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Assessing the Implications of Stress for the Decision Making of Courtroom Actors

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Abstract

The purpose of this experiment is to understand if decision making is affected when under the influence of stress. Courtroom actors such as judges, and prosecutors, make decisions everyday that can change an individual's life and they are under a great amount of stress. Theories such as bounded rationality theory, focal concern theory, and Albonetti's (1986, 1987, 1991) theory integration hypothesize that stress does affect decision making when there is a lack of information and/or constraints on a decision maker's time, situations that courtroom actors regularly face. In this research, 131 students completed a series of Stroop tasks (decision making tasks) and when under stress and no stress. The results showed that there were more errors in decision-making when participants were under stress, however, this difference is only marginally significant at conventional levels ($p < 0.05$). This research provides some evidence that decision making is affected when an individual is under stress. Future research directions and study limitations are discussed.

Keywords: Stress, Decision Making, Judges, Prosecutors

Introduction

There are many decisions and participants in the sentencing process (Spohn, 2009). Though sentences are given out by judges, they are ultimately produced in a collaborative process involving the legislature, prosecuting attorneys, judges, appellate court judges, police officers, probation officers, and in some cases, juries or correctional officials. Understanding the decisions of courtroom actors is of interest to criminologists, such that much research and numerous theoretical perspectives exist to explain how the decisions of judges, prosecutors, and other courtroom actors are made. A common criticism of this literature is that studies find patterns in sentencing and assume certain theoretical mechanisms are at play, but fail to examine those mechanisms directly. For example, the focal concerns perspective claims that courtroom actors make decisions under conditions of bounded rationality and rely on perceptual shorthands and prior experience when deciding the outcome in a criminal case. Scholars claim that such mental shortcuts and decision making environments can result in observed sentencing disparities. This paper does not test an existing theory of courtroom decision making directly, but instead considers one source of bounded rationality present for courtroom actors: stress. Specifically, this work examines how varying degrees of stress leads to cognitive failures and wrong decisions. The findings shed light on the how courtroom actors make decisions and the extent to which we can expect their decisions to be rational when made under stress.

Literature Review

Judges play a significant role in the sentencing process, in many court cases, the lead role (Spohn, 2009). The role of a judge is to keep order in the courtroom, to be impartial, fair and

unbiased. Judges determine if the laws are followed and that the constitutional rights of defendants are protected. Judges have the final responsibility in determining a sentence. In recent years, however, the power of a judge in a courtroom has been restricted by sentencing reforms such as sentencing guidelines, mandatory minimum sentencing laws, and determinate sentencing structures. During this time, the importance of the prosecutor has grown (Miethe, 1987; Wooldredge & Griffin, 2005). Some now suggest that “The prosecutor has more control over life, liberty, and reputation than any other person in America” (Spohn, 2009). This power stems from the fact that prosecutors decide who will be charged, what charges will be filed, who will be offered a plea bargain, and the type of bargain offered, all of which influence sentencing or become “de-facto sentences” as is the case with certain types of plea bargains (Spohn, 2009). The prosecutors may also give recommendations to the judge for sentencing. If the prosecutor decides not to file charges, because he or she believes either that the defendant is innocent or that the defendant is guilty but a conviction is unlikely, the case is closed. If the prosecutor does decide to file charges, the number and seriousness of the charges filed may affect the severity of the sentence imposed by the judge if found guilty. In these ways, prosecutorial decisions matter for sentencing.

With such important decisions to be made, and defendant freedom on the line, understanding how judges and prosecutors make decisions is of the utmost importance to criminologists. The criminal justice system was founded on principles of equal and rational justice, meaning that punishment decisions must be fair to all and proportional. In order to assess whether these goals are met, the process behind punishment decisions must be thoroughly understood.

