
Efficacy of Prototype
Credibility Assessment Technologies:
PCASS Final Report

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Abstract

The purpose of this study was to evaluate the effectiveness of the Preliminary Credibility Assessment Screening System (PCASS), a prototype hand-held real-time credibility assessment system. The PCASS collects electrodermal and vasomotor information from an examinee's hand, using silver/silver/chloride sensors and a photo-plethysmograph, respectively. Successful validation of the PCASS will support its deployment in operational venues. This effort evaluated the effectiveness of the PCASS during a specific issue credibility examination. The mock crime processes used as participant treatment scenarios were designed to create an environment simulating the jeopardy experienced during real-world human credibility assessment testing so a high degree of external validity is attained. This was done by limiting the information given to the participants, requiring participants to correctly follow verbal and written instructions, and by providing an incentive for being found truthful during credibility assessment testing. PCASS decisions for the 36 deceptive participants were correct for 91.7% (33), incorrect for 2.8% (1), and no opinion for 5.6% (2). If no opinion decisions are excluded, PCASS decisions for the remaining 34 deceptive participants were correct for 97.1% and incorrect for 2.9%. PCASS decisions for the 35 truthful participants were correct for 65.7% (23), incorrect for 11.4% (4), and no opinion for 22.9% (8). Excluding no opinion decisions, PCASS decisions for the remaining 27 truthful participants were correct for 85.2% and incorrect for 14.8%. Analyses indicate that decision accuracy for the PCASS examinations was significantly better than chance. The overall accuracy for correctly identifying participant veracity was 78.9% including no opinion decisions as errors (i.e., 56 of the 71 participant's veracities were correctly identified), and 91.8% excluding 10 no opinion decisions from the analysis. Statistical power analyses indicate that a sufficient number of participants were tested to ensure that these results are representative of the sampled population. These data suggest that the PCASS system is effective in detecting deception.

Key Words: Credibility Assessment, Detection of Deception, Mock Crime, Specific Issue Examination, Portable Hand-Held Device

Table of Contents

Abstract	i
Introduction	1
Method	1
Participants	2
Remuneration	3
Examiners	3
Apparatus	3
Research Space	4
Study Design	5
Sample Size Requirements	5
Participant Treatment Scenarios	5
Participant Recruitment.....	6
Participant Screening.....	6
Informed Consent.....	6
Biographical and Medical Questionnaire.....	6
Control Group Treatment.....	7
Experimental Group Treatment.....	7
Mock Crime Room.....	8
Post-Treatment Veracity Questionnaire	8
PCASS Credibility Assessment Testing	9
PCASS Pretest Interview.	9
PCASS Test Questions.....	9
PCASS Test Procedures	9
Participant Debriefing, Remuneration, Dismissal	10
Debriefing Questionnaire	10
Exit Briefing Statement.....	10
Early Dismissal of Participants	10
Instructions to Experimenters.....	10
Results	10
Decision Accuracy	10
Debriefing Results	12
Anomalies	14
Discussion	16
Decision Accuracy	16
Countermeasures	16
External Validity	17
Experimenter Anecdotes	19
Confounding Effects	20
PCASS Technical and Utility Comments	21
References	22
Appendix A: Research Space	23

Appendix B: Sample Size Requirements	32
Appendix C: Participant Solicitation Information	35
Appendix D: First Call Checksheet.....	36
Appendix E: Script for Scheduled Participants.....	37
Appendix F: Participant Instructions	38
Appendix G: Informed Consent Form.....	39
Appendix H: Biographical and Medical Questionnaire.....	47
Appendix I: Recorded Instructions to Control Group.....	48
Appendix J: Recorded Instructions to Experimental Group	50
Appendix K: Credibility Assessment Examination Consent Form.....	52
Appendix L: Veracity Questionnaire.....	53
Appendix M: PCASS Pretest Interview Outline.....	54
Appendix N: PCASS Test Questions.....	57
Appendix O: Debriefing Questionnaire.....	58
Appendix P: Exit Briefing.....	62
Appendix Q: Instructions for Experimenters	65
Appendix R: Participant Responses to Some Debriefing Questions.....	67

List of Tables and Figures

Figure 1. Preliminary Credibility Assessment Screening System (PCASS).....	4
Table 1. PCASS Instrument Decision Frequencies (N = 71).....	11
Figure 2. Methods Participants (N=30) Thought could be Used to Beat the Instrument. ..	12
Figure 3. Reactions Participants (N=21) Created to Beat the Instrument.	13
Table 2. Anomalies Among PCASS Error and No Opinion Result Subgroups.	15
Table 3. PCASS Decision Frequencies (N = 21) within Countermeasure Subgroup.....	17
Figure 4. Basement Initial Entry Point.....	18
Figure 5. Mock Crime Room Photo.	19
Figure 6. Floor Plan – 1st (Lower) Floor	24
Figure 7. Floor Plan – 3rd (Upper) Floor.....	25
Figure 8. Point of Initial Contact (PIC) Room.....	26
Figure 9. Mock Crime (MC) Room.....	27
Figure 10. 3rd Floor Monitoring Room (adjacent to MC Room).....	28

Figure 11. Intake Room..... 29
Figure 12. CAT Room – PCASS..... 30
Figure 13. 1st Floor Monitoring Room (across hall from CAT room) 31

Introduction

The Defense Academy for Credibility Assessment (DACA) research mission was initiated by the Defense Authorization Act of 1986. Three general areas of inquiry were mandated by Congress: (a) evaluate the validity of psychophysiological detection of deception (PDD) techniques used by the DoD; (b) investigate countermeasures and anti-countermeasures; and (c) conduct developmental research on PDD techniques, instrumentation, and analytic methods. The research mission was expanded by the Joint Security Commission to concentrate on the development of valid and reliable security and applicant screening tests, and to standardize their use. In support of this research mission, the Government has funded development of prototype credibility assessment instruments designed to assess the credibility of cooperative and non-cooperative English and non-English speaking individuals. These instruments were developed using theoretical models of psychological, physiological, and biological responses to stress, concealed information, and deception. The Government now seeks to evaluate the effectiveness of these instruments.

This report documents the methods, analysis, and results of testing for the Preliminary Credibility Assessment Screening System (PCASS), one of four prototype instruments evaluated by Battelle in this effort. This project was intended to evaluate the effectiveness of the PCASS system for human credibility assessment testing. To accomplish this, Battelle acquired two PCASS instruments from the Government and sent two examiners to receive specialized PCASS training from DACA instructors. Battelle conceived and implemented a research protocol, using established experimental procedures, to recruit; assign the veracity of; test the veracity of; and pay human participants. Credibility assessment testing was performed using the PCASS system, which was designed to record electrodermal and vasomotor activity and report an automated deception decision.

