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Detection of malingering via cognitive cues

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DETECTION OF MALINGERING

VIA COGNITIVE CUES

by

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ABSTRACT

Malingering is a frequently encountered problem of faking psychological or physiological symptoms or exaggerating existing conditions for external gain. Malingerers typically are seen in clinical and forensic settings and create a burden to our society due to loss of economic resources or professional time. The impact of malingering is difficult to calculate due to problems with identifying actual cases of malingering. Psychological tests traditionally have been used in the assessment of malingering. Despite major improvements in instruments and clinical interviewing techniques, however, no failsafe assessment tool has been identified for the accurate detection of malingering. Cognitive studies of lie detection have provided evidence that liars differ from truth-tellers in terms of increased cognitive load that might be measured via several cognitive cues. For example, response time is longer for liars compared to truth-tellers. Eye gaze and pupil dilation also differ when individuals lie. TRI-Con is a new approach (officially introduced by Walczyk, 2005) that uses eye data to monitor, record, and compare truthful versus deceptive responses and might be a stepping stone to more accurate and objective detection of malingering in the future. The current study was designed to reveal differences between truth-tellers and malingerers in terms of response time and eye data when confronted with different scenarios that entail telling the truth, rehearsed malingering, and unrehearsed malingering. Findings showed that response time is a more reliable cue for detecting malingering than eye data.

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CHAPTER 1

INTRODUCTION

The American Psychological Association (APA, 2007) defines malingering as "the deliberate feigning of an illness or disability to achieve a particular desired outcome (e.g., financial gain or escaping responsibility, punishment, imprisonment, or military duty)" (p. 551). Malingerers may pretend to suffer from physical or psychological problems or significantly exaggerate existing symptoms to achieve their goals. Under rare circumstances, malingering might constitute an adaptive function such as avoiding captivity during war or hostage situations (APA, 2000). In most circumstances, however, malingering represents a socially negative event characterized by deceit, fraud, or lying. This phenomenon is neither a psychiatric nor a medical disorder; it is categorized as a V-code in the Diagnostic and Statistical Manual of Mental Disorders (4th Edition) Text Revision (DSM-IV-TR; APA). The APA suggests that malingering often involves: (a) medical and legal issues; (b) objective clinical findings that differ significantly from the individual's reported problems; (c) a lack of cooperation during the evaluation process or failure to comply with the prescribed treatment; and (d) antisocial personality disorder.

Malingering might initially be confused with factitious disorder, a psychological disorder based on the purposeful fabrication of psychological or physical symptoms. Individuals with this diagnosis, however, make up symptoms in order to assume the sick role and not for the gain or escape sought by malingerers. There are four subtypes:

(a) with predominantly psychological signs and symptoms such as depression or hallucinations; (b) with predominantly physical signs and symptoms such as pretending to suffer from pain; (c) with combined psychological and physical signs and symptoms such as grief and headaches after the unconfirmed death of a spouse; and (d) factitious disorder not otherwise specified, a subtype that does not meet the criteria for any of the other subtypes. Munchhausen Syndrome is considered the most severe and chronic form of factitious disorder and often manifests itself in repeated hospitalizations (APA, 2007). The motivation differs between malingering and factitious disorder. Whereas people with factitious disorder are rewarded by adopting the sick role itself, malingerers are motivated by external factors such as financial gain, the avoidance of duties and responsibilities, or obtaining treatment or drugs that are not medically justified. The hallmark of a diagnosis of malingering is that the symptoms or deficits are intentionally created for some type of external gain (APA, 2000).

Malingering historically has been categorized as a disease by psychoanalytic theorists. However, research has not supported its pathogenic nature because of the lack of evidence supporting either conscious motivation or unconscious defense mechanisms (Lo Piccolo, Goodkin, & Baldewicz, 1999; Resnick, 1999; Singh, Avasthi, & Grover, 2007). Malingering is not considered a psychological disorder because it involves the purposeful deceiving of others for external rewards. It drains society of financial resources, falsely engages professional services, and causes a lack of productivity from the malingerer. For these reasons, it is not considered a mental disorder in and of itself, but rather a deliberate act of faking emotional, physical, or psychological distress in order to obtain otherwise inaccessible resources. For example, Lees-Haley (1997) reports a

20% to 30% base rate for malingering in his United States sample of plaintiffs claiming personal injury. The American Board of Clinical Neuropsychologists estimates that 29% of the plaintiffs in personal injury cases are malingering (Mittenberg, Patton, Canyock, & Condit, 2002).

Singh and colleagues (2007) distinguish among various categories of malingering: (a) pure; (b) partial; (c) positive; and (d) negative. Producing non-existent symptoms is considered pure malingering, whereas exaggeration of already existing indicators is a partial form of malingering. For example, a person without psychotic problems who claims to experience auditory hallucinations is producing non-existing symptoms (pure malingering), whereas a mildly depressed person who reports tremendous distress, sadness, hopelessness, and even suicidal ideations would exemplify symptom exaggeration (partial malingering). Feigning the signs of a disorder is consistent with the positive form of malingering, whereas concealing or misrepresenting signs is the negative form. Other types of malingering include the alteration of data and the staging of certain situations that later could be interpreted as an accident. For example, an individual might alter a physician's health report so that the data portray him as less healthy than he is in reality. Another malingerer might plant the proverbial banana peal in a store in order to conveniently slip on it, pretend to have been hurt due to the negligence of the store, and pursue a legal settlement for financial gain.

Samuel and Mittenberg (2005) suggest that the following factors indicate the presence of malingering: (a) atypical or exaggerated symptoms; (b) inconsistencies in symptom description; (c) activities and behaviors that contradict claims; and (d) claims that are motivated by and have circumstances other than sickness or disability. These

same authors suggest that the following factors are inconsistent with malingering: (a) obtaining aggressive treatment such as painful interventions; (b) objective collateral corroboration; (c) losses that are significant and obvious to the observer; and (d) self-defeating actions and behaviors. Taken together, these two sets of factors are important considerations when assessing an individual for malingering.

Statement of the Problem

Estimates of the incidence of malingering within the realm of psychology suggest that approximately 1% of civilian and 5% of military clients fake mental illness (Singh et al., 2007). Singh and colleagues further report rates of malingering personal injury cases ranging from 1% to 50%. Combined legal and medical cases suggest rates from 10% to 20%. According to Mischoulon (1999), psychiatric disability is estimated to cost $12 billion annually in the U.S., an estimate that has increased significantly over the past decade. Various government and privately financed programs have been established for providing payments for medical and psychiatric problems or disability, including: (a) Emergency Aid; (b) Worker's Compensation; (c) Department of Veterans' Affairs, (d) Private Insurance Companies; (e) Social Security Administration; (f) Medicare; and (g) Medicaid. All of these organizations are negatively affected by people faking their disorders and making illegitimate financial claims.

Research suggests that all age groups are involved in malingering (Singh et al., 2007). These disorders range from mental retardation to psychosis. Getting benefits for disabilities, claiming unjustified compensations, and retaliating against employers are some of the reasons for mental health malingering, according to these authors. Malingering creates a variety of problems for the medical, psychiatric, and psychological

professions that are challenged with correctly diagnosing the existence of mental and physical disease and disorder. Malingering also hurts the economy. Malingerers might target the acquisition of one-time financial compensations such as litigation suits, or they might seek financial benefits such as those which accompany disability status. Samuel and Mittenberg (2005), for example, estimate that 7.5% to 33% of individuals who claim disability status are malingerers.

The legal system is plagued by many types of malingering: in order to avoid punishment via an insanity plea; assuming incompetency to stand trial; or introducing unjustified litigation and personal injury litigation. This form of deception also burdens the correctional system with inmates who fake mental or physical illnesses (Boone, Savodnik, Ghafferian, Lee, & Freeman, 1995; Pollack & Grainey, 1984; Rubenzer, 2004).

In sum, malingering represents a burden to the medical and psychological professions, insurance and disability services, governmental systems that grant financial benefits, and to society in general (Pollack & Grainey, 1984). It drains our society of limited resources by providing benefits to people who would not receive them if their false claims were detectable.

Justification

The existence of malingering unfairly draws on resources of those legitimately suffering from various disorders. Moreover, some people who are actually ill might avoid seeking disability or treatment out of fear of being labeled a malingerer. Traditionally, the mental health profession is reluctant to identify malingerers, possibly due to legal concerns and also because of the ethical concern of violating confidences protected by

the therapeutic relationship (Resnick, 1984). However, increased competition for limited resources and general awareness of mental and medical symptoms trigger the need to differentiate accurately between real and fraudulent need for services (Singh et al., 2007). It is increasingly easy for someone to fake any type of medical or psychological disorder with the availability of information from the Internet and other resources. For example, concerns have been expressed that attorneys might coach their clients on tests designed to detect malingering and this undermines the test's validity (Rogers, 1997; Wetter & Corrigan, 1995; Youngjohn, 1995). Clients also look up professional articles about disorders in libraries, read professional medical journals, and obtain internet information on exact symptomalogy (Rogers, 1997; Wetter & Corrigan, 1995; Youngjohn, 1995). Accurate assessments of malingering are needed that can better safeguard the fair distribution of resources. The creation of a more reliable system for disability evaluators to detect feigned claims would help burdened professionals focus on processing legitimate applications more efficiently.

Literature Review

Although the importance of accurately identifying malingering seems obvious, the precise detection of this form of deception is an ongoing challenge for the medical, psychiatric, and psychological professions. It frequently involves significant differences between clinical findings and reported symptoms (Cunnien, 1997; Singh et al., 2007). Singh and colleagues (2007) suggest taking certain steps in order to increase accuracy of the recognition of feigned symptoms. Conducting a thorough clinical history by interviewing the patient, asking leading questions in order to test for responses, and conducting elaborate cross examinations for suspected malingerers are some of their

suggestions for differentiating between feigned and true illness. Observations of the client during the interview situation in order to detect verbal, facial, and behavioral cues, and an emphasis on continuing observation across time and different settings are additional suggestions of theirs. Reliance on observed cues, however, is problematic because of a heretofore high rate of misinterpretation of them.

Settings of Malingering

Malingerers fake distress, sickness, and injuries with various dishonest goals in mind. Two of the main settings in which malingering of physical or psychological problems occur are forensic settings and in claims for financial gain such as gaining disability status, workers' compensation, or during litigation. For financial damages settlement, individuals frequently fake psychological disorders because they are often difficult to detect due to the absence of tangible symptoms of such disorders.

Ziskin (1984) notes that evaluating patients for malingering is approached differently from the clinical and forensic perspective. There often is less incentive to malinger in the classical clinical setting than in forensic settings where faking symptoms or exaggerating existing conditions might constitute a major advantage. Fauteck (1995) reports that malingered psychosis is an especially frequent preference of defendants, a phenomenon that burdens the court with redundant assessments and costs the forensic system valuable time and money. Pollock (1998) interviewed three groups of prison inmates, those who were: (a) genuinely psychotic; (b) simulating a psychotic disorder; or (c) previously psychotic but currently faking psychosis. Findings from this study revealed that both simulators and inmates with a history of psychosis but presently without manifest psychiatric problems produced reports with simple and concise descriptions of

their malingered symptoms. Members of these groups also reported severe impairments due to their mental problems, and their reports appeared distressful and believable. Pollock states that challenging the truthfulness of psychosis is problematic for mental health professionals because they might be accused of increasing the distress of inmates. Despite minimal improvements in clinical interviewing and psychological measurements of malingering, the lack of a foolproof method for detecting deception remains a problem for the mental health professional in this setting (Fauteck, 1995).

Not guilty by reason of insanity (NGRI), guilty but mentally ill (GBMI), and incompetency to stand trial are three court rulings that often are pursued by an able person who is trying to avoid punishment or change an expected sentence of incarceration to psychiatric treatment (Krings, Davison, Neale, & Johnson, 2007). Rubenzer (2004) notes that one major concern with malingerers in forensic settings is their taking advantage of society's compassion for true mental health patients. Such deceptions often produce subsequent distrust toward defendants who are actually incompetent or insane. Other problems that malingerers create within this context are the enormous financial burden and the drainage of resources such as psychological and psychiatric treatments and legal fees. Malingerers in prison often are bored with the sterile environment of correctional psychiatric wards, and they require mental health services by behaviorally acting out. Rubenzer elaborates on the Supreme Court decision to prohibit the execution of mentally retarded inmates. This might constitute an enormous incentive, he states, for some criminals to fake cognitive impairments or other mental problems. He further states that mental health professionals in forensic settings report malingering rates of 16% to 18% by individuals who claim significant impairments.

Rubenzer cautions that this range is probably an underestimate, because many malingerers are not accurately identified. Whereas many prison inmates malinger, others are severely mentally ill, often undiagnosed, and in need of treatment (Teplin, 1990).

There are major concerns with prisoners who have secondary motivations for claiming mental health problems (Resnick, 1997; Rogers, Ustad, & Salekin, 1997). Inmates frequently malinger for various gain motives and burden the prison mental health system with unjustified claims that complicate diagnosis (Wang, Rogers, Giles, Diamond, Herrington-Wang, & Taylor, 1997). For example, a fake diagnosis of mental or medical illnesses might have an impact on their work assignments or provide them with medications which they can trade for cigarettes or other items. According to the American Psychiatric Association (2000), antisocial personality disorder is one major DSM diagnosis that is associated with malingering in correctional populations.

There is no accurate information regarding the rates of malingering for financial compensation, only estimates. The difficulty is because objective detection of malingering still does not exist (Samuel & Mittenberg, 2005). Sumanti, Boone, Savodnik and Gorsuch (2006) observed that approximately 9% to 29% of a sample of workers who applied for stress related workers' compensation displayed non-credible psychiatric symptoms. More than two decades ago, Marcus (1983) and Lasky (1980) described the work-related claims of psychological stress, and this figure has not declined (Sumanti, Boone, Savodnik, & Gorsuch, 2006). For example, stress related claims associated with employment rose by 700% between 1979 and 1988 and each claim costs an average of $12,000 (California Worker's Compensation Institute, 1990). Due to the insidious nature

of malingering, the actual extent of financial burden on the economy can only be grossly estimated.

Diagnosing Malingering

Research over the past three decades has shown the lack of reliable tools for detecting deception. According to Vrij (2008), even experts in lie detection such as police officers are no more successful than the average individual whose accurate identification of liars via observation of behavioral cues ranges from 45% to 60%. A meta-analysis of 108 studies about detecting deception confirmed this finding, and Aamodt and Custer (2006) reported that neither confidence, experience, education, nor sex of examiner was significantly related to accurate identification of deception. Even professionals in the field of lie detection (e.g., police, detectives, and judges) showed the same ability to detect faking as students and other individuals not professionally trained in this field (Aamodt & Custer).

Different explanations exist about the difficulties inherent in lie detection. O'Sullivan (2003) focused on examiners' thought processes which impact their ability to identify liars correctly. For example, cognitive heuristics, especially the fundamental attribution error (FAE), might provide an explanation for this human fallability. The FAE represents people's tendency to overestimate the relevance of personal traits such as aggressiveness or attentiveness when they form opinions of others (Ross & Nisbett, 1991). O'Sullivan found that individuals with better lie detection abilities are better able to separate their judgments of state and trait honesty compared to people without good lie-detection abilities. Trait judgments are opinions formed about another individual's

personality characteristics or traits, whereas state judgments involve looking at the context in which a behavior takes place.

Other explanations for the inability to accurately identify liars include the following: problems with attending sufficiently to non-verbal behaviors when judging the veracity of others' statements (Ekman, Friesen, O'Sullivan, & Scherer, 1980; Ekman, O'Sullivan, Friesen, & Scherer, 1991); more orientation to speech content instead of observing paralinguistic cues (DePaulo, Rosenthal, Rosenkrantz, & Green, 1982; O'Sullivan, Ekman, Friesen, & Scherer, 1985); a tendency to judge others as truthful or deceptive (O'Sullivan, Ekman, & Friesen, 1988; Zuckerman, DeFrank, Hall, Larrance, & Rosenthal, 1979; Zuckerman, Koestner, Colella, & Alton, 1984); and having incorrect schematas about cues to deception. Deceptive cues include the belief that people who avoid eye gazes are lying, whereas research indicates that liars increase eye gaze during deception due to their awareness of this paradigm (Zuckerman & Driver, 1985; Ekman & Friesen, 1969). Deviations from physical, personality, cultural, and behavioral norms are frequently interpreted as cues to deception. For example, people who have awkward physical characteristics or who display mannerisms which are outside of what is considered normal within one's culture are frequently viewed as suspicious, and their truthfulness is questioned (Bond, Omar, Mahmoud, & Bonser, 1990; Bond, Omar, Pitre, & Lashley, 1992; Ekman, 2001; Riggio, Salinas, & Tucker, 1988; Zebrowitz, Voinescu, & Collins, 1996).

There are no known mechanisms for identifying liars and malingerers by merely observing behaviors. Therefore, more reliable measures are necessary in order to improve the detection of deception in general and malingering in particular.

Psychological Tests

Psychological tests traditionally have been used for detecting malingering. Although no failsafe instrument has been identified at this time, the inclusion of testing has been considered a valuable adjunct methodology in detecting malingering. Research on detecting malingering via psychological measures has shown that testing has produced both false positives and false negatives. The American Psychological Association (2007) defines false positives as "a case that is incorrectly included in a group by the test used to determine inclusion" (p. 366) and false negatives as "a case that is incorrectly excluded from the group by the test used to determine inclusion" (p. 366). In the case of a malingering diagnosis, a false positive would consist of incorrectly labeling a sick individual as a malingerer. Incorrectly labeling a person faking symptoms as being "sick," on the other hand, would comprise a false negative. Increased public knowledge of psychological and medical symptomology supports more sophisticated ways of faking and also coaching for malingering, and both of these have made correct detection and malingering increasingly difficult (Leng & Parkin, 1995; Singh et al., 2007). Psychological instruments that are commonly used for detecting malingering are reviewed below.

Minnesota Multiphasic Personality Inventory-2

The Minnesota Multiphasic Personality Inventory-2 (MMPI-2) is 567-item personality measure frequently is used to assess clinical psychopathology, including clients' testing attitude and their attempts to exaggerate symptoms and was originally developed by Hathaway and McKinley (1940). The MMPI-2 is the most frequently used test for the assessment of psychopathology, especially for evaluations within the context

of forensic examinations and the review of disability claims (Bagby, Marshall, & Bacchiochi, 2005). Besides the clinical scales and subscales, the ten validity scales of the MMPI-2 play a significant role in its popularity within these contexts. These ten scales are a sophisticated way to measure whether or not a test profile is valid. Invalid test profiles might be produced by random answering and/or poor reading abilities of examinees. The validity scales also provide indications of test-taker motivation, for example, the tendency to conceal, disclose, or emphasize problems (Groth-Marnat, 2003). The F-scales (F, F-Back, and Infrequency-Psychopathology) are called the malingering scales because they measure the presence of symptoms that are indicative of severe psychiatric illness.