Theories of Decision Making

Criminologists have developed numerous theories to explain how courtroom actors determine the outcome of a case and an offenders' punishment. Many agree that constraints faced by courtroom actors prohibit them from making fully rational decisions¹. Theories of bounded rationality discuss what leads to rational thinking and decision making (Simon, 1972). Bounded rationality occurs when decisions are made under less than ideal conditions and cannot be fully rational, for example if the rationality of individuals is limited by the information that they have (or don't have). There are limits to perfect rationality, which include uncertainty about the consequences that would follow from each alternative decision, incomplete information about the set of alternatives, limited time to make a decision, and the difficulty preventing the necessary decision from being carried out (Simon, 1972).

As an illustration, Simon (1972) discusses these limitations and theories of rationality in the game of chess. The problem confronting a chess player whose turn it is to move can be interpreted in two ways. 1) It can be a problem in finding the best strategy to play, the best sequence of moves to have a winning game, or 2) one can interpret the situation as a set of accurate evaluations that the opponent could make with the goal of executing the alternative moves (Simon, 1972). Chess players do not look at all possible options, but instead generate and examine a fraction of the possible strategies as soon as they discover one that is satisfactory. This is when a design is made. A design is an evaluation that takes place to guide a search for an alternative decision (Simon, 1972). A design is only made until the person sees that it's a

¹ In the context of this manuscript, a rational decision is made based on an analytical process in which all relevant factors are considered. A rational decision one which yields an optimal outcome and is consistent with a decision-maker's objective. The term rational is not meant to be interpreted colloquially as a "good" decision or a "reasonable" one.

guaranteed move. A chess player will not sacrifice some pieces unless he/she can see through it till the end. When it comes to making a decision on a case or what the punishment of the defendant should be, judges and prosecutors will generate a design until they believe that a successful outcome is in their grasp (Simon, 1972).

Judges' cognitive systems force consistency in decisions by analyzing multiple propositions and making rational inferences (Simon, 1998). Judge's will pick the decision that is most consistent with his or her past decisions. This process of coherence seeking has both a facilitative and biasing effect (Simon, 1998). This kind of thinking is called coherence bias; A judge's representation to a legal decision will be mainly determined by his or her background, and knowledge about the physical, social and legal world. When a judge is biased, his or her's decision is overlooked by some personal knowledge or attitude.

Simon (1998) argues that "behavior is always related to environmental contexts or the psychological fields within which the behavior is performed" (Simon, 1998 p.39). Therefore a judge's and prosecutors decision process is bound to be affected by the particular psychological environment within which it is performed (Albonetti, 1991). One aspect of this environment for a judge involves the "stakes" that judges have in the outcome of each criminal case and sentence. Simon (1998) defines stakes as an interest or desire with regard to the consequences of the decision. Judges are invested in the outcome of a trial/all of their decisions for their own sake (liability) and/or for the offenders' sake (hope to help and not harm). There are competing goals to be achieved, because the decisions which limits judicial liability is not always the decision which is best for the offender, and this duality makes for a complex decision. When a judge has high stakes in just one outcome, the judge is seen as goal-driven or politically motivated. Most

judges are elected into office and have some ideologies that can influence their decision making. When a judge has high stakes in both outcomes, the judge will have to sacrifice one outcome as both cannot be achieved. In this situation the judge may experience intense conflict with oneself, or cognitive dissonance. When there are low stakes in both outcomes, the judge is seen as a “neutral broker” (Simon, 1998). Simon (1998) contends that judges genuinely strive to produce the best decision that is suited for each case.

Albonetti (1991) uses her theory integration to assess courtroom decision making. Albonetti (1991) argues that when making uncertain, complex decisions, judges and prosecutors may rely on stereotypes to determine an appropriate sentence. Courtroom actors do not know what the behavior of the offender will be once released or whether or not the offender will recidivate. The absence of complete knowledge of the future forces decision makers to rely on stereotypes to predict an offender's future behavior. The link between race, stability of disposition to commit future crimes, and the level of uncertainty may even explain the observed race disparities in sentencing and charging .

