HOW DOES STRESS AT TIME OF IDENTIFICATION AFFECT EYEWITNESS MEMORY?

by

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Research has revealed that stress at the time of the event has a negative effect on eyewitness memory; however, research is lacking on stress at the time of the identification. The present research set out to determine how stress at the time of an identification affects eyewitness memory for an event. In order to test this research question, the present study utilized the Socially Evaluated Cold Pressor Task (SECPT; event stress, or D1) and Trier Social Stress Test (identification stress, or D2), and their non-stress counterparts (friendly-Trier Social Stress Test, control-Cold Pressor Task; c-CPT) across two sessions. The SECPT/c-CPT procedures introduced To-Be-Remembered-stimuli that participants were subsequently tested on during the recall and recognition tasks.

Participants in the stress induction conditions (both D1 and D2) had significantly higher cortisol levels, blood pressure/heart rate, and subjective stress than participants in the non-stress induction conditions (both D1 and D2). Results of the memory tests revealed that participants recalled significantly more central details than peripheral details, regardless of stress condition. There was a more pronounced effect of D1 stress on peripheral than on central details, though this finding was not consistent across recall and recognition tasks. Additionally, there were no significant differences in lineup

accuracy across stress and control conditions for D1 or D2, although stress at D1 (but not stress at D2) marginally increased choosing behavior. Results revealed a significant confidence-accuracy correlation, which varied across conditions. Lastly, there was some support for the main research question, such that participants in the control condition at D2 remembered significantly more details than participants in the stress condition at D2. Although this finding was not consistent across all memory tests, it presents some evidence to support the hypothesis that stress occurring at the time of identification (retrieval) may negatively affect memory, regardless of whether the event itself was stressful.

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CHAPTER 1: REVIEW OF THE LITERATURE

One early morning, Ms. Kim stood outside her place of employment waiting for her employer to unlock the door. While she waited, a man approached her and demanded the keys. After failing to produce the keys, she was physically assaulted for fifteen minutes. Two weeks later, Ms. Kim was notified of a possible suspect, and brought to the precinct to view a lineup. While waiting for the lineup, Ms. Kim expressed some apprehension about the lineup procedure. She was assured that the one-way mirrors would afford her a degree of anonymity and that she was not undertaking the risk of another assault. Upon viewing the lineup, Ms. Kim became agitated and upset, and began to cry. She indicated that her attacker was in the lineup and articulated his position (*People v. Green*, 1991).

Ms. Kim's reaction to viewing her attacker in a lineup is an example of how people who have been victimized or have witnessed a horrendous crime may react when viewing their attacker in a lineup. In *People v. Green* (1991), an experimental psychologist testified at trial that no studies have explored the effect of stress at the time of the subsequent identification procedure (i.e., the lineup). Even though this case happened more than 25 years ago, research still does not exist to determine whether the stress she experienced during the lineup procedure may have affected her memory.

An event at which an eyewitness's memory becomes a key piece of evidence can be stressful or emotionally arousing and typically negative in nature (e.g., fear). However, the originating event is not the only part of the witnessing process that may induce different types of emotion. Witnesses may be required to retrieve the information on more than one occasion: when recounting the event to the responding police officer,

making a lineup identification, or giving their testimony in front of a judge and jury. As Ms. Kim's example shows, these actions may induce negative emotion as the witnesses are reminded of the crime, potentially relive the emotionally arousing event, and find themselves in an unfamiliar and at times adversarial setting (e.g., at the station house, in court; Bornstein, Hullman, & Miller, 2013).

Since 1989, over 300 innocent people have been exonerated based on DNA evidence. Eyewitness misidentifications were a factor in 75 percent of post-conviction DNA exoneration cases in the United States (www.innocenceproject.org). Since eyewitness misidentifications (and their subsequent eyewitness testimony) are the leading cause of wrongful convictions, eyewitnesses are perhaps the most influential part of criminal investigations, at least in cases where eyewitnesses appear. As a result, it is crucial that we discover how memory may be affected during the various stages of the witnessing process, specifically when taking into consideration that the witnessed event will often be stressful and emotionally arousing.