Friedman, Lewak, Nicols, and Webb (2001) note that the F-scale of the MMPI-2 is intended to assess examinees' tendencies to respond to the 60 test items which comprise the F-Scale in an uncommon manner. For example, individuals who do not understand the questions might obtain high scores on this scale. The same high scores, however, might be achieved by someone with situational distress who has poor reading comprehension of the items, who experiences genuine psychological problems, or who tries to exaggerate or fake problems. This scale represents one of the most sensitive scales of the MMPI-2 for suggesting severity of distress.

The F-Back scale (F_B) was designed for a similar purpose. Its items fall in the last half of the MMPI-2. Whereas the F-scale is designed to detect psychoticism, the F_B scale is designed mainly to detect distress and depression. This subscale is also important in the detection of random responding and malingering (Wetter, Baer, Berry, Smith, & Larsen, 1992). Wetter and collegues found that the F_B scale is effective in detecting random

responding and also the feigning of mild, moderate, and severe disturbance. Malingering severe psychopathology produces the highest scores on the F_B scale. Clinicians are encouraged to interpret high scores on this scale with caution, however, because there are other explanations for high scores such as fatigue or uncooperativeness.

The Infrequency-Psychopathology (F_P) scale was created to assess the tendency to over-report symptoms or to portray oneself in an unfavorable light. This subscale is sensitive to the exaggeration of problems, especially the exaggeration of psychotic symptoms. Combined with the use of all three F-scales, good clinical judgment is the critical component needed to assess malingering (Friedman et al., 2001).

An important constellation of the MMPI-2 validity scales frequently is used for detecting malingering. An inverted "V" constellation of the validity scales (low Lie [L]) scale, high F-scale, and low Correction scale) suggest that the test taker attempted to fake mental illness (Singh et al., 2007). Friedman and colleagues (2001) describe the L-scale as a 15-item subscale designed to detect underreporting of symptoms, e.g., "faking good." For example, child custody cases or employment testing are settings in which individuals may be prone to portray themselves in a favorable light. All 15 items may be scored in the false direction in these cases. For example, "I do not always tell the truth" or "I get angry sometimes" are two examples of questions that assess "faking good." The values portrayed by these two items might be highly desirable for the majority of individuals, but they rarely are achieved, and a "true" endorsement is the most truthful answer for most people. Caution in interpretation is warranted, however, because this scale is affected by moderator variables such as socio-economic status, education, and occupation.

The Correction (K) scale originally was intended to improve the sensitivity of the clinical subscales in identifying psychological problems. It adds a correction or suppressor element to the obtained scaled scores on the clinical scales. The purpose of this factor is to decrease false positives or low scores endorsed by psychiatric populations who would be expected to achieve elevations on certain clinical scales. Several issues must be considered before interpreting K-scale scores. For example, certain personality traits are closely related to the willingness to report and admit to shortcomings and problems. In these instances, an incorrect diagnosis of malingering (false positive) might occur. Clearly, scores on all of these validity scales are ambiguous at best for uncovering malingering.

In a meta-analysis of studies designed to detect malingering with the MMPI-2, Rogers, Sewell, Martin, and Vitacco (2003) found that research participants who were instructed to feign mental illness scored significantly differently from actual psychiatric patients on the F, F_B, and F-Infrequency-Psychopathology (F_P) scales. The analysis produced large between-group effect sizes which suggested that the validity scales discussed above provide a valuable tool for detecting feigned mental illness. However, Friedman and colleagues (2001) caution that whereas the L and F scales display adequate properties in the detection of extreme test-taking attitudes or misrepresentations, they show a lower level of precision with subtle levels of defensiveness and underreporting of difficulties.

The MMPI-2 is, thus, not failsafe for the accurate detection of malingering. Elevated F-scales do not automatically indicate a motivation to deceive, because they may indicate the presence of clinical depression in psychiatric populations (Steffan,

Clopton, & Morgan, 2003). Due to the high prevalence of depression in the population - a lifetime risk ranging from 5 % to 25 % depending on sex (American Psychiatric Association, 2000) - the inability to differentiate between depression and faking depression is problematic for clinical practice. Therefore, Steffan and colleagues (2003) created the Malingering Depression Scale (Md) on the MMPI-2 to identify malingerer depression. It consists of 32 items that appear to increase valid differentiation of malingering by sophisticated feigners and by naïve feigners from actual depressed students (Bagby, Marshall, & Bacchiochi, 2005; Steffan et al., 2003).

Personality Assessment Inventory

The Personality Assessment Inventory (PAI; Morey, 1991) is another personality inventory used to measure adult psychopathology that has application in the detection of malingering (Sumanti et al., 2006; Wang et al., 1997). This instrument consists of 344 test items that are scored on a 4-point Likert scale. The purpose of the PAI is to screen for mental health problems and to facilitate clinical diagnosis and treatment planning (Morey, 1991). The negative impression management (NIM) and malingering index (MI) scales on this instrument typically are used to identify malingerers. The NIM scale is a validity scale that can detect the feigning of specific disorders (Calhoun, Earnst, Tucker, Kirby, & Beckham, 2000). Hopwood, Morey, Rogers, and Sewell (2007) report that individuals who display specific distortions on the NIM and on certain clinical subscales on the PAI are more likely to feign major depressive disorder, generalized anxiety disorder, or schizophrenia. Calhoun and colleagues (2000) report less efficacy of these scales to identify feigned depression, with a hit rate of 55.9%, and generalized anxiety

disorder, with a hit rate of 38.7%. They report that malingered schizophrenia was detected in 90.9% of the researched cases.

Sumanti and colleagues (2006) found low levels of correct identification of malingerers with the two PAI validity scales (MIN and MAL). When scores on these scales are correlated with scores on other cognitive measures such as the Dot Counting test and Rey test, the correlations were exceedingly low, ranging from non-existent to moderate. This suggests a weak relationship between symptoms for psychiatric malingering and cognitive effort tests, and it confirms findings from earlier studies that psychiatric malingering is independent from faking cognitive impairment (Boone, Savodnik, Ghaffarian, Lee, & Freeman, 1995, as cited in Sumanti et al., 2006). Liljequist, Kinder, and Schinka (1998) showed that in posttraumatic stress disorder (PTSD) simulation studies, undergraduate students in the malingering experimental condition scored higher than participant ts it the control condition on the NIM and malingering index (MI). Therefore, the PAI seems to be effective in identifying PTSD in simulation research. Whereas the NIM scale is highly effective in detecting PTSD malingering in instructed simulation, it appears to misclassify individuals who actually suffer from PTSD. In other words, it yields false positives. Scores of PTSD sufferers on this scale suggest that they significantly over-report their symptoms, and for this reason, 13% to 26% of individuals with PTSD could be classified as malingerers (Calhoun et al., 2000).

Morey (1991) found a correlation of .54 between the MMPI-2's F-Scale and the PAI's NIM scale. Calhoun and colleagues (2000) caution therapists to consider the setting when assessing the probability of making a Type I or Type II error regarding diagnosis of PTSD with the PAI validity indexes. A Type I or alpha error occurs when

researchers reject a null Hypothesis that is true, whereas a Type II or beta error occurs when a false null Hypotheses is not rejected (American Psychological Association, 2007). Whereas liberal criteria for PTSD may be better suited for settings which provide critical treatments, more stringent criteria should be applied to court settings. For this reason, a NIM score greater than 8 is suggested in forensic settings.

Another important aspect of deception research is the impact of coaching. Bagby, Nicholson, Bacchiochi, Ryder, and Bury (2002) found that coaching did not increase effectiveness in malingering when research participants were assessed with the MMPI-2 and the PAI. This means that coaching malingerers on the symptomology of their reported disorders does not make them better fakers when assessed by the MMPI-2 and PAI. Guriel-Tennant and Fremouw (2006) report that coached participants in a PTSD study had lower group means than uncoached malingerers on the NIM and MI scales of the PAI. No significant difference was noted between detection of malingerers in each group.

Research in which participants simulated suffering from symptoms of schizophrenia, major depression, or generalized anxiety disorder revealed findings that the PAI's effectiveness in detecting malingering depends on the level of sophistication of the malingerer. Specifically, Rogers, Sewell, Morey, and Ustad (1996) found that the PAI is moderately effective in detecting unrehearsed simulators and also moderately effective in identifying rehearsed simulators. This suggests that extensive preparation in studying symptoms of psychotic, mood, or anxiety disorders can help malingerers to escape detection when tested with the PAI.

Rorschach Inkblot Test

The Rorschach is a projective test consisting of a set of cards with ten bilaterally symmetrical black-and-white or colored inkblots. Its original version was developed in 1921 by Swiss psychiatrist, Hermann Rorschach (Rorschach, 1964). The test format was based on the assumption that individuals have specific needs, motivations, conflicts, and individualistic ways of perceiving their environment (Groth-Marnat, 2003). The examinee is asked "What might this be?" or "What do you see in this?" when presented with each card (p. 808). Response content of responses is classified according to different structural and thematic elements such as color and movement (APA, 2007). Although frequently criticized, the Rorschach appears to maintain its status in the psychological profession as evidenced by the multitude of publications, books, and ongoing research involving this test (Archer & Newsom, 2000; Camara, Nathan, & Puente, 2000; Exner, 1997). Interpretation of the Rorschach is based on the assumption that the way people organize their responses during the test is representative of their dealings with ambiguous situations that also demand organization and judgment (Groth-Marnat, 2003). Therefore, this test is believed to provide insight into unconscious motivations and attitudes.

Another application of the Rorschach is in the detection of malingering. In testing the ability to fake psychosis on the Rorschach test, Ganellen, Wasyliw, Haywood, and Grossman (1996) found that the combination of Rorschach and MMPI-2 provide effective criteria for identifying deliberate faking of psychosis. However, other research findings regarding the Rorschach are problematic if the researcher fails to use a formal scoring system (Albert, Fox, & Kahn, 1980, as cited in Ganellen et al., 1996) such as Exner's Rorschach Comprehensive System (1991).

In another study of the detection of malingering, Meisner (1988) studied the impact of faked depression on scores from the Beck Depression Inventory (BDI), the MMPI Depression Scale, and the Rorschach. The undergraduate student participants were instructed to feel depressed, informed about the symptoms of depression, and offered a $50 cash reward for the most convincing malingering on the assessment. The findings suggest that malingered depression can be identified by the Rorschach Morbid Special (MSS) and Blood (Bl) scores for example. Interestingly, Intelligence did not have an effect on participants' ability to alter their responses. Meisner suggests that atypical frequencies in response determinants should not serve as evidence for malingering. Furthermore, Meisner (1988) found that the content indicators of depression on the Rorschach are influenced by examinees' impression management strategies, e.g., their motivation to appear depressed. Whereas in Meisner's research such motivation was demonstrated by participants who had been coached about symptoms of depression, other studies revealed that uncoached participants displayed similar scores (Feldman & Graley, 1954; Seamons, Howell, Carlisle, & Roe, 1981).

Rey Memory Test (RMT) and Rey II

The Rey Memory Test (Rey, 1964) is a brief, 15-item instrument created for the detection of memory impairment. The original test was developed by the French neurologist, André Rey, as an assessment of memory impairments. The 15 items are arrayed in three columns and five rows on a card. The items include simple geometric designs or single-digit numbers. The test taker must reproduce these items after the card has been shown for 10 seconds and is then removed (Griffin, Glassmire, Aubrey, Henderson, & McCann, 1997). In order for memory tests to work in the detection of

malingering, the malingerer must perceive the test as difficult for people with cognitive impairments. This will trigger the individual's tendency to underperform (Bolan, Foster, Schmand, & Bolan, 2002).

Simon (1994) found in forensic clinical settings that the Rey Memory Test can effectively discriminate between malingerers and controls. However, the cut-off score appears to be a crucial component when assessing for malingering. Whereas a low cut-off score of 3 items remembered results in a false positive rate of 57% in the control group, a cut-off score of 9 creates an improved differentiation between malingerers and non-malingerers. The cut-off score appears to be an important component in detecting memory malingering, but researchers vary in their determination of an appropriate one. Most frequently a score of 8 or 9 is suggested for improved accuracy (Bernard & Fowler, 1990; Goldberg & Millar, 1986; Kelly, Baker, van den Broek, Jackson & Humphries, 2005). Five case studies by Taylor, Kreutzer, and West (2003) with the Rey 15-item Test (FIT) and other standardized neurobehavioral and neuropsychological measures with outpatients showed that severely brain-damaged individuals obtained perfect scores on the FIT. The authors, therefore, support the use of high cut-off scores for identifying malingering. Malingerers score significantly lower than individuals with severe cognitive impairments.

The Rey II is a redesign of the original Rey 15-item Visual Memory Test (1964), and it demonstrates a significant improvement in the detection of malingering. The format of the Rey II is similar to the original Rey (three columns and five rows of simple items), but some of the items have been altered so that its difficulty level is slightly increased (Griffin et al., 1997). The instrument uses a qualitative scoring system with

improved effectiveness for detecting malingering over the quantitative system of its predecessor. Whereas the quantitative scoring system exhibited average sensitivity (ability to identify malingerers with 39% accuracy) and average specificity (ability to identify optimal performers with 73% accuracy), the qualitative system has an average sensitivity of 73% and specificity of 86%. Examining the nature of the qualitative errors helps to improve the detection of malingering over the original version of the Rey (Griffin et al., 1997).

Further research on malingering with the Rey AVLT used the serial position effect (SPE) for distinguishing between uncoached malingerers, coached malingerers, and individuals with actual illness (Powell, Geller, Oliveri, Stanton, & Hendricks, 2004). The American Psychological Association (2007) defines the SPE as "the effect of an item's position in a list of items to be learned on how well it is remembered" (p. 841). Individuals are more likely to remember the first items (the primacy effect) and the last items (the recency effect), whereas items in the middle of the list are more likely to be forgotten. Powell and colleagues divided research participants into four groups: (a) normal controls; (b) simulators who were coached on symptoms; (c) simulators who were coached on taking the test; and (d) individuals with actual moderate to severe subacute traumatic brain injury (TBI). Whereas the normal control group and the actual TBI patients demonstrated the expected SPE, the simulators suppressed the primacy effect. Unfortunately, the SPE does not seem to be sensitive or specific enough by itself to be used in the detection of malingering. Other assessments are necessary to create a more valid differentiation between malingerers and truth-tellers. Individuals with

sophisticated styles of exaggeration appear to be especially able to challenge Rey AVLT and its method of assessment.

Boone and colleagues (1995) correlated scores on brief cognitive instruments with personality measures, e.g., Millon Clinical Multiaxial Inventory (MCMI; Millon, 1996). Individuals with failing scores on cognitive malingering tests, such as the Rey Memorization and Dot Counting, obtained scores on personality inventories that suggested personality disorders and psychotic features. The group who scored poorly on the cognitive measures displayed elevated scores on personality test scales that indicated avoidance, dependence, passive-aggressiveness, anxiety, somatoform disorder, and dysthymia. These results might be interpreted either as showing a relationship between certain personality traits and cognitive malingering performance, or as showing an artificial elevation due to exaggeration or feigning of psychological problems. Additional analyses compared two groups of participants who failed the cognitive malingering instruments: one group had valid, non-exaggerated scores on the MCMI whereas the other group displayed faked/exaggerated scores. This difference indicated that the second interpretation is feigning or exaggeration problems (Boone, et al., 1995).

Test of Memory Malingering (TOMM)

In many ways, American society rewards sickness by providing resources to the ill such as disability payments, but then withdraw support such as financial aid when the previously sick individuals improve. Therefore, multiple incentives exist for pretending to be sick. Constantitiou and McCaffrey (2003) observed that, mental health professionals express concerns about the low level of motivation and effort when clients take a neuropsychological test. Neuropsychologists have worked on developing

assessments to detect suboptimal efforts so that invalid test scores and incorrect diagnoses can be reduced. The Test of Memory Malingering (TOMM; Tombaugh, 1996) is a frequently used test, because it is designed to identify less than optimal performance due to low motivation or lack of effort on neuropsychological tests. The test contains 50 line-drawn stimulus pictures and foil pictures. Two trials typically are run with pictures shown out of sequence on the second trial. Constantitiou and McCaffrey found that the TOMM is more effective than the Rey 15-item test at identifying children who put forth suboptimal efforts during neuropsychological evaluations. Adequate sensitivity and specificity also was noted in samples of adult TBI patients and individuals who were seeking compensation for mild head traumas (Haber & Fichtenberg, 2006).

O'Bryant, Engel, Kleiner, Vasterling, and Black (2007) identify Trial 1 of the TOMM as a brief screening instrument with high diagnostic accuracy when assessing clients demonstrating suboptimal effort. However, the researchers also suggest that additional studies are needed to assess application within clinical and forensic contexts. O'Bryant and Lucas (2006) found that the TOMM is not highly sensitive but very specific when identifying malingerers. Test sensitivity refers to the proportion of individuals with a certain condition that will be identified by the instrument, also known as "true positives." Specificity describes the proportion of people without the condition who are identified correctly by the measurement, also known as "true negatives." This means that the TOMM is more effective in identifying people who do not have the condition. The test was found to have a very high positive predictive value of .98 and a satisfying negative predictive value of .78. These findings make the test a valuable tool in the detection of faking memory problems. One limitation of this study was the use of

only one other memory test (Word Memory Test) for establishing reliability and validity of the TOMM. O'Bryant and Lucas (2006) caution that multiple methods for assessing malingering are essential for correctly identifying it.

Bolan, Foster, Schmand, and Bolan (2002) found that response latency is an important indicator for identifying malingerers on neuropsychological instruments such as the Amsterdam Short Memory Test (ASTM; Schagen, Schmand, de Sterke, & Lindeboom, 1997) and the TOMM. Simulated malingerers display significantly higher response times on these instruments compared to truth-tellers. This supports the value of using response time when developing methods for detecting malingering.

Structured Interview of Reported Symptoms

The Structured Interview of Reported Symptoms (SIRS; Rogers, Gillis, Dickens, & Bagby, 1991) consists of 172 items which are answered in a true-false format. It is designed to measure deliberate distortions of psychological functioning (Heinze, 2003) and is one of the few direct measures of malingering. The SIRS has eight primary scales, three of which measure the frequency of symptom endorsement: (a) Blatant Symptoms Scale (BL), (b) Subtle Symptoms Scale (SU), and (c) Selectivity of Symptoms Scale (SEL). An individual's tendency to endorse unusual symptoms is assessed by the following four scales: (a) Rare Symptom Scale (RS), (b) Improbable and Absurd Symptoms Scale (IA), (c) Atypical Symptom Combinations Scale (SC), and (d) Extreme Severity of Symptoms Scale (SEV). Additionally, the Reported vs. Observed Symptoms Scales (RO) assess to what extent symptoms are endorsed during the interview process. Moderate elevations suggest possible feigning, whereas marked elevations indicate definite malingering (Heinze, 2003).