As an example of using stereotypes and mental shorthands when making decisions; Steffensmeier and colleagues' (1998) focal concerns theory argues that in the absence of complete information or unlimited time to make decisions, judges develop a “perceptual shorthand” based on prior experience and stereotypical attributions to compensate for the uncertainty present in court decisions (e.g., who is dangerous and who is not). These perceptual shorthands are organized into three focal concerns. The three focal concerns are, the offender's blameworthiness and the degree of harm caused the victim, protection of the community, and practical implications of sentencing decisions. Blameworthiness is associated with the

philosophy called “just desserts” (Steffensmeier, 2006). Just desserts is the appropriate reward or punishment for one's actions. The severity of a defendant's potential punishment increases depending on the offender's culpability and the degree of injury caused. Protection of the community focuses on the need to incapacitate the offender or to deter the “would be” offenders. Predictions about the offender or the risk of recidivism are based on the nature of the offense (violent or property crime), case information, criminal history, facts of the crime, (whether a weapon was used), and characteristics of the offender such as drug usage, education, employment, or family. Practical constraints and consequences, both organizational and individual, are extralegal factors in making a sentencing decision (Steffensmeier, 2006). Organizational concerns include maintaining working relationships among other courtroom actors, ensuring a stable flow of cases, and being sensitive to local and state correctional crowding and resources. Practical consequences for the individual offender that the judge may weigh in on when deciding a sentence include concerns about the offenders ability to do them, (health conditions, special needs), and the disruption of ties to children and other family members. Research suggests that judges' sentencing decisions are based off of the seriousness of the crime committed by the offender and the defendant's prior record, mode of conviction and court size; all of these factors are consistent with the focal concerns perspective.

Uncertainty regarding the future behavior of an offender plays a large role in the decisions of courtroom actors. Decision makers attempt to decrease uncertainty in obtaining desirable outcomes by developing structures that have proven to be satisfactory in the past. Over a period of time decision making may be routinized toward obtaining successful outcomes, which in turn reduces uncertainty (Albonetti, 1986). Decision makers' beliefs about cause and

effect relations and preferences regarding possible outcomes may be used as a basis for reducing uncertainty in decision making (Albonetti, 1986, 1987). Beliefs about cause and effect relationships can reduce uncertainty when decision makers make an assumption about an individual's criminality and punish them accordingly. For example, judges may punish individuals more harshly if the source of their criminal behavior is unchangeable, but offer treatment or leniency to those whose criminal behavior is alterable. However, not knowing the outcome of the punishment, or whether the offender will offend again remains a source of uncertainty in charging and sentencing decisions. Because decision makers are unable to control the behavior of other actors involved in the case, they must attempt to predict outcomes and make decisions based on their prediction. For example, someone who is likely to reoffend may be incarcerated, but someone who is not likely to reoffend is given a community sanction but there is still uncertainty (Albonetti, 1986).

In regards to preferences regarding possible outcomes, prosecutors prioritize their conviction rates. Achieving a high conviction to acquittals ratio defines a prosecutors success, prestige, upward mobility in the prosecutorial office, and an entrance into a political arena (Albonetti, 1986,1987). Success depends on obtaining trial convictions, so prosecutors make decisions which they believe are likely to lead to conviction.

In addition to perceptual shorthands and strategies to reduce uncertainty in decisions, Burke (2006) argues that court actors form theories about cases and defendants which are difficult to stray from when determining punishment. There are four cognitive biases that lead to imperfect decision making. These four cognitive biases are: confirmation bias, selective information processing, belief perseverance, and the avoidance of cognitive dissonance (Burke,

2006). Confirmation bias is the tendency to favor information that confirms a person's theory over disconfirming information. Selective information processing is when people are incapable of evaluating the strength of evidence that are independent to one's belief. People tend to disvalue disconfirming evidence even when presented with it. Belief perseverance describes the failure to adjust beliefs in response to proof that prior information was shown to be false. (Burke, 2006).

