ABSTRACT

Are Jurors Persuaded by the "Concreteness of Truth"? The Impact of
Eyewitness Concreteness, Juror Instructions, and Visualization on Juror Decision Making

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I investigated the impact of eyewitness use of linguistic concreteness on juror decision making. Mock jurors read a summary of an ambiguous criminal case that included a concrete or abstract version of an eyewitness's testimony. When jurors received only these materials (Experiment 1), those who received the concrete testimony were more likely to render guilty verdicts and found the eyewitness more credible. However, concreteness had no effect when jurors received an additional document (Experiment 2), although juror instructions did induce skepticism of the eyewitness and the case in general. Neither concreteness nor juror visualization of the case directly influenced jurors' decisions (Experiment 3), but those jurors who received the concrete testimony while visualizing perceived the eyewitness to be more accurate over time. Overall, these results do not suggest a consistent effect of concreteness on juror decision making. Future research should consider utilizing more robust methods to manipulate concreteness.

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Eyewitness Concreteness, Juror Instructions, and Visualization on Juror Decision Making

by

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ACKNOWLEDGMENTS

# DEDICATION

To my family, for their love and support.

CHAPTER ONE

Background and Significance

Jurors are entrusted with evaluating the credibility and accuracy of eyewitness testimony. The weight jurors give such testimony can, in turn, impact their perceptions of culpability and ultimately their verdicts. Yet despite a growing body of research over the past four decades on the fallibility of eyewitness memory, many potential jurors and even some members of the legal profession have poor knowledge of how memory works and the factors which can impact its quality (e.g. Benton, Ross, Bradshaw, Thomas, & Bradshaw, 2006; Malavanti, Terrell, Dasse, & Weaver, 2014; Simons & Chabris, 2011; Wise & Safer, 2003). Instead, jurors often find themselves relying on verbal and non-verbal cues to inform their judgments about an eyewitness's testimony, such as confidence (Brewer & Burke, 2002), and eyewitness nervousness (Bothwell & Jalil, 1992). Even the style of language employed (e.g. O'Barr, 1983) can inform juror decision making. One linguistic cue poorly understood in eyewitness research is linguistic category. Linguistic category comprises a continuum from concreteness to abstractness based on semantic-syntactic categories, and a speaker's use of linguistic categories can shape perceptions of causality (Schmid & Fiedler, 1998) and even truthfulness (Hansen & Wänke, 2010). However, little research has been done to investigate the use of these categories in a courtroom setting, and none to date has investigated the role of linguistic concreteness specifically in eyewitness testimony. Further, it is unclear whether the influence of linguistic category persists when individuals are skeptical of eyewitness

memory and/or under higher cognitive load, both of which are often the case when jurors are evaluating evidence in a criminal trial.

As a result, I investigated how linguistic category choices in eyewitness testimony influence juror decision making, perceptions of defendant culpability, and perceptions of eyewitness credibility and accuracy. I manipulated the linguistic concreteness or abstractness of an eyewitness's testimony. Using a mock juror paradigm, I subjected participants to differing levels of eyewitness concreteness, skepticism, and visualization in order to determine the degree and durability of this linguistic cue.

*Misconceptions about Eyewitness Memory*

Eyewitness identification and subsequent testimony are an integral part of many criminal cases. When accompanied with other corroborating evidence, eyewitness identification can be an effective means of persuading a jury of a defendant's guilt. Eyewitnesses can sometimes be reliable and accurate in their identifications (Frontline & Loftus, 1997; Yuille & Cutshall, 1986), and their insights can help guide law enforcement's investigation of a case (Innocence Project, 2009; Wells, Memon, & Penrod, 2006). Yet memory is not infallible, and eyewitness memory can often be flawed, sometimes resulting in the wrongful conviction of innocent persons.

Numerous factors undermine the veracity of eyewitness memory, including the age of the eyewitness (Pozzulo & Lindsay, 1998), the presence of a weapon (Loftus, Loftus, & Messo, 1987), own-race bias (Meissner & Brigham, 2001), and the intentional or unintentional influence of law enforcement (Semmler, Brewer, & Wells, 2004; Steblay, 1997). Reforms have been suggested and/or enacted across the United States in an attempt to mitigate some of the factors influencing the accuracy of eyewitness

memory (see National Institute of Justice, 2003; National Research Council, 2014; Supreme Court of New Jersey, 2008); however, misconceptions about the reliability of memory in the general public persist. According to a 2009 nationwide telephone survey, 37.1% believed a single confidence eyewitness should be enough to result in a conviction and 63% incorrectly believed that memory works like a video camera (Simons & Chabris, 2011). A follow-up study in 2011 comparing online participants from Amazon's Mechanical Turk (MTurk) to the original telephone survey revealed similar rates of endorsements for the aforementioned incorrect memory statements (Simons & Chabris, 2012). Clearly, potential jurors are unaware of how memory works and what factors can undermine its veracity.

Given the public's lack of knowledge on the reliability of eyewitness memory, it is no surprise that eyewitness testimony remains a compelling factor in juror decision making, often convincing jurors to convict a defendant even in the face of otherwise circumstantial evidence. According to the Innocence Project (2015), of the 336 individuals later exonerated of criminal charges by DNA and other evidence, nearly 75% were misidentified by an eyewitness. Further, eyewitness misidentification remains the leading cause of false convictions. Even though cases of eyewitness misidentification resulting in wrongful conviction have been widely publicized (Arkowitz & Lilienfeld, 2009; Ford, 2015; Loeterman, 1997; Steer, 2015), individuals continue to place a large amount of faith in the accuracy of eyewitness memory. Educating potential jurors on the fallibility of eyewitness memory may ultimately help prevent the conviction of innocent persons.

*Influencing Juror Perceptions of Eyewitness Testimony*

Despite their best intentions, eyewitnesses potentially provide jurors with inaccurate testimony. Jurors themselves must determine the extent to which they can rely on an eyewitness's testimony. If jurors are misinformed about how memory works, their judgments about eyewitness credibility and accuracy are likely based primarily on other, tangential factors. In fact, verbal and non-verbal cues in an eyewitness's delivery of testimony can shape jurors' impressions of the reliability of the testimony, regardless of the link (or lack thereof) between these cues and eyewitness accuracy.

For example, jurors depend immensely on verbal and non-verbal cues for eyewitness confidence when making their decisions. In a survey of registered Florida voters, 56% incorrectly believed confidence reliably predicted accuracy (Brigham & Bothwell, 1983). Separately, a 2004 telephone survey of potential jurors in the District of Columbia found that 40% of respondents believed that confidence was "an excellent indicator of that eyewitness' reliability" (Schmechel, O'Toole, Easterly, & Loftus, 2006, p. 199). Further, Cutler, Penrod, and Dexter (1990) found eyewitness confidence to have a moderate effect size on juror ratings of eyewitness accuracy, despite reflecting the mere difference of an eyewitness having 80% or 100% stated confidence in their identification.

Other cues such as eyewitness emotion can also inform juror perceptions of eyewitness reliability. Nervous eyewitnesses are viewed as less confident and less accurate, despite the fact that these ratings are not related with witness accuracy, witness levels of confidence, or witness ratings of self-consciousness (Bothwell & Jalil, 1992). However, eyewitness emotion can also bolster juror ratings of eyewitness credibility, eyewitness accuracy, and defendant culpability, provided that the displayed emotion is

perceived as appropriate (Golding, Fryman, Marsil, & Yozwiak, 2003) and congruent to juror expectations (Kaufmann, Drevland, Wessel, Overskeid, & Magnussen, 2003).

Juror judgments are also influenced by the style of language employed by an eyewitness in his or her testimony. Eyewitnesses who use linguistic hedges and hesitations, referred to as powerless speech, are generally perceived by jurors as being less trustworthy (O'Barr, 1983). Jurors are more likely to believe the prosecution's case against the defendant and recommend harsher sentences when the eyewitness uses a more powerful speech style (Jules & McQuiston, 2013). Separately, paralinguistic factors such as accent and intonation can also affect juror perceptions of the eyewitness by eliciting stereotypes about speakers' backgrounds or gender expectations (Smalls, 2004). An eyewitness who uses accented English is perceived as less credible and less accurate than a witness using unaccented English, and the specific ethnicity of the accent can influence ratings of credibility, accuracy, and defendant guilt (Frumkin, 2007). In a study of potential voters in Australia, male eyewitnesses who used rising intonation and female eyewitnesses who used non-rising intonation at the end of a statement were perceived as more confident than those men and women who did not (Willis, 2000).

These linguistic cues can inform juror decision making even without the juror being explicitly aware of their influence. Since recipients are more sensitive to the effects of how a message is delivered than speakers (Semin & De Poot, 1997), it is important to investigate how eyewitness delivery of testimony shapes juror perceptions.

*Linguistic Category, Perceptions, and Decision Making*

One aspect of language that has yet to be fully investigated in relation to eyewitness testimony is linguistic category. Words can be divided into four linguistic

categories on a continuum from concreteness to abstractness. Concrete words are more "perceptible entit[ies]" that can be experienced through the physical senses, whereas abstract words cannot be perceived directly; instead, these words refer to concepts or meanings that do not necessarily have physical counterparts (Brysbaert, Warriner, & Kuperman, 2014, p. 904). Each linguistic category elicits distinct inferences about control, stability, and verifiability, as seen in Table 1 (Semin and Fiedler, 1988). According to Semin and Fiedler (1988), these categories range from the more concrete descriptive action verbs (DAVs) and interpretive action verbs (IAVs) to the more abstract state verbs (SVs) and adjectives (ADJs). The more concrete categories (DAVs and IAVs) describe specific actions that are dependent upon context, whereas the more abstract categories (SVs and ADJs) "imply endurable states" (Fiedler, 2008, p. 183). An eyewitness's use of more verifiable or more enduring language when describing the crime or the defendant can potentially influence a juror's perception of the case. Most current evidence on the influence of concreteness on perceptions and decision making focuses on two domains: interpersonal and consumer behavior.

*Concreteness and Interpersonal Perceptions*

Linguistic concreteness can be used to convey biases about in-group and out-group members. This phenomena, called linguistic intergroup bias, was first reported by Maass, Salvi, Arcuri, and Semin (1989). Maass and colleagues found that participants were more likely to describe positive actions of in-group members with more abstract terms, creating the sense that this positive action was an enduring characteristic. Positive actions of out-group members, on the other hand, were described with more concrete terms, giving the impression that the positive action was tied to that context only. The

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Table 1.1. Overview of the four categories of Semin and Fiedler's Linguistic Category Model, their characteristics, and their semantic implications

| Linguistic category | Characteristics | Semantic implications | Example |
|---|---|---|---|
| Descriptive action verbs (DAVs) | Highly context-dependent Single behavioral event, usually without emotional valence "Physically invariant" behaviors | Low information about the subject Low stability of trait High internal control Can be verified | He *hit* him. |
| Interpretive action verbs (IAVs) | Less context-dependent Single behavioral event with positive or negative valence Class of behaviors | More information about subject Low stability of trait High internal control Can be verified | He *hurt* him. |
| State verbs (SVs) | No context dependence Mental or emotional state with no clear beginning or end | More information about subject More stability of trait Low internal control Hard to verify | He *despises* him. |
| Adjectives (ADJs) | No context dependence Abstract description of a person, event, or object Unrelated to a specific event or behavior | Most information about subject Most stable Low internal control Hard to verify | He's *aggressive*. |

Note: Based on Coenen, Hedebouw, & Semin, 2006, and Schmid & Fiedler, 1998.

opposite trend was found with regard to negative actions. The negative actions of in-group members were described with more concrete terms, suggesting a temporal context to the behavior, and those of out-group members were described more abstractly, suggesting the behavior was more characteristic of the group.

Use of concreteness can also influence perceptions of causality for larger groups, to include nation-states. Leets (2000) asked participants to read an article about a conflict between North and South Korea. The article was manipulated by permutation (order of

the countries mentioned in the title and article), generalization (use of more or less concrete terms), and truncation (presence or removal of the opposing party from the sentence). Participants gave higher ratings of causality and aggressiveness for the conflict when the country was named first, when the article contained more abstract text, and when the rival agent was removed from the sentence. Additionally, using more abstract language resulted in higher ratings of how stable or established the conflict appeared. These findings regarding increased ratings of causality and stability when abstract text was used provide further evidence for the semantic implications of varying levels of concreteness.

Just as linguistic intergroup bias can be conveyed through speech, the linguistic choices an individual makes can be used to assess implicit biases. Von Hippel, Sekaquaptewa, and Vargas (1997) asked participants to watch a video of an interaction between two individuals, one black and one white. Afterwards, participants filled out a measure of explicit prejudice and read a series of stereotype-congruent and stereotype-incongruent articles. Accompanying each article were four statements summarizing the articles, each corresponding to one of the four linguistic categories. Participants rated each statement on how adequately they described the article in question. Implicit bias was assessed by calculating participants' preference for the abstract statements associated with the black individual in the stereotype-congruent articles and the abstract statements associated with the white individual in the stereotype-incongruent articles. This implicit bias was distinct from the explicit measure of bias and predicted participants' evaluative ratings of the black or white individual. These findings suggest that an individual's inherent biases about others are communicated through their use of more concrete or

more abstract language. A series of follow-up studies suggests this bias is based in differential expectancies for the groups in question, rather than a conscious motivation on the part of the speaker (Maass, Milesi, Zabbini, & Stahlberg, 1995).

Linguistic category can also influence the perceived psychological distance an individual feels from the speaker. Reitsma-Van Rooijen and colleagues (2007) asked participants to write to an unknown person about an event in which they were or were not responsible, after which they received either an abstract or concrete reply from the unknown person. Participants then filled out an interpersonal distance measure and rated their relationship with the unknown person. Those who described a positive, responsible behavior and received an abstract response reported feeling closer to the recipient and rated the message more positively than those who received a concrete response. Alternatively, participants who described a negative, irresponsible behavior and received an abstract response reported feeling more distance to the recipient and rated the message more negatively than those who received a concrete response. Thus, linguistic category can influence perceptions of social distance.

Additionally, speakers can use linguistic category to convey feelings of distance. In an analysis of twitter and Usenet postings, Snefjella and Kuperman (2015) found that individuals use concreteness to denote not only physical distance, but also temporal, and psychological distance. As physical distance from a named city increased, postings became less concrete and more abstract. The same pattern was replicated with temporal distance. As distance in time from the present moment increased, through the use of phrases such as "ago" and "next", use of concrete language decreased while abstract language increased. Social distance from an individual also resulted in the use of more

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abstract language; individuals closer in social distance, like friends and the recently deceased, were described more concretely, whereas more socially distant individuals, such as visitors or the long departed, were described more abstractly.