For the current project, I investigate how stress at the time of an identification affects eyewitness memory for the event in a standard eyewitness memory paradigm, in which eyewitnesses unexpectedly find themselves in a stress-inducing situation that they are subsequently inquired to remember. In Chapter 1, I give a brief overview of the legal background for eyewitness identification, as well as discuss how therapeutic jurisprudence may reduce the negative effects associated with the identification procedure. I then examine psychological theories and research from the basic memory, judgment, and decision-making literature. I present the methods and results for the current study in Chapters 2 and 3, respectively. Finally, I summarize the results and

discuss the implications in Chapter 4.

Legal Background

One of the main goals for anyone involved in criminal justice, psychology and law, or the legal system is to ensure that the person responsible for committing a crime is the person who is subsequently punished for committing that crime. Not only does everyone involved want the correct person to answer for his or her crime, but once a person is in custody for committing a crime, we want to ensure that every precaution is taken from initial arrest to sentencing. This includes following proper procedures during both pre-arrest and post-arrest investigations (e.g., interviewing victims and witnesses, lineup procedures). Police officers have their guidelines on the "best practices" of gathering information and they often look to the courts to determine what is and is not acceptable. Additionally, once a criminal has been charged with a crime, we want to ensure that (1) eyewitness testimony admitted into evidence is reliable, and that once it is admitted; (2) it will not lead to a reversal on appeal. In order to ensure both objectives, every precaution must be taken to follow the guidelines set forth by the criminal justice and legal systems.

In the course of a criminal investigation, there are two occasions for identification procedures to take place, before trial (pre-trial) and during trial (in-court). A pre-trial identification may be further delineated into pre- and post-indictment. An indictment is a formal charge or accusation of a serious crime; thus, pre- and post-indictment lineups refer to the occurrence of lineups before or after a suspect has been charged with a specific crime.

Whether a suspect has been indicted directly affects the protections guaranteed by

the Constitution of the United States (e.g., Sixth Amendment right to counsel). In *United States v. Wade* (1967), the defendant argued that he was entitled to counsel at a post-indictment lineup because police had the opportunity to influence the witness (i.e., verbal and non-verbal behavior) and, therefore, it was a major part of the adversarial process (*Massiah v. U.S.*, 1964). The Court ultimately agreed and held that the Sixth Amendment right to counsel applies to post-indictment lineup procedures (*United States v. Wade*, 1967), but refused to apply *Wade* to pre-indictment lineups (*Kirby v. Illinois*, 1972) or photographic lineups, even if conducted post-indictment (in part because it is easier to reconstruct the photo array at trial than it is to reconstruct a live lineup; *United States v. Ash*, 1973). This line of cases makes it clear when suspects have the right to counsel during pre-trial identification procedures, but having counsel present does not necessarily mean the lineup will not be prejudicial or biased. While counsel will likely have the ability to determine if a lineup is egregiously biased, they are far less likely to be able to determine more nuanced biases that may only be identified by an expert.

The question becomes whether an in-court identification is admissible if the pre-trial identification, either pre- or post-indictment was prejudicial. In *United States v. Wade* (1967), the Court held that even if a pre-trial identification is prejudicial or unconstitutional, the in-court identification may be admissible if the prosecution can show by clear and convincing evidence that the in-court identification was independent from and not the product of the pre-trial identification (i.e., the in-court identification was based upon observations of the suspect other than the lineup identification). The conviction will be affirmed if the court concludes that admission of the identification was harmless error. In fact, pre-trial motions to suppress eyewitness identification evidence

are filed routinely, and yet they almost never succeed (Wells, Greathouse, & Smalarz, 2012).