For courtroom actors, these cognitive biases can emerge in the early stages of an investigation. Prosecutors must determine if there is sufficient evidence to proceed with a prosecution and may have their vision colored by information given by police (Burke, 2006). Prosecutorial decisions can shape the investigation and scope of a case, so biased decision-making is problematic. Confirmation bias might cause law enforcement officers to conduct searches and ask questions that could help them confirm their suspect committed the offense. Law enforcement fails to investigate alternative theories of a crime because people tend to not look at evidence that could disconfirm their theory (Burke, 2006). In *Brady v. Maryland*, 373 U.S. 83 (1963), prosecutors suppressed evidence favorable to the defendant that might have led to a not guilty verdict.

When a case is in the hands of the prosecutor and the charges are brought, the prosecutor has most likely made a personal opinion about the defendant's guilt (Burke, 2006). If other evidence is presented, selective processing can occur. If the prosecutor believes a defendant is guilty, he or she may unconditionally accept any evidence that strengthens their case that the defendant is guilty and/or ignore exonerating evidence (Burke, 2006). Such bias would result in an irrational decision and punishment.

The theories that were listed above are so complex when it comes to understanding decision making by courtroom actors. Due to uncertainty that lies in the courtroom, bounded rationality can occur causing courtroom actors to make a decision in a less than ideal environment. Uncertainty can cause courtroom actors stress, leading them to make irrational or incorrect decisions.

Role of Stress in the Courtroom

The complex nature of decisions made in criminal court is complicated further by stress experienced by courtroom actors. Stress is defined as physical, psychological or emotional tension a person experiences. Stress can be induced in many ways, such as a sudden event, psychological response to something and or a physiological response.

There are many sources of stress for courtroom actors in a criminal court case. Some stressors include making complex or consequential decisions like deciding on a verdict or sentencing a criminal defendant, and can also come from disruptions to daily routine, heavy caseloads, pressures from superiors (chief judges of district attorneys), and listening to the details of unpleasant events like violent crimes or crimes against children (Bornstein, 2005; Miller 2007).

Judges and prosecutors may experience stress in a similar way. Both judges and prosecutors may experience stress due to a heavy workload (Miller, 2007). Judges and prosecutors may work long or unusual hours and are backlogged by on the cases they handle. Large caseloads and long work days can create occupational stress for judges and prosecutors which may affect their performance through work related burnout (Chamberlain 2008). Burnout may result from, workplace conflict, overload of responsibilities, perception of inequity, and

inadequate awards. Prosecutors and judges may also fear being overruled by higher courts, and feel pressure to maintain a positive public image while in office, especially if they need to face re-election for job security (Huber & Gordon, 2005). Other stressors for judges include dealing with a poorly prepared, inadequate, or abusive council during litigation. Further, judges and prosecutors may experience physical threats to their own safety when trying and sentencing dangerous criminals (Chamberlain, 2008).

Moreover, uncertainty in decision making can itself be a source of stress for judges and prosecutors. In a criminal case, the consequences of a conviction could include prison, fines, or even death (Bornstein, 2005). Of course judges and prosecutors are aware that their actions and decisions have consequences, but it is not always clear which charge or which punishment will elicit the desired outcome or crime control, recidivism reduction, or rehabilitation. Judges want to make the right decision, and may feel liable for decisions that are incorrect, harm defendants, or do not lead to desired outcomes. With many potential options and limited time and information to consider the most appropriate options, it is reasonable to assume that uncertainty in a decision making environment could be a source of stress.

Any or all of the stressors listed above could lead to poor decision making among courtroom actors, particularly if stress exceeds a certain intensity (threat level). Janis and Mann (1977) contend that decision making under stress requires vigilance to ensure sound and rational decisions. Vigilance only occurs when the decision maker searches for information in an unbiased manner and carefully looks for alternatives before making a decision. The theories of courtroom decision making examined previously suggest that even without stress, judges and prosecutors may be unable to express such vigilance due to time constraints and inaccurate or

incomplete information when making decisions. Adding additional stress may thwart the rational decision making process even further. In addition, when under severe stress, vigilance might be replaced by hypervigilance, which can cause disorganized and incomplete evaluation of information leading to faulty decisions and possible regret on the decision (Keinan, 1987).

