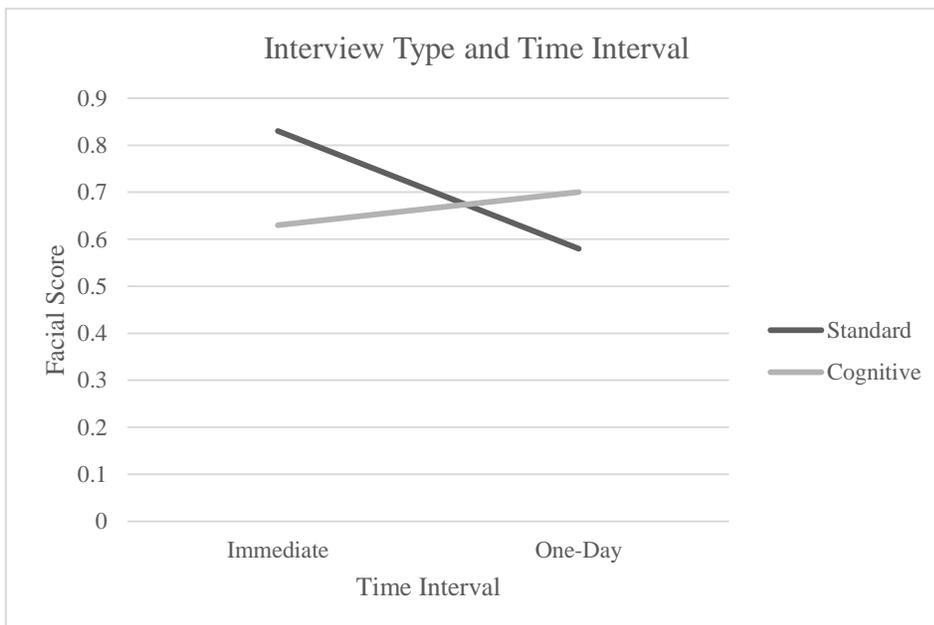
Table 2: Means and Standard Deviations for Facial Recall Scores



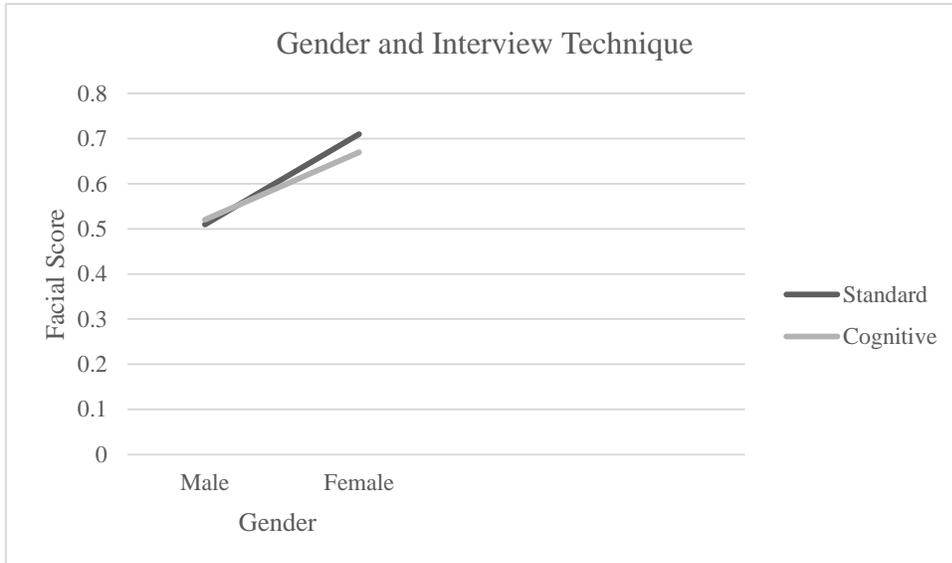
Graph 1: Significant effect between gender, interview type and interval between on detail recall