Joshi and Wakslak (2013) found similar use of concreteness conveyed feelings of social distance. Over the course of six studies, participants who were told they would be speaking to a larger group of people were more likely to use or select abstract language than those who were told they were communicating with a small number of people. However, this effect was reversed when participants had low motivation to speak to larger audiences. Weakly motivated individuals were more likely to use abstract rather than concrete language when speaking to a smaller audience. These findings also expanded to group similarity, such that participants speaking to more heterogeneous groups were more likely to use abstract arguments. The selective use of concreteness to best convey a message is of particular importance given the differences in audience size and similarity in an individual's daily interactions.

Perceptions of power can also be expressed through the degree of linguistic abstraction involved. Wakslak, Smith, and Han (2014) conducted seven experiments examining how an individual's use of abstract or concrete language can influence perceptions of that individual's personal power. Overall, use of abstract language was viewed as more powerful, regardless if the individual in question was describing another's behavior, making a statement about a product, or a politician giving a quote. Abstract speakers were also rated as more abstract thinkers, more willing to make judgments, and more competent. A mediation analysis that included abstract thinking and willingness to make judgments in the model found only partial mediation of the effect of

concreteness on power ratings. These perceptions of power may indirectly bias a person's perceptions of those individuals around him or her.

*Concreteness and Decision Making*

Individuals are more willing to invest in a prospective company when the prospectus highlights concrete language and psychological distance is high (Elliot, Rennekamp, & White, 2015). Elliot and colleagues asked participants to read an investment prospectus for a fictional company. Each investment prospectus contained both abstract and concrete language; however, participants saw either the abstract or concrete language highlighted in the prospectus. Further, the location of the fictional company was manipulated such that the company was either closer or farther away from their current location. Participants who saw the concrete language highlighted were more willing to invest in the company, and mediation analyses found that participants who saw the concrete language were more comfortable in their ability to evaluate the company, increasing their willingness to invest. Additionally, the effect of concreteness increased willingness to invest for the farther location. The use of concreteness likely conveys easily verifiable information about the fictional company despite the psychological distance, and having access to verifiable information is critical when making investment decisions. However, this effect may not be stable if using concrete language to highlight negative performance or behavior.

Separately, concreteness of store advertisements may also moderate purchasing decisions. Krishnan, Biswas, and Netemeyer (2006) had participants view either a concrete or abstract advertisement that showed a comparison of the current price with either a previous in-store price or a price from another store. Those who saw a concrete

advertisement paired with a moderate discount perceived they were getting a greater deal and were less likely to search for a lower price when the price comparison was between stores rather than within-store. Comparatively, there were no differences in the abstract advertisement conditions on deal perception or intention to search for lower price. In a second study, the advertisements were also manipulated by viewing, either at home or in-store. Participants who viewed the concrete advertisement at home perceived they were getting a greater deal and were less likely to search for a lower price when the price comparison was between stores. Once again, there were no differences in perception of the deal or intentions to search for a lower price among the abstract advertisement conditions. These two studies suggest that concreteness alone moderates the effect of price comparison type or advertisement viewing location, likely through the congruency of level of concreteness and psychological or physical distance.

*Use of Linguistic Category in the Courtroom*

Only a limited amount of research has been done to investigate the role linguistic category plays in the courtroom. However, the semantic implications of these categories as described in Semin and Fiedler's (1988) Linguistic Category Model suggest that use of linguistic category could influence juror perceptions of a case. For example, the transition from IAVs to SVs implies, among other things, a change from high internal control to low internal control. This difference in implied control can influence later judgments about an individual's level of responsibility for their actions. Schmid and Fiedler (1998) found that these implied variations in internal and external causality extend to the courtroom and can influence juror perceptions of defendant guilt. In Study 1, Semin and Fiedler had law students and undergraduate students from Germany read two criminal

cases and then give a closing argument for both the defense and prosecution. The closing arguments were videotaped in front of a panel of judges. The cases described either reactive or instrumental aggression and ranged from either mild (attempted manslaughter and bodily injury, respectively) to severe (dual manslaughter and murder, respectively). Prosecution closing statements were more likely to contain IAVs when negatively describing the defendant, suggesting high internal control for those actions and therefore higher defendant culpability. Conversely, defense closing statements were more likely to contain SVs for negative defendant descriptions, suggesting low defendant internal control for negative actions. Lay persons were more likely to use these differences in linguistic category than lawyers in training, although the pattern appeared in both groups. In a second study, undergraduate students acting as mock jurors watched a video of two prosecution and two defense speeches created during Study 1. Level of responsibility, as conveyed through the use of linguistic category, significantly predicted of level of defendant blame. These findings suggest that linguistic category plays an important role in juror evaluation of a case.

Additionally, the transition from concrete (DAVs and IAVs) to abstract categories (SVs and ADJs) can serve as a linguistic cue for truthfulness, particularly when the listener is ignorant of the actual veracity of the statement. Hansen and Wänke (2010) conducted a series of experiments to determine the effect of concreteness on perceptions of truth. Participants rated 52 concrete and abstract statements on their level of perceived truth. Participants received one of two versions of 26 concrete and 26 abstract statements, half of which were true and half of which were false. Concrete statements were more likely to be rated as true than abstract ones, regardless of actual truth of the statement. In

addition, the more concrete a statement was compared to its abstract counterpart, the greater the difference in their truth ratings. However, the effect of concreteness on juror decision making remains unclear.

<p align="center">*Linguistic Category and Construal Level*</p>

The conclusions drawn by the differential use of linguistic concreteness are likely associated with the formation of corresponding lower and higher level mental construals. Construals are mental representations by which people are able to imagine events occurring at different spatial, temporal, and social distances from themselves (Trope & Liberman, 2010). According to Construal Level Theory (CLT), individuals use higher level construals to traverse these psychological distances. To this end, higher level construals contain more abstract conceptualizations of the context-dependent information associated with lower level construals. As a result, going from a lower to higher level construal may cause the loss of some specific details, but it also results in the gain of information on overall meaning and emotional evaluation relevant to an individual's goals. Furthermore, information contained in higher level construals is more likely to remain stable as psychological distance increases, as that information is context-independent. There is some support for these differences in construal level in the brain as well. The rostro-caudal control axis in the frontal lobe supports a similar hierarchical model for abstraction (Badre, 2008). Processing from specific, concrete representations to more abstract representations requires a shift in control from posterior medial prefrontal cortical areas to more anterior ones (Amodio & Frith, 2006; Badre, 2008). These findings suggest that at least to some extent, the change in level of construal corresponds to the cortical distance traversed in frontal regions (Trope & Liberman, 2010).

This change in construal level may explain why differences in linguistic concreteness can conjure feelings of stability or control. Hansen and Wänke (2010) investigated the relationship between construal level and linguistic category. Participants were assigned to near or far spatial distance conditions in order to manipulate construal level (low and high, respectively). Participants then made ratings on the perceived truth of true and false abstract and concrete statements. Concrete statements were rated as truer than abstract ones, but most notably participants rated near concrete and far abstract statements as more true than far concrete and near abstract statements. That is, the pairings with congruent construal levels were perceived as more truthful than the incongruent ones. These findings suggest that construal level and concreteness operate on the same fundamental concept. Therefore, many of the effects of concreteness on perceptions and decision making previously reviewed may be reflections of differences in construal level. By presenting jurors with concrete eyewitness testimony, they are likely inferring the closer psychological distance and context-dependency of the information.

*Possible Routes of Persuasion*

Although concreteness may influence jurors' perceptions of credibility, it is unclear how these changes in linguistic category would operate. Several possible routes of persuasion exist, but two are highlighted here: peripheral route processing and attributions about the eyewitness's memory.

*Peripheral Route Processing*

The Elaboration Likelihood Model (ELM; Petty & Cacioppo, 1981) provides one possible explanation for how variations in concreteness can indirectly influence juror

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decision making. The ELM notes that individuals are persuaded through either a central route, after controlled processing of a message, or through a peripheral route, which includes cues unrelated to the content of the message argument (Petty & Cacioppo, 1986). When individuals are not attending to the message or do not find the message important, they are less likely to make meaningful connections to the message and assess its merit. Instead, they are more likely to use surface-level cues, such as affect or number of arguments (Cacioppo & Petty, 1984) when responding to the message.

Although ideally jurors are persuaded after critical and repeated evaluation of the information, the substantial cognitive load placed on jurors over the course of a trial may impede their ability to do so (see Malavanti & Weaver, 2014). Some linguistic tools have been shown to have peripheral influence when individuals are under cognitive constraint or when the message is of low relevance, such as prosody (Gelinas-Chebat & Chebat, 1992) and linguistic power (Holtgraves & Lasky, 1999). It is highly likely that concreteness operates in a similar manner, such that the differences in concreteness activate biases about psychological distance, power, blame, stability, or even truthfulness. Unfortunately, the route of persuasion remains unclear.

*Attributions about Memory*

Jurors may be directly influenced by concreteness if concreteness leads to assumptions about the eyewitness's memory. Previous research involving the level of detail in an eyewitness's testimony, which would manipulate the specificity and therefore concreteness of the testimony information, has been shown to influence jurors' perceptions of the quality and accuracy of an eyewitness's memory. In a series of experiments, Bell and Loftus demonstrated the effect of increased detail in an

eyewitness's testimony on juror decision making in both civil and criminal cases. Bell and Loftus (1985) had participants, acting as mock jurors, read a court case about an automobile hitting a pedestrian. The eyewitness for the prosecution testified that the pedestrian was in the crosswalk, and the eyewitness for the defense denied this. Both testimonies had vivid versions and pallid versions; the vivid version added three details about the defendant's clothing. Vividness increased perceptions of credibility and blame. In a second study, participants read about a robbery and murder at a small grocery store. Once again, the prosecution and defense witnesses conflicted; the prosecution witness identified the defendant as the shooter, whereas the defense witness did not. Vivid testimony from the prosecution eyewitness increased perceptions of credibility, judgments of guilt, and verdict, but vivid testimony from the defense did not differ from the pallid version.

In a follow-up experiment, Bell and Loftus (1989) once again asked participants read a criminal case summary. A sentence was added to manipulate the level of detail in the prosecution and defense witnesses' testimony. Participants rendered guilty verdicts more often when prosecution detail was high and were marginally less likely to make guilty verdicts when defense detail was high. In addition, the high detail eyewitnesses were perceived as more credible, having a better memory, and having paid more attention to the perpetrator compared to their lower detail counterparts. When the opposition detail was high, however, the eyewitness was rated lower on all three variables. In a second experiment, participants read a trial summary where only the defense detail was manipulated to be low or high; the prosecution detail was always low. Some participants also read that the prosecution eyewitness failed to answer questions about store details

that were provided by the high detail defense witness. Participants perceived the defendant to be less guilty in the high detail defense witness condition, and unsurprisingly the high detail defense witness was rated as more credible, having better memory, and having paid more attention to the perpetrator. When the prosecution witness was explicitly asked about the details but did not know the answer to them, participants rated the witness as less credible, less attentive, and found the defendant less culpable. Together, these experiments suggest that individuals perceive more detailed, concrete testimony indicates a better memory for the event.

Although there is support that negatively valenced items, which may include crimes or accidents, are often better remembered (Kensinger, Garoff-Eaton, & Schacter, 2006), any specific remembered details are usually central to the event, and background details are often only remembered in gist (Kensinger, Garoff-Eaton, and Schacter, 2007). Further, memory for specific details is unlikely to correspond to a better memory for the event overall. Wells and Leippe (1981) had participants witness a staged theft before identifying the culprit from a lineup and answering questions about trivial details regarding the room. Some of these participants were videotaped during a voluntary cross-examination; the cross-examination either did or did not point out the eyewitness's failure to recall trivial details. The videotapes were then shown to a separate group of participants who acted as mock jurors determining the accuracy of the eyewitness's culprit identification. For the original eyewitnesses, there was a negative relationship between performance on the trivial detail questionnaire and culprit identification. In fact, those who misidentified the culprit were more likely to remember trivial details than those who accurately identified the culprit. However, mock jurors who viewed the cross-

examinations were less likely to believe the identification of eyewitnesses who failed to recall trivial details. Despite evidence to the contrary, mock jurors assumed that memory for details was positively related to memory for the culprit.

*Moderating the Effects of Concreteness*

Given the lack of clarity in how concreteness can influence individuals' perceptions of an eyewitness's testimony, any observed effect of concreteness on jurors may be influenced by a variety of factors. Individual-level characteristics, such as level of skepticism and extent of visualization, may alternatively weaken or strengthen any effects of concreteness on juror decision making.

*Skepticism*

The extent of any effect of concreteness on juror decision making may be dependent upon the state of the individual in question. For example, a participant's mindset when evaluating information can influence the extent to which concreteness impacts their judgments. Johnson, Bush, and Mitchell (1998) had younger adults read accounts of events that either truly happened to the narrator or did not. The accounts varied by type of peripheral detail added (no detail added, perceptual detail added, emotional detail added, and perceptual or emotional detail added). Before reading the accounts, participants were assigned to a low or high suspicion group. Participants in the low suspicion group were told the accounts were from students who were telling true stories, but were reminded that memory is not infallible. For the high suspicion group, participants were told the accounts were from police interviews, and that some of the individuals may have lied. Overall, participants in the low suspicion group rated the

accounts with added perceptual or emotional detail as more believable. For the high

suspicion group, however, adding detail resulted in decreased ratings of believability. In a

follow-up experiment, participants explained their reasoning behind their believability

ratings. Once again, adding detail increased believability ratings for the low suspicion

group; however, for the high suspicion group adding detail had no effect on ratings.

Participants in the low suspicion group noted they were more likely to focus on concrete

details for their ratings, whereas participants in the high suspicion group stated they were

more likely to use their own reasoning. These findings suggest that jurors who are primed

to be more critical of the eyewitness's testimony will be less affected by the eyewitness's

use of concreteness. Since jurors are likely to be skeptical of at least some of the

information presented to them in a case, particularly those who receive some sort of

memory rebuttal (e.g. juror instructions; see Papailiou, Yokum, & Robertson, 2015), it is

important to investigate how a skeptical mindset moderates the effect of concreteness in a

mock juror paradigm.

*Use of Visualization*

Separately, any concreteness effect may be moderated by an individual's own

ability to mentally image the scenario. Previous research has found positive associations

between concreteness and imageability, with correlations ranging from .64 to .95 (see

Dellantonio, Mulatti, Pastore, & Job, 2014). Unsurprisingly, concreteness has also been

positively related to ease of visualization, with Hicks, Bell, and Wogalter (2003) finding

a correlation of .88 between the two. There has been some argument on the relationship

between concreteness and imageability, given the interchangeability of the two terms,

and indeed they are distinct concepts. Although some abstract terms, predominantly

words relating to emotions and moods, do show higher imageability ratings (Dellantonio, Mulatti, Pastore, & Job, 2014; Paivio, Yuille, & Madigan, 1968), concrete words are more imageable on average (Paivio, 2007). Overall, these relationships between concreteness and visualization suggests that more concrete juror testimony should be more easily visualized, and perhaps even more easily processed, than abstract testimony.