The PCASS is an innovative technology that offers the potential for easy and rapid information verification. If it is found to be effective, this tool could be used in a variety of operational settings. The system, currently in hand-held form, is a large, PDA-style hand-held device. The PCASS includes sensors designed to be attached to the hand of the person being questioned, for the purpose of extracting physiological responses connected with questions presented by the PCASS examiner. The PCASS uses silver/silver/chloride sensors and a photo-plethysmograph to collect electrodermal and vasomotor data, respectively, during the presentation of a series of questions. The PCASS, using a statistical decision algorithm, then renders a decision of truthful or deceptive based on the physiological responses to the questions. This information can then be integrated and used to direct tactical, strategic, and a wide array of operational decisions. To date, limited research on the effectiveness, accuracy, utility, and limitations of the PCASS has been conducted. The purpose of this study is to develop a body of knowledge in these areas, as they pertain to the operational potential and capabilities offered by the PCASS system.

Method

The purpose of the study design and mock crime processes specified below was to create an environment simulating the jeopardy experienced during real-world human credibility

assessment testing so a high degree of external validity is attained. This was done by limiting the information given to the participants, requiring participants to correctly follow verbal and written instructions, and by providing an incentive for being found truthful during credibility assessment testing. Pilot studies were conducted with the PCASS system to verify procedures, techniques, and instrumentation prior to the main data collection effort.

Participants

Participants were solicited using a classified advertisement placed in 45 metropolitan and suburban newspapers in the surrounding Columbus, OH area. After eliminating duplicate calls from the same individuals using the same or different phone numbers, calls without messages, and calls without return phone numbers, approximately 460 individuals called over a three-to-four week period. Of those 460 individuals, 182 were not able to be scheduled for various reasons including: they could not be reached, were reached but did not pass pre-screening requirements, or qualified but could not be scheduled or chose not to participate. The remaining 278 individuals agreed to participate and were scheduled. Of the 278 individuals scheduled, 147 did not arrive as scheduled, 9 arrived but withdrew after receiving instructions, 41 did not successfully complete the scenario, 3 participants completed the experiment but were classified as “pilot” tests and whose data could not be pulled forward due to changes in the testing procedure after client feedback, and 7 had their tests terminated or discarded. The 7 terminated/discarded tests included the following: 4 were discarded due to a PCASS white screen scoring error of “*Not Enough Data*” that included 1 who later admitted to being inebriated, 1 who later revealed they had a partial paralysis, 1 who later admitted to researching and using countermeasures, and 1 for unknown reasons. In addition, 1 test was discarded because the participant was discovered to have previously participated (and been disqualified) at an earlier date, 1 admitted in debriefing to have learned of the scenario from her husband (another participant), and 1 was released due to a hearing problem after repeatedly being unable to hear the examiner's prompts.

Some reasons participants were released from the experiment included the following: protocol violations such as arriving too early or late, entering the wrong door and/or touring the building, bringing another person with them, or excessive interaction with project staff; failure to complete the mock theft; and any who withdrew from the experiment voluntarily. Most who opted out of the experiment cited a discomfort with committing the mock theft.

The 71 participants who successfully completed testing included 21 White males, 28 White females, 9 Black males, and 11 Black females, 1 American Indian/Alaskan Native female and 1 male of undeclared race. No Hispanic or Asian participants were tested using the PCASS. Participant ages ranged from 19 to 59 with a mean age of 34.3 years ($SD = 12.0$).

Participants were randomly assigned to deceptive and truthful groups with the constraint that the groups be as balanced as possible for age, gender, and race. Age, gender, and race were not considered as independent variables because an insufficient number of observations of each category were obtained for a meaningful statistical analysis. Participants were U.S. citizens and native English speakers. The examiners conducting the credibility assessment test made the final determination concerning the participant's suitability for study participation. Individuals were

not allowed to participate if they could not respond due to: (a) physical discomfort or disability; (b) mental or physical fatigue; (c) mental disorder; (d) extreme emotional stress, intoxication, narcotic addiction, or excessive use of depressants, stimulants, tranquilizers, or hallucinogens. All participants had enrolled in a college, university, or other post-high school educational institute. Participants were not allowed to participate if they had a previous traditional polygraph examination or government security clearance. Participants also must not have been personally acquainted with or otherwise related to project personnel, prior to being tested. Finally, because participant knowledge of the experimental procedures used could influence reactivity, only individuals who learned of the study via newspaper advertisement were allowed to participate.

Remuneration

All participants who completed the testing were remunerated \$15 per hour of participation plus a bonus of \$50. Partial hours were paid in quarter-hour increments, except the first hour, which was paid in full. Participants were instructed that the bonus would be issued *only* if a decision of truthful was reached following the test. This instruction maintained the participant incentive to be deceptive throughout testing. Participants who did not complete the entire process (i.e., withdraw or are dismissed) were remunerated for time spent, but were not eligible for the bonus. All participants were remunerated, in cash, after debriefing was completed.

Examiners

Two PCASS examiners with previous experience in security and law enforcement were approved for training by DACA personnel. They traveled to Ft. Jackson, SC and received a 1-week training course on the PCASS system from a DACA instructor. During the training they received instruction on the approach for pretest interviews, PCASS test question construction, PCASS unit programming and test setup, countermeasures, and procedures for rendering a deception decision. As part of the training, the PCASS examiners received practical experience running tests on Ft. Jackson soldier volunteer participants who had participated in a mock crime. The crime scenario was similar to the mock theft being used in this study, but the theft items were different. The examiners performed PCASS tests on 11 soldier participants each under the supervision of the instructor. Two PCASS systems were acquired from the Government for use in this study.

Apparatus

The PCASS is a hand-held credibility assessment device developed by Lafayette Instrument Company (Lafayette, IN) (Figure 1). The system is housed within a battery-powered Ranger PDA unit developed by Trimble (Sunnyvale, CA), using an MS Mobil 5.0 operating system. This unit has a four-inch screen and is encased within a magnesium housing. The PCASS includes external components for the collection of physiological data. These include a 10" cable for the collection of electrodermal information from silver/silver/chloride (Ag/Ag/Cl) sensors and an 11" cable for the collection of vasomotor information from a photo-plethysmograph enclosure, measuring 1 7/8" x 1" x 3/4". These cables connect to a 4" x 2 3/8" x 1" plastic unit that fits on the wrist of the participant. This component processes the raw

electrodermal and vasomotor information before transmission into the main PCASS unit, via a 7' Universal Serial Bus cable. The PCASS requires the placement of two Ag/Ag/Cl sensors on the second and fourth fingertips of the participant's hand with Velcro®, and a photo-plethysmograph attached to the tip of the third finger with a spring clip enclosure. All sensors and the processor unit are attached to the same hand.