Graph 2: Effect between Gender and Interview Type on Facial Scores



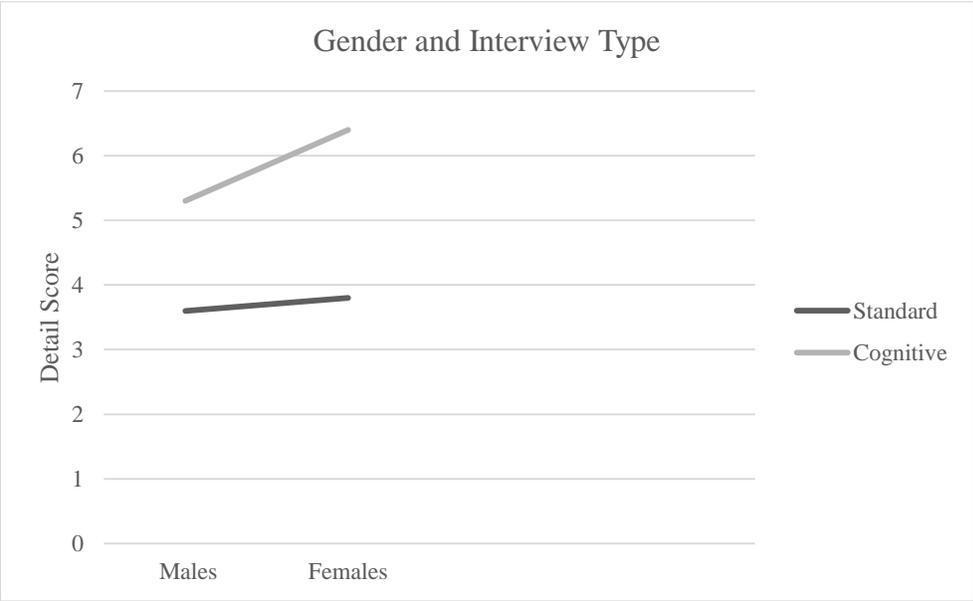
Graph 3: Effect between time interval and interview technique on facial scores



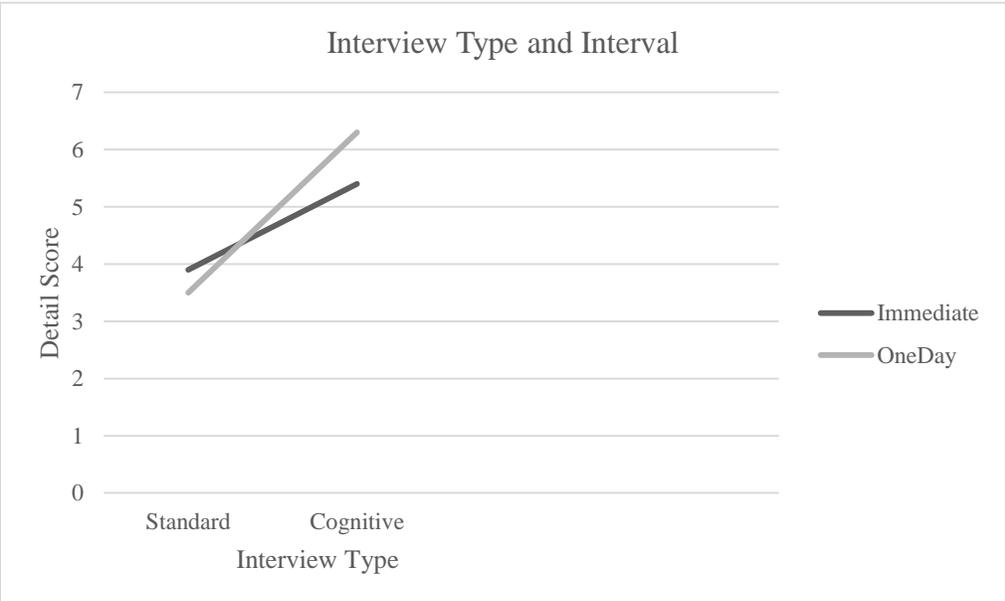
Graph 4: Effect between gender and interview technique on facial scores