Heinze (2003) reported that the SIRS was effective in detecting malingering of psychosis. Vitacco, Rogers, Gabel, and Munizza (2007) also examined its effectiveness in detecting faked mental illness, and they identified the SIRS as a robust instrument for assessment of forensic competency to stand trial.

In summary, the tests reviewed above are some of the more frequently used instruments for uncovering malingering. However, a large number of unreviewed tests exist that are used in forensic and clinical settings and also in research. Lally (2003) recognizes the difficulty of finding acceptable tests for conducting forensic evaluations when malingering is a concern. The six assessment areas of forensic practice are: (a) mental state at the offense; (b) risk for violence; (c) risk for sexual violence; (d) competency to stand trial; (e) competency to waive Miranda rights; and (f) malingering. Forensic experts were surveyed regarding forensic evaluations of malingering and they gave acceptable ratings to the SIRS, TOMM, Validity Indicator Profile, Rey 15-item Visual Memory Test, MMPI-2, PAI, WAIS-III, and Halstead-Reitan (Lally, 2003). The MCMI-II and MCMI-III had mixed acceptability ratings. No opinion about acceptability was voiced about the WASI, KBIT, Luria-Nebraska, and Stanford-Binet-Revised. These experts criticized the Rorschach, 16 PF, projective drawings, sentence completion, and TAT as unacceptable assessment tools for detecting malingering. Heinze (2003) supported the use of the MMPI-2, SIRS, M Test, the Atypical Presentation Scale, and the Rey 15-item Memory Test as instruments for detecting faked psychosis.

Psychological tests have significant shortcomings for detecting malingering and misinterpretations are frequent. Grillo, Brown, Hilsabeck, Price, and Lees-Haley (1994)

found with personal injury claimants that elevated scores on the MCMI-II were directly related to faking bad. Individuals with indications for Histrionic, Compulsive, Schizoid, Schizotypal, Paranoid, Borderline, Antisocial, Avoidant, and Passive-Aggressive Personality Disorder were more likely to obtain higher scores on the MMPI-2 validity indicators for malingering. These findings suggest that certain personality traits are more likely to result in exaggerated symptoms instead of intentional malingering.

Although there appears to be a variety of psychological tests that are fairly effective in detecting malingering, none of them is totally failsafe. Kelly, Baker, van den Broek, Jackson, and Humphries (2005) point out that there is no 'gold standard' for detecting malingering. Ethical difficulties also play an important role in malingering research. Although a real-life sample of malingerers would provide more accurate and generalizable data, recruiting patients who are actively pursuing compensation for psychological or physical problems poses ethical dilemmas. Whereas simulation studies are less ethically sensitive, data obtained from a person pretending to malinger may differ substantially from that obtained from a person who is actually malingering and motivated to succeed. Other difficulties with attributing certain scores on psychological tests to malingering is the possibility of individuals' feigning or exaggerating cognitive problems due to personality disorders without being consciously aware of it (Boone et al., 1995; Orsini, Van Gorp & Boone, 1988). A major problem in using the MMPI-2 and other psychological instruments is their inability to detect malingering with regard to specific symptoms such as back pain. A method of lie detection designed to uncover malingering at the level of answers to specific questions would be beneficial.

Psychiatrists are able to detect approximately 50% of the deception that occurs during unstructured interviews, and this only equals chance discovery (Rosen, Mulsant, Bruce, Mittal, & Fox, 2004; American Academy of Psychiatry and the Law, 2004, as cited in Samuel and Mittenberg, 2005). According to Samuel and Mittenberg, clinicians are unable to distinguish between truthful, faked, or exaggerated problems based on demeanor of the client. Because of the varying levels of reliability of most tests, their high degree of subjectivity, and their dependence on clinical experience and professional judgment for accurate interpretations, other more objective methods of detecting malingering must be considered and/or devised.

Cognitive Measures for the Detection of Malingering

Cognitive measures have received some attention in the field of lie detection and might be useful in the identification of malingering. According to Zuckerman, DePaulo and Rosenthal (1981), deception places more cognitive demands on individuals than truth-telling. In order to make lies believable, individuals must focus on internal coherence, consistency across time, and plausibility in their fabrications. Gombos (2006) states that effortful cognitive processes such as inhibition, working memory, and other mental management mechanisms represent essential cognitive elements for lie production as evidenced by research about lie detection, developmental studies about children and deception, and imaging studies that describe neural correlates of deception.

Other cognitive cues to lie detection are an increase in pupil dilation and response latency (Zuckerman et al., 1981). Walczyk and colleagues (2005) hypothesize that increased understanding about the cognitive processes used during lying might reveal more clues to detect lies. Neurological studies focus on detecting liars via brain scanning.

Phan and colleagues (2005) studied the neural correlates of lying by using functional magnetic resonance imaging (fMRI). Findings suggest that intentional lying relies on complex cognitive mechanisms which increase neural activity in the discrete anterior frontal regions (ventrolateral prefrontal cortex, dorsolateral prefrontal cortex, dorsal medial prefrontal cortex, and anterior cingulated cortex). These data are consistent with increased brain activity and a larger cognitive load during deception. Back and Oppenheim (2001) explain that cognitive load represents the information processing efforts of individuals when faced with tasks, e.g., visual stimuli. The American Psychological Association (2007) defines cognitive load as "the relative demand imposed by a particular task, in terms of mental resources required" (p. 189). Cognitive load is also known as mental load or mental workload (American Psychological Association).

Spence (2008) argues, however, that this science is still in its early stages and further data is needed. For example, he reports that 16 peer-reviewed fMRI studies have shown increases in neural activity in prefrontal regions during lying when compared to truth-telling. However, most of these studies did not succeed in identifying specific brain areas that were activated by truthfulness. Spence cautions researchers to focus on improving reliability before applying fMRI assessments to the detection of malingering.

Vrij, Fisher, Mann, and Leal (2006) suggest that the increase in cognitive load during lying could provide a new measure of detecting deception. They discuss that learning to attend to signs indicating increased cognitive demands might improve the ability to detect deception.

Response Time

Response time has been used as an indicator of lying. It represents the time lapse between the end of the question asked by the examiner and the beginning of the answer of the participant. Research suggests that people with well-integrated schemata in their memory will provide faster responses (Walczyk et al., 2005). A cognitive schemata is defined as "a collection of basic knowledge about a concept or entity that serves as a guide to perception, interpretation, imagination, or problem solving" (American Psychological Association, 2007, p. 815). For example, when reading, a person relies on previously obtained knowledge and general experiences which aids in comprehension of the material. A schemata is the organized knowledge structure that can be accessed during the reading process. Individuals typically utilize their schemata when they relate new materials to already memorized information. Having access to rich schemata will increase comprehension of the new material (Alvarez & Risko, 1989).

Vendemia, Buzan and Green (2005) conducted a longitudinal study in which they examined response time for unrehearsed and rehearsed deception. Findings indicate that lying creates longer response time than truth-telling, even for individuals who have been practicing the deception.

Within the context of employment, Holden, Kroner, Fekken, and Popham (1992) found that honest job applicants compare their answers to their existing self-schemata such as providing personal information about their work habits. Dishonest applicants who try to obtain a job for which they are not well-qualified become impression managers, and they respond more slowly to questions to which they are lying in order to make a positive but untrue impression.

Baker, Stern and Goldstein (1990) compared response latencies between participants who were asked to respond to questions either with the truth or with a lie. Liars displayed a significantly longer time span between the end of questions and the beginning of the responses. This supports the notion that it takes more effort to gain access to fabricated material than to truthful schematas.

Brain-imaging techniques support the conclusion that lying is more time-consuming than truth-telling. As previously discussed, Spence et al., (2001) found that lying produces increased neural activation of the bilateral and ventrolateral prefrontal cortices when brain imaging was performed with functional magnetic resonance imaging (fMRI).

Participants in a study involving mock crimes showed an increase in response times whenever they were presented information pertaining to a mock crime, but they responded at a their normal speed to unrelated information (Seymour, Seifert, Shafto, & Mosmann, 2000). When participants were asked about what concealed knowledge they had of the mock the crime, response time measures were more accurate than physiological indicators in predicting faked responses. Walczyk and colleagues (2005) confirmed that response time differs significantly between truth-tellers and liars. The researchers also found that social skills function as a moderator variable. For example, people who possess very good social skills were the fastest responders within the lying group.

Pupil Dilation

Thousands of years ago, people already believed that eyes provided information about a person's inner thoughts and emotions, a notion that is confirmed by modern

studies. Deception impacts pupil dilation. Increases in cognitive load are reflected in increases in pupil dilation (Beatty & Lucero-Wagoner, 2000). The increase in more complex thinking strategies often employed during deceptive schemes also is related to increased pupil dilation. Therefore, dilation provides an objective mechanism for measuring a person's deception, or at least it may constitute a useful converging cue to deception.

According to Beatty (1982), eyes are reflective of individuals' cognitive load. Kimberley and collegues (2008) describe cognitive load as the extent to which cortical resources are utilized in order to manage thought processes. For example, a large cognitive load indicates that large amounts of information necessary in order to perform a task. Specifically, pupil dilation is indicative of increased efforts in cognitive processes (Van Gerven, Paas, Van Merrienboer, & Schmidt, 2004). In digit span recall, pupil size becomes larger with increasingly demanding tasks such as adding digits (Granholm, Asarnow, Sarkin, & Dykes, 1996). Beatty and Lucero-Wagoner (2000) consider the task-evoked pupillary response as indicative of a response to certain cognitive processes such as trying to retrieve something from memory, thinking about a difficult subject, or pausing during a complicated speech.

Ahern and Beatty (1979) found that individuals who were assigned to perform mental arithmetic showed enlarged pupils whenever the difficulty level was increased. In an earlier study, Wright and Kahneman (1971) found that increasing difficulty of verbal comprehension tasks also was reflected in an increase in pupil size. These data indicate the possibility that pupil dilation may be a cue to malingering.

Eye Gaze

Other indicators of cognitive load that could provide important information for the detection of malingering include eye movements, gaze aversion, and eye fixation. For example, research provides evidence for socially triggered gaze aversion when individuals are involved in difficult cognitive processes. Doherty-Sneddon, Bruce, Bonner, Longotham, and Doyle (2002) and Glenberg, Schroeder, and Robertson (1998) reported an increase in individuals looking away while answering cognitively demanding questions during communication with others. People appear to have a tendency to avoid visual stimulation when cognitive demands increase, perhaps to minimize external distraction. Different theories are proposed to explain gaze aversion such as decreasing negative feelings within the context of a negative social-emotional situation, feeling self-conscious due to one's previous history of misconduct and deception, and an attempt to organize the cognitive load that is associated with processing environmental information (Doherty-Sneddon & Phelps, 2005). However, as previously discussed, liars are frequently aware of this paradigm and make a conscious effort to increase eye gaze (Ekman & Friesen, 1969).

Intentional deception such as malingering seems to have an effect on certain physiological responses that are not easily controlled by the individual and, therefore, appear to be more objective measures for the detection of malingering than the traditionally used techniques such as psychological assessment. Providing false responses may increase the cognitive load which impacts certain cognitive cues such as response time (Baker et al., 1990; Holden et al., 1992). Having to fabricate non-existing information instead of accessing already existing mental schematas of truthful

information increase the time needed to provide a deceitful response, and this makes liars, rehearsed or unrehearsed, slower than those accessing the truth and divulging the truth (Vendemia et al., 2005).

Processing demands are associated with a decrease in spontaneous eye movements such as blinking and an increase in fixation (Bagley & Manelis, 1979; May, Kennedy, Williams, Dunlap, & Brannan, 1990; Underwood, Jebbett, & Roberts, 2004). Baker and colleagues (1990) found that individuals who received the contradictory instructions to lie to themselves, while at the same time providing truthful answers, displayed fewer eye movements and increased response time compared to truth-tellers. Therefore, eye data appears to be a viable, objective, and measurable detection of deception.

Rehearsal of Lies

Previous research has shown that rehearsed lying differs from unrehearsed lying in terms of response time, because the liar must prepare and practice feasible but untrue lies (Walczyk, Mahoney, Doverspike, & Griffith-Ross, 2009). Liars who rehearse beforehand make decisions to lie in advance and prepare fabrications which shorten response times. Participants who have practiced a certain answer in response to a particular question show slower responses when the same question is paraphrased (DePaulo, Lindsay, Malone, Muhlenbruck, Charlton, & Harris, 2003).

Time-Restricted Integrity Confirmation (TRI-Con)

A new cognitive method of lie detection based on response time is called TRI-Con. This approach is based on the Activation-Decision-Construction Model (ADCM) of lying, and this cognitive measure has been shown to be an effective method of lie

detection and perhaps malingering (Walczyk, Roper, Seeman & Humphreys, 2003; Walczyk et al., 2005). In the ADCM, there is a distinction between questions requiring a "yes" or "no" response versus open-ended questions that trigger cued recall (e.g., "What is your age?"). The latter typically involve larger cognitive loads because examinees may have to search their long-term memory. Thus, cognitive cues might be less reliable for the detection of deception in this format than for yes/no responses. Walczyk and colleagues (2003) and Walczyk and colleagues (2005) discuss that TRI-Con might be considered the first approach to lie detection that focuses specifically on maximizing cognitive loads for liars while minimizing them for truth-tellers. It furthermore helps to protect from countermeasures of lie detection, such as rehearsal. TRI-Con focuses on cues to deception such as response time, logical consistency of responses to questions that inquire about the same topic, and eye data such as pupil dilation, blinking, and eye fixation.

The activation component in ADCM represents the encoding of questions and the retrieval of previously stored episodic or semantic memories. During this step, any important encoded information of semantic and episodic knowledge is activated. The question occupies the articulatory loop of working memory, and the truthful response is retrieved from Long Term Memory (Baddeley, 1992; as cited in Walczyk, et al., in press). Truth-tellers typically decide beforehand to answer truthfully and are able to access the information quickly and respond within a short time span. This decreases response time significantly when compared to liars (Walczyk et al., 2005; Walczyk et al., 2009).

The decision component in ADCM, refers to choosing to lie or to tell the truth based on the question asked. As previously noted, the motivation for malingering includes "financial gain, escaping responsibility, punishment, imprisonment, or military duty" (American Psychological Association, 2007, p. 551) and it entails a deliberate act of faking or exaggerating illness or disability. Like most other self-serving lies, malingering constitutes protection of the self and occurs in order to improve one's situation. Liars decide after hearing the question to either lie or tell the truth. This process usually increases their response time when compared to truth-tellers. Even rehearsed lies take longer because rehearsed liars do not access their truthful memory but rather have to remember to tell a lie. This last step seems to be responsible for the increases in time lapse noted when someone provides false responses (Walczyk et al., 2009).

The construction component ADCM consists of fabricating the lie. During this phase the truth is a rich retrieval cue to Long Term Memory, whereas lying requires attention in order to make it plausible and feasible (Walczyk et al., 2009). Various factors such as social context and knowledge about examiners' suspicions impact the creation of a lie (Fiske & Taylor, 1991). A screening out of unfeasible or implausible lies takes place, also a verification with prior statements, and both of theses processes add to response time (DePaulo, Kasky, Kirkendol, Wyer, & Epstein, 1996). The ADCM, thus, provides a theoretical account of the process of lie generation useful for the present research.

Whereas the ADCM is a theoretical account of lying, TRI-Con is a new method of lie detection based on the ADCM. TRI-Con involves testing examinees in laboratory-like conditions. The TRI-Con approach for detecting malingering uses cognitive cues in

order to make clear distinctions between truth-tellers, rehearsed malingerers, and unrehearsed malingerers. Rehearsal needs to be considered as a possible countermeasure to cognitive lie detection (DePaulo et al., 2003). TRI-Con consists of an eye tracking laboratory that has the capability to monitor response time and eye data.

Although many psychological assessments have shown effectiveness in detecting malingerers, they are far from failsafe in that they often create false positives and false negatives. The existing measures of malingering only allow diagnosis of a possible pattern of malingering through false impression management, and they are designed to measure global psychological constructs. Even in combination with other processes such as clinical interviews and a review of client history, the danger exists that sophisticated liars can prepare for the process and "learn" the appropriate symptoms of their malingered ailment. Therefore, other measures need to be developed that are more objective and are less amenable to manipulation by clients. Another measure is needed to assess the truthfulness of declarations about having specific psychological symptoms.

Response time, eye gaze, pupil dilation, and other eye data can provide cues to a person's truthfulness or deception when answering questions. Applying such cognitive techniques to assess malingering may minimize examinees' conscious control over such responses, especially under the cognitive load–maximizing conditions of TRI-Con. Cognitive cues of deception are difficult to monitor and control by individuals and thus may provide more reliable data for detecting malingering. TRI-Con is one of these approaches for measuring cues that are difficult to alter by the client. It may help the medical and psychological fields by providing more accurate assessments and preventing malingerers from draining important resources, especially when coupled with eye data.

Summary

Although psychological testing traditionally has been used for the assessment of malingering, and other measures are available for identifying people who fake or exaggerate existing psychological and physiological problems, the problems of false positives and false negatives warrant a search for more effective methods for detecting deception. Many of the psychological tests used for diagnosing malingering (e.g., the MMPI-2) are at best indirect measures of malingering with the purpose of identifying clinical syndromes instead of focusing on specific instances of deception. More direct measures of malingering (e.g., TOMM, SIRS) are frequently highly focused either on particular symptoms or lying about memory deficits or psychotic symptoms. Another problem with psychological testing is the alternative scoring methods which yield varying results within the malingering range (e.g., a person could be in extreme distress or merely expressing a need for help and score high on the F-scale on the MMPI-2). Multiple measures such as testing with several instruments, obtaining a detailed client history, and being aware of all possible gains that could be obtained by faking problems, could increase effectiveness in detection. These methods, however, are time-consuming and subjective, and require clinical judgment.

Cognitive techniques such as eye gaze, response time, and pupil dilation are objectively measurable and are difficult to control by examinees. These methods overcome deliberate coaching to provide fake symptoms and also the examinee "learning" psychological or medical problems in order to pretend distress. The TRI-Con approach, coupled with the collection of eye data, is a computerized method for cognitive lie detection. Although still in its infancy, it holds much promise as a more accurate

method for detecting malingering. Precision and accuracy in diagnosing malingering has the potential to prevent financial drain from resources provide a fairer distribution of resources. TRI-Con may replace inaccurate psychological assessments in the future and provide clinicians with a clearer picture of their clients' motivation. The current study utilizes the TRI-Con method to detect malingering, because it is a potentially more reliable method that prevents false positives in the identification of malingerers.

The purpose of this study is to determine if cognitive cues such as response time, eye focus, and pupil dilation can discriminate among rehearsed malingerers, unrehearsed malingerers, and truth-tellers.

Hypotheses

The following Hypotheses will be tested:

Hypothesis 1

Unrehearsed malingerers will display longer response times than rehearsed malingerers who, in turn, will display longer response times than truth-tellers on questions pertaining to their psychological or physical symptoms.

Hypothesis 2

Unrehearsed malingerers will have fewer eye movements when answering questions than rehearsed malingerers who, in turn, will display fewer eye movements than truth-tellers on questions pertaining to their psychological or physical symptoms.