Figure 1. Preliminary Credibility Assessment Screening System (PCASS).

The operating system, user interface, and data collection software was developed by Lafayette Instrument Company, specifically for the PCASS. The decision algorithm that integrates electrodermal and vasomotor responses time-locked with the stimulus presentation to make a decision was developed by the Johns Hopkins Applied Physics Laboratory (Baltimore, MD).

Research Space

The project research space for all participant activities and credibility assessment testing was performed in Columbus, OH. Battelle leased sections of two floors of the three-floor office

building. Floor plans for the building and individual room layout schematics including personnel, furniture, and test instrument and equipment distribution are presented in Appendix A. Participant and research staff activities in each room are detailed in later sections describing the mock crime scenarios and credibility assessment testing procedures. Video monitoring of participant movement throughout the building and within each study room was performed using closed circuit television (CCTV) cameras and viewed by staff from the monitoring room. The following study spaces are depicted in Appendix A:

- Floor Plan – 1st (Lower) Floor
- Floor Plan – 3rd (Upper) Floor
- Point of Initial Contact (PIC) Room
- Mock Crime (MC) Room
- 3rd Floor Monitoring Room (adjacent to MC Room)
- Intake Room
- Credibility Assessment Testing (CAT) Room – PCASS
- 1st Floor Monitoring Room (across hall from CAT room)

Study Design

Participants were assigned to one of two groups (one control and one experimental) prior to their participation in the project. The group assignments were random unless it was necessary to assign group membership to correct base rate imbalances toward the end of testing. The sampling goal was 68 total participants, with approximately 34 participants in each group (i.e., a 50% base rate). Participants in the experimental group took part in a mock theft, and then attempted to conceal that participation during subsequent credibility assessment testing. Participants in the control group experienced the same procedures as those in the experimental group, except they did not attempt deception during credibility testing.

Sample Size Requirements. A statistical power analysis (Appendix B) indicated that 34 truthful and 34 deceptive participants were required to provide a power of 80% to detect a difference between a base rate of 50% and an observed accuracy rate of 65% using a simple proportion test with a statistical significance level of .05. Because we tested 35 truthful and 36 deceptive participants, we expect our results to be representative of the population tested.

Analyses were performed by calculating 95% confidence intervals for various proportions and using the confidence intervals to test hypotheses about the proportions. If a confidence interval contains the value 0.5, then the test would conclude that the performance of the PCASS was not statistically different than 0.5, and if the confidence interval does not contain the value 0.5, the test would conclude that the performance of the PCASS was statistically greater than 0.5.

Participant Treatment Scenarios

Deceptive participants (experimental group) participated in a mock theft scenario while truthful participants (control group) were told a theft had taken place but that they were innocent. The scenario was designed to simulate the theft of personal possessions (i.e., a “diamond” ring)

from within a business office. The overall strategy for the mock theft scenario is similar to the “Utah-style” studies reported by Kircher and Raskin (1988) and Podlesney (1976).

Participant Recruitment. Participants were solicited via local newspaper advertisements (Appendix C) that provided a telephone number for interested persons. Advertisements soliciting study participants were targeted at the general population throughout the greater Columbus, OH metropolitan area. Those calling the phone number received an answering machine message (Appendix C) requesting name, phone number, and a preferred time when they could be reached. Pre-screening information was also related on the message to avoid collecting personally attributable medical data during the initial callback screening process to follow. Additionally, personnel who possess a security clearance are not supposed to disclose that information, and this process permitted a self-screening opportunity:

- *“If you have ever taken a polygraph or held a government security clearance above “confidential,” you are not eligible for this study. You will be asked to disclose any prescription medication that you might be taking. All information collected will be maintained in a confidential manner.”*

Participant Screening. The participants received a follow-up telephone call from project staff who asked screening questions (i.e., age, health, education, etc) (Appendix D). Qualified participants were told the project paid a set hourly rate of \$15 per hour in quarter-hour increments plus the opportunity to earn a \$50 bonus. Interested participants were given an appointment on a specific date and time and provided directions to a specific building, floor, and room (Appendix E). Parking was provided at no cost. Project staff provided a first name only and, if questioned, said that the study is sponsored by the U.S. federal government under the direction of Battelle. If the participant’s appointment was more than one day away, someone called the participant the day before the appointment to ensure their continued interest. Participants arriving more than 10 minutes late were disqualified from the study. [Original protocol plans called for scheduling additional standby participants to be available when regularly-scheduled participants did not show or arrived late. During practice and pilot testing it became clear that the high rate of “no-shows” diminished the value of scheduling dedicated standby participants].

Informed Consent. Participants were told to enter the Point of Initial Contact (PIC) Room at a specified location and time. When they arrived, they were not greeted by nor encountered any project staff; however, they found a note with their name on it (Appendix F) instructing them to read and complete the forms on the table. The forms included an Informed Consent Form (Appendix G), and a Biographical and Medical Questionnaire (Appendix H). The Informed Consent Forms in Appendix G included control and experimental group versions. Each version presented an overview of the mock crime activities (experimental group only), test procedures, and disclosure of risks. Participants were provided a copy of their Informed Consent Form at the end of the study.

Biographical and Medical Questionnaire. The Biographical and Medical Questionnaire (Appendix H) asked basic demographic background questions and had the participant address several behavioral issues that could potentially modify responses measured by the instruments

(e.g., use of caffeine, prescription medications, etc). This questionnaire initially included a question on ingestion of alcohol within the past 24 hours to screen participants who might have consumed excessive alcohol the night preceding their appointment. This question was removed to prevent underage participants (19 and 20 years old) from potentially self-incriminating themselves in illegal alcohol consumption (*Ohio's legal drinking age is 21*). As an alternative to asking this question, no participant who was suspected by the project staff to be under the influence of alcohol or drugs when they arrived was permitted to participate in the study.

The PIC Room note (Appendix F) instructed participants to place the completed forms inside an envelope located on the table, and to leave the envelope in the room when they departed. Participants were instructed in the note to then play and listen to the message contained in the tape recorder on the table (Appendix I for control and Appendix J for experimental participants). Note paper and black ink pen were available for the participant to take notes. There was an intercom on the table for participants to call an experimenter and ask questions if necessary. Project staff answered participant questions about the Informed Consent Form and general questions about the study, but did not discuss specifics about the scenarios. If participant questions persisted beyond 30-45 seconds, they were disqualified from the study. This was necessary to limit inter-participant bias due to variations in their pretest treatment.