Graph 5: Effect between time interval and gender on facial scores



Graph 6: Effect between gender and interview type on detail scores



Graph 7: Effect between interview type and interval on detail scores

A multiple regression analysis was used to test if the personality traits significantly predicted participants' detail recall for the immediate conditions. It was found that extraversion significantly predicted detail recall ($\beta = -.089$, $p < .048$) as did agreeableness ($\beta = .139$, $p < .17$) and neuroticism ($\beta = .069$, $p < .047$). A regression analysis was also done for mood and racial bias but found no significant results. In addition, a multiple regression analysis was used to test if the personality traits significantly predicted participants' detail recall for the one day conditions. It was found that openness significantly predicted detail recall ($\beta = .110$, $p < .019$). A regression analysis was also done for the one day condition on mood and racial bias but found no significant results.

DISCUSSION

The results from the study support previously reported studies about mood, personality, and recall factors. These factors include the prediction that individuals with high agreeableness and extraversion scores would report more detailed accounts in comparisons to other personality types. The results from this study are consistent with the data acquired by Areh (2007) which demonstrated that individuals with high extraversion would recall more accurate details. In addition, the study found that participants with high neuroticism scores reported more accurate details. In general, neuroticism scores were high for participants. This was a new discovery since previous research indicated that individuals with high neuroticism scores would recall less details. This can possibly be explained by the period of the semester in which the experiment took place. It was during the end of semester which means finals and important assignments were coming up. This could have caused participants to report neurotic type behavior more frequently.

Interestingly, the study did not find any significant results for mood. The results also did not yield anything significant for racial bias either. Previous research demonstrated that mood can affect memory recall (Forgas, Laham, & Vargas, 2005). However, it was not the case for this study. New measures must be explored for the racial and mood aspect of the study. It is also possible that individuals answered the surveys regarding racial bias in a favorable manner. A test such as the Implicit Association Test could be applied since it would test implicit racial bias from participants without their awareness. This test would produce more accurate measures of racial bias. The study also described itself as a mood measure for films so participants were expecting to report mood. A possible option may be to devise a method for measuring mood in an implicit manner.

As consistent with previous research by Megreya & Bindemann (2012), most participants struggled to successfully identify both perpetrators in the conditions. Also, participants struggled to successfully recall details of the suspects whenever they reported two suspects. The findings in the study support the notion that individuals tend to focus on one perpetrator whenever multiple perpetrators are involved. Participants rarely identified two perpetrators in the one-day conditions for males. Accuracy increased as the time delay got longer for women as previously discussed. However, the one-day conditions typically only reported one of the perpetrators for males. Overall, accurate scores for the face shots declined from the immediate to the one-day conditions in almost all groups as observed in Table 2.

The results are also consistent with previous research that women would recall more detailed accounts. This was observed especially in the facial recall scores. Women outscored men in every condition for facial recall. This result is consistent with the findings from Rehnman & Herlit (2007). Women also scored higher in the cognitive one-day condition than for the immediate condition. This also seems to suggest that women have a higher consolidation rate for memories than men do when the cognitive method is used. This is an aspect that should be explored in future studies. As predicted, the cognitive interviews yielded more accurate details than the standard interview. The result of women reporting accurate face shots highlights the importance of the cognitive interview. The cognitive interview technique allows individuals to relive events in an attempt to increase accuracy (Ginet & Py 2011). However, studies have not explored the effect that cognitive interviews may have in recalling faces. The results seem to suggest that cognitive interviews are a reliable measure in order to produce accurate facial recall.