Hypothesis 3

Unrehearsed malingerers will have greater pupil dilations as measured by an eye tracker than rehearsed malingerers who, in turn, will display greater pupil dilations as

measured by an eye tracker than truth-tellers on questions pertaining to their psychological or physical symptoms.

Hypothesis 4

The time required to answer questions will significantly discriminate between unrehearsed malingerers, rehearsed malingerers, and truth-tellers.

Hypothesis 5

Pupil dilation will significantly discriminate between unrehearsed malingerers, rehearsed malingerers, and truth-tellers.

Hypothesis 6

Gaze fixation will significantly discriminate between unrehearsed malingerers, rehearsed malingerers, and truth-tellers.

Hypothesis 7

The combination of response times, pupil dilation, and gaze fixation will provide criteria for categorizations of unrehearsed malingerers, rehearsed malingerers, and truth-tellers significantly better than any of these cues in isolation.

CHAPTER 2

METHOD

The purpose of this study was to determine if cognitive cues, such as response time, gaze fixation as vertical and horizontal eye movements, and pupil dilation can discriminate among rehearsed malingerers, unrehearsed malingerers, and truth-tellers. A questionnaire was developed to collect demographic information from the volunteer participants of this study. A set of four different scenarios was created, providing instructions to respond in accordance with different malingering conditions.

Participants

A total of 108 undergraduate and graduate participants were recruited from psychology courses at a mid-sized southern university in the United States after approval for this research had been obtained from the university's Internal Review Board (IRB). A copy of the IRB approval application packet appears in Appendix A. Attempts were made to recruit an ethnically diverse sample. Of the 108 participants, 37 (34.3%) were male, 70 (64.8%) female, and one response to gender was omitted (.9%). The participants reported 19 different college majors. Age range was from 18 to 60 ($M = 21.278$, $SD = 5.275$). Twenty participants (18.5%) identified themselves as African-American, 81 (75%) as Caucasian-American, one (.9%) as Native-American, three (2.8%) as Latino/Latina/Hispanic, and three (2.8%) as other ethnicity. For religious affiliation, one

(.9%) participant was Atheist, two (1.9%) Jewish, one (.9%) Buddhist, 94 (87%) Christian, two (1.9%) Hindi, and eight (7.4%) other. Forty (37%) of the participants were Freshman, 15 (13.9%) Sophomore, 20 (18.5%) Junior, 15 (13.9%) Senior, and 18 (16.7%) graduate students. For marital status, 99 (91.7%) were single and nine (8.3%) were married. English was the first language for 105 (97.2%) of the participants.

Students were offered extra credit by their instructors in exchange for their participation. An alternative non-research assignment was available for students who did not wish to participate but who wanted to obtain comparable extra credit. All participants were treated in accordance with the *Ethical Principles of Psychologists and Code of Conduct* (American Psychological Association, 2002). All data was held in strict confidence. Students' names were recorded only for extra credit notification to the instructors and were separated from their data. Moreover, the data was reviewed only by the researcher and research assistants.

Instrumentation

Demographic Questionnaire

A demographic questionnaire, developed by the experimenter, was administered. It has eight questions regarding participants' sex, age, ethnicity, religion, student classification (year in school), college major, marital status, and number of children. Participants were instructed to either fill in the blanks or circle the appropriate responses to each item (see APPENDIX B).

Malingering Scenarios and Related Questions

Each of the four malingering scenarios was developed by this researcher, and required participants to adopt different roles. By describing a situation in which

malingering is a viable option for attaining certain advantages or to avoiding unpleasant consequences. The scenarios were written to reflect hypothetical situations that are realistic and could happen to the participants. They involve sustaining an injury at work and having the opportunity to receive unjustified time off after being healed (doctor scenario); missing an exam without a legitimate reason (instructor scenario); recovering from a psychological disability and then having the opportunity of receiving unjustified disability payments (disability scenario), and being involved in a car accident (judge scenario).

In each scenario the main character (role adopted by the participant) is faced with the dilemma of providing honest feedback (truth teller condition) and possibly risking a variety of disadvantages or coming up with convincing deceptive responses (unrehearsed malingering condition, rehearsed malingering condition) and gaining those advantages. Possible hypothetical risks for the truth-tellers entailed: (a) not being able to use earned sick leave for staying at home for additional time after having recovered from a work-related injury; (b) receiving an "F" on a make-up exam resulting in failing a college course, losing financial aid, and experiencing a decrease of the overall GPA; (c) being rejected for disability payments for a recovered psychological illness; and (d) receiving monetary damages for a non-existing physical condition after a car accident during which the main character was psychologically attacked by the guilty party. The scenarios were developed so that individuals from diverse backgrounds could relate to their main character role and would be able to quickly comprehend what is at stake and what advantages could be gained if they could successfully malinger.

Each scenario was followed by a set of eight to nine short questions designed to elicit either yes/no or open-ended responses. For example, a yes/no question from the instructor scenario was "Were you sick?" An example of an open-ended question for the same scenario was "What, if any, were the symptoms of your illness?" According to TRI-Con, yes/no questions and open-ended questions impose different cognitive loads on examinees and should be analyzed separately (Walczyk et al., 2003; Walczyk et al., 2005; Walczyk et al., 2009). Yes/no questions involve recognition memory. For instance, the question "Have you ever been arrested?" provides the target experience that a participant needs only verify or deny by searching memory. Open-ended questions generally require cued recall, a less sensitive memory measure. As an example, "How many times have you been late for my class?", if asked by an instructor, would require the recall and tallying of several separate instances of episodic memories, a potentially time consuming error prone endeavor. The questions were also created for monitoring for consistency of the responses. All of the scenarios had three pairs of sentences that were potentially contradictory for consistency checks. For example, during the judge scenario participants were asked "Did you receive any bodily injuries?" and also "What were your bodily injuries?" This feature allowed the researcher to monitor if participants consistently replied according to their malingering condition and also if they remembered the details of their assumed roles.

The ETL 400 and the Eye Tracking Task

Eye Tracking Laboratory

The ISCAN ETL-400 Tabletop Remote Eye Tracking Laboratory, by ISCAN, Inc. of Burlington, MA, is an integrated research laboratory which collects eye tracking

data in the form of pupil size, eye movements, blinking, corneal reflection, and visual point of regard data of participants in response to presented stimuli. A remote infrared camera was mounted on a pan/tilt platform on a desk facing the examinee. It has the ability to track the participant's head in order to keep the eye in the camera's center field during testing. This camera obtained a clear image of the eye without its illumination being visible to the participant. ISCAN automatically records the data. The system can be adjusted quickly to produce information about point of regard, which is the correlation between raw eye position and the examinee's precise focal point on a computer screen. The obtained data was superimposed in real-time to the eye tracking monitor. Changes in speed of eye movements were recorded during the experiment. Recordings of velocity, response time, and all verbalizations during the experiment were stored on the eye tracking computer. ISCAN allows for quick calibration. The examinee sat in a comfortable chair responding to the pre-recorded questions while the examiner ensured that the procedures are understood and followed.

The TRI-Con approach was used for detecting malingerers because of its potential to provide cognitive lie detection. Although it is an unconventional method in detecting malingering at this time, it might provide greater accuracy and a better differentiation between malingerers and truth-tellers than would be afforded by a cognitive lie detector focused on cognitive cues to deception.

Before answering questions under TRI-Con, each participant's head was positioned on a head stand located approximately two feet in front of a computer screen on which was displaced a tree-lined country scene. The infrared eye scanner was just below the computer screen; about 1.5 feet in front of the participant's face but did not

obstruct his or her view of the screen. Before each round of questions (those for the practice scenario or the four test scenarios), the ETL 400 Infrared Eye Tracker was calibrated (or recalibrated) for the participant. The examiner would ask the participant to look in the top left of the screen, top right, bottom left, and bottom right, while the ETL 400 registered eye position via mouse clicks. For each question, the computer controlling the eye tracker would send a signal over a serial port connected to a second computer that presented the scenario questions and recorded responses digitally using *Audacity*. The eye data would be available for analysis from when a given question was fully asked to when a participant answered the question.

The ETL 400 takes 60 "snapshots" of the eye per second. In each instance, the pupil dilation, point of regard (where on the screen), and other variables were stored in an ASCII file that can be read by other software for analysis. Following calibration, the computer screen, which participants were told to focus on during testing, has a virtual coordinate system of pixels corresponding to where participants are looking on it. The origin is in the upper, left hand corner (horizontal=0, vertical=0). The bottom right has coordinates horizontal=511, vertical=511. Thus, units of pupil dilation and other eye data are expressed in pixels falling within a horizontal and vertical range of 0 to 512. For each question, the time needed to answer bounded the relevant eye data for that question. If it took 1.5 seconds, a total of 90 eye snapshots were available. The median pupil dilation during that time was taken as the measure of pupil dilation. On the advice of personnel at I-Scan, Inc. of Woburn, Massachusetts, manufacturers of the ETC 400, the standard deviations of the horizontal and vertical points of regard while answering a question were calculated and used as the measures of eye movement. Because they are in standard

deviation units, they are also expressed in pixels of movement. Based on previous research, greater pupil dilation and smaller eye movement were interpreted in the present research as indicative of greater cognitive load.

Audacity Software

Audacity, a free, open source recording and editing software, was downloaded for recording the questions and answers of each scenario. Audacity software has been developed by a group of experts and is currently distributed under the GNU General Public License. Audacity digitally records live audio input and converts the auditory information into digital representations which enable users to change the speed or pitch of the recorded files (Audacity Source, 2009).

Audacity allows experimenters to analyze recordings by providing graphic representations of pitch and frequency. For example, silence is represented as a flat line, whereas any type of sound is manifested as waves, their height increasing with volume. The graphics of the program do not discriminate between voice sounds or background noises and register any auditory information graphically.

Response Time Measurement

Each participant's answers to questions were saved in a separate Audacity file. Audacity allows determining the time needed to answer a question to the millisecond level of precision. The software provided a visual metric, much like a meter stick, that measured time visually as the length on the screen between waves. Recordings were also transcribed verbatim, allowing the coding for consistency across inter-related questions and for the presence of filler (utterances that are non-responsive to questions).

Consistency Coding

Walczyk and colleagues (2009) describe inconsistent answers as explicitly or implicitly contradicting previously provided answers or answers that are impossible in reality. For example, if participants replied "Yes" to Question 2 ("Did you receive any bodily injuries?") during the judge scenario, they were also expected to provide a short description of the type of their injuries for Question 4 ("What were your bodily injuries?"), not say "None." If participants provided a "Yes" response to the first question, but were unable to name their injury, it was coded as an instance of inconsistency for this scenario. Consistency requires memorization of the previously asked question and the answer given. Furthermore, inconsistencies provided responses checks on their adherence with the experimental instructions. For example, participants who were asked to malinger and answered "Yes" to Question 7 ("Are you ready to return to work?") during the doctor scenario, were inconsistent with their overall role for their experimental condition. The consistent response would have been "No" because participants were instructed to malinger and gain additional sick leave in order to stay at home (three question pairs as consistency checks for all the scenarios). Inconsistent responses were summed up across scenarios for each participant to give the total number of inconsistencies, which was used in the exploratory analyses. APPENDIX C shows the coding forms indicating the pairs of questions that were inter-related and served as consistency checks.

Filler Coding

Filler is any verbal utterance which is non-responsive to the question. Examples are "uhm" and "ahh." For this study, instances of filler were counted when they preceded

the actual answer, usually prolonging the response time. The instances of such filler were tallied for each of the scenarios. When an answer began with filler, for example, "Uhm, no", "No" was considered the time when the actual answer began. This provided more accurate response times. For the exploratory analysis, instances of filler were summed across the scenarios for each participant.

Procedure

General Procedures for All Conditions

First informed consent was obtained from each participant, and any of their questions were answered. Participants were informed then about their experimental condition by a greeter, which was done randomly. Greeters read to participants instructions appropriate to their conditions. Participants were escorted to the eye tracking laboratory.

A Practice Scenario and practice questions preceded the four test scenarios. Examinees in all three malingering conditions (rehearsed malingering, unrehearsed malingering, truth-telling) all read through the same four test scenarios. What differentiated experimental conditions were their instructions concerning how to respond specifically to the questions. Truth-tellers were instructed to tell the truth to all questions according to their assigned roles; whereas participants in the two malingering conditions were instructed to deceive. The rehearsed malingerers were the only group able to review the questions pertaining to the scenarios and were able to prepare their deceptive answers in advance according to their assigned roles. The other two conditions (unrehearsed malingering, truth-telling) were asked the same questions, but again, without an opportunity to rehearse their responses. Questions to each scenario were designed to elicit

yes/no or short answers, consistent with recommendations for conducting lie detection examinations under TRI-Con (Walczyk et al., 2005). A copy of the scenarios and related questions appears in APPENDIX D. The instructions summarized below make clear the task required of participants in each condition.

Roles of the Greeter and the Examiner

This experiment required two experimenters: (a) a greeter who obtained informed consent, assigned malingering conditions, read instructions, collected information via demographic questionnaires, and debriefed participants (Debriefing Statement see APPENDIX E), and (b) a TRI-Con examiner who started the testing program, calibrated the eye tracker, and monitored eye movements of the participants during the experiment to ensure accuracy of the data. The examiner also read the scenarios to participants as the latter followed along holding a hard copy (Instructions for Greeters appear in Appendix F; Instructions for Examiners appear in APPENDIX G).

Instructions for Truth-tellers, Rehearsed Liars, and Unrehearsed Liars

A general set of instructions provided an overview of the procedures under TRI-Con, an overview of the scenarios, and so forth. A copy appears in Appendix H.

Truth-tellers

Truth-tellers were asked to reply honestly to all questions pertaining to the scenario according to the roles they were asked to adopt in each scenario. They were advised to answer as convincing as possible.

Unrehearsed Malingerers

Unrehearsed malingerers were asked to provide untruthful responses to all questions pertaining to the scenario according to their assigned roles. They were advised

to be as convincing as possible and to fake psychological or physiological distress in order to obtain an advantage or avoid a punishment.

Rehearsed Malingerers

These participants received the exact same instructions from the greeter concerning how to respond that the unrehearsed malingerers did. However, before the testing under TRI-Con for each scenario, participants were given copies of the related questions and were allowed three minutes in which to prepare deceptive answers.

For all three conditions, the scenarios were read slowly by the examiner in the eye tracking laboratory. A hard copy of each scenario was given to the participants so that they could follow along. Questions had been digitally recorded previously and asked after each scenario was read. All answers were digitally recorded. The same procedure was followed for the other three scenarios. The order of the four test scenarios was randomized over participants to control for possible order effects.

Participants wore a microphone headset that was connected to a desktop computer. The microphone was positioned close to the examinee's mouth. The computer recorded answers using Audacity. Participants were seated in a comfortable chair facing away the examiner, who sat at a computer screen controlling the eye tracker. Examiners were also blind to the malingering condition in order to minimize experimental bias.

Data Analysis

This study is a between-subjects design and had 34 participants in the unrehearsed malingering condition, 34 participants in the rehearsed malingering condition, and 40 participants in the truth-telling experimental condition. In order to simplify this complicated data set to an analyzable form, median response times, pupil dilation, and

eye movements were determined for each question type (yes/no, open-ended) within each scenario for each participant. Using the medians of these measures avoided the potentially skewing effects of influential outliers which are common in these kinds of data (Hays, 1994; Walczyk et al., 2009). The data gathering for each question began when the digitally recorded question had been fully asked and was terminated when the participant first began his/her answer. A One-way Analysis of Variance (ANOVA) followed by the Newman-Keuls post-hoc procedure (Hays, 1994) was used to analyze the data. ANOVAS are hypothesis-testing statistical procedures that evaluate mean differences between different experimental conditions (Gravetter & Wallnau, 2004).

In review, for this study, the malingering conditions (Independent Variables) were: (a) truth-telling, (b) rehearsed malingering, and (c) unrehearsed malingering. The measured outcomes (Dependent Variables) were: (a) response times, (b) horizontal eye movement, (c) vertical eye movement, and (c) pupil dilation.

The means for the response times, eye movement data, and pupil dilation for each participant were calculated and analyzed. These means were compared across the three experimental conditions and question types. The purpose of this analysis was to determine if cognitive data differs between truth-tellers and individuals who are malingering. The impact of rehearsal also was analyzed by comparing the data from rehearsed malingerers with that of unrehearsed malingerers and that of truth-tellers.

The initially proposed discriminant analyses could not be conducted due to technical problems with the recording of the eye data and the resulting low numbers of participants in each condition. Thus, it was impossible to have separate calibrations and validation sub-samples.

For Hypotheses 1 through 3, a one-way ANOVA was used to analyze the mean differences in response times, eye gaze (horizontal and vertical eye movements), and pupil dilation between truth-tellers, rehearsed malingerers, and unrehearsed malingerers. Hypotheses 4 through 7 were untestable because, as explained above, the discriminant function analysis was not possible.

Hypothesis 1

Response times were determined for each question from each of the four scenarios and determined to the millisecond precision. Missing data, which occurred due to random technical glitches such as the examiner failing to reactivate the Audacity recorder for a particular question, were excluded from the analysis. This happened infrequently (< 2% of the scores).

Hypothesis 2

Eye gaze was measured by the ETL 400 separately as horizontal eye movement and vertical eye movement and recorded as numerical data. These numbers are expressed in screen pixels and correspond to average eye movements made during the time used to answer each question. The total possible number of pixels horizontally and vertically is 512. Missing data were excluded from analyses (< 2% of the scores).

Hypothesis 3

Pupil dilation was measured and recorded as numerical data by the ETL 400 eye tracker. As with eye movements, pupil dilation was measured in screen pixel units with a possible range from 0 to 512. The data used for each question was the median level of pupil dilation during the time the participant used to answer a given question. Recall that

the ETL 400 takes 60 "pictures" of the eye each second. Again, missing data were not entered (<2% of the scores).

Hypotheses 4 through 7

Hypotheses 4 through 7 concerned using response times, pupil dilation, and gaze fixation (the opposite of eye movements) as cues to deception in K-means discriminate analyses. However, as noted above, technical problems, missing data, and an insufficient number of participants tested resulted in insufficient sample size to support the calibration and validation sub-samples needed to have discriminant functions of sufficient power.

CHAPTER 3

RESULTS

The purpose of this chapter is to present the statistical results of the experiment. The following section provides the means, standard deviations, and total number of participants for each experimental condition for relevant Hypotheses 1-3. Results of exploratory analyses also are provided.

Participants

The sample for this experiment consisted of adult college students ranging in age from 18 to 60 years who were enrolled in undergraduate/graduate college courses at a midsize southern university. A total of 108 participants completed the study. However, due to initial technical problems with the eye tracker, only 90 of these produced successfully recorded eye data (eye movements and pupil dilation), and these comprised the sample used in the data analyses.