The tape recorded instructions informed all participants (control and experimental) that this was a deception study involving a pretend or mock theft, and that they would be given a credibility assessment examination by an examiner who would not know whether they were innocent or guilty of the theft. Participants were cautioned that they would be disqualified from receiving the bonus of \$50 if they did not follow instructions, or revealed details of their activities to anyone they encountered before completing the credibility assessment examination. Finally, participants were told they would receive a bonus *only* if they were found to be truthful during the examination.

Control Group Treatment. The recorded instructions for truthful or non-deceptive participants (Appendix I) briefly reviewed that the participant's task was to cooperate with the credibility assessment process and to be completely truthful. They were informed that a ring was stolen by some other participant, but that they were innocent of the theft. They were instructed to then proceed to the Intake Room where they would be met by an experimenter who would ask some questions and escort them to the Credibility Assessment Testing (CAT) Room.

Experimental Group Treatment. The recorded instructions for deceptive participants (Appendix J) directed the participant to go to another floor in the building, and to tell the receptionist there that they had an appointment with "Mr. Carlson." The recording informed the participant that there was no Mr. Carlson in the office, but the receptionist was new and would have to leave the room to confirm that. When the receptionist left the room, the participant was to steal a diamond ring from an envelope contained within a metal cash box in the receptionist's desk drawer. The participant was instructed to take the ring, conceal it on their person, and destroy the envelope. The recording cautioned the participant to not leave fingerprints, and to make up a cover story in case someone asked them questions or they were caught. The participant was further cautioned to hurry because the receptionist might return at any time. If caught, the participant was directed to tell the receptionist the cover story and leave the office as

soon as possible. Participants were told there might be a security guard roaming the building, and to not draw attention to themselves. They were instructed to keep track of time because they had 10 minutes to complete the crime once they left the PIC Room. Upon completion, the participant was to leave the office and proceed to the Intake Room where they would be met by an experimenter who would ask some questions and escort them to the CAT Room.

Mock Crime Room. The Mock Crime (MC) Room was located on a different floor than the PIC Room. The following sequence of events took place:

- The participant arrived at the Mock Crime Room (entrance door marked Gordon and Associates, Room 307)
- The receptionist was working at her desk
- The receptionist was unfamiliar to the participant (i.e., was not the same staff member who spoke to the participant during the First Call Checksheet screening, recorded the answering machine message, or the instructional tape recording)
- The office was set up as a functioning office; music covered exterior sounds; empty offices in adjoining units had light and sound effects to simulate working offices
- The participant stated that they had an appointment to see Mr. Carlson
- The receptionist stated that she didn't think there was a Mr. Carlson there, but she was new and would have to go and check, and to please wait there
- The receptionist left the office using the main entrance door, walked down the hall and went into an adjacent Monitoring Room
- The receptionist monitored the participant's activities through communications with staff in the 1st floor Monitoring Room (CCTV was not installed in the 3rd floor Monitoring Room)
- With the receptionist out of the room, the participant opened the receptionist's desk drawer where they found a black metal cash box containing an envelope with a diamond ring inside (the ring was costume jewelry but appeared authentic; writing on the envelope indicated it was lost and found)
- Inside the drawer, on top of the metal cash box was a cardboard tissue box, which the participant had to pick up and move to access the cash box
- The receptionist's cell phone on the desk was activated from inside the Monitoring Room while the participant was in the middle of committing the theft
- The participant took the ring, concealed it on their person, destroyed the envelope, closed up the drawer, and left the office
- The receptionist did not return to the office until the participant had left
- The participant continued to the Intake Room as instructed during the recorded instructions
- The receptionist returned to the office to confirm that the ring had been taken, and prepared the room for the next participant

Post-Treatment Veracity Questionnaire. Participants (control and experimental) were met by an experimenter at the Intake Room, and asked to complete a Credibility Assessment Examination Consent Form (Appendix K) and a Veracity Questionnaire (Appendix L) prior to testing. The Veracity Questionnaire was intended to ensure they understood their role in the project. If they answered the questions correctly they were escorted into the CAT Room. If they

answered the questions incorrectly or otherwise revealed their participation in the theft (experimental group), they were debriefed and paid for their time only, and their participation in the project was terminated.

PCASS Credibility Assessment Testing

PCASS Pretest Interview. Prior to data collection with the PCASS, a pretest interview, lasting approximately 30 minutes, was conducted by the examiner. The pretest interview process followed an outline (Appendix M) that involved a brief introduction to the instrument; questions on health, honesty, family background, education, employment, and leisure activities; and a review of the test questions. The pretest interview was reviewed during pilot testing to align the approach, demeanor, and pace used by the two examiners collecting data for this study. Their practice and pilot study sessions included processing three participants each, and video and audio recordings were reviewed to ensure consistency in testing. When participant availability permitted, both PCASS examiners tested at the same time using an available Intake Room (Appendix A) as the second CAT Room.

PCASS Test Questions. The PCASS system contains its own question development software, using a Modified General Question Technique (MGQT) probable-lie comparison question format. Eight test questions were developed for application to this particular mock theft scenario and programmed into the PCASS units. The questions included two relevant, three comparison, two irrelevant, and one sacrifice relevant question. The PCASS test questions and presentation order are presented in Appendix N.

PCASS Test Procedures. The participant was led from the Intake Room to the CAT Room by an experimenter and introduced to the PCASS examiner. During the pretest interview, the participant was asked to sit along side of an office desk facing approximately 45 degrees to the examiner (Appendix A). Following the pretest interview, the examiner placed the PCASS processor and sensors on the participant's wrist and fingertips, and moved approximately 90 degrees to the participant's line of sight. The participant rested their sensored arm on the desk to minimize movement, which can cause loss of signal. Before beginning the test, the examiner ensured that the sensors were receiving a good signal, and asked the participant to remain still during the testing process. Throughout testing, the participant was not looking at the examiner, but the examiner observed the participant for distress or behaviors that might indicate physical countermeasures were being used (e.g., muscle tension, biting tongue, pinching thigh, etc). During data collection, the PCASS test questions were presented verbally by the examiner, every 25 seconds, as prompted by the PCASS software program. Three successive repetitions of the question list were presented to the participant, requiring approximately 10-15 minutes. If any anomalies occurred during questioning (e.g., loss of signal from movement), the examiner was able to repeat a single question without repeating the entire test. Following the data collection process, the internal PCASS algorithm scored the data and rendered a decision of red (deceptive), green (truthful), or yellow (no opinion). In the event of a yellow decision, the PCASS data collection process was repeated one time, and this was the final decision for that participant. The PCASS examiner then called an experimenter to escort the participant to debriefing. The examiner answered general questions from the participant about the test

procedures but did not discuss the result of the test (i.e., the deception decision). Total time in the CAT Room was approximately 45 minutes (30 minutes for pretest, 15 minutes for in-test).