Implications of the Study

The study was conducted with the intent to examine the effects of gender, interview technique, and time interval on eyewitness recall. Time interval studies for eyewitness testimonies have conflicting results so adding new data is important. This study reported that both detail and facial recall declined as the time interval increased. The data collected also supported previous studies that females being able to outperform men in memory related tasks. The scores in the one day for females were higher in comparison to men. These findings may suggest that women have a higher level of memory consolidation in comparison to men. Women also out performed men in the facial recall which was consistent with previous research. Both these findings suggest that women overall are more reliable witnesses. Therefore, attorneys and judges might be inclined to pick women over men. Personality types such as agreeableness and extroversion also seem to indicate higher incentive to recall details of a crime. Therefore, possibly administering personality tests for jurors could be done. This would ensure that the proper individuals who will yield more accurate details are chosen for the jury. Personality measures can assist detectives to determine if a suspect is suitable for an interview also. Administering personality test for jurors may help in determining certain personality types are more prone to error. If an individual is dysphoric, it can lead to recall error (Rounding, Jacobson & Lindsay, 2014).

The study also provides new data in support of the cognitive interview for law enforcement detectives. Leading questions in standard interviews have been shown to alter memory recall (Loftus, 1975). This can be an important factor since it can provide an alternative for interviewing witnesses. This study adds to the already overwhelming amount of evidence that cogni-

tive interviews yield more accurate information about a crime. The study also highlights the importance of facial recall from cognitive interviews. Also, law enforcement typically line up the suspects and let witnesses choose one from the lineup. The study demonstrates that witnesses presented with facial shots all at once following a cognitive interview would identify suspects more accurately.

Limitations

The main limitations of the study were the unequal groups and the lack of control over the conditions. The study was administered online which limited certain aspects of the study. This was evident in the one day condition in which multiple samples which were thrown out. Participants tried to take the one day condition on the same day. However, with the time log on Qualtrics, I could monitor which participants took the survey in the correct time interval. This also limited the sample size. Although participants were evenly split between males and females, some of the conditions had unequal groups. In order to yield the proper results for the measures in the study, the groups need to be equal and monitored.

Future Research

For future research, some changes need to be made. Investigators may need to administer the study in person. This would guarantee control over the conditions. This may influence participants to also fill out the necessary measures instead of leaving them blank. When studies are done online, participants may lose interest and not answer truthfully. While if it is person, then it can yield more truthful accounts. A new mood measure and racial bias may also be needed. The mood measure in this study did not produce any significant results. However, an implicit mood measure can be used. The Implicit Association Test would also be a possibility to administer if

the study is done with supervision. Administering the IAT online would not work therefore it was not attempted in this study. However, future studies can easily incorporate this IAT in its research design. Another element that can be explored is the time intervals. Due to time constraints, only a one day condition was explored. However, adding more days and observing the scores could be done for future research. This would be an interesting factor to explore, especially with the pattern of increasing facial scores from immediate to one-day that women displayed in the study.

Appendix A
Demographics Questionnaire

Demographics Questionnaire

1.) Which interval best captures your age?

- A.) 18-24 years old
- B.) 25-34 years old
- C.) 35-44 years old
- D.) 45-54 years old
- E.) 55-64 years old
- F.) 65-74 years old
- G.) 75 years or older

2.) Please specify your race/ethnicity:

- A.) White
- B.) Hispanic or Latino
- C.) Black or African American
- D.) Native American or American Indian
- E.) Asian / Pacific Islander
- F.) Other

3.) What is the highest level or degree of school you have completed?

- A.) High school graduate, diploma or the equivalent (for example: GED)
- B.) Some college credit, no degree
- C.) Trade/Vocational/Technical school
- D.) Associate's Degree
- E.) Bachelor's Degree
- F.) Master's Degree
- G.) Professional Degree
- H.) Doctorate Degree

4.) Please specify your gender:

- A.) Male
- B.) Female
- C.) Prefer not to say

5.) Please identify your major, or write undeclared.

6.) Please identify your minor, or write N/A.

7.) What is your marital status?

- A.) Single, never married
- B.) Married
- C.) Divorced
- D.) Widowed
- E.) Separated

- 8.) What is your current employment status?
- A.) Employed for wages
 - B.) Self-employed
 - C.) Out of work and looking for work
 - D.) Out of work but not currently looking for work
 - E.) A homemaker
 - F.) A student
 - G.) Military
 - H.) Retired
 - I.) Unable to work

Appendix B
Informed Consent



Individual Differences in Eyewitness Testimony Informed Consent

Principal Investigator: Mustapha Mouloua, Ph.D.