The amount of stress experienced by those trying and sentencing criminal cases should not be understated. The consequences of acute and prolonged occupational stress are well-documented (for a review see Motowildo et al., 1986; Costa et al., 2014). What is less clear is how stress alters decision making of courtroom actors. The goal of the justice system is to provide equal justice to all of it's clients. The review of literature above suggests that uncertainty in decision making and occupational stress experienced by courtroom actors may threaten their ability to make rational decisions, which may lead to improper decisions or decisions made based on stereotypes. To ensure the fair treatment of all offenders entering our courts, the consequences of stress for decision making need to be further explored.

Present study

The present study examines the role of stress on decision making accuracy. Expanding upon the work of Wood (2016), this research investigates whether there is a difference in cognitive performance when an individual are placed in stressful environments. It is hypothesized that when under stress, people will make more cognitive errors and take longer to make a decision. The findings of this research can inform discussions of decision-making within criminal courts by shedding light on the ways in which stress alters decision making processes.

This research utilizes an experimental design to assess the impact of psychological and physical stress on cognitive failures, or decision-making errors. Varying levels of stress are

induced on participants, their anxiety is measured, and their performance on cognitive tasks is recorded. We compare the number of “wrong decisions” made for each level of stress induced, making it is possible to determine the extent to which different types of stress hinder decision making.

Sampling

This research utilizes a sample of college students as participants. Student volunteers were acquired from undergraduate classes at a liberal arts college in Massachusetts. The researchers recruited subjects from four different classrooms and explained to students how the experiment examines decision making when induced with stress. Professors in the Psychology and Criminology departments offered extra credit to those who took the Cognitive Failures Questionnaire (CFQ), which served as a basis for selecting experimental participants². The link to the CFQ was emailed by the Professors to the undergraduate students to complete. Students were asked to take the CFQ and told that they may be contacted to complete the second half of the experiment. A total of 131 students participated in the survey.

Based on results from the questionnaire, the top 15 scores (High Cognitive failures) and bottom 15 (Low cognitive failures) scores identified participants (30 participants total) who were selected for inclusion into the experiment. The purpose of choosing the top and bottom 15 participants is to compare the performance and decision making of individuals with varying inclinations toward having mental lapses and cognitive control (Broadbent et al., 1982) . Three emails were sent to the selected students to requesting their participation in the study and attempting to schedule a time to participate in the experiment. Not all 30 students responded,

² All incentives and sampling procedures were approved by an institutional IRB. The extra credit provided was discretionarily provided to students by each professor, but was not enough to sway their grades.

only 14 of the original 30 responded to the email. There were eight students who responded with high CFQ scores and six students who responded with low CFQ scores. To obtain a greater sample size, the researcher selected students who scored closest to the high cognitive failures group and the low cognitive failures and elicited their participation. A total of 40 undergraduate students were emailed to participate in the second part of the experiment. Out of the 40 students emailed, 22 students participated in the second part of the experiment, yielding a response rate of 55%.

Measures

The primary concepts measured in this experiment are stress and decision making accuracy. Stress is the independent variable manipulated by the researcher and decision making accuracy is the dependent variable. Below, each of the measures are described in detail.

Stress

The State-Trait-Anxiety-Inventory (STAI) to measure their level of stress. The STAI consisted of 20 questions and was created on a Google Form. The range of possible scores could be anywhere from 20-80. Although the STAI includes varying types of stress, only the state anxiety questions were considered in this experiment. State anxiety is the level of anxiety/stress the individual is feeling at a certain point in time, which is contrasted with trait anxiety or the general level of stress/anxiety that person feels across all situations due to his or her personality. The STAI was administered twice during the experiment to determine how participants were feeling in each experimental condition. There were three experimental conditions; practice condition, no threat, and high threat condition. In the no threat condition participants were told to complete the decision making task with no threats presented. In the high stress condition, stress

was induced by pointing a nerf gun at the participant during decision making. Participants were told that the nerf gun was loaded with one nerf bullet that wrong decisions or incorrect responses would discharge the nerf gun in a Russian Roulette style manner. Participants were also told to complete the decision making task as quickly as possible and that their decision accuracy or number of correct responses would be recorded and shared with others. Participants were randomly assigned to take the low threat or the high threat condition in different orders, but each participant was completed all conditions.