Participant Debriefing, Remuneration, Dismissal

Debriefing Questionnaire. Upon completion of the PCASS credibility assessment testing, participants were led by an experimenter to a debriefing room where the experimenter administered a Debriefing Questionnaire (Appendix O). The questions were intended to solicit useful information regarding the quality and value of the study, their perceptions of the procedures, realism of the scenario (for experimental participants), and whether they would consider participating again in a similar study.

Exit Briefing Statement. The experimenter read an Exit Briefing (Appendix P) thanking the participant for their participation, and asking them not to discuss the project or their activities with anyone. Appendix P contains Exit Briefing versions tailored to the activities of control and experimental participants. All participants were assured that they in no way violated any rules or laws, and the activities were strictly for the purpose of deceiving the examiner. It was emphasized that they had performed no illegal acts, and that all the role players encountered (e.g., the receptionist) were project staff members. Participants were encouraged to ask questions about the study if desired, and were provided with copies of their signed Informed Consent Forms which had project staff contact information in case questions or concerns should arise. The participants were given their remuneration in cash, and dismissed.

Early Dismissal of Participants. Important aspects of creating an environment of jeopardy during the pretest participant treatment included limiting the information given, and requiring participants to correctly follow verbal and written instructions. As expected, this approach motivated some participants to choose to end their participation; while others made mistakes in behavior that caused them to be dismissed by project staff (e.g., deviating from the instructed pathway through the building, disclosing their participation in the theft to project staff, etc). Participants who did not complete the full credibility assessment testing were administered the Exit Briefing, paid for their time, and dismissed.

Instructions to Experimenters. Procedures and responsibilities for experimenters supporting the study are presented in Appendix Q. Consistency of interaction between project staff and participants is important to avoid bias in the pretesting treatment experience. Important aspects of study logistics, timing, and participant handling are also presented.

Results

Decision Accuracy

Table 1 presents the results of the statistical analysis of the PCASS test data. PCASS decisions for the 36 deceptive participants were correct for 91.7% (33), incorrect for 2.8% (1), and no opinion for 5.6% (2). If no opinion decisions are excluded, PCASS decisions for the remaining 34 deceptive participants were correct for 97.1% and incorrect for 2.9%. PCASS decisions for the 35 truthful participants were correct for 65.7% (23), incorrect for 11.4% (4),

and no opinion for 22.9% (8). Excluding no opinion decisions, PCASS decisions for the remaining 27 truthful participants were correct for 85.2% and incorrect for 14.8%. Analyses indicate that decision accuracy for the PCASS examinations was significantly better than chance.

Table 1. PCASS Instrument Decision Frequencies (N = 71).

Participant Condition	PCASS Instrument Decisions			
	Deceptive	Truthful	No Opinion	Total
Deceptive	33	1	2	36
Truthful	4	23	8	35
Total	37	24	10	71

Note: Four participants were excluded due to physiological artifacts as determined by the instrument software (i.e., white screen scoring error of “*Not Enough Data*”).

The overall accuracy for correctly identifying participant veracity was 78.9% including no opinion decisions as errors (i.e., 56 of the 71 participant’s veracities were correctly identified), and 91.8% excluding 10 no opinion decisions from the analysis. Statistical power analyses indicate that a sufficient number of participants were tested to ensure that these results are representative of the sampled population.

For the PCASS, the percentage of correct responses was $(33+23)/71 = 78.9\%$. A 95% confidence interval for the percentage of correct responses ranges from 70.9% to 86.8%. The sensitivity of an instrument is defined to be the proportion of correct decisions for the deceptive participants. For the PCASS, the sensitivity was 91.7% (33/36), with a 95% confidence interval ranging from 84.1% to 99.2%. For deceptive participants, there were incorrect decisions for 2.8% (1/36) and no opinion for 5.6% (2/36). The specificity of an instrument is defined to be the proportion of correct decisions for the truthful participants. For the PCASS test, the specificity was 65.7% (23/35), with a 95% confidence interval of 52.5% to 78.9%. For truthful participants, there were incorrect decisions for 11.4% (4/35) and no opinion for 22.9% (8/35).

If no-opinion decisions are excluded:

- The overall percentage of correct decisions is 91.8% (56/61) with a 95% confidence interval ranging from 86.0% to 97.6%;
- The sensitivity is 97.1% (33/34) with a 95% confidence interval ranging from 92.3% to 100%; and
- The specificity is 85.2% (23/27) with a 95% confidence interval ranging from 73.9% to 96.4%.

In addition to the 71 participants receiving PCASS decisions (i.e., correct, error, or no opinion), four participants were excluded due to physiological artifacts as determined by the instrument software. These four were discarded due to a PCASS scoring result of “*Data Error*” that included 1 who later admitted to being inebriated, 1 who later revealed they were partially paralyzed, and 2 for unknown reasons (1 of those 2 admitted in debriefing to researching and using countermeasures).

Debriefing Results

Data collected through the Debriefing Questionnaire (Appendix O) returned mixed results regarding useful information. Certain questions received redundant, consistently vague, or very limited responses from participants, and because of their negligible value will not be summarized. Participant responses to notable yes-no and Likert scale questions asked during the debriefing were quantified (see Appendix R). Responses to notable open-ended questions were collected and grouped into categories (e.g., a response of “*I tried to relax myself*” was grouped together in the same category with another participant's response of “*I tried to calm myself down*”), and are reported below.

In response to the question, “*Do you think you could beat the credibility assessment instrument if you wanted to?*” 61% of the deceptive participants answered yes, and 39% answered no. Twenty-three percent of the truthful participants believed they could beat the examination, while 77% did not believe they could do so. The 30 participants who answered yes to that question were then asked, “*Please explain how [you would beat the instrument].*” The responses were grouped into six categories: distracting oneself (mentioned 8 times by the participants); convincing oneself of innocence (8); using physiological methods such as relaxing, controlling breathing and heart rate, coughing, etc. (13); deliberately taking medication that would interfere with the instrument's reading (2); acquiring foreknowledge of the examination/instrument and practicing (2); and those who were unsure of a specific method, but convinced that it “*was a machine and therefore could be beaten somehow*” (2). See Figure 2.