Descriptive Statistics

Hypotheses 1 through 3 were tested using the statistical procedure of a 2 x 3 mixed Analysis of Variance (ANOVA). The within-subjects factor was question type with two levels: yes/no, open-ended. The between-subjects factor was the malingering condition with three levels: unrehearsed malingering, rehearsed malingering, and truth-telling. In the significant main effect for malingering condition, the studentized Newman-

Keuls procedure (Hays, 1994) was used to determine those means that were significantly different at alpha of .05. Although no hypotheses specifically concerned question type, it was expected based on past research that yes/no questions would entail shorter response times and less cognitive load (less pupil dilation; more eye movement) than open-ended questions (Walczyk et al., 2003; Walczyk et al., 2005; Walczyk, Mahoney, Doverspike, & Griffith-Ross, 2009). Effect sizes in the form of eta squared ($\acute{\eta}^2$) are reported for all significant main or interactive effects.

Results for Hypotheses

Hypothesis 1

Unrehearsed malingerers will display longer response times than rehearsed malingerers who, in turn, will display longer response times than truth-tellers on questions pertaining to their psychological or physical symptoms.

Means and standard deviations for response times are reported in Table 1 by scenario, question type, and condition. Regarding the doctor scenario, a significant main effect was found for question type, $F(1, 104) = 76.552$, $p = .000$, $\acute{\eta}^2 = .424$. There were significantly longer response times for open-ended questions than for yes/no questions, replicating previous research (e.g., Walczyk et al., 2009). There also was a significant main effect for the malingering condition, $F(2, 104) = 3.411$, $p = .037$, $\acute{\eta}^2 = .062$. The Newman-Keuls post-hoc procedure revealed a significant difference only between truth-tellers and unrehearsed malingerers. The experimental condition x question type interaction also was significant, $F(2, 104) = 7.317$, $p = .001$. It can be seen in Table 1 that responses to yes/no questions are similar across malingering conditions. For open-ended questions, however, there is a large difference between malingerers and truth-tellers.

Open-ended questions provided the best cues to deception. Hypothesis 1 was partially supported in this case.

A significant main effect was found for question type in the instructor scenario, $F(1, 102) = 89.752, p = .000, \acute{\eta}^2 = .468$. There were significantly longer response times for open-ended questions. There was no significant main effect for the malingering condition, $F(2, 102) = 1.767, p = .176$, however, the malingering condition x question type interaction was significant, $F(2, 102) = 4.675, p = .011$. Larger differences between unrehearsed malingerers and truth-tellers were observed for open-ended than yes/no questions (see Table 1). Hypothesis 1 was not supported in this case.

For the disability scenario, a significant main effect was again found for question type, $F(1, 104) = 92.241, p = .000, \acute{\eta}^2 = .470$. There were significantly longer response times for open-ended questions. However, there was no significant main effect for experimental condition, $F(2, 104) = 1.865, p = .160$, nor was the malingering condition x question type interaction significant, $F(2, 104) = .023, p = .977$. Hypothesis 1 was not supported in this instance.

Regarding the judge scenario, a significant main effect was again found for question type, $F(1, 104) = 25.599, p = .000, \acute{\eta}^2 = .198$. There also were significantly longer response times for open-ended questions. Furthermore, there was a significant main effect for malingering condition, $F(2, 104) = 8.396, p = .000, \acute{\eta}^2 = .139$. The Newman-Keuls post-hoc procedure revealed significant differences between truth-tellers and unrehearsed malingerers as well as between truth-tellers and rehearsed malingerers. The malingering condition x question type interaction also was significant, $F(2, 104) = 2.396, p = .096, \acute{\eta}^2 =. 044$. Examination of means from Table 1 reveal large

differences for open-ended questions only, and smaller differences for the yes/no questions. Hypothesis 1 was partially supported in this case.

Table 1

Summary Statistics for Response Times by Question Type, Scenario, and Malingering Condition

Question Type	Malingering Condition								
	Truth Tellers			Unrehearsed Malingerers			Rehearsed Malingerers		
	M	SD	N	M	SD	N	M	SD	N
Yes/No Response Times									
Doctor	.851	.237	40	.937	.399	34	.931	.338	33
Instructor	1.073	.347	40	1.020	.301	34	.877	.331	31
Disability	.793	.258	40	.934	.350	34	.838	.233	33
Judge	.792	.314	40	1.160	.555	34	.916	.307	33
Open-ended Response Times									
Doctor	.942	.314	40	1.241	.457	34	1.164	.392	33
Instructor	1.268	.443	40	1.458	.492	34	1.287	.347	31
Disability	1.036	.274	40	1.179	.522	34	1.070	.379	33
Judge	.976	.332	40	1.245	.407	34	1.203	.353	33

Hypothesis 2

Unrehearsed malingerers will have fewer eye movements when answering questions than rehearsed malingerers who, in turn, will display fewer eye movements than truth-tellers on questions pertaining to their psychological or physical symptoms.

Summary statistics for horizontal eye movements appear in Table 2 by malingering condition, scenarios, and question type. The next four analyses concerned the horizontal eye movement data. For the doctor scenario, a significant main effect was found for question type, $F(1, 61) = 9.015$, $p = .004$, $\acute{\eta}^2 = .129$. There was significantly greater horizontal eye movement for yes/no questions, which suggested lower cognitive load, consistent with expectations. However, there was no significant main effect for the malingering condition, $F(2, 61) = .977$, $p = .382$, nor was the malingering condition x question type interaction significant, $F(2, 61) = .459$, $p = .634$. Hypothesis 2 was not supported in this case.

A significant main effect was found for question type for the instructor scenario, $F(1, 84) = 36.630$, $p = .000$, $\acute{\eta}^2 = .304$. Significantly greater horizontal eye movement for open-ended questions was found, the opposite of what was found in the doctor scenario, and inconsistent with expectations (Walczyk et al., 2005). However, there was no significant main effect for experimental condition, $F(2, 84) = .050$, $p = .951$. The experimental condition x question type interaction also was not significant, $F(2, 84) = .088$, $p = .916$. Hypothesis 2 was not supported.

In the disability scenario, a significant main effect was found for question type, $F(1, 84) = 5.890$, $p = .017$, $\acute{\eta}^2 = .066$. As for the instructor scenario, there was significantly greater horizontal eye movement for open-ended questions, contrary to

expectations. There was no significant main effect for malingering condition, $F(2, 84) = 1.952$, $p = .148$, nor was the malingering condition x question type interaction significant, $F(2, 84) = .152$, $p = .634$. Hypothesis 2 was, again, not supported.

Regarding the judge scenario, no significant main effect was found for question type, $F(1, 84) = .550$, $p = .461$, contrary to the other scenarios. There was no significant difference in horizontal eye movement between yes/no and open-ended questions. There was no significant main effect for malingering condition, $F(2, 84) = .488$, $p = .616$. The malingering condition x question type interaction also was not significant, $F(2, 84) = 2.277$, $p = .109$. Hypothesis 2 was not supported here as well. Overall, the pattern of results across the scenarios was a lack of support for Hypothesis 2 with the horizontal eye movement data.

Table 2

Summary Statistics for Horizontal Eye Movements by Question Type, Scenario and Malingering Condition

	Malingering Condition								
Question Type	Truth Tellers			Unrehearsed Malingerers			Rehearsed Malingerers		
	M	*SD*	*N*	*M*	*SD*	*N*	*M*	*SD*	*N*
Yes/No									
Horizontal Eye Movement									
Doctor	62.164	25.949	25	54.279	32.610	20	71.557	38.770	19
Instructor	52.321	38.674	35	49.543	39.565	26	52.567	30.944	26
Disability	60.230	36.989	34	48.971	37.047	26	66.312	39.634	27
Judge	61.495	39.328	34	60.121	41.441	26	72.648	34.414	27
Open-ended									
Horizontal Eye Movement									
Doctor	52.867	28.207	25	47.349	34.558	20	56.378	36.171	19
Instructor	72.875	39.305	35	69.998	41.275	26	70.151	34.452	26
Disability	66.417	34.165	34	52.908	37.396	26	73.506	38.400	27
Judge	68.380	39.659	34	61.532	40.697	26	68.977	33.059	27

Summary statistics for the vertical eye movement data are provided in Table 3. Regarding the doctor scenario, a significant main effect occurred for question type, $F(1, 61) = 8.686, p = .005, \acute{\eta}^2 = .125$. There was significantly greater vertical eye movement for yes/no questions, just as occurred with the doctor scenario with horizontal eye movement. Again, this was expected. However, there was no significant main effect for the malingering condition, $F(2, 61) = .920, p = .404$. The malingering condition x question type interaction was not significant, $F(2, 61) = 1.445, p = .244$. Hypothesis 2 was, again, not confirmed.

In the instructor scenario, a significant main effect was found for question type, $F(1, 84) = 33.807, p = .000, \acute{\eta}^2 = .287$. There was significantly greater vertical eye movement for open-ended questions, again, inconsistent with the doctor scenario and inconsistent with expectations of greater cognitive load with open-ended questions. However, there was no significant main effect for malingering condition, $F(2, 84) = .178$, $p = .837$. Again the malingering condition x question type interaction was not significant, $F(2, 84) = .232, p = .794$. Hypothesis 2 was not supported in this scenario.

A significant main effect was found for question type for the disability scenario, $F(1, 84) = 5.664, p = .020, \acute{\eta}^2 = .063$. There was significantly greater vertical eye movement for open-ended questions, contrary to expectations. The main effect for malingering condition was not significant, $F(2, 84) = 1.388, p = .255$, as was the malingering condition x question type interaction, $F(2, 84) = .621, p = .540$. Again, Hypothesis 2 was not supported.

For the judge scenario, a significant main effect also was found for question type, $F(1, 84) = 4.846, p = .030, \acute{\eta}^2 = .055$. There were significantly greater vertical eye

movements for open-ended questions, contrary to expectations. However, there was no significant main effect in the malingering condition, $F(2, 84) = .964$, $p = .386$, nor for the malingering condition x question type interaction, $F(2, 84) = .957$, $p = .388$. Hypothesis 2, again, was not supported. As with the horizontal eye movement data, the overall pattern with of the vertical eye movement data provides no support for Hypothesis 2.

Table 3

Summary Statistics for Vertical Eye Movement by Question Type, Scenario and Malingering Condition

	Malingering Condition								
Question Type	Truth Tellers			Unrehearsed Malingerers			Rehearsed Malingerers		
	M	*SD*	*N*	*M*	*SD*	*N*	*M*	*SD*	*N*
Yes/No									
Vertical Eye Movement									
Doctor	59.076	28.733	25	55.036	34.667	20	74.909	44.833	19
Instructor	48.010	34.200	35	42.465	31.712	26	49.933	32.580	26
Disability	56.679	33.185	34	46.892	36.469	26	62.522	43.338	27
Judge	54.165	32.287	34	55.859	39.891	26	67.591	35.226	27
Open-ended									
Vertical Eye Movement									
Doctor	52.447	26.657	25	50.058	34.459	20	56.608	38.611	19
Instructor	64.914	33.343	35	63.016	34.101	26	65.378	39.190	26
Disability	58.533	30.114	34	52.329	36.571	26	69.484	42.994	27
Judge	61.937	32.750	34	58.507	38.053	26	69.774	35.364	27

Hypothesis 3

Unrehearsed malingerers will have greater pupil dilations as measured by an eye tracker than rehearsed malingerers who, in turn, will display greater pupil dilations as measured by an eye tracker than truth-tellers on questions pertaining to their psychological or physical symptoms.

Means and standard deviations for pupil dilation can be found in Table 4. In the doctor scenario, no significant main effect was found for question type, $F(1,61) = 1.043$, $p = .311$. In other words, there was no significant difference in pupil dilation between yes/no and open-ended questions, contrary to expectation. There was no significant main effect for malingering condition, $F(2,61) = .038$, $p = .963$. Also, the experimental condition x question type interaction was not significant, $F(2,61) = .739$, $p = .482$. Hypothesis 3 was not supported in the doctor scenario.

A significant main effect was found for question type for the instructor scenario, $F(1,85) = 42.191$, $p = .000$, $\eta^2 = .332$. There was significantly greater pupil dilation for open-ended questions, which makes sense given their expected greater cognitive load. However, there was no significant main effect for the malingering condition, $F(2,85) = .270$, $p = .764$. Finally, the malingering condition x question type interaction was nonsignificant, $F(2,85) = .135$, $p = .874$. Hypothesis 3 was not supported.

A significant main effect was found in the disability scenario for question type, $F(1,86) = 4.892$, $p = .030$, $\eta^2 = .054$. As expected, there was significantly greater pupil dilation for open-ended questions. However, there was no significant main effect for the malingering condition, $F(2,86) = .088$, $p = .916$. Also, the malingering condition x

question type interaction was non-significant, $F(2, 85) = 1.657$, $p = .197$. Hypothesis 3 again was not supported.

No significant main effect was found for question type in the judge scenario, $F(1, 86) = 1.876$, $p = .174$. There was no significant difference in pupil dilation between yes/no and open-ended questions, nor was there a significant main effect in the malingering condition, $F(2, 86) = .383$, $p = .683$. Not surprisingly, the malingering condition x question type interaction nonsignificant, $F(2, 86) = 1.153$, $p = .320$. Hypothesis 3 was not supported for this scenario. Across the four scenarios, there is no support for the hypotheses that malingering entails more pupil dilation than truth-telling or that rehearsal lowers cognitive load.

Table 4

Summary Statistics for Pupil Dilation by Question Type, Scenario and Malingering Condition

Question Type	Malingering Condition								
	Truth Tellers			Unrehearsed Malingerers			Rehearsed Malingerers		
	M	SD	N	M	SD	N	M	SD	N
Yes/No Pupil Dilation									
Doctor	69.124	14.144	25	70.775	18.184	20	69.586	12.585	19
Instructor	59.175	19.459	35	60.887	22.560	27	63.194	21.534	26
Disability	67.267	14.788	35	68.637	15.441	27	68.382	12.724	27
Judge	66.929	14.255	35	68.328	11.106	27	69.417	12.520	27
Open-ended Pupil Dilation									
Doctor	69.432	14.613	25	69.829	15.967	20	68.713	12.337	19
Instructor	70.384	15.278	35	72.118	15.635	27	72.573	12.703	26
Disability	68.746	15.404	35	70.343	14.660	27	68.195	13.183	27
Judge	66.870	15.570	35	69.953	13.309	27	69.789	11.791	27

Hypothesis 4

The time required to answer questions will significantly discriminate between unrehearsed malingerers, rehearsed malingerers, and truth- tellers.

As noted above, discriminant functions for a calibration and validation samples could not be estimated due to insufficient sample size, thus Hypotheses 4 through 7 could not be tested.

Hypothesis 5

Pupil dilation will significantly discriminate between unrehearsed malingerers, rehearsed malingerers, and truth-tellers.

As noted above, discriminant functions for a calibration and validation samples could not be estimated due to insufficient sample size, thus Hypotheses 4 through 7 could not be tested.

Hypothesis 6

Gaze fixation will significantly discriminate between unrehearsed malingerers, rehearsed malingerers, and truth-tellers.

As noted above, discriminant functions for a calibration and validation samples could not be estimated due to insufficient sample size, thus Hypotheses 4 through 7 could not be tested.

Hypothesis 7

The combination of response times, pupil dilation, and gaze fixation will provide criteria for categorizations of unrehearsed malingerers, rehearsed malingerers, and truth-tellers significantly better than any of these cues in isolation.

As noted above, discriminant functions for a calibration and validation samples could not be estimated due to insufficient sample size, thus Hypotheses 4 through 7 could not be tested.

Exploratory Analysis

The following exploratory analyses were conducted. No specific hypotheses were put forth in the introduction concerning these analyses, however, contradictions across questions and filler have been proposed as possible cues to deception (Walczyk et al., 2003; Walczyk et a., 2005; Walczyk et a., 2009). A one-way ANOVA was used for the exploratory analyses.

No significant main effect was found for filler in the malingering condition, $F(2, 105) = 1.159$, $p = .318$, however, significant main effects were found for inconsistencies, $F(2, 105) = 4.732$, $p = .011$. Surprisingly, participants in the truth-telling condition had significantly more inconsistencies than the unrehearsed and rehearsed malingerers. Means, standard deviations, and numbers of participants for each experimental condition for inconsistencies and filler appear in Table 5.

Table 5

Summary Statistics for Filler and Inconsistencies by Malingering Condition

	Malingering Condition								
	Truth Tellers			Unrehearsed Malingerers			Rehearsed Malingerers		
	M	SD	N	M	SD	N	M	SD	N
Total Filler	.925	2.759	40	1.971	4.210	34	1.088	2.021	34
Total Inconsistencies	1.075	2.093	40	.265	.994	34	.148	.558	34

Summary of Results

Means, standard deviations, and effect sizes for response times, horizontal eye movements, vertical eye movements, and pupil dilation were calculated for each question type (yes/no, open-ended) and malingering condition (truth-tellers, rehearsed malingerers, unrehearsed malingerers) by using a mixed-model ANOVA. The studentized Newman-Keuls procedure (Hays, 1994) was used to determine means that were significantly different at an alpha of .05 in the case of the malingering condition.

Findings from the study partially supported Hypothesis 1 because response times differed significantly for malingering conditions across two of the four scenarios (doctor and judge). As predicted, truth-tellers had significantly shorter response times than both groups of malingerers. However, the hypothesized significant difference between rehearsed and unrehearsed malingerers was not found. Therefore, rehearsal did not have a significant impact on response time.

Horizontal eye movements did not differ significantly across malingering conditions. Hypothesis 2 predicted that truth-tellers would have significantly more eye movement than rehearsed malingerers, who in turn would have significantly more eye movement than the unrehearsed malingerers. High levels of eye movement indicate less of a cognitive load (Walczyk et al., 2003; Walczyk et al., 2005; Walczyk, Mahoney, Doverspike & Griffith-Ross, 2009). Therefore, the horizontal eye movement data does not support Hypothesis 2. The vertical eye movements also failed to support Hypothesis 2 with no significant differences of vertical eye movements across the malingering conditions.

Similar to the eye movement, pupil dilation failed to support previous findings that increases in pupil dilation due to increased cognitive load occurs due to deception. No significant differences in pupil dilation were found across the malingering conditions. Hypotheses 4 through 7 could not be tested because of the inability to perform a discriminant analysis. The overall findings of the study suggest that response time is the best cognitive cue of malingering. However, response time fails to discriminate between rehearsed and unrehearsed malingering.

Filler and inconsistencies were counted for each malingering condition. Whereas no significant difference was found for the frequency of filler in each condition, there were significantly more inconsistencies for truth-tellers than for malingerers. This surprising finding, among others, will be interpreted in the discussion that follows.