Co-Investigator: Noel Cal

Investigational Site: UCF SONA System

Researchers at the University of Central Florida (UCF) study many topics. To do this we need the help of people who agree to take part in a research study. You are being invited to take part in a research study which will include 160 people. You must be 18 years of age or older and a UCF student to be included in the research study. Because the researcher is an undergraduate student he is being guided by Dr. Mustapha Mouloua, a UCF faculty supervisor in Psychology.

What you should know about a research study:

- Someone will explain this research study to you.
- A research study is something you volunteer for.
- Whether or not you take part is up to you.
- You should take part in this study only because you want to.
- You can choose not to take part in the research study.
- You can agree to take part now and later change your mind.
- Whatever you decide it will not be held against you.
- Feel free to ask all the questions you want before you decide.

Purpose of the research study:

- The purpose of this study is to better understand memory recall among college students.

What you will be asked to do in the study:

You will be asked to watch a short film and fill multiple surveys. The surveys will consist of demographic based questions, a Profile of Mood States, Five Factor Model Test, and basic questions relating to recall and memory.

Location: This study will require you to come to log in to the UCF SONA system.

Time required: You should allot approximately 60 minutes to participate in this study.

Risks: There is minimal risk involved in this study. Any data collected will be completely anonymous and will not be linked to participants in any way. You as the participant may also withdraw from the study at any time.

Benefits: As a research participant you will not benefit directly from this research, besides learning more about how research is conducted.

Compensation or payment: There is no payment offered for this study, however SONA credit may be assigned by SONA Systems. Once you complete the study, we will send verification to SONA Systems who is in charge of assigning points to your account.

Confidentiality: We will limit your personal data collected in this study to people who have a need to review this information. Your identity will be kept confidential. Your information will be assigned a code. All of the information from the study will be kept in a locked filing cabinet and stored on a password protected computer. Your information will be combined with information from other people who took part in this study. When the researcher writes about this study to share what was learned with other researchers, he/ she will write about this in aggregate form. Your name will not be used in any report.

Study contact for questions about the study or to report a problem: If you have questions, concerns, or complaints, or think the research has hurt you, talk to Dr. Mustapha Mouloua, Faculty Supervisor, UCF Psychology Department at (407) 823-2091 or by email at mustapha.mouloua@ucf.edu

IRB contact about your rights in the study or to report a complaint: Research at the University of Central Florida involving human participants is carried out under the oversight of the Institutional Review Board (UCF IRB). This research has been reviewed and approved by the IRB. For information about the rights of people who take part in research, please contact: Institutional Review Board, University of Central Florida, Office of Research & Commercialization, 12201 Research Parkway, Suite 501, Orlando, FL 32826-3246 or by telephone at (407) 823-2901. You may also talk to them for any of the following:

- Your questions, concerns, or complaints are not being answered by the research team.
- You cannot reach the research team.
- You want to talk to someone besides the research team.
- You want to get information or provide input about this research.

Appendix C

The Big Five Personality Test

Introduction

This is a personality test, it will help you understand why you act the way that you do and how your personality is structured. Please follow the instructions below, scoring and results are on the next page.

Instructions

In the table below, for each statement 1-50 mark how much you agree with on the scale 1-5, where 1=disagree, 2=slightly disagree, 3=neutral, 4=slightly agree and 5=agree, in the box to the left of it.

Test

I....