Decision Making Errors

Decision-making errors is measured through cognitive failures. Cognitive Failures are mistakes or errors people make of slips of attention or memory failure (Wood, 2016). Cognitive Failures were measured with a Stroop task administered during the experiment. A Stroop task requires participants to select the word that is printed, while ignoring the color of the ink the word is written in. For example, when the word and the meaning are congruent (the word 'RED' written in red ink) the task is relatively easy. However, when the ink colour and words are incongruent (the word 'RED' written in blue ink) the task is much more difficult (Wood, 2016). A cognitive failure occurs when a subject presses the button associated with the words itself rather than the color of the color of the ink. This is considered a "wrong" decision.

The Cognitive Failures Questionnaire (CFQ) was also utilized to measure the overall differences in general cognitive abilities and the likelihood to experience cognitive failures among research participants. The CFQ was created on a Google Form. Each question from the original CFQ in Broadbent's (1982) study is present in the researcher's questionnaire. The CQF was utilized only to obtain participants for the experiment.

Experimental Procedures

Each student who responded to the request to participate in the experiment met with the researcher individually. Before any experimental procedures took place, the students met outside the lab experiment room where they were given a consent form explaining the experimental procedures and research goals to read and sign.

The experiment began with the students' using the University's eye tracker. The researcher calibrated each participant eye and eye movements to obtain a baseline measurement and ensure the most accurate results. The students then engaged in a Stroop task while using the eye tracker. Participants engaged in three separate trials with stroop tasks under different conditions; a Practice Condition, a Low-Stress condition, and High-Stress condition. Every participant took the practice condition first. In the practice condition, participants were told that in the center of the screen where they would see a target word, (BLUE, YELLOW, GREEN, or RED) written in white ink. Participants were required to press a button that corresponds to the appropriate word that was displayed on the screen. The controller consists of buttons that matched the color of the target words displayed. For example, if the word that appeared on the screen was "RED," the participant would press the red button. The target words appeared in a random order.

After the practice trial, participants took a State-Trait-Anxiety-Inventory (STAI) to measure their level of stress. After the STAI was completed, participants were randomly assigned to engage in either the no stress condition or the high stress condition of the Stroop Task. All three conditions were given to each participant. In the no stress condition, the target words would appear in the center of the screen in a random order however, the target word's

text color could appear. The target word would be written in color (instead of white like the practice condition). The color of the target word may be congruent with the word (e.g., the word green written in green text), or incongruent with the word (e.g., the word blue written in green text).

In the high threat condition, the same Stroop task will take place as the low threat condition except participants were told that the speed at which they respond to matters and that their scores will be shared with other participants. Participants in this condition were also told that if they fail to press the button in the allocated time or press the wrong button, then the researcher will fire a Nerf gun at them, with a revolver chamber, in a Russian roulette style manner. The bullet was taken out prior to the start of the high threat condition, and no participants were shot during the course of the experiment. Just like courtroom actors who face stress with time constraints, workload and public pressure, this condition imposes both a time pressure on the participant, stress from their performance being public and shared, and a physical threat of being hit with a nerf bullet.

After the first condition was completed (either the low threat or the high threat condition), research subjects re-took the STAI. This re-test allows for an assessment of whether state-dependent stress increased or decreased during the experiment. Participants who engaged in the no stress condition first then completed the Stroop Task in the high stress condition, and participants who engaged in the high stress condition first completed the no stress condition. Cognitive failures, or errors on the Stroop task were recorded for all trials and all conditions.

Analytic Plan

This experiment consisted of a mixed factorial design (2 x 2 x 2), consisting of the following factors: Congruency (incongruent vs. congruent stroop tasks), Stress (high stress and no stress), and Cognitive Failures. This experiment has two within subjects independent variables, congruent vs incongruent, and stress, as well as one between subjects independent variables, cognitive failures.