This ease in visualizability for more concrete terms may also help to explain the finding that concrete words and concrete passages of text are better remembered than their abstract counterparts (Hamilton & Rajaram, 2001; Paivio, Walsh, & Bons, 1994; Sadoski, Goetz, & Fritz, 1993). Indeed, some have posited that there are dual processing routes for more concrete information: the processing of semantic information, and the processing of the visual, tactile, olfactory, and other sensory aspects (e.g. Paivio, 2007). Further research has investigated the dual semantic and visual routes for the processing and recall of concrete information. Functional magnetic resonance imaging (fMRI) studies have provided limited support for the role of other, not language-specific regions in processing concrete compared to abstract words, such as the left fusiform gyrus and bilateral angular gyri (Fliessbach, Weis, Klaver, Elger, & Weber, 2006; Roxbury, McMahon, & Copland, 2014). However, more support for the multimodality of concrete information has been found using event-related potentials (ERP). Barber, Otten, Kousta, and Vigliocco (2013) investigated the N400 and N700 negative waveform responses to abstract and concrete words. The N400 and N700 are associated with the processing concrete words and visual imagery, respectively. The words were matched on ratings of imageability, context availability, emotional valence, familiarity, and other lexical and sublexical characteristics. Despite these efforts to control available context and imagery,

participants displayed more negativity at the N400 and N700 waveforms for concrete words. This persistent effect of concreteness possibly reflects of the more integrated multimodal cortical networks necessary to mentally image concrete words. Therefore, by having a greater number of semantic connections and available modalities, concrete testimony should be better remembered than abstract.

*Individual differences in visualizing ability.* Visualization strategies have been found to improve text recall for children (Pressley, 1976), high school students (Anderson & Kulhavy, 1972), and even second language learners (Ghazanfari, 2009). However, individuals vary in their reported ability to mentally visualize stimuli. Marks (1973) developed the Vividness of Visual Imagery Questionnaire (VVIQ), which assesses individual differences in visualizing ability. The vividness of mental images, or how closely they resemble their real-life equivalents, can influence the quality of an individual's memory for those images (Marks, 1973). High visualizers have been shown to have greater memory performance than low visualizers. Denis (1982) found that high visualizers performed better on a recognition test immediately following a text, but only when the text in question was more concrete and therefore more imageable. Additionally, McKelvie and Demers (1979) found high visualizers performed better than low visualizers for short-term recall of pictures, concrete words, and abstract words. Further, high visualizers showed better long-term recall of pictures and concrete words compared to low visualizers, suggesting an interaction between visualizing ability and concreteness for long-term memory tasks. As a result, it is possible that an individual's ability to visualize the eyewitness's testimony may moderate the influence of concreteness. If a

juror refrains from visualizing an eyewitness's testimony, or is poor at visualizing, they may have lower recall of that testimony, particularly if that testimony is more abstract.

*The Present Experiments*

I investigated how a prosecution eyewitness's use of linguistic category impacts juror decision making and perceptions of the testimony when jurors are more skeptical of the eyewitness's testimony and when jurors are primed to better visualize the case. The following experiments, following the paradigm developed by Malavanti and Weaver (2014), employed a balanced number of prosecution and defense statements from an ambiguous criminal case.

In the present experiments, I explored how the effect of eyewitness concreteness changes under conditions likely to be facing jurors. Experiment 1 explored the influence of concreteness on jurors under simplified conditions. The aim of Experiment 2 was to examine the effect of concreteness on perceptions of the eyewitness and defendant and juror decision making when jurors are primed to be more or less suspicious of eyewitness memory. I used juror instructions to simulate a skeptical mindset similar to that used in the studies by Johnson, Bush, and Mitchell (1998). Experiment 3 investigated whether the effect of concreteness is facilitated by visualization, and whether or not this effect persists over time.

I hypothesized that jurors would find eyewitnesses more credible and be therefore more likely to convict when eyewitnesses employ more concreteness in their testimony. However, in Experiment 2 those ratings would be reduced for those participants primed to be skeptical of the testimony. In Experiment 3, I expected that the effect of concreteness would be facilitated by visualization, such that participants in the

visualization condition would be more likely to believe the concrete eyewitness

compared to participants in the other conditions.

CHAPTER TWO

Experiment One

*Overview*

In Experiment 1, I investigated how linguistic category impacts mock jurors'
perceptions of eyewitness credibility and juror decision making under simplified
conditions. Mock jurors read a case summary, to include prosecution and defense
statements, and a transcript of an eyewitness's testimony. Participants then rendered their
verdict and indicated the perceived level of credibility of the eyewitness.

*Hypotheses*

I had two main hypotheses for the study:

1. A main effect of concreteness for verdict confidence, such that participants
   who receive the concrete version of the eyewitness testimony will be more
   willing to convict.

2. A main effect of concreteness for perceived eyewitness credibility, such that
   participants who receive the concrete version of the eyewitness testimony will
   be more willing to believe the eyewitness.

*Method*

*Participants*

Study participants ($N = 167$) were drawn from those enrolled in introductory undergraduate psychology courses at Baylor University. Participants received one hour of course credit for their participation. As only U.S. citizens over the age of 18 are permitted to participate in a jury, only participants over 18 were permitted to participate in the study. Eleven participants failed to complete the study and two participants failed over 33% of the case questions; thus a total of fifteen participants were withdrawn from analyses, resulting in a final sample size of 154 (30.1% male, $M_{age} = 19.32$, Age range: 18-26).

*Materials*

*Case summary.* I created a summary of a case for the armed robbery of a local convenience store that includes prosecution and defense statements. The prosecution evidence included the identification of the defendant by an eyewitness, the defendant's lack of a solid alibi, and the defendant's past history of drug possession. The defense evidence included the fact that the defendant did not confess to the crime, had no history of violence, and that the defendant was only identified because he frequented the convenience store as a customer. The case is intended to be ambiguous and the prosecution's evidence will be primarily circumstantial in nature.

*Eyewitness testimony.* The case information also included the transcript of the testimony of the eyewitness, a clerk at the convenience store during the time of the

robbery. The eyewitness testimony contains several factors known to decrease the accuracy of eyewitness memory: the presence of a weapon, perpetrator use of disguise, and high stress. Further, the eyewitness claimed he was confident in his identification of the defendant. I worked to ensure that the two versions did not differ radically in semantic content. For example, I replaced phrases with more concrete verbs, such as *He walked to the register*, to phrases with more abstract ones, e.g. *He came to the register*; alternatively, I modified verb phrases, such as *I'll never forget his face*, to make adjective phrases, e.g. *His face will be unforgettable to me*. Each part of the testimony that introduced new information was matched between versions, and these versions did not differ in word length ($p > .10$). Four independent raters evaluated each section of the testimony on the level of concreteness with high reliability, $\kappa = .67$ and $.68$ for the two versions. The raters confirmed the concrete version of the testimony was more concrete than the abstract version ($p = .01$).

*Dependent Measures*

In order to have a continuous dependent variable for verdict, I created *verdict confidence* by multiplying each participant's verdict (-1 = Guilty, 1 = Not guilty) by their percent confidence (0% = No confidence and 100% = Complete confidence).

Participants rated their perceived level of eyewitness credibility on a scale from 0% (Not at all credible) to 100% (Completely credible).

*Procedure*

Participants completed, in one sitting, a study through online survey software. Participants were told that this study would ask participants to read the testimony of an

eyewitness of a crime and answer questions about that testimony as well as some demographic questions. Participants were asked to indicate their informed consent by selecting a radio button on the website. At the start of the study, participants were assigned a subject number to safeguard their identity and were notified that they would be referred to by that subject number throughout the study and analysis to ensure their privacy and anonymity.

Participants were randomly assigned to one of the two treatment conditions (concrete or abstract). All participants read, at their own pace, the case summary and a version of the eyewitness's testimony (concrete or abstract). At the end of the study, participants were asked several questions to assess their awareness of details in the case summary. Participants were then asked to indicate their initial verdict, either "Not Guilty" or "Guilty", based on the information provided, as well as to indicate the degree of confidence in their verdict. Participants were also asked to rate the eyewitness's credibility. All participants were debriefed on the aims of the study at the end. Two participants who failed over 33% of the case questions were removed from analyses for failure to attend to the experiment materials.

*Design and Data Analysis*

The study consisted of one independent variable, level of concreteness in the eyewitness testimony: Concrete ($n = 76$) or Abstract ($n = 78$). I conducted a 2-way multivariate analysis of variance (MANOVA; fixed factor: concreteness condition) to evaluate the effect of concreteness on verdict confidence and perceived eyewitness credibility. The dependent variables were verdict confidence and perceived eyewitness credibility.

*Results*

*Experimental Manipulation*

      Means and standard errors for the experimental groups are reported in Table 2.1.

Table 2.1. Mean Ratings and SEMs for Verdict Confidence and Eyewitness Credibility

| Group | Verdict Confidence | Eyewitness Credibility |
|---|---|---|
| Concrete ($n = 76$) | -17.61 (7.75) | 62.07 (2.63) |
| Abstract ($n = 78$) | 10.72 (7.65) | 54.80 (2.59) |

Note: Standard errors are in parentheses.

      There was a small effect of testimony concreteness. As seen in Figure 2.1, jurors who received the concrete version of the eyewitness testimony were more likely to find the defendant guilty, $F(1, 152) = 6.77$, $p = .010$, partial $\eta^2 = .04$, although the concrete and abstract groups had similar levels of confidence in their verdicts ($M = 67.95$ and $M = 64.74$, respectively).

      Additionally, there was a marginally significant but small effect of concreteness on eyewitness credibility such that the concrete group found the eyewitness slightly more credible ($M = 24.03$) than the abstract group ($M = 21.77$), $F(1, 152) = 3.88$, $p = .051$, partial $\eta^2 = .03$ (Figure 2.2).

*Discussion*

      The findings from this initial study offer support for my two hypotheses. Jurors who read concrete testimony from a prosecution eyewitness are more likely to find the
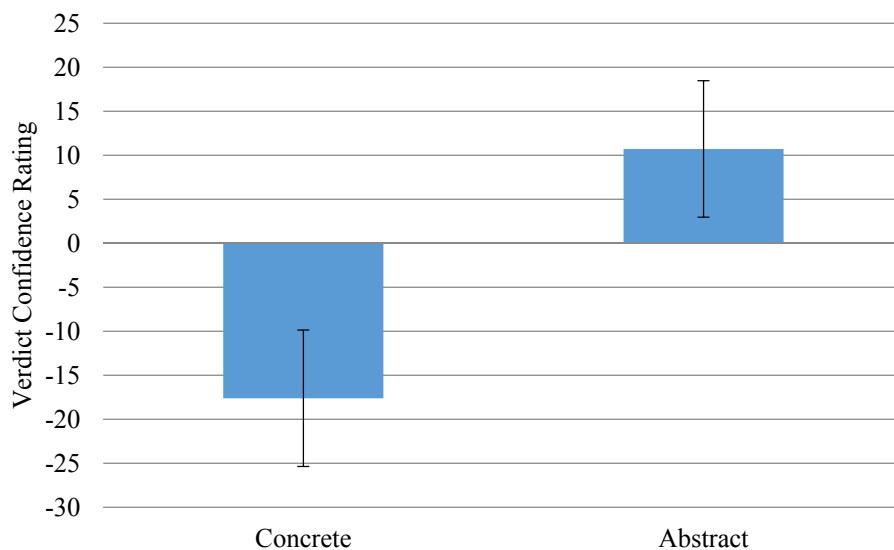
Figure 2.1. Verdict confidence ratings: Participants who received the concrete testimony were more likely to find the defendant guilty than those who received the abstract testimony.
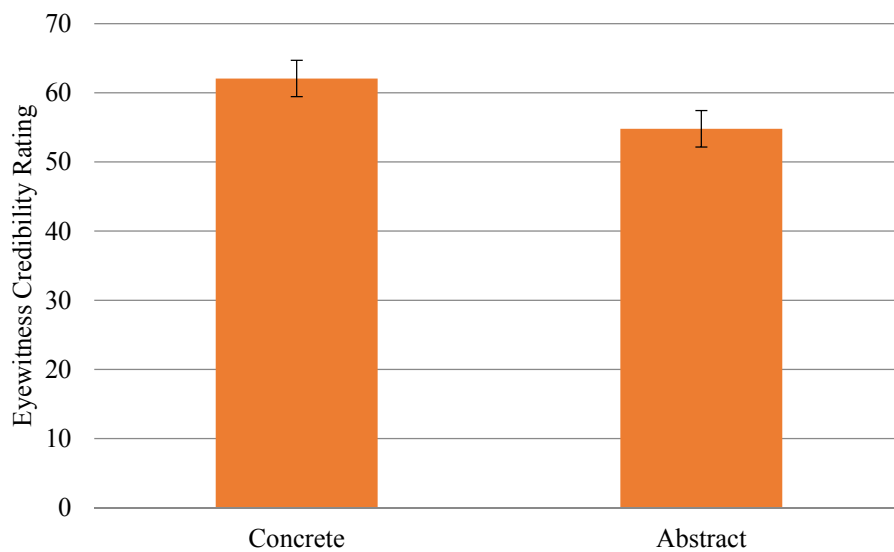


Figure 2.2.Eyewitness credibility ratings: Participants who received the concrete testimony were marginally more likely to find the eyewitness credible than those who received the abstract testimony.

defendant guilty in the context of an ambiguous criminal trial. Additionally, those who read the concrete testimony rated the eyewitness as more credible. Taken together, these two findings suggest jurors are more willing to believe the eyewitness's version of events when presented concretely, and this in turn influences their verdict decisions.

Interestingly, the difference in verdict confidence ratings varied predominantly by verdict decision rather than by confidence. The difference in concreteness ratings may have served as a cue for verifiability of the information, therefore appearing more reliable to the jurors when making their decisions. It is unclear if participants were aware of the effect of concreteness on their decisions; however, the similarity in confidence ratings suggests they were not considering concreteness explicitly. Regardless, no definitive claims can be made about the route of persuasion through which concreteness operates.

Another possible explanation for the differences in verdict and credibility ratings is the concreteness effect on memory. The more concrete testimony may have rendered the events described by the eyewitness more vivid and therefore more durable in memory. Although the availability heuristic may not moderate the vividness effect on judgments (Shedler & Manis, 1986), it is possible that the use of more concrete language made the eyewitness appear more attentive to detail (Bell & Loftus, 1989). Thus, ratings of eyewitness credibility were influenced by jurors' perceptions of how eyewitness memory operates.