Since it appears that even a prejudicial or biased lineup procedure will not prevent the prosecution from using an in-court identification, it is unlikely that any other factors known to affect the reliability of lineup identification would also prevent the in-court identification. As such, it is crucial that any known factors that may affect the reliability of a lineup identification may be discovered and prevented from occurring in the first place. One such example is that of stress, which may occur at multiple times during the course of an investigation. In order to reduce stress, a therapeutic jurisprudence approach may assist in determining methods that can reduce the stress that witnesses experience.

Therapeutic Jurisprudence

Therapeutic jurisprudence is "the study of the role of the law as a therapeutic agent," which aims to execute legal procedures in ways that promote psychological well-being of the individuals involved (Wexler & Winick, 1991). A perspective that originated within a small circle of academicians as an interdisciplinary approach to the law and mental health field, it has since developed into a therapeutic perspective on the law in general (Wexler, 1997). Because scholars and practitioners have recognized that therapeutic jurisprudence has many applications, it has been applied to an extensive list of disparate areas of law (e.g., tort, contract, & criminal law; Wexler & Winick, 1991). Wexler and Winick suggested that the law itself can be seen to function as a therapist or therapeutic agent. They suggested, moreover, that legal rules, legal procedures, and the roles of lawyers and judges are social forces that produce therapeutic or anti-therapeutic consequences. In other words, therapeutic jurisprudence concentrates on how existing

law, whatever its nature, can be therapeutically applied (Hora, Schma, & Rosenthal, 1999). Wexler and Winick proposed that these consequences be assessed and the law be designed to serve more effectively as a therapeutic agent.

In order to determine how we can improve the law in terms of therapeutic agency, therapeutic jurisprudence requires an analysis of the effects of existing legal rules, and the way they are applied, on the psychological well-being and behavior of a particular sector of the population. If this analysis shows that the law or the way it is applied has negative effects, the first step within a therapeutic jurisprudence approach would be to look for procedures that could help to reduce these negative effects without altering the law itself or the way it is applied. If these procedures are insufficient the focus is shifted to the modification of the application of the law. If this, too, does not effectively reduce the observed negative effects, a reform of the law itself may be required (Köhnken, Fiedler, & Möhlenbeck, 2004).

A classic application of therapeutic jurisprudence is with patients going through the process of being committed to a hospital (Winick, 2005a, 2005b). A central question is how the conflict between individual autonomy and legal coercion (i.e., civil commitment) can be reconciled. Moreover, methods can be devised to structure civil commitment to reduce patients' perceptions of coercion. After examining the psychological research of choice and the effects of coercion, scholars have argued that a few core principles are essential for patients to maintain their self-esteem and self-worth, namely being treated with dignity and respect, having the opportunity to give voice to their beliefs and to tell their story, and to be guided, not coerced into making decisions. Generally, people function more effectively when they make decisions for themselves as

opposed to being subjected to coercion. Although empirical research on the relationship between the perception of coercion and hospitalization treatment outcome is lacking, theoretically, patients who feel coerced do not respond as well as those who feel that they have made voluntary choices (Winick, 2008). Witnesses might likewise experience a degree of coercion in their interactions with the police.

Therapeutic Jurisprudence and Eyewitnesses

Therapeutic jurisprudence has been extended beyond pure areas of the law and utilized in areas at the cross-section of law and psychology, including the area of eyewitness memory. When a crime occurs, the police officers' primary goal is to solve the crime and apprehend the criminal. In order to reach that goal, the police officers must elicit as much information as possible, and as accurate information as possible, from witnesses (bystanders and victims), as their testimony is considered to be the best predictor of solving crimes (Berresheim & Weber, 2003; George & Clifford, 1992; Kebbell & Milne, 1998; Kebbell & Wagstaff, 1997). While apprehending the criminal is likely important to witnesses as well, their immediate concern may be more focused on minimizing their psychological suffering from having been victimized (even bystander witnesses, though not direct victims, likely experience negative effects, especially when witnessing violent events).