Both within subjects and between subjects comparisons were made using ANOVAs. Specifically, ANOVAs were used to determine if there is a difference in decision making errors when subjects were and were not under stress (within-subject comparison) and when the task was complex or not (incongruent versus congruent stroop tasks). The results are described below.

Results

Stress

Stress was measured by participants taking the STAI. Participants who took the STAI during the no threat condition averaged a score of 33.4, while the participants who took the STAI during the high threat condition averaged a score of 41.3. Independent sample T-test resulted in $t(19) = 1.87$ and $p = .077$. The data shows that stress was manipulated in this experiment, but just shy of being significant at conventional levels ($p < 0.05$). Even though the results are shy of being significant, participants were marginally more stressed in the high stress condition, compared to when participants were in the no threat condition.

Interestingly, stress did seem to have an impact on the participants when taking the task. The average response time for participants to respond when induced with stress averaged .832ms. When participants took the no stress condition, they averaged .828ms. Participants are

averaging more eye fixations during the low-stress trials rather than the high-stress trials. The longer the fixation may indicate greater attention to the task at hand, while a greater number of fixations could signal less attention and more stress. These results might tell us that participants are more focused on the center target word rather than the actual target when induced with stress. Variations in fixation or attention could confound this study's results regarding stress and decision making.

Decision making errors under stress

Decision making errors in this study is viewed as errors while taking the Stroop task. The errors that participants make is clicking the wrong button based on the color and the word represented. Participants averaged 95.7% accuracy when induced with stress compared to 98.3% accuracy when there was no stress at all. Paired samples T-test resulted in: $t(20) = 1.808$, $p = .086$. The analyses suggest that there were more errors in decision-making when participants were under stress, however, this difference is only marginally significant at conventional levels, meaning that the observed disparity could have resulted by chance rather than from the experimental manipulation.

Task Difficulty

When an incongruent word appears in a sequence of congruent words, the task becomes slightly harder for the participants. *Table 1* shows that regardless of task difficulty, there were more decision-making errors (lower accuracy) when participants were in the stress condition. However, when the task was difficult (incongruent), there was less of a difference in accuracy based on stress than when the task was simple (congruent). Stated differently, there appears to be a larger effect of stress when the task is simple than when it is difficult. When the task was

simple, subjects made fewer eye movements compared to when the task was difficult. This might suggest that when a word is incongruent, participants press the button that corresponds with the color and not the target word without moving their eyes or focusing their attention, thus causing the participants to get the response wrong. Eye movements may be necessary for difficult tasks but not simple ones, resulting in the larger impact of stress in the simple task condition.

Table 1. Accuracy of Decision-Making when Under Stress

	STRESS	NO STRESS
CONGRUENT	97.348%	99.677%
INCONGRUENT	92.734%	92.680%

Discussion

Interpretation of Findings

The data shows that stress did influence participants while performing the task however, the results were shy of being significant ($p < .05$). The difference could be due to random chance. This suggests that participants were only slightly more stress during the stress condition, but that this difference could be due to random change. It is not clear that the experiment effectively manipulated stress in the way that was intended. Lack of participants stress could influence the rest of the results.

When there was marginally more stress, there were more decision making errors compared to the no stress condition. Again this difference is not statistically significant, but does suggest that stress may influence decision making. When the decision taking task was more complex (the word is incongruent) the task becomes slightly harder for the participants compared to when the word is congruent. There was not a big margin in response time when

participants were completing difficult and not-difficult tasks, however, participants did take longer to respond when they were in the high stress condition compared to the no stress condition. This suggests that there is something different happening when the subjects were under stress. One possible explanation is that when a participant is under the stress, he or she experiences greater bounded rationality. Based on the work of Albonetti (1987) and other theorists discussed above, it appears that the decisions that participants made under less than ideal circumstances (more stress or more difficult decisions) be subject to greater error because of the constraints on rationally. This work serves as tentative support for the bounded rationality framework. Given the stressful conditions that judges and prosecutors make sentence and charge decisions, the greater tendency for decision making errors is concerning.