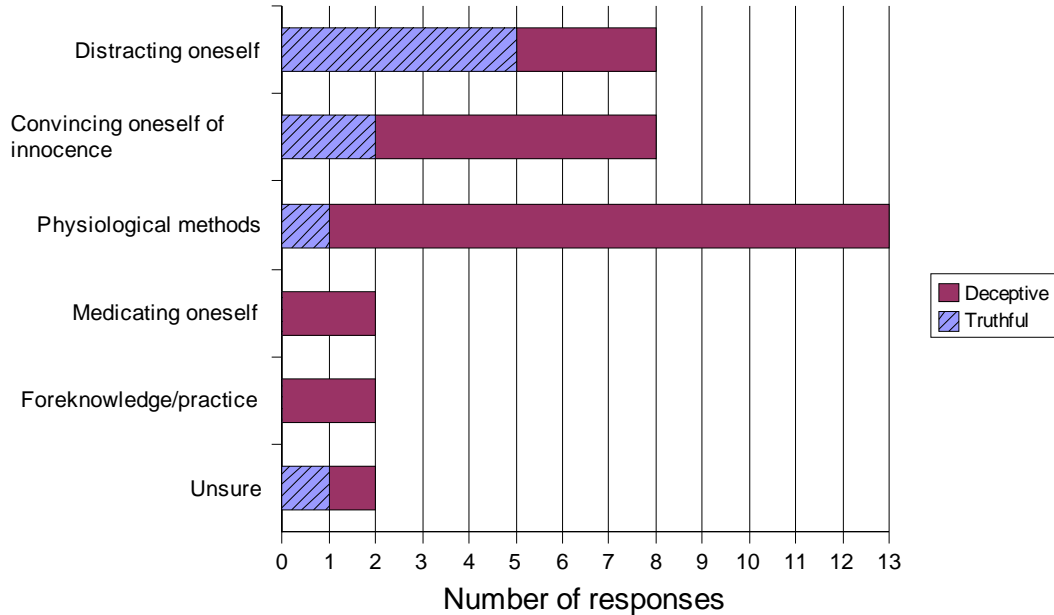


Figure 2. Methods Participants (N=30) Thought could be Used to Beat the Instrument.

Only one truthful participant (3%) answered yes when asked “*Did you make any hidden movements during the exam?*” The participant admitted to deliberately tightening his back muscles to see if the instrument could detect it. The PCASS did detect his movement, and the

examiner reminded him to remain still. His test result was a correct classification of truthful. None of the deceptive participants admitted in debriefing to making hidden movements during the exam.

In response to the question, “*Did you make any kind of reactions to beat the credibility assessment instrument?*” 44% of deceptive participants answered yes, with 56% answering no. Fourteen percent of truthful participants attempted reactions to beat the examination. The 21 participants who answered yes to that question were then asked, “*What type [of reactions did you make]?*” The responses were grouped into four categories: mental methods such as thinking calm thoughts, counting backwards during the examination, and visualizing oneself in calm or comforting situations (mentioned 10 times by the participants); visual behaviors such as intense staring at a single point to induce a trance-like state (2); respiratory methods such as holding one’s breath and deep breathing (12); and exam-related behaviors such as deliberately answering questions inconsistently or keying oneself up for perceived control questions (5). See Figure 3.

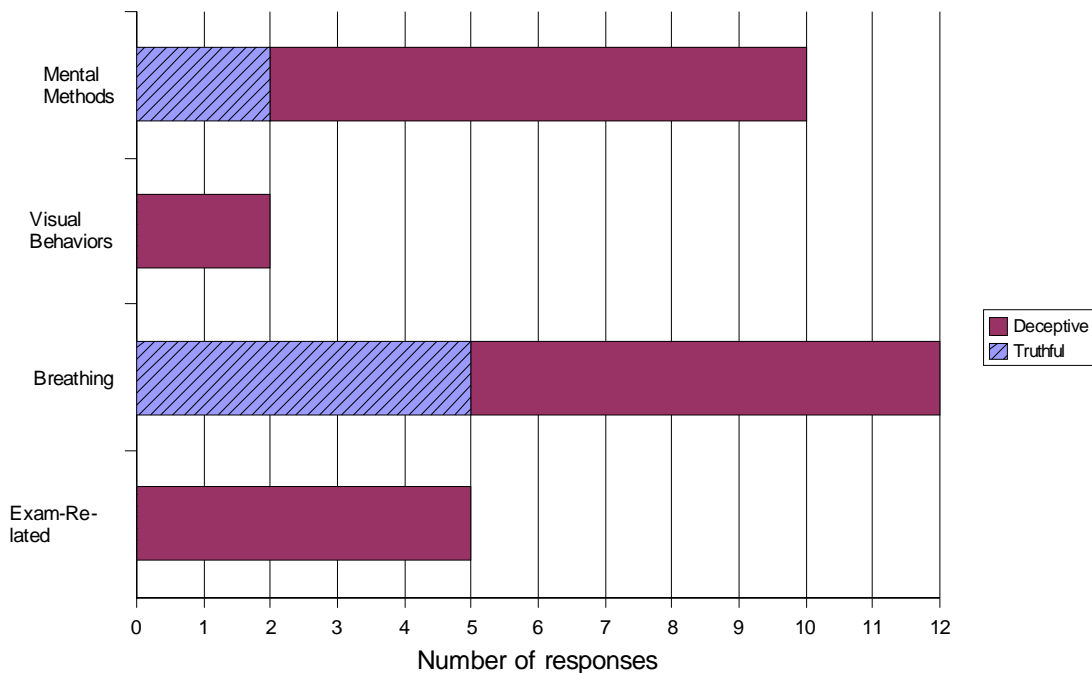


Figure 3. Reactions Participants (N=21) Created to Beat the Instrument.

Participants were asked to rate, on a scale of 1 (low) to 5 (high), how effective the \$50 bonus was in motivating them to complete the project. Deceptive participants answering 1,2,3,4, or 5 were 3%, 0%, 14%, 33%, and 50%, respectively (values are rounded), for a mean of 4.28. The percentages of truthful participants responding to the same question were 14%, 9%, 9%, 20%, and 49%, respectively, for a mean of 3.8.

Deceptive participants were asked to rate, on a scale of 1 (low) to 5 (high), how realistic the mock crime seemed. Deceptive participants answering 1,2,3,4, or 5 were 3%, 0%, 31%, 33%, and 33%, respectively (values are rounded), for a mean of 3.94.