*Conclusion*

Although it remains unclear how concreteness is influencing juror decision making, jurors were influenced by the concreteness manipulation employed in the eyewitness's testimony. However, note that jurors received a minimal amount of

information in this study. Would the concreteness effect persist if jurors were required to

process more information about the case before rendering their verdicts? Additionally,

inducing suspicion of an account has been found to reduce believability ratings when

detail is increased (Johnson, Bush, & Mitchell, 1998). The use of juror instructions has

been shown to increase skepticism in eyewitness memory (Papailiou, Yokum, &

Robertson, 2015). Will the concreteness effect persist when additional information raises

skepticism about the credibility of the eyewitness's testimony?

CHAPTER THREE

Experiment Two

*Overview*

In Experiment 2, I investigated the effect of concreteness on perceptions of the eyewitness and juror decision making when jurors are primed to be more critical of eyewitness memory. Mock jurors read a case summary, to include prosecution and defense statements, and a transcript of an eyewitness's testimony. Participants then read either juror instructions or an unrelated document. Finally, jurors rendered a verdict and answered questions about the eyewitness, the defendant, and the case in general.

*Hypotheses*

Experiment 2 had four main hypotheses:

1.  A main effect of sample, such that participants in the Baylor University sample will respond differently than participants in the MTurk sample.

2.  A main effect of testimony, replicating the results of the Experiment 1. Participants in the concrete testimony condition will find the eyewitness more credible, more accurate, the defendant more culpable, and will be more likely to convict.

3.  A main effect of skeptical mindset, such that participants who receive the juror instructions will be more skeptical of the eyewitness, will find the defendant less culpable, and therefore be less likely to convict.

4. An interaction effect of testimony type and mindset condition. Participants in the concrete testimony who are primed for the skeptical mindset will have lower ratings and will be less likely to convict compared to those not in the skeptical mindset. Participants in the abstract testimony condition who are in the skeptical mindset will be the less likely to convict compared to their concrete counterparts.

*Method*

*Participants*

Study participants ($N = 190$) were drawn from those enrolled in introductory undergraduate psychology courses at Baylor University ($n = 99$) and online using Amazon's Mechanical Turk (MTurk; $n = 91$) website. Undergraduate students received one hour of course credit for their participation. MTurk participants were offered a rate of $3.00/hour ($1.50/30 minutes) in exchange for their completion of the online survey. Once again, only participants over the age of 18 were allowed to participate in the study. Twenty-four participants (Baylor = 18, MTurk = 6) failed to complete the study and six participants failed 40% or more of the case questions (Baylor = 1, MTurk = 5). Thus, a total of 30 participants were withdrawn from analyses, resulting in a final sample size of 160 (42.5% male, $M_{age} = 27.7$, Age range = 18-69). The final undergraduate sample consisted of 80 participants (26.3% male, $M_{age} = 19.2$, Age range = 18-39), and the MTurk sample consisted of 80 participants (58.8% male, $M_{age} = 36.2$, Age range = 22-69).

*Materials*

*Case summary.* I used the same ambiguous criminal case as employed in the Experiment 1.

*Eyewitness testimony.* I updated the eyewitness testimony from Experiment 1 to strengthen the concreteness and abstractness of the two versions. Once again, these versions did not differ in word length ($p > .10$). Two independent raters evaluated each section of the testimony on the level of concreteness with moderate reliability, $\kappa = .58$ and .65 for the two versions. The raters confirmed the concrete version of the testimony was more concrete than the abstract version ($p = .017$).

*Juror instructions.* These instructions were modified from the provisional juror instructions recently recommended by the Supreme Judicial Court of Massachusetts (Commonwealth v. Gomes, 2015). Participants not in the skeptical mindset condition were given a document of equal length on an unrelated topic to account for the passage of time taken by those reading the juror instructions.

*Dependent Measures*

*Verdict confidence.* In order to have a continuous dependent variable for verdict, I used the aforementioned variable *verdict confidence*. Verdict confidence was determined by multiplying each participant's verdict (-1 = Guilty, 1 = Not guilty) by their percent confidence (0% = No confidence and 100% = Complete confidence).

*Questionnaire*.  I adapted the questionnaire employed by Jules and McQuiston (2013) for this study. Participants were asked to render their verdict and level of confidence in their verdict, answer two questions regarding defendant culpability, three questions regarding eyewitness accuracy, three questions on eyewitness credibility, and five questions regarding facts about the case to ensure participants are paying attention to the materials. All questions were measured on a scale from 0% to 100% except for verdict ("Guilty" or "Not guilty") and the case questions, which were either "Yes" or "No" or multiple choice. Six participants failed 40% or more of the case questions and were removed from analyses for failure to attend to the experiment materials.

*Procedure*

Participants completed, in one sitting, a study through online survey software. Participants were told that in this study they would be simulating the role of a juror in a criminal case and would be asked to answer questions about that case as well as some demographic questions. All participants completed an informed consent form in order to participate in the study. At the start of the session, participants were assigned a subject number to safeguard their identity and were referred to by that subject number throughout the study and analysis to ensure their privacy and anonymity.

Participants were randomly assigned to one of four treatment combinations. All participants read, at their own pace, the case summary and a version of the eyewitness's testimony (concrete or abstract). After reading testimony, participants in the skeptical mindset condition were given a set of juror instructions explaining the fallibility of eyewitness memory. Participants not in the skeptical mindset condition read an unrelated document of equal length. All participants then rendered their verdict and answered

questions about the eyewitness, defendant, and several questions about the case in general. Participants who failed over 80% of the case questions were removed from analysis for failure to attend to the experiment materials. All participants were debriefed about the study's aims at the end of the study.

*Design and Data Analysis*

The study consisted of three independent variables: sample, concreteness, and mindset. The first variable was sample: Baylor ($n = 80$) or MTurk ($n = 80$). The second variable was the level of concreteness in the eyewitness testimony: Concrete ($n = 80$) or Abstract ($n = 80$). The final variable was mindset: Skeptical ($n = 80$) or Control ($n = 80$).

I conducted a series of four 2 x 2 x 2 analyses of variance (ANOVA; fixed factors: sample, concreteness condition, mindset condition) to evaluate the effect of concreteness and mindset on verdict confidence, eyewitness credibility, eyewitness accuracy, and defendant culpability. The dependent variables were verdict confidence, perceptions of defendant culpability, perceptions of eyewitness credibility, and perceptions of eyewitness accuracy.

To determine the proportion of participants who rendered guilty and not guilty verdicts, I calculated the frequencies of the verdicts. In order to have a continuous dependent variable for verdict, verdicts, coded as -1 and +1, were multiplied by percent confidence to create verdict confidence scores. Participant ratings of the eyewitness and defendant were summed to create total scores for defendant culpability, eyewitness credibility, and eyewitness accuracy.

Participants were fairly equivalent in their verdict decisions. A little over half of participants (56.3%) found the defendant guilty. Participants were overall fairly confident in their verdict decisions ($M = 70.00$, $SD = 19.10$).

All means and standard errors for the experimental groups are reported in Table 3.1. The effect of each independent variable is presented in Figures 3.1-3.3.

Table 3.1. Mean Ratings and SEMs on all Dependent Variables

| Group | Verdict Confidence | Defendant Culpability | Eyewitness Credibility | Eyewitness Accuracy |
|---|---|---|---|---|
| Undergraduate | 5.65 (7.82) | 52.91 (2.84) | 54.03 (2.68) | 52.38 (2.73) |
| Online | 1.38 (7.82) | 55.18 (2.84) | 64.34 (2.68) | 60.78 (2.73) |
| Concrete | 10.84 (7.82) | 52.98 (2.84) | 59.18 (2.68) | 56.53 (2.73) |
| Abstract | -3.81 (7.82) | 55.11 (2.84) | 59.19 (2.68) | 56.63 (2.73) |
| Instructions | 22.79 (7.82) | 48.69 (2.84) | 55.11 (2.68) | 51.00 (2.73) |
| Control | -15.76 (7.82) | 59.39 (2.84) | 63.26 (2.68) | 62.16 (2.73) |

Note. Standard errors in parentheses.

*Verdict Confidence*

Verdict confidence scores did not differ between the undergraduate and online samples, $F(1, 152) = 0.15$, $p = .700$, partial $\eta^2 = .001$. There was a non-significant effect of testimony concreteness on verdict confidence, $F(1, 152) = 1.75$, $p = .187$, partial $\eta^2 = .01$. Additionally, there was a significant main effect of document, $F(1, 152) = 12.14$, $p = .001$, partial $\eta^2 = .07$. This represents a medium effect size. Those who read the juror instructions were more confident in not guilty verdicts ($M = 22.79$) compared to those who received the control document ($M = -15.76$). Finally, there was also a small

significant interaction between sample and testimony concreteness, $F(1, 152) = 4.06$, $p =$ .046, partial $\eta^2 = .03$ (Figure 3.4). Post-hoc analyses indicated that undergraduate participants who received the concrete version of the testimony were more likely to render not guilty verdicts ($M = 24.13$) than undergraduate students who received the abstract testimony ($M = -12.83$), $F(1, 152) = 5.58$, $p = .019$, partial $\eta^2 = .04$. There were no other significant or trending interactions.

*Defendant Culpability*

Ratings of defendant culpability were similar between the two samples, $F(1, 152) = 0.32$, $p = .572$, partial $\eta^2 = .002$. There was no significant effect of concreteness, $F(1, 152) = 0.28$, $p = .598$, partial $\eta^2 = .002$. However, there was a small significant effect of document, $F(1, 152) = 7.09$, $p = .009$, partial $\eta^2 = .05$. Participants who received the juror instructions were less likely to find the defendant culpable ($M = 48.69$) than those who received the control document ($M = 59.39$). There were no significant or trending interactions.

*Eyewitness Credibility*

Ratings of eyewitness credibility differed by sample, $F(1, 152) = 7.40$, $p = .007$, partial $\eta^2 = .05$. This represents a small effect size. Online participants rated the eyewitness as more credible ($M = 64.34$) than undergraduate participants ($M = 54.03$). Once again, there was no significant effect of testimony concreteness, $F(1, 152) = 0.00002$, $p = .996$, partial $\eta^2 = .00$, but a small significant effect of document, $F(1, 152) = 4.61$, $p = .029$, partial $\eta^2 = .03$. Participants who received the control document found the

eyewitness more credible ($M = 63.26$) than those who received the juror instructions ($M = 55.11$). There were no significant or trending interactions.
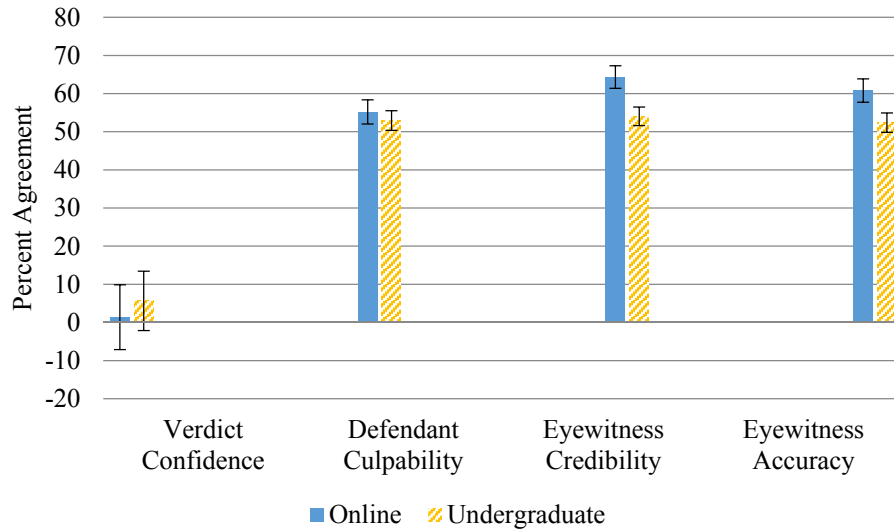


Figure 3.1. Effect of sample: Participants in the online sample rated the eyewitness as more credible and more accurate than those in the undergraduate sample.
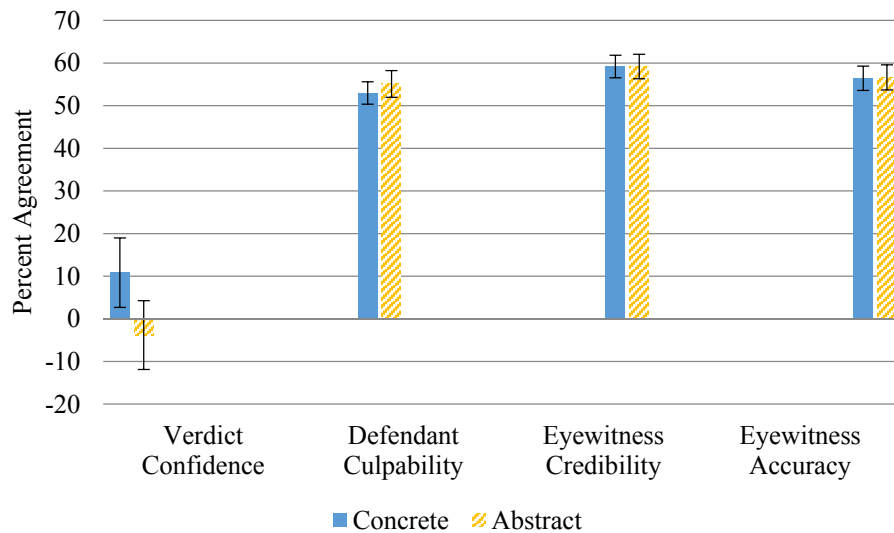


Figure 3.2. Effect of concreteness: Concreteness had no effect on verdict confidence scores or ratings of defendant culpability, eyewitness credibility, or eyewitness accuracy.
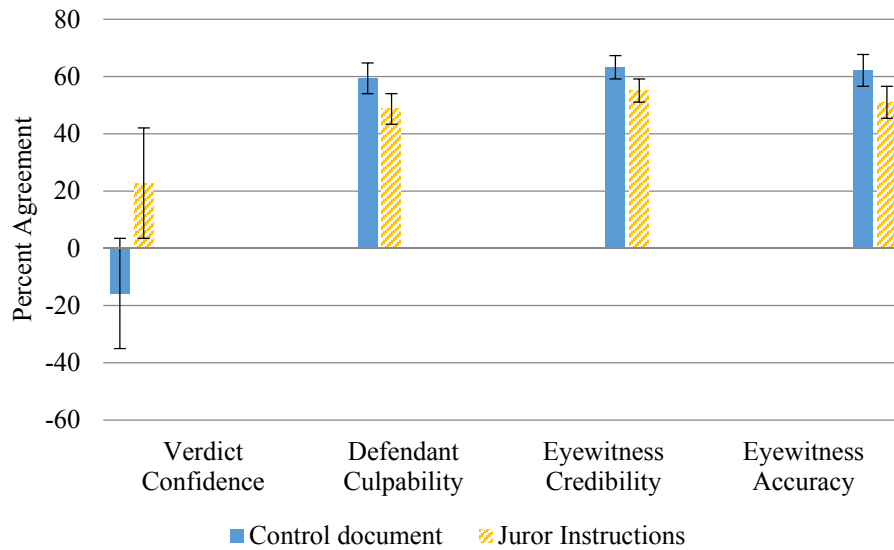
Figure 3.3. Effect of juror instructions: Participants who received juror instructions were less likely to convict, found the defendant less culpable, and found the eyewitness less credible and less accurate than those who received the control document.