In most jurisdictions, police officers often receive minimal or no formal training in interviewing cooperative witnesses and as expected, this leads to poor interview practices (see Fisher & Schreiber, 2007, for a review). By conducting effective interviews, they can elicit high-quality witness information and facilitate witnesses' health simultaneously. By the same token, ineffective interviews may undermine

witnesses' psychological health. In general, the standard police interview does not meet the goal of promoting witnesses' psychological health, which may subsequently result in negative effects (Fisher & Geiselman, 2010). However, the Cognitive Interview (CI), originally developed by Geiselman et al. (1984) and revised by Fisher, Geiselman, Raymond, Jurkevich, and Warhaftig (1987), has been identified as a procedure that may reduce these negative effects. The CI is an effective memory retrieval procedure for interviewing eyewitnesses, and is based on scientific principles of memory. The revised version consists of five sections: (1) establish rapport; (2) a period of free recall; (3) follow-up questions; (4) review gathered information; and (5) final termination of the interview. If used properly, it may elicit extensive, accurate information and promote witnesses' psychological health.

The CI was initially developed to enhance witness memory, rather than for therapeutic purposes; however, more recently Fisher and Geiselman have considered the CI as a way to promote witnesses' psychological well-being. Fisher and Geiselman (2010) proposed that in a properly conducted investigation, the police interview could concurrently elicit witness information to solve crimes and promote witnesses' psychological health through the use of the CI (Wexler & Winick, 1996).

There are no known formal studies that have systematically examined the CI, nor its individual components' ability to enhance witnesses' psychological functioning; however, based on anecdotal evidence, Fisher and Geiselman (2010) believe CIs may have the ability to enhance witnesses' psychological health. For example, Fisher regularly conducts training programs on the CI at FBI headquarters as part of a program for experienced sketch artists. Several of the sketch artists who had interviewed rape

victims reported that, following a well-conducted CI, victims often reported feeling more in control of their earlier ordeal and generally more self-confident (Fisher & Geiselman, 2010).

A more thorough analysis of the therapeutic aspects of the CI, revealed several components that may contribute to a therapeutic outcome (Fisher & Geiselman, 2010). For example, previewing the interview with witnesses may help them feel at ease—witnesses will often be anxious about the interview process because they are uncertain about what is expected of them and how the process will transpire. Cognitive Interviewers attempt to reduce that uncertainty by previewing the structure of the interview and explaining the ground rules of the interview, as part of a general rapport-building process. An additional component that promotes psychological well-being is the use of open-ended questions, which allows witnesses the ability to talk more and give voice to their stories. Instead of being limited to closed-ended questions, their thoughts and emotions drive the interview process with the interviewer altering his or her questions in response to the witnesses' recollections as opposed to the interviewer sticking to a pre-determined set of questions. This also gives witnesses greater control over the interview process, which subsequently leads to a greater sense of self-efficacy. Similarly, the increase in memory recall elicited from the CI may boost their sense of accomplishment, which would then allow them to conclude that they could control the event rather than be controlled by the event.

Overall, the superior performance with the CI has shown that it is an effective means of eliciting better eyewitness descriptions of events, with the effect generalizing across cultures, types of witness, retention interval, and kind of event to be recalled

(Fisher & Schreiber, 2007; Holliday, Brainerd, Reyna, & Humphries, 2009). Importantly, the CI also appears to contribute to a therapeutic outcome, which enhances witnesses' psychological functioning and health (Fisher & Geiselman, 2010).

In addition to the interview process, the identification procedure has a crucial role in eliciting information, most importantly that of the identification of a perpetrator. There is a paucity of research to determine what specific elements of the eyewitness identification procedure may cause stress, how we might alleviate stress assuming it exists, or even whether stress experienced during a lineup procedure may affect witnesses' memory. Despite this lack of tangible information, it is possible to make a reasonable deduction based on the general procedures described in police training materials, as well as from anecdotal evidence.