Anomalies

PCASS standard testing procedures call for retesting an individual whenever an initial scoring of yellow (no opinion) is returned. If the results of the second test return another yellow screen, the scoring (referred to here as a “*double-yellow*”) is accepted as no opinion. As mentioned above, of the 71 test participants, 10 resulted in a double-yellow no opinion decision (2 deceptive and 8 truthful).

Review of the examiner notes, Biographical and Medical Questionnaires, and debriefing responses revealed certain notable information for the 1 false negative (i.e., deceptive conditioning with a truthful result), for 3 of 4 false positives (i.e., truthful conditioning with deceptive results), and for 9 of 10 double-yellows resulting in no opinion. Table 2 presents a compilation of various prescription drugs, medical conditions, and other anomalies disclosed by these participants. None of these participants presented to the test room displaying attributes that would disqualify them based on the screening and disqualifying criteria established in the protocol; however, certain extenuating circumstances within these subgroups are worth noting for informational purposes only.

Table 2. Anomalies Among PCASS Error and No Opinion Result Subgroups.

Anomalies Among PCASS Error and No Opinion Result Subgroups						
Participant Condition	PCASS Result	Medical Condition	Drugs	Other Disclosures	Examiner Notes	Examiner/Experimenter Speculation
Deceptive	Truthful	-Morbid Obesity -No Dr. care				
Truthful	Deceptive		-Admitted heroin use 48 hrs prior			
Truthful	Deceptive	-High BP		-Religious -Former missionary -Felt guilty thinking about it	-Hits on comparison & irrelevant questions	
Truthful	Deceptive					-Frightened -Hid behind door of Intake Room
Deceptive	No Opinion				-Flat signal -PCASS movement -Movement undetected by examiner	-Possible undetected countermeasures
Deceptive	No Opinion			-Stole golf club 29 yrs prior		
Truthful	No Opinion	-Diabetes -Morbid Obesity	-Prevacid -Furosamide -Lantus -Novolog -Simvastation -Diovan -Chlor-Con M		-PCASS noted a lot of movement	
Truthful	No Opinion	-Nerve disorder -Post-shingles pain	-Neurontin -Vytorin			
Truthful	No Opinion	-Diabetes -Double bypass -High BP -Rattlesnake bite 2 yrs prior				
Truthful	No Opinion	-Very dry skin		-Ex-convict -Prior theft	-PCASS movement -Movement undetected by examiner	
Truthful	No Opinion			-Barber -Possible hair product on hands		
Truthful	No Opinion				-Seemed "too loose" -Mentioned "happy hour"	-Possible unconfirmed inebriation
Truthful	No Opinion	-Back surgery 2 months prior	-Morphine pump implant -Fentanyl -Baclofen -Albuterol			

Discussion

Decision Accuracy

Analyses indicate that decision accuracy for the PCASS examinations was significantly better than chance. As depicted in Table 1, the overall accuracy for correctly identifying participant veracity was 78.9% including no opinion decisions as errors (i.e., 56 of the 71 participant's veracities were correctly identified), and 91.8% excluding 10 no opinion decisions from the analysis. Statistical power analyses indicate that a sufficient number of participants were tested to ensure that these results are representative of the sampled population. These data suggest that the PCASS system is effective in detecting deception.

Countermeasures

During PCASS testing, examiners observed participants for any suspected or obvious signs that they might be using countermeasures. The policy in this situation was for the examiner to direct the participant to cease the relevant behavior or adopt a countering behavior (e.g., "please remain still," or "please breathe normally"). If the participant continued or resumed the behavior, the examiner would disqualify the participant as uncooperative; although there were no disqualifications for this reason during PCASS testing.

Debriefing questions revealed that 21 of the 71 tested participants (30%) responded yes to the question "Did you make any kind of reactions to beat the credibility assessment instrument?" (Figure 3). Interpretation of these results requires closer scrutiny of the context and limitations of the debriefing process. The debriefing experimenters emphasize that the participants exhibited a wide range of commitment and motivation in their responses, and many were clearly looking forward to being paid and dismissed after a rigorous exercise. Some responses referring to the participant trying to breathe calmly or mentally relax were interpreted by the experimenters to be notably low in commitment. How dedicated they were to trying these techniques and the duration of their use during testing is unclear. In contrast, a few participants revealed greater commitment both in their use of the technique and in their intention to "beat" the instrument. Although excluded because of a white screen "Not Enough Data" error and not one of the final 71, one female participant admitted to having extensively researched the use of countermeasures before her appointment and used several techniques throughout testing. She reported that during the PCASS test, she "tightened her stomach muscles during challenge questions," and was "moving her toes and flexing her legs to change blood flow." She also claimed that she deliberately yawned many times before and during the test. It is unclear whether her creation of these reactions had anything to do with the white screen scoring result. None of these reactions were noticed by the examiner.

Another perspective on this debriefing question is how the test results breakout within the 21 participants who admitted to creating some kind of reaction to beat the instrument. Within this subgroup, the PCASS scored a correct answer in 20 of the 21 cases (95.2%) (Table 3). The single error occurred on an anomalous female participant (deceptive conditioning) who was morbidly obese. [*Participant screening and disqualifying criteria established in the protocol did not prohibit her participation so long as she could complete the tasks in the scenarios*]. Her

response was one of those the debriefing experimenters noted as being vague and low in commitment. She stated that she “*tried to breathe slowly and calm her pulse.*” The contrast between deceptives (44%) and truthfuls (14%) follows the rationale that truthful participants would not be as likely to try to beat the instrument at all, let alone use countermeasures to do so. That 14% of the truthful participants admitted to creating a reaction seems high in this context, which supports the experimenters’ contention that some participants responded affirmatively more out of an attempt to remain generally calm than with an intention to alter the test results. While these results seem to support that the type of countermeasures and manner of employment used by these participants had no apparent negative effect on the PCASS test results, inadequacies in the data do not warrant any substantive conclusions.

Table 3. PCASS Decision Frequencies (N = 21) within Countermeasure Subgroup.

Participant Condition	PCASS Instrument Decisions			
	Deceptive	Truthful	No Opinion	Total
Deceptive	15	1	0	16
Truthful	0	5	0	5
Total	15	6	0	21

Note: One of four participants excluded due to physiological artifacts as determined by the instrument software (i.e., white screen scoring error of “*Not Enough Data*”) admitted to using countermeasures.