*Eyewitness Accuracy*

Ratings of eyewitness accuracy also varied by sample, $F(1, 152) = 4.76$, $p = .031$, partial $\eta^2 = .03$. This represents a small effect size. Online participants rated the eyewitness as more accurate ($M = 60.78$) than the undergraduate participants ($M = 52.38$). Again, there was no significant effect of testimony concreteness, $F(1, 152) = 0.001$, $p = .978$, partial $\eta^2 = .000005$. Document type had a small significant effect on eyewitness accuracy ratings, $F(1, 152) = 8.38$, $p = .004$, partial $\eta^2 = .05$. Participants who received the control document found the eyewitness more accurate ($M = 62.16$) than those who received the juror instructions ($M = 51.00$). Finally, there was a small but significant interaction between sample and testimony concreteness, $F(1, 152) = 4.62$, $p = .033$, partial $\eta^2 = .03$ (Figure 3.5). Post-hoc analyses indicated undergraduate participants who received the concrete testimony were less likely to rate the eyewitness as accurate ($M = 48.18$) than online participants who also received the concrete testimony ($M =$

Figure 3.4. Interaction of concreteness and sample on verdict confidence: Undergraduate participants who received the concrete testimony were less likely to convict than undergraduate students who received the abstract testimony.



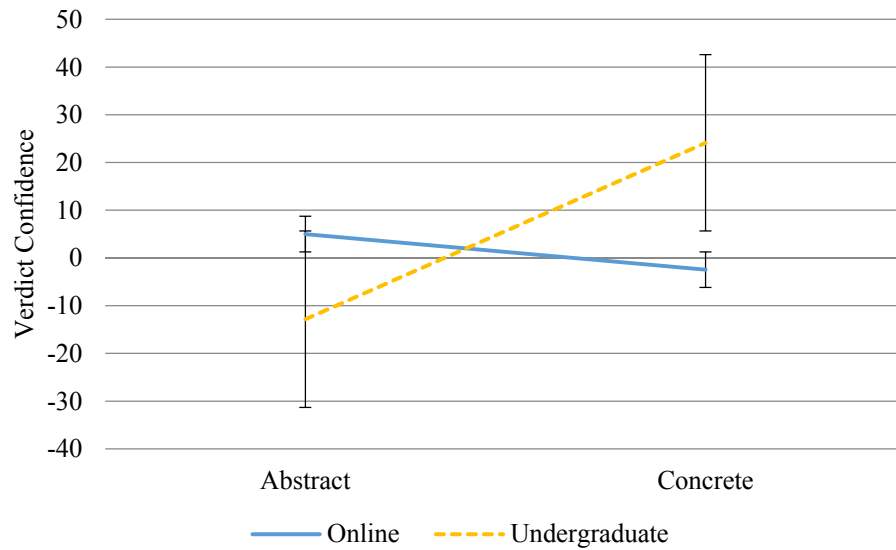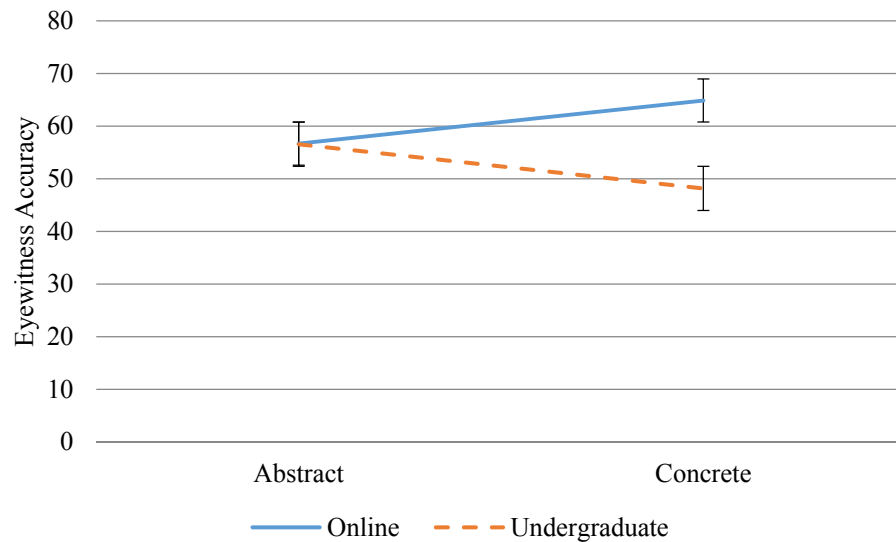Figure 3.5. Interaction of concreteness and sample on eyewitness accuracy: Undergraduate participants who received the concrete testimony found the eyewitness less accurate than online participants who received the same testimony.

64.88), $F(1, 152) = 9.38$, $p = .003$, partial $\eta^2 = .06$. This represents a medium effect size. There were no other significant or trending interactions.

## *Discussion*

### *Sample Differences*

As expected, the undergraduate and online sample did differ in their responses to the case. Although the two samples gave similar ratings of verdict confidence and defendant culpability, overall the online sample was more likely to rate the eyewitness as credible and accurate than the undergraduate sample. These differences were expected, given that undergraduate participants were predominantly psychology and neuroscience students and were currently enrolled in psychology courses. The undergraduate participants likely had some knowledge on the fallibility of eyewitness memory. However, it is important to note that the ratings for eyewitness credibility and accuracy were overall relatively high for both groups. These findings support previous research on the general public's misconceptions about the reliability of eyewitness memory (Simons & Chabris, 2011; Simons & Chabris, 2012).

### *Testimony Manipulation*

Contrary to the findings in the previous study, concreteness did not affect verdict confidence ratings. As overall confidence ratings in verdict decisions were similar for the concrete and abstract groups ($M = 70.84$ and $M = 69.16$, respectively), group differences in verdict confidence ratings were driven by differences in verdict. Participants who received the concrete testimony were more likely to render not guilty verdicts. Although

this effect was non-significant, it does raise concerns about the consistency and reliability of the concreteness effect on juror decision making.

There were two instances of interactions between sample and testimony concreteness. For verdict confidence ratings, undergraduate participants who received the concrete version of the testimony were more likely to render not guilty verdicts ($M =$ 24.13) than undergraduate participants who received the abstract version of the testimony ($M = -2.45$). Therefore, the aforementioned finding regarding the direction of the concreteness effect on verdict decisions may be reflecting this difference between the undergraduate groups. Regardless, the reasons for this change in direction compared to Experiment 1 remain unclear. Separately, for eyewitness accuracy ratings, undergraduate participants who received the concrete testimony found the eyewitness less accurate ($M =$ 48.18) than the online participants who received the concrete testimony ($M = 64.88$). These findings suggest that the effects of concreteness may differentially affect individuals based on their knowledge of memory processes.

Concreteness did not influence perceptions of defendant culpability, eyewitness credibility, or eyewitness accuracy. There was also no evidence to support my hypothesis regarding an interaction between testimony concreteness and increased skepticism. The lack of findings for concreteness may have been due in part to the fact that all participants read an additional document before rendering their verdicts and making their ratings. However, the observed power for the main effect of concreteness was low throughout the study, ranging from only .05 to .26. Therefore, the study may not have had sufficient power to accurately detect any effects of concreteness on the dependent variables.

*Document Manipulation*

The use of juror instructions to manipulate skepticism was effective across all dependent variables. Participants who received the juror instructions were more confident in their not guilty verdicts, were less likely to rate the defendant as culpable, and were less likely to rate the eyewitness as credible or accurate. Receiving information about the fallibility of eyewitness memory increased their skepticism of the eyewitness's version of events. These findings provide support for previous research on the effectiveness of juror instructions at increasing juror skepticism of eyewitness identification (Malavanti & Weaver, 2014; Papailiou et al., 2015), although it is unclear whether this increased skepticism was accompanied with a lack of sensitivity to factors known to impact the quality of eyewitness testimony, as reported elsewhere (Papailiou et al., 2015). Although I found support for use of juror instructions on juror decision making, the consistency and overall usefulness of juror instructions require further investigation, particularly given the variety of modes, language, and information in different versions of juror instructions (Bornstein & Hamm, 2012).

*Conclusion*

Undergraduate students with some psychology coursework were less likely to find the eyewitness credible or accurate compared to the online sample. Separately, juror instructions had a consistent small to medium sized effect on all dependent measures. Those jurors who were arguably more familiar with how memory works found the eyewitness to be less credible and less accurate, and all jurors were more skeptical of the information when presented with juror instructions. In contrast, concreteness had no effect on any measure of juror decision making. The lack of significant findings for

testimony concreteness may have been due to the small size of the effect in this study. The concreteness effect, if due in part to its effects on memory and/or decision making, should be amplified by increase in the imageability of the testimony. Therefore, Experiment 3 will investigate the effects of a visualization manipulation in order to increase the vividness of the testimony. Additionally, even though the average criminal jury trial lasts around five days (U.S. State Department, Bureau of International Information Programs, 2009), the durability of the concreteness effect on juror decision making is uncertain. By having participants make ratings immediately after the testimony and approximately a day later, the effects of concreteness and vividness over time can be assessed.

CHAPTER FOUR

Experiment Three

*Overview*

In Experiment 3, I investigated the effect of concreteness and visualization on

eyewitness perceptions and juror decision making. Mock jurors read a case summary, to

include prosecution and defense statements, and a transcript of an eyewitness's

testimony. Half of the participants received instructions to engage in visualizations

throughout the experiment. Finally, jurors rendered their verdict, answered questions

about the eyewitness, the defendant, and the case in general, and completed a randomized

version of a visualization questionnaire. Participants then completed a second part that

took place at least 24 hours later, where they described the case from memory, re-

rendered their verdicts, and once again answered questions about the eyewitness and the

defendant.

*Hypotheses*

I had four main hypotheses for Experiment 3:

1. A main effect of testimony, replicating the results of Experiment 1. Participants in

   the concrete testimony condition will be more likely to convict, will find the

   defendant more culpable, and will find the eyewitness more credible accurate

   overall.

2. An interaction effect of visualization condition and time, such that participants

   who are visualizing the case and eyewitness testimony will recall the details of the

case better and therefore have little change compared to those not visualizing in their verdicts and ratings of defendant culpability, eyewitness credibility, and eyewitness accuracy.

3. An interaction effect of testimony type and visualization condition. Participants who are visualizing the concrete testimony will be more likely to convict, more likely to find the defendant culpable, and more likely to rate the eyewitness as credible and accurate compared to participants in the non-visualization condition or abstract testimony conditions.

4. An interaction effect of testimony type, visualization condition, and time. Participants visualizing the concrete testimony will be more likely to maintain their verdicts over time than those not visualizing. Participants visualizing the abstract testimony will also be more likely to maintain their verdicts compared to those not visualizing.

*Method*

*Participants*

Study participants were drawn from those enrolled in introductory undergraduate psychology courses at Baylor University and online using Amazon's MTurk website. Undergraduates received one hour of course credit for their participation, and MTurk participants were offered a rate of $3.00/hour ($1.50/30 minutes) in exchange for their completion of the online survey.

Only 51 participants completed both parts of the experiment. Four participants who failed to recall any correct details from Part 1, one participant completed both parts

within an hour, and two participants who completed Part 2 over a week after completing Part 1 were removed from analyses, resulting in a total sample of 44 (56.8% female, $M_{age}$ = 30.77, age range = 18-56; Baylor $n$ = 13, MTurk $n$ = 31). The final group sizes were as follows: Abstract Testimony/No Visualization ($n$ = 9), Abstract Testimony/Visualization ($n$ = 11), Concrete Testimony/No Visualization ($n$ = 13), Concrete Testimony/Visualization ($n$ = 11).

*Materials*

*Case summary.* I used the same ambiguous criminal case as employed in the previous studies.

*Eyewitness testimony.* In order to avoid any inconsistencies in perceptions of concreteness or abstraction between the raters and participants updated the eyewitness testimony using normed concreteness ratings. These ratings of 40,000 common English words were provided by over 4,000 online participants (Brysbaert, Warriner, & Kuperman, 2014). In these normed ratings, concreteness was defined as being experienced through all physical senses, similar to the physical invariance described by the Linguistic Category Model (Schmid & Fiedler, 1998). The research team worked to ensure that the two versions did not differ in content. Once again, these versions did not differ in word length ($p$ > .10). The concrete version of the testimony was more concrete than the abstract version ($p$ = .039).

*Visualization condition.* Participants in the visualization condition were asked on three occasions to engage in visualization. First, they were told to imagine themselves as

a juror sitting in a courtroom for 30 seconds. They were shown images of an empty juror box and courtroom to facilitate any visualization. They were then asked to describe what they would see if they looked around, assuming the court was in session, to further facilitate any imagery. Second, they were told to imagine themselves in the eyewitness's place as they read through the eyewitness's testimony. Finally, they were asked to describe the convenience store that served as the scene of the crime in the eyewitness's testimony.

These prompts were piloted by 28 participants in introductory undergraduate psychology courses at Baylor University. Three participants failed the attention check prompt, resulting in a final sample of 25 (32% male, $M_{age}$ = 19.08, Age range = 18-21). Participants reported moderate levels of ease with the visualizations ($M$ = 58.06, $SEM$ = 4.15) and how well they were able to visualize ($M$ = 61.32, $SEM$ = 4.22). Additionally, participants spent on average 133.72 seconds on their visualizations ($SEM$ = 22.01). In the courtroom visualization, the majority of participants mentioned the judge (72%), audience (72%), defendant (60%), and lawyers (52%). The average description was 27.16 words ($SEM$ = 3.68). In the convenience store visualization, the majority of participants described the conveniences store, to include merchandise and store layout (60%); less than half of participants mentioned the alleged robbery that took place (44%). The average description was 47.88 words ($SEM$ = 5.29).

*Dependent Measures*

In order to have a continuous dependent variable for verdict, I used the aforementioned variable *verdict confidence*.

I used the same questionnaire as employed in Experiment 2.

*Manipulation Checks*

I included three manipulation checks to evaluate whether or not participants were evaluating the materials as intended. First, I asked participants to rate how abstract or concrete they found the eyewitness's testimony. Participants rated the concreteness on a 7-point Likert-type scale from 1 (Very abstract) to 7 (Very concrete). Participants were provided definitions of abstraction and concreteness based on Brysbaert et al. (2014). As such, participants were told that "concrete" referred to something that could be experienced through the senses and/or actions, and "abstract" referred to something that could not be experienced directly through the senses and/or actions, but must be inferred through language. Second, I asked participants to rate the percent to which the eyewitness's testimony influenced their verdict decisions (0% = Not at all and 100% = Very much). Finally, to ensure participants recalled some information about the case, I asked participants to recall any details they remembered from Part 1 of the study.