CHAPTER 4

DISCUSSION

The purpose of this experiment was to explore whether or not cognitive data (response time, eye gaze, and pupil dilation) can provide significant discrimination between individuals who are telling the truth, individuals who have rehearsed their malingering, and individuals who malinger without the possibility for rehearsal. The independent variables for this experimental design were the three treatment conditions: (a) truth-telling, (b) unrehearsed malingering, and (c) rehearsed malingering. The dependent variables were the cognitive cues for detecting malingering: (a) response time, (b) horizontal eye movements, (c) vertical eye movements, and (d) pupil dilation. Differences based on answer type (yes/no versus open-ended) also were examined. Exploratory analysis focused on the relationship between experimental condition and the number of inconsistent responses. Another exploratory analysis was conducted in order to determine relationships between experimental condition and the number of initial filler used by the participants.

The following discussion of this experiment begins with an overall description of the research. Then, the seven proposed hypotheses are discussed separately and interpreted. Two types of exploratory analyses will be described and interpreted before providing an overall discussion of the results. The final portion of this chapter is

dedicated to suggestions for further research in this area and identifying limitations of this experiment.

Overview

The purpose of this experiment was the development of a research model in order to explore the effectiveness of cognitive cues for the detection of malingering. Cognitive cues were chosen because they provide an observable measure of cognitive load which differs depending on the demands placed on memory and overall thought processes. Truth-tellers are assumed to have a smaller cognitive load because they search their memory for existing factual information whereas individuals who answer deceptively have an increased cognitive load due not only to having to search their memory for the existing truthful response but also having to create new information that alters the truth. Rehearsal of deception is supposed to decrease the cognitive load because these individuals have the opportunity to prepare their answers and store this new information in memory for later retrieval, however, it their cognitive load is still larger than that of truth-tellers.

The current malingering study found partial support for previous research studying cognitive data in the context of lie detection. Response times were analyzed across the three different malingering conditions and also across question type (yes/no versus open-ended). Whereas response time was found to partially differentiate between malingerers and truth-tellers, it failed to provide this differentiation across all question types. It also failed to differentiate between rehearsed and unrehearsed malingerers. Eye gaze was measured as horizontal and vertical eye movements and also was analyzed across the malingering conditions and the question type. This cognitive measure did not

provide significant differences between the malingering groups. Another type of cognitive data that failed to provide significant identification of each malingering condition was pupil dilation. The following conclusions provide an interpretation of the results for each of the seven hypotheses.

Conclusion

A discussion of each of the first three hypotheses will follow. Hypotheses 4 through 7 could not be further investigated due to technical problems with the study and a resulting sample size that was too small for discriminant analyses. Therefore, the discussion will focus separately on Hypotheses 1 through 3 and report exploratory findings.

Interpretation of Hypothesis 1

In the first hypothesis, unrehearsed malingerers were predicted to display longer response times than rehearsed malingerers, who in turn, would display longer response times than truth-tellers on questions pertaining to their psychological or physical symptoms. This hypothesis was partially supported because response times for half of the scenarios were significantly longer for malingerers than truth-tellers. However, no significant differences were found between rehearsed and unrehearsed malingerers. Due to the design of this study, truth-tellers may have had similar cognitive schemata during the scenarios because they had to pretend to be truth-tellers. Walczyk and colleagues (2005) stated that individuals with well-integrated schemata in their memory are able to respond faster. In other words, actual truth-tellers who store factual information in their episodic memory can retrieve this knowledge faster than individuals who have to make up information.

The results from the response data only partially confirmed previous research which found that deception increases cognitive demands, in other words, create a greater cognitive load, which can be measured by analyzing response times and eye data (Vendemia Buzan & Simon-Dade, 2005; Vrij, Fisher, Mann, & Leal, 2006; Walczyk, et al., 2005; Zuckermann, DePaulo, & Rosenthal, 1981). However, the findings did not confirm that rehearsal has a significant impact on response time. Response times for rehearsed and unrehearsed malingerers did not differ significantly. This finding contradicts previous research in which practicing a deceptive response was found to significantly decrease response time (DePaulo et al., 2003; Walczyk et al., 2009).

Interpretation of Hypothesis 2

In the second hypothesis, it was predicted unrehearsed malingerers would have fewer eye movements when answering questions than rehearsed malingerers who, in turn, would display fewer eye movements than truth-tellers on questions pertaining to their psychological or physical symptoms. Eye movements also described as eye gaze indicates the level of cognitive load. Individuals who place large demands on their cognitive functioning display fewer eye movements than individuals with smaller cognitive loads (Doherty-Sneddon et al., 2002; Glenberg, Schroeder & Robertson, 1998).

Eye movements were examined in the current study by two different measures: horizontal and vertical movements. None of the eye movement data supported Hypotheses Two. There was no significant difference between the malingering conditions. Therefore, eye movement did not provide a cue for detecting malingering nor did it differentiate between rehearsed and unrehearsed malingerers.

The eye movement data contradicted previous research findings (Doherty-Sneddon et al., 2002; Glenberg, Schroeder & Robertson, 1998). However, previous research also suggests that an intentional change in eye gaze or eye movements may result in the opposite effect. Ekman & Friesen (1969) reported that liars are frequently aware of their eye contact being observed, and they may intentionally change their eye movements in order to avoid direct eye contact. In the current study, all malingering groups were instructed to answer in a believable way which might have encouraged them to change their eye movements. Compared to the other cognitive data, eye movement seems to be the one set of cues that is easily manipulated by individuals, whereas response time and pupil dilation take place on a less voluntary basis.

As mentioned previously, the research design created pretend situations for all malingering groups. Essentially, the truth-tellers also were faced with additional cognitive loads because they had to accurately remember their truthful situation. Overall, the eye movement data did not provide reliable differentiation between all three conditions.

Interpretation of Hypothesis 3

In Hypothesis 3, unrehearsed malingerers were predicted to have greater pupil dilations, as measured by an eye tracker than rehearsed malingerers, who in turn, would display greater pupil dilations than truth-tellers on questions pertaining to their psychological and physical symptoms. An increase in cognitive load is reflected in an increase in pupil dilation (Beatty, 1982; Beatty & Lucero-Wagoner, 2000; Granholm, Asarnow, Sarkin & Dykes, 1996; Van Gerven, Paas, Van Merrienboer & Schmidt, 2004). Therefore, truth-tellers who are assumed to have the smallest cognitive load would have

less pupil dilation than rehearsed malingerers who in turn would have less pupil dilation than unrehearsed malingerers. As with the eye movement data, however, pupil dilation did not provide significant differentiation between the malingering conditions. Again, this may be due to the fact that all of the malingering groups had a similar level of cognitive load due to having to learn and remember their roles and situational contexts. Therefore, Hypothesis 3 was not supported by the findings of the current study.

Interpretation of the Exploratory Data

Although not hypothesized, other factors were analyzed for significance across malingering conditions. First, inconsistencies were summed up across the scenarios in order to determine significant differences among the three malingering conditions. Previous research has indicated that inconsistencies are significantly more prevalent in situations that increase cognitive load (DePaulo et al., 2003; Vrij el al, 2000). Therefore, truth-tellers should have had significantly fewer inconsistencies than rehearsed malingerers, who in turn, should have had significantly fewer inconsistencies than unrehearsed malingerers. It was interesting to note that truth-tellers had significantly more inconsistencies than unrehearsed and rehearsed malingerings. This may be due to truth-tellers being actually in a pretend situation and having difficulty remembering their "pretend" truth. The other two conditions were not significantly different from each other, and this finding failed to support previous research.

Second, instances of fillers were summed up across malingering conditions. These nonresponsive utterances were counted only when preceding the actual answer, which would have prolonged the response time. No significant differences were found for filler across the malingering conditions.

Third, questions were divided into yes/no or open-ended types and separately analyzed. Whereas yes/no questions entail recognition memory and provide participants with information which they can either deny or confirm, open-ended questions involve cued recall and provide opportunities for a variety of different responses. Open-ended questions place larger demands on cognitive functioning, thereby increasing an individual's cognitive load (Anderson, 2000; DePaulo et al., 2003; Walczyk et al., 2009). Due to the differences in cognitive load for each question type, the data were analyzed separately. Although open-ended questions seemed to create higher cognitive loads as evidenced by findings from the response time analysis (significantly longer response times for all four scenarios) and this is partially confirmed by the analyzed pupil dilation (more pupil dilation for half of the scenarios, whereas the other half showed no difference between question type), the eye movement data provided mixed findings. During the doctor scenario especially, participants showed significantly greater vertical eye movements for yes/no questions, whereas their eye movements for the other scenarios was increased for open-ended questions. This contradicts the assumption that open-ended questions elicit a higher cognitive load. Possible explanations include the idea that it was more difficult to answer yes/no questions. For example, during the instructor scenario, one of the yes/no questions is "Did you miss the test for a good reason?" This question might have elicited additional cognitive demands. Although participants are aware of why they missed the test, they may not be ready to classify their reason as good. Another explanation could be that three of the four scenarios start with yes/no answers and participants may experience initial problems assuming their malingering role.

Implications

Human manipulation in the form of malingering has complex sources and motivations, and has resulted in a waste of financial and human resources. Due to problems with inaccurate identification of malingering, society continues to be burdened by individuals who make false claims or exaggerate existing physical or psychological problems (Mischoulon, 1999; Pollack & Graney, 1984; Singh et al., 2007). One way of attempting to more accurately expose malingering is the exploration of more objective, factual data that rely less on clinical experience and judgment than do the traditional methods of detection. In particular, cognitive research has focused on the differences in brain functioning when faced with the decision to tell the truth or to deceive (Baker, Stern & Goldstein, 1990; Gombos, 2006; Phan et al., 2005; Spence et al., 2001; Vrji et al., 2006; Walczyk et al., 2003, Walczyk et al., 2005., Walczyk et al., 2009; Zuckerman et al., 1981). Response times, eye movements, and pupil dilation have been measured for differentiating between liars and truth-tellers (Beatty & Lucerno-Wagoner, 2000; Van Gerven et al., 2000; Walczyk et al., 2003, Walczyk et al., 2005; Walczyk et al., 2009,; Zuckerman et al., 1981). Furthermore, the differences between response types (yes/no or open-ended) and their impact on cognitive data have been explained in previous research (Anderson, 2000; DePaulo et al., 2003; Walczyk et al., 2009). Other studies have identified the impact of rehearsing on deceptive responses (DePaulo et al., 2003; Walczyk et al., 2009).

Findings from the current study suggest that response times differ between individuals who are asked to tell the truth and individuals who are asked to malinger, and a significant difference was noted between these two conditions and the rehearsal of

malingering conditions. None of the eye data was able to significantly differentiate between the malingering conditions.

Additional measurements that were not part of the hypotheses, and which are useful for exploratory analysis only, also provided important information. Questions had been divided into triggering yes/no and open-ended responses. The findings indicate that cognitive load increases with open-ended questions during the majority of the scenarios. Response time measures confirmed these assumptions. However, the eye movement data provided mixed results. Pupil dilation data only partially confirmed the assumption of cognitive load increasing when a more elaborate response is demanded.

Additional exploratory analysis focused on measuring differences in filler and inconsistencies by malingering condition. Whereas the analysis of filler did not provide significant results, inconsistencies were found to be more prevalent for truth-tellers than for any of the other malingering groups. This may be due to the design of the study. All malingering conditions are essentially based on pretense, even in the truth-telling group. Therefore, having more instances of filler may indicate the difficulties individuals had in remembering the truthful event as previously instructed. Malingerers may feel more freedom to elaborate in order to make up information according to their malingering condition, and they may have fewer restrictions that trigger inconsistencies.

Limitations

The current study had a number of limitations that may have influenced its results. One of the limitations was the participant sample. As frequently experienced in research within university settings, the sample consisted of a fairly homogeneous group of college students. Although ranging in age from 18 to 60 years, the average age for this sample

was 21 years. The majority of the sample was female (70%) and Caucasian-American (75%). Another limitation with college samples is that their educational level is typically above the average education of the general population. Therefore, any generalization of the results must be done with caution.

Another limitation of this research was the actual research design. Although the experimental conditions were divided into truth-tellers, rehearsed malingerers, and unrehearsed malingerers, all treatment conditions entailed pretending. In particular, truth-tellers were not actually responding with an actual truthful response because it was only the truth they were instructed to remember. The additional demand of searching memory for the pretend information for each scenario does not reflect the actual cognitive load of individuals who have to search their memory for factual information based on their own episodic memory.

Furthermore, the technical aspects of this study may have impacted the results. Although, Audacity provides various advantages for digitally recording, replaying, and analyzing auditory data, its indiscriminant recordings and registering of random sounds may have contributed to inaccurate measurement of the data. Various background noises, such as moving chairs, opening doors, and coughing were registered as sounds and manual analysis of the data was necessary in order to determine the actual response times. Due to background noises, the graphic display of data was inaccurate for recording the actual end of the question as a beginning point for the response time. Some of the participants also had filler or premature peeps from the software, such as registering a cough as the answer. Therefore, manual analysis of the recordings and calculations of

response times was necessary. Due to the nature of human imprecision and differences in auditory awareness for sounds, the measured response times might lack precision.

Another limitation of this study is that it had several technical errors that impacted the data. During the initial part of the study, problems with recording eye data resulted in 18 cases not having any eye data recorded. Other technical problems included questions that occasionally were omitted resulting in missing data and instructions that were read in the wrong order during several cases. During those instances, the experimenter had to redirect participants to the actual instructions for each scenario.

Another problem in the experiment was the impact of noise disturbances during the study. Not having a soundproof laboratory created various distracting background noises that may have influenced participants' responses and made it difficult to filter out the actual responses during the manual transcription and analysis of response times.

Future Research Suggestions

The current experiment analyzed various cognitive cues in order to increase effectiveness and accuracy for the detection of malingering. However, due to the lack of an authentic malingering context in which participants were told to actually tell the truth or malinger, further research may benefit from creating more realistic contexts for studying malingering. For example, healthy participants could be asked to tell the truth about their intact health with comparison groups of participants who are instructed to make up convincing symptoms of non-existing illnesses without the context of pre-imposed scenarios. This would eliminate the impact of having to search their memory for information about pretend contexts. Although this does not provide for monitoring

consistent with the experimental condition, the outcome data may provide significant findings.

Another research suggestion is to use participants from populations which represent the general population. University research samples provide various limitations in order to generalize research findings to the general population. Having a more heterogeneous sample that is more representative of the U.S. population may change the outcomes of studies of malingering.

The rehearsed and unrehearsed experimental groups were instructed to make up feasible responses about non-existing psychological or physical illnesses. Additional research suggestions are to instruct individuals with actual minor psychological and physical problems and instruct them to exaggerate. This may reflect the actual problem of malingering in which individuals suffer from a mild level of distress but report a higher level in order to gain certain advantages. They may not have to increase their cognitive load as much as individuals who have to come up with novel information which is not available in their memory.

Another research suggestion is to monitor the technical aspects of cognitive studies. The previously discussed technical problems may have contributed to the inaccuracy of some data. Therefore, multiple measures of response sets in settings free from disturbances may increase the accuracy of malingering research.

Another suggestion for future research is to sample individuals who admit to previous incidents of malingering, and to study their motivational factors, preparations for malingering, and concerns about appearing truthful. This may provide preventive measures and assist in decreasing instances of malingering.

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APPENDIX A

HUMAN USE COMMITTEE APPROVAL FORM

Human Use Committee Review

DEPARTMENT HEAD APPROVAL FORM

TO: Project Directors

FROM: Barbara Talbot, Office of University Research
btalbot@latech.edu
318-257-5075 phone
318-257-5079 fax
http://research.latech.edu/

SUBJECT: HUMAN USE COMMITTEE REVIEW

DATE: June 2008

Please submit this page signed by your Department Head or Dean when submitting a proposal to the Human Use Committee for expedited approval. Their signature is stating that they are aware of this proposal and/or survey that is being conducted.

(print or type below)

Department

Psychology & Behavioral Sciences

Department Head Name

Tilman Sheets

_____ _____

Signature
(Actual original signature required)

Date

Do you plan to publish this study?
X YES ☐NO
Will this study be published by a national organization?
☐YES X NO
COMMENTS:

STUDY/PROJECT INFORMATION FOR HUMAN SUBJECTS COMMITTEE

Describe your study/project in detail for the Human Subjects Committee. Please include the following information.

TITLE: Detecting Malingering via Cognitive Cues to Deception

PROJECT DIRECTOR(S): Birgit Smart, Jeffrey J. Walczyk, Mary-Ann Goodwyn, Tony Young

EMAIL: bms013@latech.edu
PHONE: 318-257-4315

DEPARTMENT(S): Psychology and Behavioral Sciences

PURPOSE OF STUDY/PROJECT: To test and refine cognitive cues to deception that may differ in individuals who malinger with or without rehearsal from truth tellers. The cognitive cues are eye gaze (focus), response time, and pupil dilation. Results of this study might contribute to the development of more reliable and precise indicators that inform about a person's veracity when incentives for malingering are present.

PARTICIPANTS: About 90 undergraduate and graduate students of Louisiana Tech University

PROCEDURE: Participants will be asked to participate in one experiment in which they will either malinger without rehearsal, malinger with rehearsal, or tell the truth. The experiment will involve imagined scenarios which are possible situations that can happen in students' lives. Students will be asked to adopt the role of each scenario and answer questions. Eye tracking technology will be used to assess eye movement data, such as pupil dilation and gaze. Response time will also be collected from each participant. Specifically, a camera mounted in front of each participant during individual testing will rapidly take pictures of his/her eyes. Recordings will allow researchers to assess what participants are looking at on a computer screen. Recordings will later be scored for retinal

dilation, gaze aversion, and other indices thought to be correlated with the act of malingering.

SUPPLEMENTAL INFORMATION REQUESTED OR OTHER CHANGES by IRB Committee

1. How and where will subjects be recruited?

Subjects will be recruited from undergraduate and graduate psychology classes at Louisiana Tech University.

What will they be told?

They will be told that the goal of the study is to identify cognitive cues of deception that differ between truth tellers, rehearsed malingerers, and unrehearsed malingerers. The students will be told that their eye movements, such as gaze and dilation, and response time will be measured. NO DECEPTION WILL BE INVOLVED IN THIS EXPERIMENT REGARDING ITS PURPOSE OF SCOPE.

Who will recruit?

Recruiting will be conducted by Birgit Smart or Dr. Walczyk, that is, by one of the co-investigators of this project.

Will there be alternative extra credit?

Yes, the instructors in the classes where the option to participate will be announced will make extra credit assignments available to students who do not wish to participate in this experiment. The alternative activity will be designed by instructors and will consist of doing an educational task that will take an equivalent amount of time as participation in the experiment.

2. You can see below that a declaration has been added to the procedure section of the Consent Form that questions may be asked about which students are not prone to be frank.

3. Will anyone encounter potentially embarrassing scenarios?

Yes, the experimenter who serves in the role of the lie detection examiner will hear answers to potentially embarrassing questions. He or she, however, will not know if the participant has been assigned to a condition in which answers given are truthful or deceptive. Moreover, all experimenters will be warned that all answers given are strictly for research purposes and should in no way be shared

with others or used to evaluate the participant at any time in the future. Of course, participants will be play acting, not disclosing personal truths.