1. Am the life of the party.
2. Feel little concern for others.
3. Am always prepared.
4. Get stressed out easily.
5. Have a rich vocabulary.
6. Don't talk a lot.
7. Am interested in people.
8. Leave my belongings around.
9. Am relaxed most of the time.
10. Have difficulty understanding abstract ideas.
11. Feel comfortable around people.
12. Insult people.
13. Pay attention to details.
14. Worry about things.
15. Have a vivid imagination.
16. Keep in the background.
17. Sympathize with others' feelings.
18. Make a mess of things.
19. Seldom feel blue.
20. Am not interested in abstract ideas.
21. Start conversations.
22. Am not interested in other people's problems.
23. Get chores done right away.
24. Am easily disturbed.
25. Have excellent ideas.
26. Have little to say.
27. Have a soft heart.
28. Often forget to put things back in their proper place.
29. Get upset easily.
30. Do not have a good imagination.
31. Talk to a lot of different people at parties.
32. Am not really interested in others.

33. Like order.
34. Change my mood a lot.
35. Am quick to understand things.
36. Don't like to draw attention to myself.
37. Take time out for others.
38. Shirk my duties.
39. Have frequent mood swings.
40. Use difficult words.
41. Don't mind being the center of attention.
42. Feel others' emotions.
43. Follow a schedule.
44. Get irritated easily.
45. Spend time reflecting on things.
46. Am quiet around strangers.
47. Make people feel at ease.
48. Am exacting in my work.
49. Often feel blue.
50. Am full of ideas.

Appendix D
Profile of Mood States Test

Profile of Moods States

Directions: Describe HOW YOU FEEL RIGHT NOW by circling the most appropriate number after each of the words listed below

FEELING	Not at all	A little	Moderate	Quite a bit	Extremely
1. Friendly	1	2	3	4	5
2. Tense	1	2	3	4	5
3. Angry	1	2	3	4	5
4. Worn out	1	2	3	4	5
5. Unhappy	1	2	3	4	5
6. Clear-headed	1	2	3	4	5
7. Lively	1	2	3	4	5
8. Confused	1	2	3	4	5
9. Sorry for things done	1	2	3	4	5
10. Shaky	1	2	3	4	5
11. Listless	1	2	3	4	5
12. Peeved	1	2	3	4	5
13. Considerate	1	2	3	4	5
14. Sad	1	2	3	4	5
15. Active	1	2	3	4	5
16. On edge	1	2	3	4	5
17. Grouchy	1	2	3	4	5
18. Blue	1	2	3	4	5
19. Energetic	1	2	3	4	5
20. Panicky	1	2	3	4	5
21. Hopeless	1	2	3	4	5
22. Relaxed	1	2	3	4	5
23. Unworthy	1	2	3	4	5
24. Spiteful	1	2	3	4	5
25. Sympathetic	1	2	3	4	5
26. Uneasy	1	2	3	4	5
27. Restless	1	2	3	4	5
28. Unable to	1	2	3	4	5
29. Fatigued	1	2	3	4	5
30. Helpful	1	2	3	4	5
31. Annoyed	1	2	3	4	5
32. Discouraged	1	2	3	4	5
33. Resentful	1	2	3	4	5
34. Nervous	1	2	3	4	5
35. Lonely	1	2	3	4	5
36. Miserable	1	2	3	4	5
37. Muddled	1	2	3	4	5

38. Cheerful	1	2	3	4	5
39. Bitter	1	2	3	4	5
40. Exhausted	1	2	3	4	5
41. Anxious	1	2	3	4	5
42. Ready to fight	1	2	3	4	5
43. Good-natured	1	2	3	4	5
44. Gloomy	1	2	3	4	5
45. Desperate	1	2	3	4	5
46. Sluggish	1	2	3	4	5
47. Rebellious	1	2	3	4	5
48. Helpless	1	2	3	4	5
49. Weary	1	2	3	4	5
50. Bewildered	1	2	3	4	5
51. Alert	1	2	3	4	5
52. Deceived	1	2	3	4	5
53. Furious	1	2	3	4	5
54. Effacious	1	2	3	4	5
55. Trusting	1	2	3	4	5
56. Full of pep	1	2	3	4	5
57. Bad-Tempered	1	2	3	4	5
58. Worthless	1	2	3	4	5
59. Forgetful	1	2	3	4	5
60. Carefree	1	2	3	4	5
61. Terrified	1	2	3	4	5
62. Guilty	1	2	3	4	5
63. Vigorous	1	2	3	4	5
64. Uncertain about things	1	2	3	4	5
65. Bushed	1	2	3	4	5