*Covariates*

*Vividness of Visual Imagery Questionnaire (VVIQ).* All participants completed the 16-item VVIQ (Marks, 1973) in order to assess individual differences in visualizing ability. The measure focuses on visual mental imagery ability; however, given vision's role as one of the dominant senses (Heller, 1992; Heller, Calcaterra, Green, & Brown, 1999; Rock & Victor, 1964) and the research focus on eyewitness memory, I am utilizing this measure for assessing overall visualization ability. For ease of interpretation, each item was rated on a 5-point Likert-type scale from 1 (No image at all) to 5 (Perfectly clear and as vivid as normal vision) such that higher scores indicated higher visualizing ability. As McKelvie (1995) found no differences in visualization ratings made with eyes

closed or open, participants in this sample did not receive instructions regarding their

eyes. The original VVIQ reported a test-retest reliability of .74 and a split-half reliability

of .85, and a meta-analysis of the VVIQ found Cronbach's alpha to be .88 (McKelvie,

1995). The alpha coefficient in this sample, as estimated by Cronbach's alpha, was .94 ($n$

= 44). The mean VVIQ score was 57.64 ($SEM$ = 1.94; range: 21-80).

*Procedure*

Experiment 3 followed a similar methodology as Experiment 2. Participants were

asked to complete in one sitting, a study through online survey software. Participants

were told that in this study, they would simulate the role of a juror in a criminal case

answer questions about that case, as well as some demographic questions. All participants

were asked to complete an informed consent form in order to participate in the study. At

the start of the session, participants were assigned a subject number to safeguard their

identity and were referred to by that subject number throughout the study and the analysis

to ensure their privacy and anonymity.

Participants were randomly assigned to one of four treatment combinations:

Abstract Testimony/No Visualization, Abstract Testimony/Visualization, Concrete

Testimony/No Visualization, or Concrete Testimony/Visualization. Participants assigned

to the visualization condition received prompts throughout the experiment. All

participants read, at their own pace, a case summary, which included background

information of the crime, prosecution statements, and defense statements. After the case

summary, all participants read one of two versions of an eyewitness's testimony from the

same crime (concrete or abstract). Finally, participants rendered their verdict, indicated

their level of confidence in their verdict, and answered questions about defendant

culpability, eyewitness credibility, eyewitness accuracy, and the case in general.

Participants who failed over 40% of the case questions were removed from analysis for failure to attend to the experiment materials. Finally, participants completed a randomized version of the VVIQ.

Participants were asked to complete a follow-up online questionnaire at least 24 hours later. They described the alleged crime before once again making their verdicts, indicating their level of confidence, and rating the eyewitness and defendant. Participants were debriefed at the end of each part of the study.

*Design and Data Analysis*

I planned to conduct a series of four 2 x 2 x 2 x 2 mixed-design ANOVAs (fixed factors: sample, concreteness condition, visualization condition; repeated factor: time point) to evaluate the effect of concreteness and visualization on verdict confidence, defendant culpability, eyewitness credibility, and eyewitness accuracy over time. However, due in part to the small sample size and the lack of any significant relationships between sample group and the dependent variables at either time point, the samples were combined for experimental analyses. As a result, I conducted a series of four 2 x 2 x 2 mixed-design ANOVAs (fixed factors: concreteness condition, visualization condition; repeated factor: time point) and ANCOVAs (covariate: VVIQ scores). Mixed-design ANCOVAs were conducted to control for the effect of visualizing ability (high vs low visualizers).

In order to determine the proportion of participants who rendered guilty and not guilty verdicts, I calculated the frequency of the verdicts at each time point. Verdicts, coded as -1 and +1, were multiplied by percent confidence to create verdict confidence.

Participant ratings of the eyewitness and defendant were summed to create total scores

for defendant culpability, eyewitness credibility, and eyewitness accuracy.

## Results

### Manipulation Checks

*Testimony manipulation*.  In order to evaluate if participants perceived any

difference in testimony concreteness, I conducted a simple independent samples *t*-test

between testimony groups. Overall, participants did not find the testimony to vary by

concreteness, $t(42) = 0.10$, $p = .918$.

*Influence of eyewitness on verdict*.  To explore the weight participants gave to the

eyewitness's testimony, I conducted a two-way ANOVA with testimony condition and

visualization condition as independent variables. Participants gave the testimony similar

weight in their decisions by testimony concreteness, $F(1, 40) = 0.92$, $p = .342$, partial $\eta^2 =$

.02, and by visualization condition, $F(1, 40) = 0.89$, $p = .350$, partial $\eta^2 = .02$.

*Memory for case materials*.  I reviewed the recollections participants provided in

Part 2 to ensure that they recalled at least one correct detail from the case described in

Part 1. On average, participants recalled 7.86 case details ($SEM = 0.66$) and spent an

average of 171.11 seconds on their descriptions ($SEM = 28.49$). The average time

between completing both parts of the study was 1.57 days ($SEM = 0.15$ days).

Concreteness and visualization condition had no effect on number of recalled details, $F(1,$

$40) = 1.34$, $p = .156$, partial $\eta^2 = .05$, and $F(1, 40) = 0.01$, $p = .979$, partial $\eta^2 < .01$,

respectively. Additionally, average days between Part 1 and Part 2 had a marginally

significant relationship with number of details recalled, $r(42) = -.27$, $p = .075$.

*Experimental Manipulation*

All means and standard errors for the experimental groups are reported in Tables

4.1 and 4.2.

Table 4.1: Means and SEMs on Verdict Confidence and Defendant Culpability over Time

| Group | Verdict Confidence | | Defendant Culpability | |
|---|---|---|---|---|
| | Time 1 | Time 2 | Time 1 | Time 2 |
| Concrete | 15.83 (14.30) | 14.54 (14.28) | 47.75 (4.87) | 50.10 (5.43) |
| Abstract | 9.1 (16.93) | 3.70 (16.11) | 51.70 (5.32) | 52.30 (5.17) |
| Visualization | 8.05 (16.06) | 2.55 (15.20) | 50.45 (4.61) | 54.52 (5.45) |
| No visualization | 17.50 (14.86) | 16.68 (14.96) | 48.64 (5.53) | 47.68 (5.15) |

Note. Standard errors in parentheses.

*Verdict confidence.* There was no significant effect of time, $F (1, 40) = 2.69$, $p =$

.109, partial $\eta^2 = .06$, concreteness, $F (1, 40) = 0.13$, $p = .717$, partial $\eta^2 = .003$, or

visualization, $F (1, 40) = 0.19$, $p = .667$, partial $\eta^2 = .005$, on verdict confidence scores.

However, there was a trending three-way interaction of time, concreteness condition, and

visualization condition, $F(1, 40) = 3.92$, $p = .055$, partial $\eta^2 = .09$ (Figure 4.1). This

represents a medium effect size. Those participants in the Abstract

testimony/Visualization condition became less confident in their not guilty verdicts over

time ($M_1 = 14.91$, $M_2 = 4.00$), $F(1, 40) = 9.07$, $p = .004$, partial $\eta^2 = .19$. There were no

other significant or trending interactions.

*Defendant culpability.* No significant main effects of time, $F(1, 40) = 0.49$, $p = .488$, partial $\eta^2 = .01$, testimony concreteness, $F(1, 40) = 0.17$, $p = .687$, partial $\eta^2 = .004$, or visualization condition, $F(1, 40) = 0.19$, $p = .664$, partial $\eta^2 = .005$, were observed. There were no significant or trending interactions.
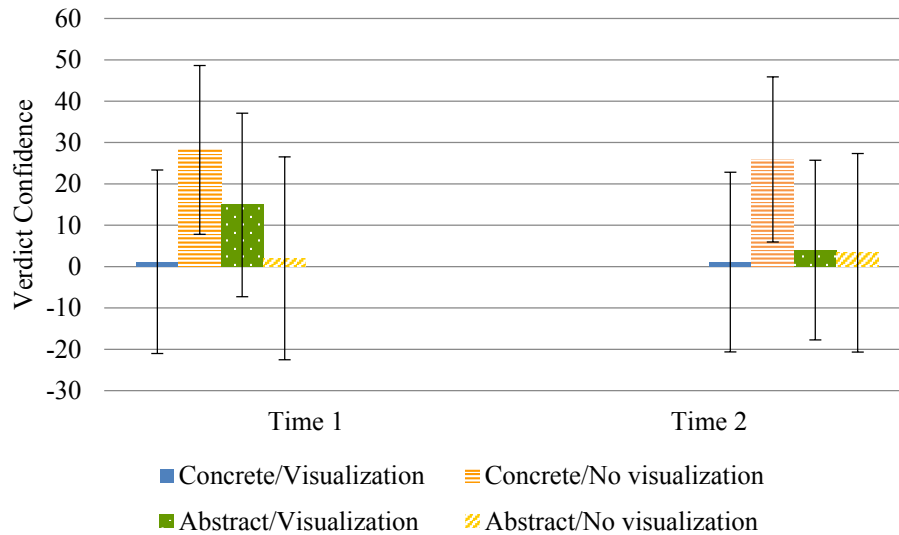


Figure 4.1. Effect of concreteness and visualization on verdict confidence: Participants in who received the abstract testimony and were instructed to visualize the case became less confident in their not guilty verdicts over time.

Table 4.2. Means and SEMs on Eyewitness Credibility and
Eyewitness Accuracy over Time

| Group | Eyewitness Credibility | | Eyewitness Accuracy | |
|---|---|---|---|---|
| | Time 1 | Time 2 | Time 1 | Time 2 |
| Concrete | 58.85 (5.21) | 57.42 (4.66) | 50.21 (4.66) | 53.53 (5.29) |
| Abstract | 60.53 (4.78) | 61.98 (4.66) | 60.17 (4.79) | 57.25 (5.90) |
| Visualization | 59.18 (4.76) | 55.09 (4.29) | 51.14 (4.39) | 53.03 (5.45) |
| No visualization | 60.05 (5.35) | 63.89 (4.91) | 58.33 (5.17) | 57.41 (5.68) |

Note. Standard errors in parentheses.

*Eyewitness credibility.* I did not find any main effects of time, $F(1, 40) = 0.01$, $p$ = .977, partial $\eta^2$ = .0002, concreteness condition, $F(1, 40) = 0.34$, $p = .572$, partial $\eta^2$ = .008, or visualization condition, $F(1, 40) = 0.78$, $p = .381$, partial $\eta^2$ = .02. There were no significant or trending interactions.

*Eyewitness accuracy.* Once again, there was no main effect of time, $F(1, 40) =$ 0.10, $p = .759$, partial $\eta^2$ = .002, testimony concreteness, $F(1, 40) = 1.15$, $p = .291$, partial $\eta^2$ = .03, or visualization condition, $F(1, 40) = 1.06$, $p = .309$, partial $\eta^2$ = .03. However, there was a significant interaction of time, concreteness condition, and visualization condition, $F(1, 40) = 4.93$, $p = .032$, partial $\eta^2$ = .11. This represents a medium effect size. As seen in Figure 4.2, participants in the Concrete testimony/Visualization group believed the eyewitness was more accurate at Time 2 than at Time 1 ($M_1 = 48.30$, $M_2 =$ 57.39), $F(1, 40) = 6.51$, $p = .015$, partial $\eta^2$ = .14. Additionally, there was a trending two-way interaction between time and concreteness condition, $F(1, 40) = 3.19$, $p = .082$, partial $\eta^2$ = .07 (Figure 4.3). This represents a medium effect size. At Time 1, participants who received the abstract testimony rated the eyewitness as more accurate ($M = 60.85$) compared to those who received the concrete testimony ($M = 50.06$). Separately, participants who received the concrete testimony found the eyewitness more accurate at Time 2 ($M = 53.83$) than at Time 1. There were no other significant or trending interactions.

## Covariate Analyses

*Visualization ability.* VVIQ scores were significantly related to verdict confidence ($r = -.35$, $r = -.35$), defendant culpability ($r = .38$, $r = .45$), and eyewitness
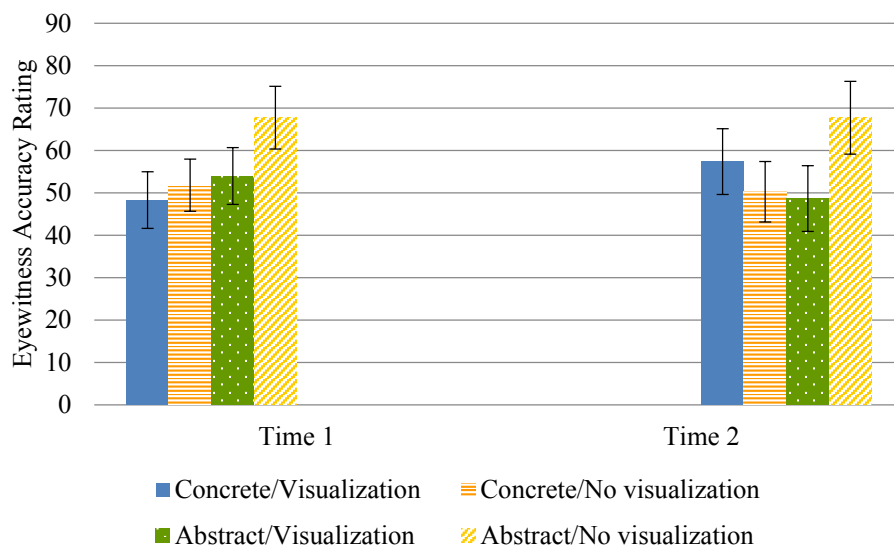
Figure 4.2. Three-way interaction on eyewitness accuracy: Participants in the Concrete/Visualization group rated the eyewitness as more accurate at Time 2 compared to Time 1.
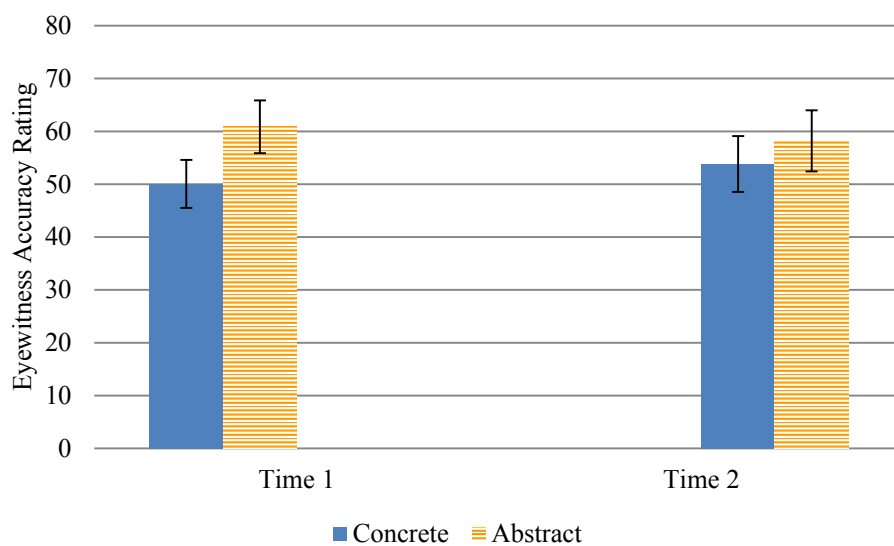


Figure 4.3. Trending two-way interaction on eyewitness accuracy: Participants who received the concrete testimony rated the eyewitness as more accurate at Time 2 compared to Time 1.

accuracy ($r = .33$, $r = .35$) ratings at both time points and with eyewitness credibility at

Time 2 ($r = .34$). There was a non-significant but trending relationship with eyewitness

credibility at Time 1 ($r = .26$, $p = .090$). Therefore, VVIQ score was entered as a

covariate into analyses for all dependent variables to control for individual differences in

visualizing ability. All means and standard errors for analyses with VVIQ entered as a

covariate are reported in Tables 4.3 and 4.4.