Conceivably, the first step in an eyewitness identification procedure is to contact witnesses to view a lineup; however, police officers generally do not think the lineup starts until they read the instructions (J.S. Neuschatz, personal communication, October 20, 2017). Guidelines typically do not include what should be done in terms of contacting or talking to a witness before the lineup. Furthermore, when police officers contact witnesses to view a lineup (an average delay of 12.78 days following the crime; Behrman & Richards, 2005), the police officers could be familiar, meaning that the witnesses have already had some contact with the police officer (e.g., scene of the crime), or new, with no prior contact. For therapeutic purposes, it would appear that a familiar police officer contacting the witnesses (assuming the prior contact was positive) would be better than a police officer who has had no previous contact with the witness.

Similar to previewing the CI with witnesses because they are often anxious about

the interview process due to uncertainty, it would be equally important to preview the identification procedure with witnesses at the earliest possible moment to help them feel at ease because they are equally likely to be anxious about the identification procedure. Exactly when this would be is unclear; it could occur via the phone as a precursor to meeting, or shortly after meeting in person with the goal of completing an identification procedure. Previewing the procedure should reduce witnesses' anxiety levels, which may ultimately affect memory at the time of the identification. Once contact has ensued for witnesses to view a lineup, police officers then proceed to set up a time to complete the procedure.

In the case of a live lineup, witnesses must come to the police station in order for proper measures to be taken (e.g., one-way mirror, standardization of administration). It is important to note that witnesses commonly report anxiety about the prospect of attending a live lineup (Tinsley, 2001), which may have implications for how they approach the identification task. Furthermore, despite not viewing a live lineup, some witnesses were visibly upset during an electronically recorded lineup that was also conducted in a police station (Memon, Havard, Clifford, Gabbert, & Watt, 2011). Regardless of the source of the stressor (e.g., anticipatory stress), it is unclear how this increase in anxiety could affect memory at identification.

If a photo or video lineup is utilized, the police officers have more options (e.g., police station, witnesses' workplace, home, etc.) to carry out the identification procedure, which often includes offering to come to the witness. Taking the lineup to the witnesses may expedite the process; since this is the police officers' job and their main goal is to solve the crime and apprehend the criminal, it is in their best interest to get a lineup

identification as soon as possible. Additionally, conducting the photo or video lineup in a place chosen by the witness may relieve any anxiety that could occur from going to a police station to conduct the lineup. It is possible that in the absence of a preview of identification procedures, witnesses who arrive at the police station without having prior knowledge of type of lineup could have increased anxiety levels, even if the resulting lineup is a photo or video lineup. It is also possible that conducting a lineup at a location other than the police station may be better practice to reduce anxiety, which could lead to a reduced effect of stress and anxiety on memory at the time of the identification.

An additional aspect that is vital to the promotion of therapeutic agency is any behavior that will make witnesses feel less coerced. Since police officers' main goal is to solve the crime and apprehend the criminal, they may feel that it is their duty to convince (i.e., coerce) witnesses into viewing a lineup and possibly even making an identification. While the police officers may think that they are helping, they may actually be doing more harm. To prevent witnesses from feeling coerced (i.e., real or perceived), police officers should avoid making witnesses feel like it is their job to choose the correct person; rather, police officers should emphasize that the lineup is an opportunity for witnesses to help the police catch the perpetrator. Preventing witnesses from feeling coerced into viewing a lineup, or making an identification, should assist them in regaining control and increase witnesses' feelings of self-efficacy.