INSTRUMENTS AND MEASURES TO INSURE PROTECTION OF CONFIDENTIALITY, ANONYMITY: ***The ISCAN camera eye trackers (please see attached) will be used to assess eye movements***. Moreover, a microphone headset will be worn by participants to measure response latencies. Answers will be digitally recorded. Names will NOT be used in any of the analyses or publications that will result from this research. Specifically, subject numbers, rather than names, will be used to track and compile all participants' data. Only aggregated group data will be reported.

RISKS/ALTERNATIVE TREATMENTS: There is a risk that participants will be made uncomfortable having to pretend to malinger because of their religious or moral beliefs. Moreover, they may be apprehensive that their answers will be used to evaluate them. With the consent of instructors, students not wishing to participate in research will be offered an alternative means of obtaining extra credit such as summarizing a journal article (see benefits and compensations below).

BENEFITS/COMPENSATION: Students will receive extra credit points from their instructors in exchange for participation. In addition, students will learn what it is like to participate in a psychological experiment.

SAFEGUARDS OF PHYSICAL AND EMOTIONAL WELL-BEING: To minimize the aforementioned risks, participants will be assured that they may withdrawal from research anytime and that their anonymity will be protected. If any students are made to feel uncomfortable, they will be referred to the Louisiana Tech University Counseling Services located in 310 Keeney Hall, phone: 318-257-2488 or to Mary Livingston or Les Guice as specified on the informed consent form.

Note: Use the Human Subjects Consent form to briefly summarize information about the study/project to participants and obtain their permission to participate.

Human Subjects Consent Form

The following is a brief summary of the project in which you are asked to participate. Please read this information before signing the statement below.

TITLE OF PROJECT: Response Time, Pupil Dilation, and Eye Movements: Cognitive and Physiological Cues to Deception

PURPOSE OF STUDY/PROJECT: To extend, refine, and test further the Activation-Decision-Construction Model of Malingering and to develop further cognitive cues to deception, including response time, pupil dilation, and eye responses. Combined, these cues may eventually lead to a viable method for detecting malingering.

PROCEDURE: Participants will be asked to be involved in one of a series of experiments in which they will either tell the truth to questions about physical or psychological issues, fake psychological or physical problems (malinger) without the opportunity to rehearse or malingering with time for rehearsing their response. **SOME OF THE QUESTIONS MAY INVOLVE TOPICS ABOUT WHICH MANY UNDERGRADUATES ARE NOT PRONE TO BE FRANK.** The experiments may involve imagined scenarios during which malingering (faking or exaggerating) psychological or physical problems might lead to beneficial outcomes in terms of getting away with something or having financial benefits. Eye tracking technology will be used to monitor and record eye movement data. Responses will be recorded for subsequent coding.

INSTRUMENTS: ISCAN eye tracking technology will be used to assess eye movement data.

RISKS/ALTERNATIVE TREATMENTS: There is a risk that you might be made uncomfortable having to malinger because of their religious or moral beliefs. Moreover, you might feel some embarrassment of questions to be asked. With the consent of instructors, students not wishing to participate in research will be offered an alternative means of obtaining extra credit such as summarizing a research article from a scholarly journal.

BENEFITS/COMPENSATION: You will receive extra credit points from instructors in exchange for participation. In addition, you will learn what it is like to participate in a psychological experiment, the methods used by psychologists, and so forth.

I, _____, attest with my signature that I have read and understood the following description of the study, "_____", and its purposes and methods. I understand that my participation in this research is strictly voluntary and my participation or refusal to participate in this study will not affect my relationship with Louisiana Tech University or my grades in any way. Further, I understand that I may withdraw at any time or refuse to answer any questions without penalty. Upon completion of the study, I understand that the results will be freely available to me upon request. I understand that the results of my survey will be confidential, accessible only to the principal investigators, myself, or a legally appointed representative. I have not been requested to waive nor do I waive any of my rights related to participating in this study.

_____ _____

Signature of Participant or Guardian **Date**

CONTACT INFORMATION: The principal experimenters listed below may be reached to answer questions about the research, subjects' rights, or related matters.

Birgit Smart
Phone: 318-257-4315

or Jeffrey J. Walczyk
Phone: 318-257-3004

Members of the Human Use Committee of Louisiana Tech University may also be contacted if a problem cannot be discussed with the experimenters:

Dr. Les Guice (257-3056)
Dr. Mary M. Livingston (257-2292 or 257-4315)

MEMORANDUM

TO: Ms. Birgit Smart, Dr. Walczyk, Dr. Mary-Ann Goodwyn, and Dr. Tony Young

FROM: Barbara Talbot, University Research

SUBJECT: HUMAN USE COMMITTEE REVIEW

DATE: September 16, 2008

In order to facilitate your project, an EXPEDITED REVIEW has been done for your proposed study entitled:

"Detecting Malingering Via Cognitive Cues to Deception"

 # HUC-596

The proposed study's revised procedures were found to provide reasonable and adequate safeguards against possible risks involving human subjects. The information to be collected may be personal in nature or implication. Therefore, diligent care needs to be taken to protect the privacy of the participants and to assure that the data are kept confidential. Informed consent is a critical part of the research process. The subjects must be informed that their participation is voluntary. It is important that consent materials be presented in a language understandable to every participant. If you have participants in your study whose first language is not English, be sure that informed consent materials are adequately explained or translated. Since your reviewed project appears to do no damage to the participants, the Human Use Committee grants approval of the involvement of human subjects as outlined.

Projects should be renewed annually. ***This approval was finalized on September 4, 2008 and this project will need to receive a continuation review by the IRB if the project, including data analysis, continues beyond September 4, 2009.*** Any discrepancies in procedure or changes that have been made including approved changes should be noted in the review application. Projects involving NIH funds require annual education training to be documented. For more information regarding this, contact the Office of University Research.

You are requested to maintain written records of your procedures, data collected, and subjects involved. These records will need to be available upon request during the conduct of the study and retained by the university for three years after the conclusion of the study. If changes occur in recruiting of subjects, informed consent process or in your research protocol, or if unanticipated problems should arise it is the Researchers responsibility to notify the Office of Research or IRB in writing. The project should be discontinued until modifications can be reviewed and approved.

If you have any questions, please contact Dr. Mary Livingston at 257-4315.

APPENDIX B

DEMOGRAPHIC QUESTIONNAIRE

DEMOGRAPHIC QUESTIONNAIRE

Please respond to the following demographic items by filling in the blanks or circling the most fitting response.

1. Gender: Male Female

2. Age: _____ years, months

3. Ethnicity/Race: African-American Caucasian-American

   Native-American Latina/Latino/Hispanic

   Asian-American Other (Please specify):_____

4. Religion Atheist Jewish
   Buddhist Muslim

   Christian Hindi

   Other (please specify):_____

1. What is your present student classification (year in school)?
Freshman Sophomore Junior Senior Graduate Student

Other (please specify) _____

6. Current major (please specify)_____
7. Marital Status Single Married
8. What is your native language? _____
9. What is your secondary language: _____

APPENDIX C

CODING FORMS WITH PAIRS

OF INTERRELATED QUESTIONS

Questions for Scenario 1

Assume that the questions are being asked by your doctor. Answer them as you were instructed outside and as quickly as possible.

- How are you feeling today?
- Are you suffering from any type of pain? (A1)*
- Do you currently experience any problems from the fall at work?
- How does your back feel right now? (A2)*
- Are you able to move around without pain and continue your work?
- Do you need to stay at home for additional time to heal? (C1)*
- Are you ready to return to work? (B1)*
- Do you think you would experience any pain if you were to go back to work right now? (B2)*
- How much more time do you think you need in order to heal? (C2)*

* Letter/Number combinations show questions monitoring for consistency, e.g., A1 and A2 are constitute a question consistency pair.

Questions for Scenario 2

Assume that the following questions are being asked by your instructor in her office. Answer them as you were instructed outside and as quickly as possible.

- Did you miss the test for a good reason? A1*
- What was your reason? A2*
- Were you sick? B1*
- Why didn't you call me?
- What, if any, were the symptoms of your illness? B2*
- Where were you during the exam? C1*
- What were you doing?
- Were you able to come to class on the day of the exam? C2*

* Letter/Number combinations show questions monitoring for consistency, e.g., A1 and A2 are constitute a question consistency pair.

Questions for Scenario 3

Assume that the questions are asked by a disability examiner. Answer them as you were instructed outside and as quickly as possible.

- Are you suffering from depression at this time? A1*
- Have you experienced any improvements in your mood lately? A2*
- How is your energy level now? B1*
- Do you still have any problems with memory?
- Are you easily fatigued? B2*
- How is your concentration?
- Do you think you can go back to work at this time? C1*
- Does your depression currently make it difficult to perform your job? C2*
- Do you feel that you are so sick that you still need disability payments?

* Letter/Number combinations show questions monitoring for consistency, e.g., A1 and A2 are constitute a question consistency pair.

Questions for Scenario 4

Assume that the judge is asking the questions.

- You were involved in a car accident. What suffering did you have from the accident? A1*
- Did you receive any bodily injuries? B1*
- Did you feel any pain after the accident? A2*
- What were your bodily injuries? B2*
- Did you experience any psychological distress?
- Do you believe that you should receive monetary damages beyond the costs of replacing your car?
- Where have you felt pain? C1*
- How does your neck feel since the accident? C2*
- Do you have any problems moving your neck?

* Letter/Number combinations show questions monitoring for consistency, e.g., A1 and A2 are constitute a question consistency pair.

APPENDIX D

SCENARIOS AND RELATED QUESTIONS

Scenario 1

Please adopt the role of a salesperson at a large department store who has been home on sick pay for the past two weeks after an accident at work. Specifically, you slipped and hurt your back slightly. It is really time for you to return to work because your injury has healed completely. You have experienced no problems in the past few days. You feel great and suffer from no type of physical pain. You have another appointment with your physician who will decide whether you should stay at home and use your sick time or go back to work.

Questions for Scenario 1

Assume that the questions are being asked by your doctor. Answer them as you were instructed outside and as quickly as possible.

- How are you feeling today?
- Are you suffering from any type of pain? (A1)*
- Do you currently experience any problems from the fall at work?
- How does your back feel right now? (A2)*
- Are you able to move around without pain and continue your work?
- Do you need to stay at home for additional time to heal? (C1)*
- Are you ready to return to work? (B1)*
- Do you think you would experience any pain if you were to go back to work right now? (B2)*
- How much more time do you think you need in order to heal? (C2)*

Scenario 2

You just missed a major test in your 8:00 AM English 102 Composition class because you overslept. Your professor, a tough-minded individual, will only excuse you for genuine illness. Otherwise you will get an "F" for the missed exam and most likely for the course. It is past the drop date. Your financial aid and your goal of a high GPA for graduation are at risk unless you are able to convince your professor that you can make up this test. You have an appointment in her office at 2:00 PM, hopefully to convince her to make up the exam.

Questions for Scenario 2

Assume that the following questions are being asked by your instructor in her office. Answer them as you were instructed outside and as quickly as possible.

- Did you miss the test for a good reason?
- What was your reason?
- Were you sick?
- Why didn't you call me?
- What, if any, were the symptoms of your illness?
- Where were you during the exam?
- What were you doing?
- Were you able to come to class on the day of the exam?

Scenario 3

Approximately six months ago you suffered from severe depression which made it impossible for you to work in your dead-end job. Your depression made you feel weak, tired, and unable to enjoy anything at that time. You also had problems concentrating and remembering things. Your depression made it impossible for you to work so you slept all day long. Your work consists of standing on an assembly line in a chicken plant every day where you sort the chicken parts into bags of wings and drum sticks, a really boring and disgusting job. You decided to claim disability for a chronic depressive disorder at that time but have since fully recovered and are able to return to work. You have energy and enjoy life again. The appointment for your disability examination is scheduled today and you will be asked questions about your psychological condition.

Questions for Scenario 3

Assume that the questions are asked by a disability examiner. Answer them as you were instructed outside and as quickly as possible.

- Are you suffering from depression at this time?
- Have you experienced any improvements in your mood lately?
- How is your energy level now?
- Do you still have any problems with memory?
- Are you easily fatigued?
- How is your concentration?
- Do you think you can go back to work at this time?
- Does your depression currently make it difficult to perform your job?
- Do you feel that you are so sick that you still need disability payments?

Scenario 4

You drove your 1999 Toyota Corolla three weeks ago on campus when this big Mercedes came out from a side road in reckless disregard of your car and your right away. The car hit you, totaled your Corolla, but did not cause you any physical injuries. Immediately after the accident happened, the driver of the Mercedes jumped out, yelled at you for not stopping on time, and did not ask you if you were okay or if you needed help. Later, you overhead him talking to his wife on his cell phone saying that a "jackass college kid ran into me." He creates difficulties for you, requesting his insurance to check your role in the accident very carefully and not pay for your totaled car. You finally have a court date and the judge is going to ask you questions about your psychological and physical well-being resulting from the accident.

Questions for Scenario 4

Assume that the judge is asking the questions. Answer them as you were instructed outside and as quickly as possible.

- You were involved in a car accident. What suffering did you have from the accident?
- Did you receive any bodily injuries?
- Did you feel any pain after the accident?
- What were your bodily injuries?
- Did you experience any psychological distress?
- Do you believe that you should receive monetary damages beyond the costs of replacing your car?
- Where have you felt pain?
- How does your neck feel since the accident?
- Do you have any problems moving your neck?

APPENDIX E

DEBRIEFING STATEMENT

Debriefing Statement

The purpose of this study is to test if individuals who make up deceptive statements according to the role they have been assigned in hypothetical scenarios display differences in pupil dilation, eye gaze, and response time when compared with individuals who are asked to respond with the truth according to the role they have been assigned in the same hypothetical scenarios.

Previous research in lie detection has shown that individuals differ in response time depending on whether they tell the truth, rehearse their lies before answering, and lie without rehearsal. Furthermore focused eye gaze differs between these three categories. Pupil dilation also differs between individuals who are allowed to rehearse their lies, unrehearsed liars, and truth tellers.

This study focuses in particular on measuring the above cognitive cues to deception within the context of malingering, e.g. faking bad. The purpose of this research is to explore ways for more accurate identification of individuals who malinger.

As we have informed you before, your identity and response to questions will be kept private. Your answers were recorded under your participant number instead of your name or other identifiers in order to assure your confidentiality. Likewise, it is important that you do not reveal information concerning your participation in this experiment or other characteristics of the experiment itself because discussing this study with others could affect the data of other future participants. Revealing information about the experiment might result in inaccurate results and hurt the scientific value of the study. Your participation has not only allowed you to learn about the experimental procedure but also let you to increase your understanding of the psychological factors mentioned above that were tested in this study. Thank you for helping to advance the field of cognitive psychology.

For any questions about your participation in this experiment, please contact one of the following researchers.

Birgit Smart
bms013@latech.edu

or

Jeffrey J. Walczyk
Woodard Hall, Room 114-E

APPENDIX F

INSTRUCTIONS FOR GREETERS

Instructions for *Greeters* for the Malingering Experiment

Please proceed in the following order:

1. **Welcome the participant to the study and make sure that the person showing up has actually an appointment on the sign-up schedule.**

    - If participants show up promptly, start testing right away. You do not have to wait until the scheduled time.

    - If participants do not show up on time, call their listed number right away reminding them that they are scheduled and see if they can come within the next 10 minutes.

    - DO NOT LEAVE OUT ANY PARTICIPANT NUMBERS AND ALWAYS GO IN THE ORDER OF THE SHEET. ASSIGN NUMBERS IN THE ORDER PARTICIPANTS ARE SHOWING UP FOR THE STUDY.

    - Example: Joe is unable to come for his 9:00 am appointment and he would have been Participant Number 10, Jane who shows up for her 9:30 am appointment will be Participant Number 10.

2. **Obtain informed consent for the experiment.**

    - Provide participants with written informed consent and a pen and ask them if they have any questions.

    - If they agree to the conditions of the study and want to participate, let them sign the sign-in sheet.

    - Ask participants to fill out the sign in sheet. Remind them to print their names legibly in order for them to receive their extra credit.

3. **Check the sign-in sheet in order to determine what condition participant is in (right column, e.g., A, B, or C).**

    - Administer the malingering condition instructions according to participant's assigned condition.
    - Example: if Joe is in condition A, look in the folder with "Condition A Procedure" and follow the instructions for greeters by providing the "Condition A Instructions for Participants" to the participant for reading along while you read your instructions verbatim.

- After you and participants are finished with the reading, place the greeter and participant instructions back into their correct folder in order to avoid confusion.

4. **Escort the participant to the examiner in the eye-tracking laboratory.**

   - Introduce each participant to the examiner by stating participant's number and experimental condition.

   - Example: "This is Joe, number 30, and he is in condition A."

5. **After the eye-tracking session, the examiner will escort participant back to you.**

   - Have participants read the deb0riefing statement and thank them for participating in this experiment.

APPENDIX G

INSTRUCTIONS FOR EXAMINERS

Instructions for *Examiners* for the Malingering Experiment

Please proceed in the following order:

1. **Make sure that you obtain participant number and experimental condition for each participant from the greeter.**

2. **Administer the malingering instructions (spoken task) next.**

    - Make sure that your malingering instruction (condition A, B, or C) matches the participant's assigned malingering condition.

3. **For this experiment, the audacity file recordings are needed. Audacity file names should be AUD800. AUD801, etc. Begin recording after the practice item. Pause except during questions.**

4. **The computer will display the random order of the scenarios, e.g., 1,3,4,2. This provides you with the information you need in order to give correct handouts to the participants. Each scenario, including the practice one, is on a separate handout. Read each scenario aloud so the participant can follow along. Read slowly and clearly.**

- Example: Joe comes in, receives a handout for the practice scenario, undergoes calibration, receives the supplemental instructions, and answers the questions accordingly. Next handout the next scenario, review of scenario, chin on headrest, and answers, etc.

- All scenarios have a number on the left hand top corner of the page.

5. **For hygienic purposes, place a fresh tissue on the chinrest before asking each participant to put their chin on the device.**

6. **Calibrate the eye tracker.**

    - Instruct each participant to remain as still as possible.

    - One of your main tasks is to keep the eye tracker calibrated throughout the session.

    - After running through the practice item, turn on the eye tracking recorder.

    - Save each participant's eye data file under EYE and participant's number. For example, participant number 800 is EYE800, etc.

- Put headphones on the participant's ears so that the attached microphone is close to the participant's mouth.

- For the Malingering Experiment, the response time file will have the file name LIE and participant's number. For example, participant number 801 will be saved under LIE801, etc.

- Run through the practice questions with the participants, reminding them to answer quickly.

- After the practice items, begin recording data with the beginning of the actual malingering scenarios. Use the eye tracker by clicking on the appropriate key. Following the last question, end recording and use the eye tracker by clicking on the appropriate key. SAVE THE DATA BY NAMING SYSTEM NOTED ABOVE.

7. **Explain to participants that they are done with this part of the study and return them to the greeter. A debriefing statement will follow.**

SUPPLEMENTAL INSTRUCTIONS FOR CONDITION A

See Handout for CONDITION A for instructions.