Table 4.3. Means and SEMs on Verdict Confidence and Defendant Culpability over Time
with VVIQ Entered as a Covariate

| Group | Verdict Confidence | | Defendant Culpability | |
|---|---|---|---|---|
| | Time 1 | Time 2 | Time 1 | Time 2 |
| Concrete | 12.52 (14.39) | 11.33 (14.05) | 48.97 (4.60) | 51.78 (4.61) |
| Abstract | 11.45 (15.81) | 6.65 (15.44) | 51.15 (5.06) | 51.20 (5.06) |
| Visualization | 7.96 (14.94) | 2.46 (14.59) | 50.48 (4.78) | 54.56 (4.79) |
| No visualization | 16.00 (15.20) | 15.51(14.85) | 49.64 (4.86) | 48.42 (4.87) |

Note. Standard errors in parentheses.

*Verdict confidence.* Time, concreteness, and visualization condition remained

non-significant with the inclusion of visualization ability as a covariate, and the trending

three-way interaction of time, concreteness, and visualization condition persisted, $F(1,$

$39) = 3.78$, $p = .059$, partial $\eta^2 = .09$. Visualization ability had a medium, significant

effect on verdict confidence scores, $F(1, 39) = 5.22$, $p = .028$, partial $\eta^2 = .12$.

*Defendant culpability.* Adding visualization as a covariate did not change the

previously reported results. Visualization had a large, significant effect on defendant

culpability ratings, $F(1, 39) = 8.73$, $p = .005$, partial $\eta^2 = .18$.

Table 4.4. Means and SEMs on Eyewitness Credibility and Eyewitness Accuracy over Time with VVIQ Entered as a Covariate

| Group | Eyewitness Credibility | | Eyewitness Accuracy | |
|---|---|---|---|---|
| | Time 1 | Time 2 | Time 1 | Time 2 |
| Concrete | 59.56 (4.86) | 57.92 (4.25) | 50.67 (4.39) | 54.60 (5.03) |
| Abstract | 60.17 (5.33) | 61.93 (4.67) | 60.02 (4.82) | 57.15 (5.53) |
| Visualization | 59.20 (5.04) | 55.12 (4.42) | 51.16 (4.55) | 53.06 (5.22) |
| No visualization | 60.53 (5.13) | 64.73 (4.49) | 59.53 (4.63) | 58.68 (5.32) |

Note. Standard errors in parentheses.

*Eyewitness credibility.* With visualization ability added as a covariate, there remained no significant main effects of time, concreteness, or visualization condition. Visualization ability had a medium significant effect on eyewitness credibility ratings, $F(1, 39) = 4.19$, $p = .048$, partial $\eta^2 = .10$.

*Eyewitness accuracy.* With visualization ability added as a covariate, there remained no main effect of time, concreteness, or visualization condition. Including visualization ability as a covariate also did not affect the three-way interaction, $F(1, 39) = 4.58$, $p = .039$, partial $\eta^2 = .11$, or the trending two-way interaction between time and concreteness condition, $F(1, 39) = 3.55$, $p = .067$, partial $\eta^2 = .08$. Visualization ability had a significant effect on eyewitness accuracy ratings, $F(1, 39) = 5.06$, $p = .030$, partial $\eta^2 = .12$.

*Discussion*

*Testimony Manipulation*

Once again, concreteness did not affect verdict confidence or ratings of defendant culpability, eyewitness credibility, or eyewitness accuracy. Nevertheless, there was one trending two-way interaction between concreteness and time. Participants who received the received the concrete testimony found the eyewitness to be less accurate at Time 1 than those who received the abstract testimony. Although this does not support my hypothesis, it is important to note that those who received the concrete testimony did find the eyewitness more accurate at Time 2. The effect of concreteness on perceptions of accuracy, therefore, may be stronger as participants attempt to recall the eyewitness's testimony, rather than during immediate judgments.

*Visualization Manipulation*

Visualization did not significantly affect mock jurors' verdict confidence scores or ratings of defendant culpability, eyewitness credibility, or eyewitness accuracy. However, a significant three-way interaction between time, concreteness, and visualization provides additional support that visualization can bolster the effects of concreteness over time. Participants who read the concrete version of the testimony while visualizing found the eyewitness's testimony more verifiable at Time 2 than Time 1. The conclusion that concreteness effects are bolstered by visualization over time is potentially supported by a trending three-way interaction such that those who received the abstract testimony and visualized became less confident in their not guilty verdicts over time. Although the finding that those in the abstract condition became less confident over time

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is somewhat in line with expectations, it is unclear why only the visualized abstract testimony resulted in participants altering their verdict confidence. Thus, although participants may have become less confident overall at Time 2, there appears to be a specific effect of visualizing and testimony concreteness on participant changes in ratings.

*Visualization Ability*

Even when accounting for individual visualization ability, there were no significant main effects of concreteness or visualization condition. VVIQ scores did have a significant effect on verdict confidence and ratings of defendant culpability, eyewitness credibility, and eyewitness accuracy. Therefore, visualizing ability does account for some of the variance in juror's decisions about guilt and their perceptions of the eyewitness. Regardless, the majority of the previously reported significant and trending interactions did not change even with visualization ability included in the model.

*Conclusion*

No definitive support was found for the hypotheses regarding the effects of concreteness and visualization on juror decision making. Although neither concreteness nor visualization affected the number of case details recalled, there was qualified support for the effect of concrete testimony over time and/or in conjunction with visualizing the case. Separately, although the hypotheses regarding the stability of the ratings for the visualization condition were not supported, there was evidence that visualizing does have an effect on juror decision making. Additionally, individual differences in visualizing ability account for a significant amount of variance in juror decision making.

A critical limitation of this study was its extremely low power to detect a main effect of concreteness or visualization. In addition to the previously stated low participation rate, there are indications of other problems with the experimental materials. It may be the case that the concreteness manipulation was not robust enough, as a manipulation check indicated participants rated the testimony similarly, regardless of its concreteness. Further, participants may have been distracted by the text prompts asking them about their visualizations. Although this allowed me to investigate their imagery for the case, it may have been perceived as an additional, distracting task. Future research should not only utilize a larger sample size to account for low participation rates in Part 2 of the study, but should also work to make the manipulations as strong as possible to avoid being underpowered.

CHAPTER FIVE

General Discussion

Jurors rely on the information presented to them over the course of a trial to make their decisions. Although one hopes that jurors come to these decisions after careful deliberation of the evidence, the evidence suggests otherwise. Judgments are influenced not only by the weight of the information presented, but also by perceptions of the motives, confidence, and credibility of those presenting it. Given the focus on dialogue in the adversarial criminal trial, the linguistic choices made by a lawyer or witness can influence juror decision making in a similar manner as their argument or testimony. By examining the effects of linguistic choices on juror decision making, one can better understand how language choices play a subtle role in perceptions of guilt or reliability.

My research focused on changes in linguistic category, a linguistic cue that only limited research has investigated in the context of the criminal justice system, and no research to date has examined its use in an eyewitness's testimony. I explored how changes in linguistic category from concrete to abstract influenced jurors' verdict decisions as well as their perceptions of the eyewitness. Although initial findings suggest that more concrete testimony is perceived as more credible and may influence jurors' decision making, I found that these findings should be interpreted with caution.

Mock jurors in Experiment 1 who received the concrete version of the eyewitness testimony were more likely to find the defendant guilty and were more likely to rate the eyewitness as credible than those who received the abstract version. These findings were

small effects but expected, as more concrete language is perceived as more verifiable, possibly influencing jurors by leading them to expect the information to be supported by later evidence.

In Experiment 2, there was limited evidence to suggest mock jurors were influenced by the concreteness of the eyewitness's testimony. It is possible that the additional document to read increased jurors' skepticism of the testimony across conditions. With time to reflect on their decisions, jurors may have found the eyewitness's testimony less reliable, as increases in skepticism have been found to result in reduced believability (Johnson, Bush, & Mitchell, 1998).

Nonetheless, this study did find support for the use of juror instructions to induce skepticism. Mock jurors who received the modified juror instructions were more confident in their verdicts, found the defendant less culpable, and rated the eyewitness as less credible or accurate compared to those who did not receive the instructions. This study also found differences in ratings of the eyewitness's perceived credibility and accuracy between a sample of undergraduate psychology students and an online sample of the general public. Undergraduate students found the eyewitness less credible and less accurate than the online sample. As undergraduate psychology students are likely to be familiar with some of the failings of memory, these differences may show that education on memory can increase skepticism of eyewitness accounts (Papailiou et al., 2015). Whether this increased skepticism is nuanced enough to differentiate scenarios when memory is likely to be reliable is beyond the scope of this study.

There were no significant effects of concreteness when mock jurors were visualizing the case over time (Experiment 3). However, mock jurors who received the

concrete version of the testimony while visualizing the case found the eyewitness more accurate at Time 2 than at Time 1. Further, those who received the abstract testimony while visualizing the case became less confident in their verdicts over time. Together, these findings suggest that the combination of testimony and the visualization condition led jurors to change their level of belief in the eyewitness's version of events over time.

Instead of aiding participants to maintain the details of the case over time and promoting stability in ratings, visualizing seems to influence individuals to change from their original decisions. One possibility for these results is imagination inflation. Imagining events can lead to the creation of false memories (Loftus, 2003; Thomas, Bulevich, & Loftus, 2003). By visualizing the eyewitness's testimony, participants may have elaborated on the original eyewitness testimony. When recalling the testimony at Time 2, participants' inflated memories of the testimony may have caused them to change their original ratings. Separately, the act of visualizing the actions from a third-person perspective has been found to be less imageable than visualization of one's self (Libby & Eibach, 2002). The act of visualizing from an omniscient perspective or even from the perspective of another individual, such as the cashier, may have led to these unexpected findings on visualization. Further, it may simply be the case that vividness effects on memory may not influence judgments. Shedler and Manis (1968) found that vividness effects on judgments about a woman's fitness as a parent were not mediated by availability of the case arguments in memory. Therefore, perhaps the vividness of a given participant's mental images for the case influenced their judgments irrespective of their memory for the case details themselves.

Although the effects of visualizing itself were not clear, visualizing ability as measured by the VVIQ did account for a significant portion of the variance in juror decision making and perceptions. The ability to visualize a situation may be particularly helpful for jurors who are inundated with a plethora of information, and could help jurors as they build their mental narratives about the case (Hastie, Penrod, & Pennington, 1983).

As previously stated, the main limitation of these studies was the small effect size of concreteness in Experiments 2 and 3. As the manipulation was subtle in an attempt to maintain consistency between the two versions, it may have been too weak to detect at the sample sizes I had collected. Further, recruitment problems with Experiment 3 led to the study being underpowered even further, as desired sample sizes were not achieved. Future research investigating the effect of concreteness on juror decision making should use more robust manipulations. Unlike examinations of linguistic concreteness in other fields which may only manipulate the concreteness of short statements, eyewitness testimony is defined by its narrative nature. Therefore, it is possible that eyewitness statements considered more abstract in isolation may become more concrete when combined with other information included in the testimony. Additionally, the use of a written summary of the testimony may have contributed to an increase in syntactic complexity that overshadowed our sentential-level manipulations of concreteness. By using more effective and ecological methods, such as including audio of direct- and cross-examinations, the effect of linguist concreteness on juror decision making could be better assessed.

Jurors are undoubtedly influenced by the language an eyewitness utilizes when delivering their testimony or answering questions. However, the effects of linguistic

concreteness on juror decision making and perceptions of the defendant and eyewitness require more investigation before definitive conclusions can be made. The described efforts to investigate linguistic concreteness in more ecologically valid settings, such as when jurors are more skeptical or when jurors are recalling information from a day prior, have yet to produce consistent effects. Nevertheless, future related research using more robust methods could provide lawyers with a new tool in witness preparation.

APPENDICES

APPENDIX A

Planned Sample Size and Power Analysis

*Experiment 1*

A power analysis for the aforementioned MANOVA was conducted using

G*Power (Version 3.1.9.2; Faul, Erdfelder, Lang, & Buchner, 2009) with $\alpha = .05$ and

power = .80. Based on a moderate effect size of $f = .25$, G*Power indicates a total sample

size of 158 participants will result in an 80% chance of finding a true effect. I planned to

recruit 160 total participants to allow for 80 participants per group. The power for the

intended design was .85.

*Experiment 2*

A power analysis for the aforementioned series of ANOVAs was conducted using

G*Power (Version 3.1.9.2; Faul, Erdfelder, Lang, & Buchner, 2009) with $\alpha = .05$ and

power = .80. Based on a moderate effect size of $f = .25$, G*Power indicates a total sample

size of 158 participants will result in an 80% chance of finding a true effect. I planned to

recruit 160 total participants to allow for 20 participants in each treatment combination.

The power for the intended design was .81.

*Experiment 3*

A power analysis for the aforementioned series of mixed-design ANOVAs was

conducted using G*Power (Version 3.1.9.2; Faul, Erdfelder, Lang, & Buchner, 2009)

with $\alpha = .05$ and power = .80. Based on a moderate effect size of $f = .25$, G*Power

software indicates a total sample size of participants will result in an 80% chance of

finding a true effect. I planned to recruit 72 total participants to allow for 9 participants in

each treatment combination. The power for the intended design was .85.