Once the witnesses have been contacted and are at the location of the lineup identification, the crucial portion of the procedure begins. As mentioned above, police officers generally believe that the lineup begins when they read the lineup instructions. The lineup procedure varies across jurisdictions, but generally proceeds as follows: The

lineup administrator (e.g., police officer) gives a cautionary instruction to the witness that the culprit may or may not be present in the lineup. The witness then views the lineup either simultaneously or sequentially (see Pozzulo, Reed, Pettalia, & Dempsey, 2016 for comparison), depending on jurisdiction and type of lineup employed (e.g., live, photo, video). The witness then makes an identification (i.e., chooses the suspect from the lineup) or rejects the lineup (i.e., indicates the suspect is not in the lineup). Witnesses are often asked to indicate which of the suspects they have identified by pointing to or stating the position of the suspect. The lineup administrator then (usually) asks them to indicate their confidence judgment at the time of the identification decision, which is then recorded (Police Executive Research Forum, 2013).

Recommendations for police lineups include five core best practices for lineups, as enumerated in the National Academy of Sciences' Report (National Research Council of The National Academies, 2014): (1) train all law enforcement officers in eyewitness identification; (2) implement double-blind lineup procedures (i.e., procedures conducted by investigators who do not know the identity of the actual suspect); (3) develop and use standardized witness instructions (e.g., a cautionary instruction to the witness that the culprit may or may not be present in the lineup); (4) document witness confidence judgments at the time of the identification decision (before any subsequent factors can influence it); and (5) videotape the witness identification process (preservation of the process in its entirety).

For therapeutic purposes, the most controversial recommendation is the implementation of double-blind lineup procedures. Double-blind lineup procedures may negatively affect witnesses' psychological well-being by interrupting the rapport already

developed between the principal police officer and witness. Similar to the earlier suggestion that a familiar police officer contact the witness to schedule the lineup, it would also be better for rapport if the same police officer were to conduct the lineup procedure. Despite the therapeutic reason to maintain the same police officer across procedures, the reasoning behind this recommendation is largely to act as a prophylactic against post-identification feedback (any feedback given to eyewitnesses immediately following their identification in a lineup procedure; Wells & Bradfield, 1998). Wells and Bradfield (1998) demonstrated that a casual comment from a lineup administrator, such as "Good. You identified the actual suspect," significantly inflated confidence statements and an extensive set of retrospective judgments (e.g., quality of view during the crime), which are precisely the criteria courts use in deciding whether an identification was impermissibly suggestive and thus deemed as inadmissible evidence (Wells & Quinlivan, 2009).

Although post-identification feedback can bias memory (e.g., Dysart, Lawson, & Rainey, 2012), it can also help in maintaining rapport with witnesses after they have completed a stressful and anxiety-provoking procedure. It is important to balance the benefits that blind administration promotes in terms of identification accuracy, with the therapeutic action of maintaining rapport and being a supportive guide in the process. Police officers are often opposed to double-blind administration, stating that replacing a familiar face who has gained rapport with the witness with an unfamiliar face could reduce the therapeutic agency of the witness (Kovera & Evelo, 2017). From the witnesses' point of view, they finally feel comfortable with the police officer they have been working closely with thus far, and have suddenly been handed off to an unfamiliar

face who has no vested interest in finding the perpetrator.

One successful example of reducing stress at time of retrieval has occurred within the vulnerable population of child witnesses. If adults report anxiety about going to a police station to make an identification (Memon et al., 2011; Tinsley, 2001), imagine what a child would experience when reporting abuse or making an identification. Child Advocacy Centers (CACs) were developed, in part, to aid in investigating child abuse claims while reducing the traumatic effects of investigations on children. CACs provide a child-friendly, safe and neutral location with a more streamlined process and additional measures that are meant to prevent re-traumatization. In addition to changes at the investigative phase, special accommodations have occurred when children provide testimony at the federal (e.g., allowing the presence of a support person during the child's testimony or closing the courtroom) and state level (e.g., videotape or closed-circuit television [CCTV] testimony). These modifications are designed to reduce the stress associated with appearing in court and to increase the accuracy of children's testimony, although evidence for accuracy has not yet been investigated. Now that the legal relevance and a therapeutic jurisprudence analysis has been presented, it is time to turn our attention to the psychological aspect, beginning with the operational definition of stress.