SUPPLEMENTAL INSTRUCTIONS FOR CONDITION B

See Handout for CONDITION B for instructions.

SUPPLEMENTAL INSTRUCTIONS FOR CONDITION C

See Handout for CONDITION C for instructions.

Condition A Procedure

Instructions to be followed by the greeter:

Hand a copy of these instructions to the participant so that he or she can follow along as you READ ALOUD slowly and clearly to the participant. Afterward, ask the participant to summarize the instructions in his or her own words. Verify his or her understanding.

For this experiment, I will take you to a different room that contains an eye tracker capable of recording eye movements, blinking, and pupil dilation. You will be asked to sit in front of an infrared eye scanner and look at a computer screen with a landscape. Your head will be positioned on a headstand and rest there during the experiment. You will be asked to wear a microphone headset, which will allow the computer to measure your response time in answering questions and prevent others from hearing the questions you are being asked. The data collected in this experiment will be evaluated as possible cues to truthfulness or deception.

You will be asked to read hypothetical scenarios in which you will adopt various roles. After each, a series of questions will be posed. While answering, keep your eyes focused on the landscape. You may look at any part of the landscape, but try not to look away from the scene. Please answer all questions honestly, consistently, and as quickly as possible. Avoid throat clearing and irrelevant utterances, such as "uh" and "ah." Please remove any items from your mouth, such as gum or candy, before entering the room. As a final reminder, please answer all questions TRUTHFULLY according to the role you are asked to adopt and with nothing but the truth, speaking only the information necessary to answer the question. All information will be kept strictly confidential and anonymous.

Can you summarize for me in your own words what we want you to do?

(*Offer corrective feedback or clarification as needed.*)

Condition A Instructions for Participant

For this experiment, I will take you to a different room that contains an eye tracker capable of recording eye movements, blinking, and pupil dilation. You will be asked to sit in front of an infrared eye scanner and look at a computer screen with a landscape. Your head will be positioned on a headstand and rest there during the experiment. You will be asked to wear a microphone headset, which will allow the computer to measure your response time in answering questions and prevent others from hearing the questions you are being asked. The data collected in this experiment will be evaluated as possible cues to truthfulness or deception.

You will be asked to read hypothetical scenarios in which you will adopt various roles. After each, a series of questions will be posed. While answering, keep your eyes focused on the landscape. You may look at any part of the landscape, but try not to look away from the scene. Please answer all questions honestly, consistently, and as quickly as possible. Avoid throat clearing and irrelevant utterances, such as "uh" and "ah." Please remove any items from your mouth, such as gum or candy, before entering the room. As a final reminder, please answer all questions TRUTHFULLY according to the role you are asked to adopt and with nothing but the truth, speaking only the information necessary to answer the question. All information will be kept strictly confidential and anonymous.

Can you summarize for me in your own words what we want you to do?

Condition B Procedure

Instructions to be followed by the greeter:

Hand a copy of these instructions to the participant so that he or she can follow along as you READ ALOUD slowly and clearly to the participant. Afterward, ask the participant to summarize the instructions in his or her own words. Verify his or her understanding.

For this experiment, I will take you to a different room that contains an eye tracker capable of recording eye movements, blinking, and pupil dilation. You will be asked to sit in front of an infrared eye scanner and look at a computer screen with a landscape. Your head will be positioned on a headstand and rest there during the experiment. You will be asked to wear a microphone headset, which will allow the computer to measure your response time in answering questions and prevent others' from hearing the questions you are being asked. The data collected in this experiment will be evaluated as possible cues to truthfulness or deception.

You will be asked to read hypothetical scenarios on you will adopt various roles. After each, a series of questions will be posed. While answering, keep your eyes focused on the landscape. You may look at any part of the landscape, but try not to look away from the scene. Please answer all questions deceptively, consistently, and as quickly as possible. Avoid throat clearing and irrelevant utterances, such as "uh" and "ah." Please remove any items from your mouth, such as gum or candy, before entering the room. As a final reminder, please answer all questions ANSWER *ALL* QUESTIONS WITH LIES according to the role you are asked to adopt. IT IS IMPORTANT TO BE CONSISTENT, SO PLEASE MAKE SURE THAT THE LIES YOU PROVIDE DO NOT CONTRADICT ONE ANOTHER. All information will be kept strictly confidential and anonymous.

Can you summarize for me in your own words what we want you to do?

(*Offer corrective feedback or clarification as needed.*)

Condition B Instructions for Participant

For this experiment, I will take you to a different room that contains an eye tracker capable of recording eye movements, blinking, and pupil dilation. You will be asked to sit in front of an infrared eye scanner and look at a computer screen with a landscape. Your head will be positioned on a headstand and rest there during the experiment. You will be asked to wear a microphone headset, which will allow the computer to measure your response time in answering questions and prevent others' from hearing the questions you are being asked. The data collected in this experiment will be evaluated as possible cues to truthfulness or deception.

You will be asked to read hypothetical scenarios on you will adopt various roles. After each, a series of questions will be posed. While answering, keep your eyes focused on the landscape. You may look at any part of the landscape, but try not to look away from the scene. Please answer all questions deceptively, consistently, and as quickly as possible. Avoid throat clearing and irrelevant utterances, such as "uh" and "ah." Please remove any items from your mouth, such as gum or candy, before entering the room. As a final reminder, please answer all questions ANSWER *ALL* QUESTIONS WITH LIES according to the role you are asked to adopt. IT IS IMPORTANT TO BE CONSISTENT, SO PLEASE MAKE SURE THAT THE LIES YOU PROVIDE DO NOT CONTRADICT ONE ANOTHER. All information will be kept strictly confidential and anonymous.

Can you summarize for me in your own words what we want you to do?

Condition C Procedure

Instructions to be followed by the greeter:

Hand a copy of these instructions to the participant so that he or she can follow along as you READ ALOUD slowly and clearly to the participant. Afterward, ask the participant to summarize the instructions in his or her own words. Verify his or her understanding.

For this experiment, I will take you to a different room that contains an eye tracker capable of recording eye movements, blinking, and pupil dilation. You will be asked to sit in front of an infrared eye scanner and look at a computer screen with a landscape. Your head will be positioned on a headstand and rest there during the experiment. You will be asked to wear a microphone headset, which will allow the computer to measure your response time in answering questions and prevent others' from hearing the questions you are being asked. The data collected in this experiment will be evaluated as possible cues to truthfulness or deception.

You will be asked to read hypothetical scenarios in which you will adopt various roles. After each, a series of questions dealing with this scenario will be posed. While answering, keep your eyes focused on the landscape. You may look at any part of the landscape, but try not to look away from the scene. Please answer all questions deceptively, consistently, and as quickly as possible. Avoid throat clearing and irrelevant utterances, such as "uh" and "ah." Please remove any items from your mouth, such as gum or candy, before entering the room. As a final reminder, please answer all questions ANSWER *ALL* QUESTIONS WITH LIES according to the role you are asked to adopt. IT IS IMPORTANT TO BE CONSISTENT, SO PLEASE MAKE SURE THAT THE LIES YOU PROVIDE DO NOT CONTRADICT ONE ANOTHER. All information will be kept strictly confidential and anonymous.

Prior to testing, you will be given a copy of the questions so you can rehearse your lies before the questions are being asked. Try to prepare believable and consistent lies during rehearsal time.

Can you summarize for me in your own words what we want you to do?
(Offer corrective feedback or clarification as needed)

Condition C Instructions for Participant

For this experiment, I will take you to a different room that contains an eye tracker capable of recording eye movements, blinking, and pupil dilation. You will be asked to sit in front of an infrared eye scanner and look at a computer screen with a landscape. Your head will be positioned on a headstand and rest there during the experiment. You will be asked to wear a microphone headset, which will allow the computer to measure your response time in answering questions and prevent others' from hearing the questions you are being asked. The data collected in this experiment will be evaluated as possible cues to truthfulness or deception.

You will be asked to read hypothetical scenarios in which you will adopt various roles. After each, a series of questions dealing with this scenario will be posed. While answering, keep your eyes focused on the landscape. You may look at any part of the landscape, but try not to look away from the scene. Please answer all questions deceptively, consistently, and as quickly as possible. Avoid throat clearing and irrelevant utterances, such as "uh" and "ah." Please remove any items from your mouth, such as gum or candy, before entering the room. As a final reminder, please answer all questions ANSWER *ALL* QUESTIONS WITH LIES according to the role you are asked to adopt. IT IS IMPORTANT TO BE CONSISTENT, SO PLEASE MAKE SURE THAT THE LIES YOU PROVIDE DO NOT CONTRADICT ONE ANOTHER. All information will be kept strictly confidential and anonymous.

Prior to testing, you will be given a copy of the questions so you can rehearse your lies before the questions are being asked. Try to prepare believable and consistent lies during rehearsal time.

Can you summarize for me in your own words what we want you to do?

APPENDIX H

SET OF INSTRUCTIONS

SET OF INSTRUCTIONS

A copy of the written instructions will be provided to participants as the greeter reads aloud. All participants will be asked to summarize instructions in their own words after hearing them. Misunderstandings will be corrected. After the participants have read along, they will be allowed to review the written scenarios until they indicate that they understand their roles.

General Instructions

"In the following experiment, please listen closely to each scenario and then respond to the following questions with a short answer or yes/no reply depending on what role you have been assigned. Please listen carefully to each scenario. Do you have any questions at this point? Are you ready to get started?"

This first scenario is for practice purposes only but reflects the basic features of the longer experimental scenarios.

Practice Scenario:

> Imagine that you did not want to get out of bed this morning, but you were scheduled to come to this experiment for extra credit for your Psychology 102 class. Please pretend that you decided to stay at home and take the day off. Your instructor will question you at the beginning of your next class period, tomorrow, concerning why you blew off the experiment you signed up for.

Instructions for the Truth Telling Condition:

"You know that you missed the experiment without a good reason (you did not want to get out of bed) but decide to tell your instructor the truth about not showing up for the experiment. Please answer the following questions truthfully."

Instructions for the Unrehearsed Malingering Condition:

"You know that you do not have a good excuse for missing the experiment but would like to get the extra credit anyway. You figure that pretending that you were ill might make your instructor more sympathetic and you might receive the extra credit. Please answer the following questions by adopting the role (pretending) of having been too ill to go to the experiment."

Instructions for the Rehearsed Malingering Condition:

"You know that you do NOT have a good excuse for missing the experiment but would like to get the extra credit anyway. You figure that pretending that you were ill will make your instructor more sympathetic and you will receive the extra credit. Please answer the following questions by adopting the role of having been (pretending to be) too ill to go to the experiment." After the instructions, the participant will receive the following list of questions for two minutes in order to rehearse answers to the scenario.

Questions Asked in all Three Conditions:

Assume that the following questions are being asked by your instructor. Answer them as you were instructed outside and as quickly as possible.

1. What were you doing at the time you were scheduled for the experiment?
2. Were you unable to come to the experiment?
3. Were you sick at the time of your appointment for the experiment?

4. If anything, what was your illness?
5. Why didn't you call me?

After successfully completing the practice scenario, the experimental scenarios will be presented. The order will be randomized.

Scenario 1:

> Please adopt the role of a salesperson at a large department store who has been home on sick pay for the past two weeks after an accident at work. Specifically, you slipped and hurt your back slightly. It is really time for you to return to work because your injury has healed completely. You have experienced no problems in the past few days. You feel great and suffer from no type of physical pain. You have another appointment with your physician who will decide whether you should stay at home and use your sick time or go back to work.

Instructions for the Truth Telling Condition:

"Please answer truthfully the following questions about your health condition. Recall that you are fine and ready to return to work."

Instructions for the Unrehearsed Malingering Condition:

"You want to have additional time off by using the three weeks of sick time you have accumulated during your years of work. You will be given a list of the questions in a few minutes concerning your health condition. Lie about how you feel. Though you feel well, please make sure that you will provide convincing lies in order to meet your goal of getting extra sick time for staying at home. Pretend that your back still hurts and that you are unable to continue your work at this time."

Instructions for the Rehearsed Malingering Condition:

"You want to have additional time off by using the three weeks of sick time you have accumulated during your years of work. You will be given a list of the questions in a few minutes concerning your health condition. Lie about how you feel. Though you feel well, please make sure that you will provide convincing answers in order to meet your goal of getting extra sick time for staying at home. Pretend that your back still hurts and that you are unable to continue your work at this time." After the instructions, the participant will receive the following list of questions for two minutes in order to rehearse answers to the scenario.

Questions to be Asked in all Three Conditions:

Assume that the questions are being asked by your doctor. Answer them as you were instructed outside and as quickly as possible.

1. How are you feeling today?
2. Are you suffering from any type of pain?
3. Do you currently experience any problems from the fall at work?
4. How does your back feel right now?
5. Are you able to move around without pain and continue your work?
6. Do you need to stay at home for additional time to heal?
7. Are you ready to return to work?
8. Do you think you would experience any pain if you were to go back to work right now?
9. How much more time do you think you need in order to heal?

Scenario 2:

> You just missed a major test in your 8:00 AM English 102 Composition class because you overslept. Your professor, a tough-minded individual, will only excuse you for genuine illness. Otherwise you will get an "F" for the missed exam and most likely for the course. It is past the drop date. Your financial aid and your goal of a high GPA for graduation are at risk unless you are able to convince your professor that you can make up this test. You have an appointment in her office at 2:00 PM, hopefully to convince her to make up the exam.

Instructions for the Truth Telling Condition:

"Please answer truthfully the following questions with the hope that being truthful will surprise the instructor into being sympathetic and lenient with you."

Instructions for the Unrehearsed Malingering Condition:

"You need to come up with a compelling lie so that your instructor will let you retake the exam. Pretend that you were sick and were unable to take the exam but did not have time to see a doctor for an excuse. The questions you will be asked will concern your health condition. Be sure to answer with convincing lies in order to meet your goal of taking a make-up."

Instructions for the Rehearsed Malingering Condition:

"You need to come up with a compelling lie so that your instructor will let you retake the exam. Pretend that you were sick and unable to take the exam but did not have time to see a doctor for an excuse. The questions you will be asked will concern your health condition. Be sure that you will prepare convincing lies in order to meet your goal

of taking a make-up." After the instructions, the participant will receive the following list of questions for two minutes in order to rehearse answers to the scenario.

Questions to be Asked in all Three Conditions:

Assume that the following questions are being asked by your instructor in her office. Answer them as you were instructed outside and as quickly as possible.

1. Did you miss the test for a good reason?
2. What was your reason?
3. Were you sick?
4. Why didn't you call me?
5. What, if any, were the symptoms of your illness?
6. Where were you during the exam?
7. What were you doing?
8. Were you able to come to class on the day of the exam?

Scenario 3:

> Approximately six months you suffered from severe depression which made it impossible for you to work in your dead-end job. Your depression made you feel weak, tired, and unable to enjoy anything at that time. You also had problems concentrating and remembering things. Your depression made it impossible for you to work so you slept all day long. Your work consists of standing on an assembly line in a chicken plant every day where you sort the chicken parts into bags of wings and drum sticks, a really boring and disgusting job. You decided to claim disability for a chronic depressive disorder at that time but have since fully

recovered and are able to return to work. You have energy and enjoy life again. The appointment for your disability examination is scheduled today and you will be asked questions about your psychological condition.

Instructions for the Truth Telling Condition:

"Please answer truthfully the following questions about your psychological condition when the examiner asks you about your bout with depression."

Instructions for the Unrehearsed Malingering Condition:

"Although you are completely capable of returning to work you would like to take advantage of getting money for disability so you do not have to go back to your disgusting and boring job. In a few minutes, you will be asked questions from the disability examiner. Please lie about your health condition and pretend that you are still depressed so you get disability payments. Remember to be as convincing as possible in your lies."

Instructions for the Rehearsed Malingering Condition:

"Although you are completely capable of returning to work you would like to take advantage of getting money for disability so you do not have to go back to your disgusting and boring job. In a few minutes you will be asked questions from the disability examiner. Please lie about your health condition and pretend that you are still depressed so you get disability payments. Remember to be as convincing as possible in your lies." After the instructions, the participant will receive the following list of questions for two minutes in order to rehearse answers to the scenario.

Questions to be Asked in all Three Conditions:

Assume that the questions are asked by a disability examiner. Answer them as you were instructed outside and as quickly as possible.

1. Are you suffering from depression at this time?
2. Have you experienced any improvements in your mood lately?
3. How is your energy level now?
4. Do you still have any problems with memory?
5. Are you easily fatigued?
6. How is your concentration?
7. Do you think you can go back to work at this time?
8. Does your depression currently make it difficult to perform your job?
9. Do you feel that you are so sick that you still need disability payments?

Scenario 4:

You drove your 1999 Toyota Corolla three weeks ago on campus when this big Mercedes came out from a side road in reckless disregard of your car and your right away. The car hit you, totaled your Corolla, but did not cause you any physical injuries. Immediately after the accident happened, the driver of the Mercedes jumped out, yelled at you for not stopping on time, and did not ask you if you were okay or if you needed help. Later, you overhead him talking to his wife on his cell phone saying that a "jackass college kid ran into me." He creates difficulties for you, requesting his insurance to check your role in the accident very carefully and not pay for your totaled car. You finally have a court date and the

judge is going to ask you questions about your psychological and physical well-being resulting from the accident.

Instructions for the Truth Telling Condition:

"Recall that you suffered no physical or psychological injuries from the accident. Please answer truthfully the following questions about your physical and psychological condition when the judge asks you."

Instructions for the Unrehearsed Malingering Conditions:

"You are really angry at the arrogant Mercedes driver and would like to get some extra money (and getting a little payback) from the accident by pretending that you had a neck injury (whip-lash). You pretend further that you have problems moving your neck and feel pain during daily activities. Assume that the questions will be asked by the judge concerning any physical or psychological symptoms due to the accident. Please remember to be as convincing as possible in your lies in order for the judge to award you money for your fake pain and injury."

Instructions for the Rehearsed Malingering Condition:

"You are really angry at the arrogant Mercedes driver and would like to get some extra money (and getting a little payback) from the accident by pretending that you had a neck injury (whip-lash). You pretend further that you have problems moving your neck and feel pain during daily activities. Assume that the questions will be asked by the judge concerning any physical or psychological symptoms due to the accident. Please remember to be as convincing as possible in your lies in order for the judge to award you money for your fake pain and injury." After the instructions, the participant will receive

the following list of questions for two minutes in order to rehearse answers to the scenario.

Questions in all Three Conditions:

Assume that the judge is asking the questions.

1. You were involved in a car accident. What suffering did you have from the accident?
2. Did you receive any bodily injuries?
3. Did you feel any pain after the accident?
4. What were your bodily injuries?
5. Did you experience any psychological distress?
6. Do you believe that you should receive monetary damages beyond the costs of replacing your car?
7. Where have you felt pain?
8. How does your neck feel since the accident?
9. Do you have any problems moving your neck?