APPENDIX B

Eyewitness Testimony

*Experiment 1*

*Concrete Testimony*

I work as a cashier. On the night of the 11<sup>th</sup>, before the robbery, I prepared to close up. It was around 9:45 P.M., about 15 minutes before I closed the store. I stood at the front, and I looked around and there were no customers in the store. The door opened and I looked up and there's a guy in a sweatshirt. He was twitching nervously. I didn't do anything about him at first, but soon he put his hood up so I suspected something. The hood didn't completely cover his face. He walked to the register and asked for a pack of cigarettes. I turned my back to him for a second and he quickly went around the counter and put a knife to my throat. I looked down; it appeared to be a black military knife. It looked like the combat knives from the military surplus store down the street. He told me to open the cash drawer, so I opened it. I was trembling. He stole the money out of the drawer. Then he put the knife to my back and ordered me to "lay on the ground," so I did. Then he went out of the store. I called the police as soon as he left. I'll never forget his face; it was definitely the defendant. Sure, I don't remember the face of every customer who comes in, but I assure you I never saw him before the robbery.

*Abstract Testimony*

I'm a cashier. On the night of the 11th, before the robbery, I was ready for closing time. It was around 9:45 P.M., about 15 minutes before the store is closed. I was at the front, and I realized there were no customers in the store. The door opened and I noticed a nervous, twitchy guy in a sweatshirt. I didn't think anything about him at first, but soon he tried to hide his face with the hood so I was suspicious. His face wasn't completely covered by the hood. He came to the register and wanted a pack of cigarettes. My back was facing him for a second and he was quickly around the counter and suddenly a knife was at my throat. It looked like a black military knife. It was similar to the combat knives from the military surplus store down the street. He wanted me to open the cash drawer, so I did. I was scared. He stole the money out of the drawer. Then he had the knife at my back and wanted me to "lay on the ground," so I did. Then he was out of the store. I called the police as soon as he was gone. The guy's face is unforgettable; it was definitely the defendant. Sure, I don't remember the face of every customer I have, but I'm sure I had never seen the defendant before the robbery.

*Experiment 2*

*Concrete Testimony*

I work as a cashier. On the night of the 11th, before the robbery, I was preparing to close up. It was around 9:45 P.M., about 15 minutes before I lock the door to the store. I was standing at the front and realized there were no customers in the store at the time. But then a guy in a sweatshirt opened the door, and he was twitching nervously. I didn't do anything about him at first, but when he put the hood of his sweatshirt over his head I

immediately suspected something. Of course, the hood didn't cover his face completely. He walked to the register and asked for a pack of cigarettes. I turned my back to him for a second before he dashed around the counter and put a knife to my throat. It seemed to be a black military knife. It looked like the combat knives from the military surplus store down the street. He told me to open the cash drawer, so I did. I was trembling. He stole the money out of the drawer. Then he put the knife to my back and ordered me to "lie down on the ground," so I lay down. After that he ran out of the store. I called the police to tell them what happened as soon as he fled. I'll never forget his face; it was definitely the defendant. Sure, I don't remember the face of every customer who comes in, but I assure you I never saw him before the robbery.

*Abstract Testimony*

I'm a cashier. On the night of the 11th, before the robbery, I was ready for closing time. It was around 9:45 P.M., about 15 minutes before the store is closed. I was chilling out at the front and realized there were no customers in the store at the time. But then the door opened and I noticed a nervous, twitchy guy in a sweatshirt. I didn't think anything about him at first, but when he put the hood of his sweatshirt up I immediately was suspicious. Of course, his face wasn't completely covered by the hood. He walked to the register and wanted a pack of cigarettes. I had my back facing him for a second before he dashed around the counter and there suddenly was a knife at my throat. It looked like a black military knife. It was similar to the combat knives from the military surplus store down the street. He wanted me to open the cash drawer, so I did. I was terrified. He stole the money out of the drawer. Then, with the knife now at my back, he said he wanted me down on the ground, so I complied. After that he made a getaway. I let the police know

what happened as soon as he was gone. The guy's face is etched in my mind; it was definitely the defendant. Sure, I don't remember the face of every customer I have, but I'm confident I never saw the defendant before the robbery.

<center>*Experiment 3*</center>

*Concrete Testimony*

I work as a cashier. On the night of the 11th, before the robbery, I was preparing to close up. It was around 11:45 P.M., nearly 15 minutes before I lock the door. I was standing at the front and noticed there were no customers in the store at the time. But then a guy wearing a sweatshirt swung open the door, and I saw he was twitching nervously. I didn't react to him at first, but when he threw the hood of his sweatshirt over his head I immediately suspected something. Of course, the hood didn't cover his face completely. He walked to the counter and asked for a pack of cigarettes. I turned my back towards him for a second before he ran around the counter and immediately held a knife to my throat. It looked like a black military knife. It looked like the combat knives from the military surplus store down the street. He ordered me to open the drawer, so I opened it. I was trembling. He snatched the money from the drawer. Then he held the knife to my back and ordered me to "lie down on the ground," so I lay down. After that he fled the store. I called the police to tell them what happened as soon as he left. I'll never forget his face; it was undoubtedly the defendant. Sure, I don't remember the face of every customer who comes in, but I assure you I never saw him before the robbery.

*Abstract Testimony*

I am employed as a cashier. On the night of the 11th, before the robbery, I was ready for finishing time. It was around 11:45 P.M., about 15 minutes before the store is closed. I was chilling out at the front and realized there were no customers in the store at the time. But then the door was opened and I observed a nervous, twitchy guy in a sweatshirt. I didn't think anything about him at first, but when he put the hood of his sweatshirt up I immediately was suspicious. Of course, his face wasn't entirely covered by the hood. He came to the register and wanted a pack of cigarettes. I had my back to him for a moment before he dashed around the counter and suddenly there was a knife at my throat. It resembled a black military knife. It was similar to the combat knives from the military surplus store down the street. He wanted me to open the register, so I did it. I was terrified. He took the cash from the drawer. Then, with the knife now at my back, he said he wanted me down on the ground, so I complied. After that he made a getaway. I let the police know what happened as soon as he was gone. The guy's face will forever be in my mind; it was definitely the defendant. Sure, I don't recognize the face of every customer I have, but I'm sure I never saw the defendant before the robbery.

APPENDIX C

Juror Questionnaire (modified from Jules and McQuiston, 2013)

1. On the case against Christopher Jackson, do you find the defendant:

Guilty             Not guilty

2. Indicate the degree of confidence you have in the above verdict decision:

| No Confidence | | | | Moderate Confidence | | | | Complete Confidence | | |
|---|---|---|---|---|---|---|---|---|---|---|
| 0% | 10 | 20 | 30 | 40 | 50 | 60 | 70 | 80 | 90 | 100% |

3. How strong is the case against the defendant?

| Not Strong at All | | | | Moderately Strong | | | | Very Strong | | |
|---|---|---|---|---|---|---|---|---|---|---|
| 0% | 10 | 20 | 30 | 40 | 50 | 60 | 70 | 80 | 90 | 100% |

4. How credible is the eyewitness, Trey Matthews?

| Not at all Credible | | | | Moderately Credible | | | | Completely Credible | | |
|---|---|---|---|---|---|---|---|---|---|---|
| 0% | 10 | 20 | 30 | 40 | 50 | 60 | 70 | 80 | 90 | 100% |

5. How confident do you believe the eyewitness is about the accuracy of his testimony?

| Not at all Confident | | | | Moderately Confident | | | | Completely Confident | | |
|---|---|---|---|---|---|---|---|---|---|---|
| 0% | 10 | 20 | 30 | 40 | 50 | 60 | 70 | 80 | 90 | 100% |

6. How strongly do you believe the eyewitness is accurate in his identification of Christopher Jackson as the armed robber?

| Not Strongly at All | | | | Somewhat Strongly | | | | Very Strongly | | |
|---|---|---|---|---|---|---|---|---|---|---|
| 0% | 10 | 20 | 30 | 40 | 50 | 60 | 70 | 80 | 90 | 100% |

7. How accurate is the eyewitness's recollection of the details surrounding the armed robbery?

| Not at all Accurate | | | | Moderately Accurate | | | | Completely Accurate | | |
|---|---|---|---|---|---|---|---|---|---|---|
| 0% | 10 | 20 | 30 | 40 | 50 | 60 | 70 | 80 | 90 | 100% |

8. How trustworthy is the eyewitness?

| Not at all Trustworthy | | | | Moderately Trustworthy | | | | Very Trustworthy | | |
|---|---|---|---|---|---|---|---|---|---|---|
| 0% | 10 | 20 | 30 | 40 | 50 | 60 | 70 | 80 | 90 | 100% |

9. What is the likelihood the defendant is guilty of breaking and entering and attempted robbery?

| Not at all Likely | | | | Moderately Likely | | | | Completely Likely | | |
|---|---|---|---|---|---|---|---|---|---|---|
| 0% | 10 | 20 | 30 | 40 | 50 | 60 | 70 | 80 | 90 | 100% |

10. Do you believe the eyewitness had a good opportunity to observe the armed robber?

| Not at all | | | | He may have | | | | He definitely did | | |
|---|---|---|---|---|---|---|---|---|---|---|
| 0% | 10 | 20 | 30 | 40 | 50 | 60 | 70 | 80 | 90 | 100% |

11. Where did the alleged crime take place?
    a. In a house
    b. In a park
    c. In a convenience store
    d. In a bar

12. What weapon was used in the alleged crime?
    a. Knife
    b. Gun
    c. Baseball bat
    d. Taser

13. What was the eyewitness's occupation?
    a. Cab driver
    b. Cashier
    c. Lawyer
    d. Military

14. Did the defendant have a solid alibi?

                    Yes              No

15. Did the defendant confess to the crime?

                    Yes              No

APPENDIX D

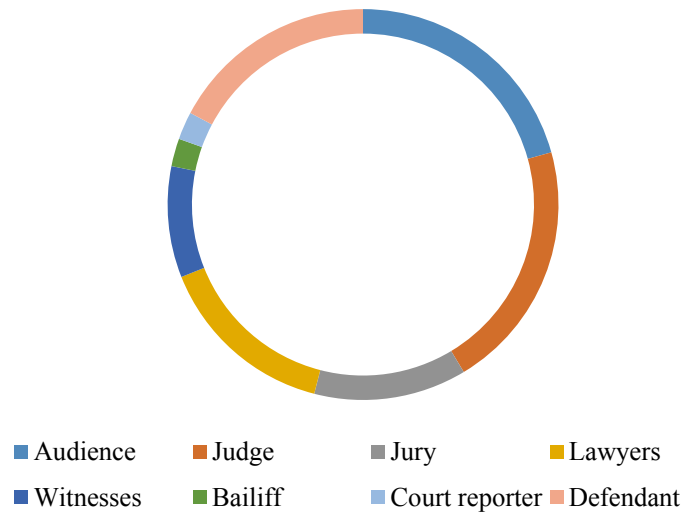Participant Visualizations from Experiment 3

*Pilot Visualizations*



Figure D.1. Pilot visualizations of the courtroom: Participants mentioned the presence of the audience (72%), judge (72%), the defendant (60%), lawyers (52%), other members of the jury (44%), witnesses (32%), the bailiff (8%), and the court reporter (8%).
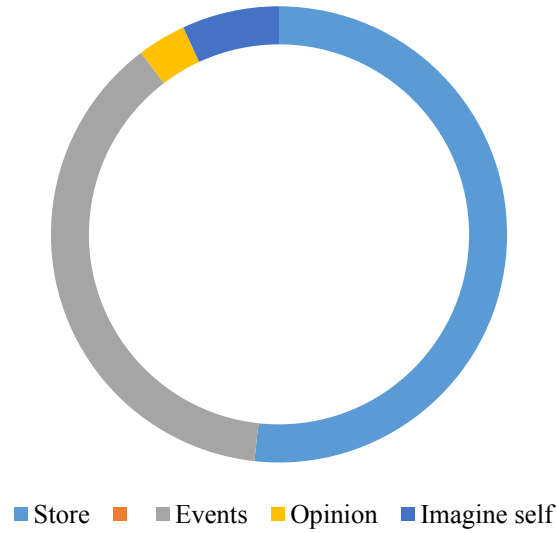
Figure D.2. Pilot visualizations of the crime: Participants described the convenience store (60%), the events of the crime as relayed by the case summary and/or witness (44%), imagined themselves in the scenario (8%), and mentioned their own opinions about the case (4%).
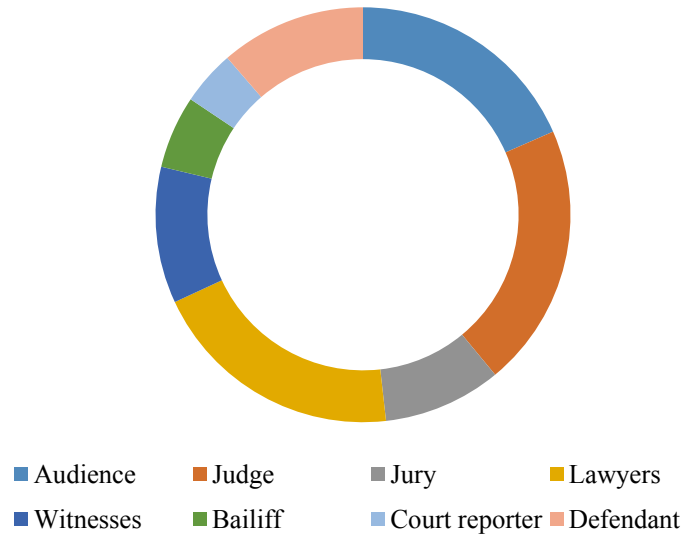
*Experiment 3 Visualizations*



Figure D.3. Experiment 3 visualizations of the courtroom: Participants described the presence of the judge (64.44%), lawyers (62.22%), the audience (57.78%), the defendant (35.56%), witnesses (33.33%), other members of the jury (28.89%), the bailiff (17.78%), and the court reporter (13.33%).
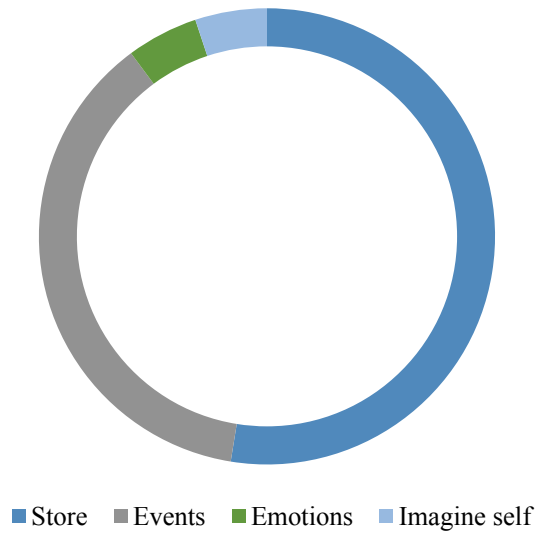
Figure D.4. Experiment 3 visualizations of the crime: Participants described the convenience store (68.89%), the events of the crime from the case summary and/or witness (48.89%), imagined themselves in the scenario (6.67%), and mentioned their own emotions about the case (6.67%).

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