Operational Definition of Stress, Arousal, and Emotion

There is considerable support for the hypothesis that high levels of stress at the time of encoding impair the accuracy of eyewitness testimony (Christianson, 1992; Deffenbacher, Bornstein, Penrod, & McGorty, 2004). There is also support for the notion that emotion influences the accuracy of eyewitness recollections and people's

susceptibility to misleading information (Forgas, Laham, & Vargas, 2005).

A review of the eyewitness literature reveals a fluid use of terms used to describe the response eyewitnesses have to witnessing a negative event like a crime, which includes the use of single terms such as arousal (Brigham, Maass, Martinez, & Whittenberger, 1983; Leippe, Wells, & Ostrom, 1978; Peters, 1988), emotionality (Clifford & Scott, 1978), or stress (Hosch & Cooper, 1982; Kirschbaum, Pirke, & Hellhammer, 1993; Toglia, Payne, Nightingale, & Ceci, 1989); while others have used multiple terms interchangeably (e.g., anxiety, arousal, distressed, emotional, stress) within the same study (Andreano & Cahill, 2006; Christianson & Nilsson, 1984; Yim, Quas, Cahill, & Hayakawa, 2010). Additional studies used more creative terms such as mentally shocking or upsetting (Loftus & Burns, 1982) or combined two terms such as emotional arousal (Christianson & Mjorndal, 1985; Christianson, Nilsson, Mjorndal, Perris, & Tjellden, 1986) and physiological arousal (Dutton & Carroll, 2001; Libkuman, Nichols-Whitehead, Griffith, & Thomas, 1999). It is clear that many researchers have utilized varying terms to describe the same concept. Furthermore, some researchers appear to consider this distinction negligible. For example, Deffenbacher discussed the same study in two separate reviews. In the first review he referred to the study in terms of arousal (Deffenbacher, 1994), while in the second review he referred to the study in terms of stress (Deffenbacher et al., 2004). Other researchers express concern with the ambiguity of the terms, resulting in a call for a clarification of these concepts (e.g., Christianson, 1992; Hanoch & Vitouch, 2004).

Additionally, the way stress is operationally defined in a given study can impact the observed relationship between stress and memory (Bornstein & Robicheaux, 2009;

Buchanan, Tranel, & Adolphs, 2006) and affect the conclusions we make about the results. The majority of research suggests that the presence of arousal or stress at the time of the event decreases witnesses' ability to remember details and identify the culprit (Deffenbacher et al., 2004). Leippe et al. (1978) surmised that serious crimes may be more emotionally arousing than trivial ones (arguably a true statement); however, they defined seriousness in terms of monetary value of a stolen object (as opposed to presence of violence). Crime seriousness (as defined by Leippe et al., 1978) is a poor proxy for stress and arousal, but without careful consideration of the operational definition in this specific study (and subsequent studies utilizing this definition of crime seriousness), a less than diligent researcher may have overlooked this aspect and concluded that crime seriousness does not negatively affect memory performance. Thus, the generalizability of studies using this operational definition to all crimes of varying levels of seriousness is questionable at best. This is a prime example that the way a word is operationally defined can impact the observed relationship between stress and memory.

Though it appears that there is no specific pattern to discern the appropriate term for a given study, it is clear that the operational definition of that term is key. Thus, for the sake of transparency, the original language or terminology will be maintained when describing and referring to prior research. These terms are used to describe individual states (e.g., a person has a high level of negative arousal), contexts (e.g., a stressful situation), and stimuli (e.g., emotionally arousing words), and thus using a singular term to encompass every possible combination is difficult. However, the term *stress* will be used in the remainder of the manuscript when conveying theoretical concepts in the abstract to refer broadly to individual states, contexts, and stimuli. In order to compare