Appendix E
Symbolic Racism Scale

The Symbolic Racism Scale

1. It's really a matter of some people not trying hard enough; if blacks would only try harder they could be just as well off as white.
 - <1>Strongly agree
 - <2>Somewhat agree
 - <3>Somewhat disagree
 - <4>Strongly disagree
2. Irish, Italian, Jewish, and many other minorities overcame prejudice and worked their way up. Blacks should do the same.
 - <1>Strongly agree
 - <2>Somewhat agree
 - <3>Somewhat disagree
 - <4>Strongly disagree
3. Some say that black leaders have been trying to push too fast. Other feel that they haven't pushed fast enough. What do you think?
 - <1> Trying to push very much too fast
 - <2>Going too slowly
 - <3>Moving at about the right speed
4. How much of the racial tension that exists in the United States today do you think blacks are responsible for creating?
 - <1>All of it
 - <2>Most
 - <3>Some
 - <4>Not much at all
5. How much discrimination against blacks do you feel there is in the United States today, limiting their chances to get ahead?
 - <1>A lot
 - <2>Some
 - <3>Just a little
 - <4>None at all
6. Generations of slavery and discrimination have created conditions that make it difficult for blacks to work their way out of the lower class
 - <1>Strongly agree
 - <2>Somewhat agree
 - <3>Somewhat disagree
 - <4>Strongly disagree
7. Over the past few years, blacks have gotten less than they deserve
 - <1>Strongly agree
 - <2>Somewhat agree
 - <3>Somewhat disagree
 - <4>Strongly disagree

8. Over the past few years, blacks have gotten more economically than they deserve.

<1>Strongly agree

<2>Somewhat agree

<3>Somewhat disagree

<4>Strong disagree

Appendix F

Social Dominance Orientation Questionnaire

Social Dominance Scale

Please could you indicate the extent to which you agree or disagree with these statements in relation to racial groups, by circling a number on the scale, where 1 indicates that you strongly disagree and 7 indicates you strongly agree.

1. Some groups of people are simply inferior to other groups.

Strongly disagree Strongly agree
1 2 3 4 5 6 7

2. It would be good if groups could be equal.

Strongly disagree Strongly agree
1 2 3 4 5 6 7

3. In getting what you want, it is sometimes necessary to use force against other groups.

Strongly disagree Strongly agree
1 2 3 4 5 6 7

4. It's OK if some groups have a more of a chance in life than others.

Strongly disagree Strongly agree
1 2 3 4 5 6 7

5. Group equality should be our ideal.

Strongly disagree Strongly agree
1 2 3 4 5 6 7

6. To get ahead in life, it is sometimes necessary to step on other groups.

Strongly disagree Strongly agree
1 2 3 4 5 6 7

7. There is a need for increased social equality.

Strongly disagree

Strongly agree

1 2 3 4 5 6 7

8. If certain groups stayed in their place, we would have fewer problems.

Strongly disagree

Strongly agree

1 2 3 4 5 6 7

9. We should strive to make incomes as equal as possible.

Strongly disagree

Strongly agree

1 2 3 4 5 6 7

10. No one groups should dominate society.

Strongly disagree

Strongly agree

1 2 3 4 5 6 7

11. It's probably a good things that certain groups are at the top and other groups are at the bottom.

Strongly disagree

Strongly agree

1 2 3 4 5 6 7

12. Inferior groups should stay in their place.

Strongly disagree

Strongly agree

1 2 3 4 5 6 7

13. Sometimes other groups must be kept in their place.

Strongly disagree

Strongly agree

1 2 3 4 5 6 7

14. We should do what we can to equalize conditions for different groups.

Strongly disagree

Strongly agree

1 2 3 4 5 6 7

15. We would have fewer problems if we treated people more equally.

Strongly disagree

Strongly agree

1 2 3 4 5 6 7

Appendix G
Standard Interview

Standard Questions:

1. Were the perpetrator(s) armed? If so, what weapon?
2. What type of shirt did the perpetrator(s) who took the money have on?
3. What was the color of the shirt of the perpetrator who took the money?
4. Did either of the perpetrator(s) have hats on? If so, what type was it?
5. Were there people in the waiting lobby while the robbery took place?
6. Please describe the perpetrator(s)' ethnicity.
7. Did the perpetrator(s) wear sunglasses? If so, what type?
8. Did the perpetrator(s) wear masks or face coverings?
9. Did you notice if the perpetrator(s) had tattoo(s)?
10. What exit did the perpetrator(s) take?
11. Was there a perpetrator near the lobby?
12. Who gave the perpetrator(s) the money?
13. Did the perpetrator(s) had on gloves?
14. What was the sex of the perpetrator(s)?

Appendix H
Cognitive Interview

Cognitive Interview

1. Describe in your own words what happened? Feel free to list the events and provide as much details as possible.
 1. How well do you remember this?
 2. Was it difficult reimagining the events? If so, explain.
2. Can you describe the setting of the crime? Feel free to close your eyes in attempts to remember better.
3. Do you think it would be easy to identify the suspect(s) if you were one of the victims?
 1. If so, explain what detail you would remember the most.
4. How many suspects were there?
5. Can you describe the suspect(s)' attire?
 1. Was any clothing type noticeable?
 2. How well do you remember this?
 3. Was it difficult to come to this conclusion?
6. Can you clarify any visible and unique things that stood out from the suspects?
7. What impression did the suspect(s) give you? Did they seem violent or passive?
8. Is there any detail you think is important to mention?
 1. If so, why is this detail important?
9. What was the last thing you remember from the crime?
10. Did viewing the crime bring out any unwanted emotions?
 1. If so, did it affect your recollection of events?

Appendix I

Face Shots



Appendix J
Debrief Statement



Debriefing Statement

For the study entitled:
“Individual Differences in Eyewitness Testimony”

Dear Participant;

During this study, you were asked to watch a video and answer questionnaires and participate in an interview. You were told that the purpose of the study was to better understand memory recall for college students. The actual purpose of the study was to evaluate the individual differences in memory. In doing this, you were placed in a series of twelve possible conditions. The conditions of the study were gender(male/female), type of interview (standard/cognitive) and time interval (immediate/one day/two days).

We did not tell you everything about the purpose of the study because it may influence the data collected. If participants knew the true purpose of the study, then it would not yield usable data for the study.

You are reminded that your original consent document included the following information: age, ethnicity, level of school/degree completion, major and minor information, gender, employment and marital status. If you have any concerns about your participation or the data you provided in light of this disclosure, please discuss this with us. We will be happy to provide any information we can to help answer questions you have about this study.

Now that you know the true nature of the study, you have the option of having your data removed from the study. Please contact the PI if you do not want your data to be used in this research and it will be withdrawn.

Study contact for questions about the study or to report a problem: If you have questions, concerns, or complaints or think the research has hurt you, talk to Dr. Mustapha Mouloua, Faculty Supervisor, UCF Psychology Department at (407) 823-2091 or by email at mustapha.mouloua@ucf.edu.

IRB contact about your rights in the study or to report a complaint: Research at the University of Central Florida involving human participants is carried out under the oversight of the Institutional

Review Board (UCF IRB). This research has been reviewed and approved by the IRB. For information about the rights of people who take part in research, please contact: Institutional Review Board, University of Central Florida, Office of Research & Commercialization, 12201 Research Parkway, Suite 501, Orlando, FL 32826-3246 or by telephone at (407) 823-2901.

If you have experienced distress as a result of your participation in this study, a referral list of mental health providers is attached to this document for your use.⁶ (Please remember that any cost in seeking medical assistance is at your own expense.)

Please again accept our appreciation for your participation in this study.

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