Limitations

A limitation of this research is that the task designed to capture decision making processes was too easy for the participants. Based on the results, participants completed close to 100% of the decision making tasks correctly, even when stress was induced. This was an unexpected result that poses challenges to interpreting the findings. The task being too easy may give the participants more confidence in completing the task and/or prohibit the subjects from becoming stressed about their performance. Further, without a sufficiently difficult task, the experimental procedure does not mimic the courtroom decisions made by judges and prosecutors. As such, the generalizability of the findings are limited.

Additionally, although this work sought to understand the decisions of courtroom actors, the participants in this experiment are not prosecutors and judges, and the

experimental manipulation that the participants did not mimic real life stress that judges or prosecutors face in courts. This discrepancy could explain why there were only marginal differences in decision making errors across conditions. Failure to capture the stress of courtroom actors or use subjects that purportedly makes decisions like those actors threaten the external validity of the study's findings. Judges and prosecutors may perform differently on the Stroop task, or the subjects from this experiment may perform differently under different, more onerous stress.

Another limitation of this research is the sample composition and sample size. Most of the participants chosen for this experiment were college students majoring in Criminal Justice at a University. The participants selected are not the same age as courtroom judges or prosecutors and lack experience in the courtroom. All of these differences questions the generalizability of the study's findings to the target population of courtroom actors. Future research should seek to expand the sample to include a more heterogeneous population and/or to sample criminal justice professionals, like judges and prosecutors.

A small sample size also poses challenges for the present study. With only 22 students, it is possible that lack of statistical power biases the findings towards insignificance. With such a small sample, large differences between experimental conditions are needed to reach significance, so it seems plausible that there are real differences in decision making when under stress, but the present study lacked the statistical power to detect them. Future research should replicate this work with a larger sample to investigate this claim.

Future Research

Future research should seek to improve upon the acknowledged limitations in the current study. Future research should utilize a more difficult decision making task. In the current study, there were four colored targets located at each corner of the screen; The blue target is at the top left corner of the display, the yellow target is located at the top right corner, the red target is located at the bottom right corner of the display, and the green target is located at the bottom left corner of the display. A suggestion to make the task more difficult would be to have the targets move to a random location instead of being stationed at one corner of the screen. The colored targets would be stationed at their respective corners of the display, this caused participants to memorize where the targets were located so they did not have to look for the target when the target word was displayed. Another suggestion could be to add more incongruent words to make the task more difficult. There were also five total incongruent words that were displayed. When an incongruent word was presented, their accuracy dropped, even when stress was not induced, suggesting greater difficulty. Another task that can be created instead of utilizing a Stroop task is to present participants with possible court case scenarios and have them make a decision on how they would handle the case when induced with different levels of stress. Having participants read possible court cases and make decisions when under stress can almost mimic the decision making process that judges and prosecutors go through. Future research should consider these options.

Inducing more stress or different types of stress is another way to improve upon the current research. Courtroom actors experience stress everyday in their respective environment. Stress in courtroom actors can develop from having a huge amount of cases to handle, some courtroom actors may have time constraints to make a decision, or even have

public pressure to make the right decision. Future research should try to mimic these stresses. A low stress condition could also be included in the next experiment by giving students a time limit to locate the target and press the appropriate button. A way to induce low levels of stress, is to tell participants that their scores will be shared with other participants, rather than pointing a gun on them. This distinction would also allow for differentiation between social stress and physical stress, both of which may impact courtroom actors.

A final suggestion for future research is to utilize a larger sample size. Instead of collecting 22 participants, the researcher should collect more students. A majority of students selected to participate were predominantly Criminal Justice major and Psychology majors at a single college. The researcher should include students from different majors to increase the sample size and external validity. Another suggestion could be to include a sample of older and more mature people to participate in the experiment. Including adults into the experiment could create a better understanding of how judges prosecutors make decisions given the fact that judges and prosecutors are older than college students. The researcher could also narrow the sample to have judges and prosecutors participate in the experiment. Having judges and prosecutors participate in the experiment could help the researcher better understand how these courtroom actors make decisions when under stress.

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