External Validity

The mock crime processes used as participant treatment scenarios were designed to create an environment simulating the jeopardy experienced during real-world human credibility assessment testing so a high degree of external validity is attained. This was done by limiting the information given to the participants, requiring participants to correctly follow verbal and written instructions, and by providing an incentive for being found truthful during credibility assessment testing. The overall strategy for the mock theft scenario is similar to the studies reported by Kircher and Raskin (1988) and Podlesney (1976). Participants’ uncertainty regarding whether they were participating in a genuine research study or being scammed into committing an actual theft was increased by:

- Soliciting and screening participants via classified newspaper advertisement and telephonic communication
- Using a study building with high contrast between the initial entry point (Figure 4) and mock crime area (Figure 5) (i.e., a basement in extreme disrepair versus a working business office on an upper floor)
- Providing only written and audio-recorded instructions prior to the credibility assessment examination
- Providing no direct contact with known study personnel prior to the credibility assessment examination
- Instructing participants to watch out for a roaming security guard, to have an alibi ready, and to avoid leaving fingerprints
- Instructing telephonic screeners to answer questions regarding the project ambiguously



Figure 4. Basement Initial Entry Point.



Figure 5. Mock Crime Room Photo.

To increase the participant's perception that they would lose something if they were found deceptive during the credibility assessment examination, a \$50 bonus was offered only if the participant was found truthful by the instrument. While all participants successfully completing the project were ultimately paid the bonus regardless of test outcome, experimenter anecdotes suggest that participants were emotionally invested in the scenarios. Finally, among deceptive participants asked in debriefing to rate the realism of the scenario, a mean value of 3.94 on a scale of 1 through 5 was attained. This indicates that in general, the mock crime treatment scenario achieved its intended purpose to simulate a real-world environment.

Experimenter Anecdotes

Through the course of testing the instrument, we had at least two participants call the local police to report their suspicions regarding the study. When one of the two participants arrived with the police, she mentioned having thought that the scenario was not as she'd expected; having used the wrong entrance, she hadn't seen her name on the forms as she'd been told to expect.

Several participants mentioned thinking the study wasn't real, or asking the experimenter “*Is this real?*” or “*Is this a scam?*” Particularly during the debriefing, some participants mentioned wondering whether they'd be mugged. Subjects often reported being put at ease when they finally came in contact with the staff.

On four occasions, during veracity screening, participants inadvertently confessed to having committed the mock theft. Their participation was ended at that point, and they were remunerated accordingly.

Perhaps half of the participants mentioned the scenario reminded them of various spy and horror movies.

On more than a few occasions, participants' past experiences came to light during the pretest interview and debriefing. More than a few mentioned having a criminal history, and being reminded of having stolen things in the past. A few disclosed fears about violating parole by committing the mock crime – or in one case, fear of reigniting a habit of theft.

From time to time, a disqualified participant would become irate. Usually, we noticed that the participants who were most upset were those who came in with specific expectations about payment or time that would be spent at the test site. Conversely, participants who had no expectations or grand ideas about how the study might benefit them were not disappointed.

Most participants simply stuffed the ring in a pocket or purse, but from time to time, the resourcefulness of participants proved surprising. The examiners saw rings emerge from socks, shoes, mouths, undergarments, and even a bologna sandwich! One participant, unable to open the cash box, decided to hide the entire box in her jacket.

Motivations mentioned for taking part in the study were as broad as the backgrounds of the participants themselves. Many participants mentioned that money was a motivating factor, but several mentioned having made a hobby of participating in research studies, or participating to satisfy academic curiosity.

Innocent participants, as a general rule, showed more overall confusion as to their role in the study. This was likely due to the fact that truthful participants had a great deal of information withheld from them. Efforts were made in debriefing to assure them of the importance of testing honest people on credibility assessment instruments.

Confounding Effects

Controls were implemented to prevent conscious and unconscious bias into the experiment. For example, group membership (whether a participant was control or experimental) was randomly assigned by a scripted database function, and not by a staff member. Also, group membership was kept hidden from any who were responsible for collecting data. Monitoring-personnel and examiners worked in different rooms, and monitoring-personnel were careful to not reveal any information about the participants. Examiners were only provided a participant's name and ID number prior to data collection. The unpredictable rate of no-shows

eliminated any patterns in subject arrival times that might have revealed sensitive information to examiners.

To minimize any unknown effects of potential differences between the CAT Room and Intake Room used by the two examiners and their specific PCASS units, the examiners switched instruments and rooms halfway through data collection.

To minimize any unknown effects of potential differences between PIC Rooms used by deceptive and truthful participants, room assignments and the instructional audio tapes were switched halfway through data collection.

White noise machines were placed in the PIC rooms and in the Intake area to mask and muffle exterior voices and sounds. This helped to ensure that the participants could not overhear things from adjacent rooms, such as in-briefings/debriefings, other instructional audio tapes playing, or any examinations being conducted.

PCASS Technical and Utility Comments

Examiners had a number of comments and notations about technical and utility issues with the PCASS system. Overall, the system was easy to learn and use, and setup and programming of the unit for the test presented no notable problems. Initial practice and pilot tests presented a recurring problem getting the unit running at the beginning of the test. Frequently a dialog stating “Fatal Error” would appear. The examiners found that this occurred whenever they tried to run back to back tests without rebooting the computer. After incorporating a reboot between tests into their regular routine, the error message did not return. There were also occasional difficulties maintaining an EDA signal due to insecure contacts, participant movement, and excessively sweaty or unclean hands. The treatment scenario used in this study did not permit participants to wash their hands before testing, and many had become slightly grimy during the process. The examiners tried both adhesive pads and small metal plates for the EDA during pilot testing, and found that the metal plates provided a more consistent signal. The metal plates were then used throughout testing. One note of convenience for examiners using the PCASS was that they should ensure to name data files logically for each participant before the start of a test to reduce post-test reconstruction of files and administrative burden.

References

Devore, JL (2003) *Probability and Statistics for Engineering and the Sciences*, Sixth edition, Duxbury Press, Duxbury, Massachusetts.

Kircher, JC and Raskin, DC (1988) Human versus Computerized Evaluations of Polygraph Data in a Laboratory Setting. *Journal of Applied Psychology*, 73, 291-302.

Podlesney, JA (1976) Effectiveness of techniques and physiological measures in the detection of deception. Unpublished doctoral dissertation, University of Utah, Salt Lake City.

Safe Use of LASERs – ANSIZI Z136.1 (2000). New York: American National Standards Institute; 2000:163.

Safe Use of LASERs Outdoors – ANZI ZI136.6 (2000). New York: American National Standards Institute; 2000.

Appendix A:
Research Space

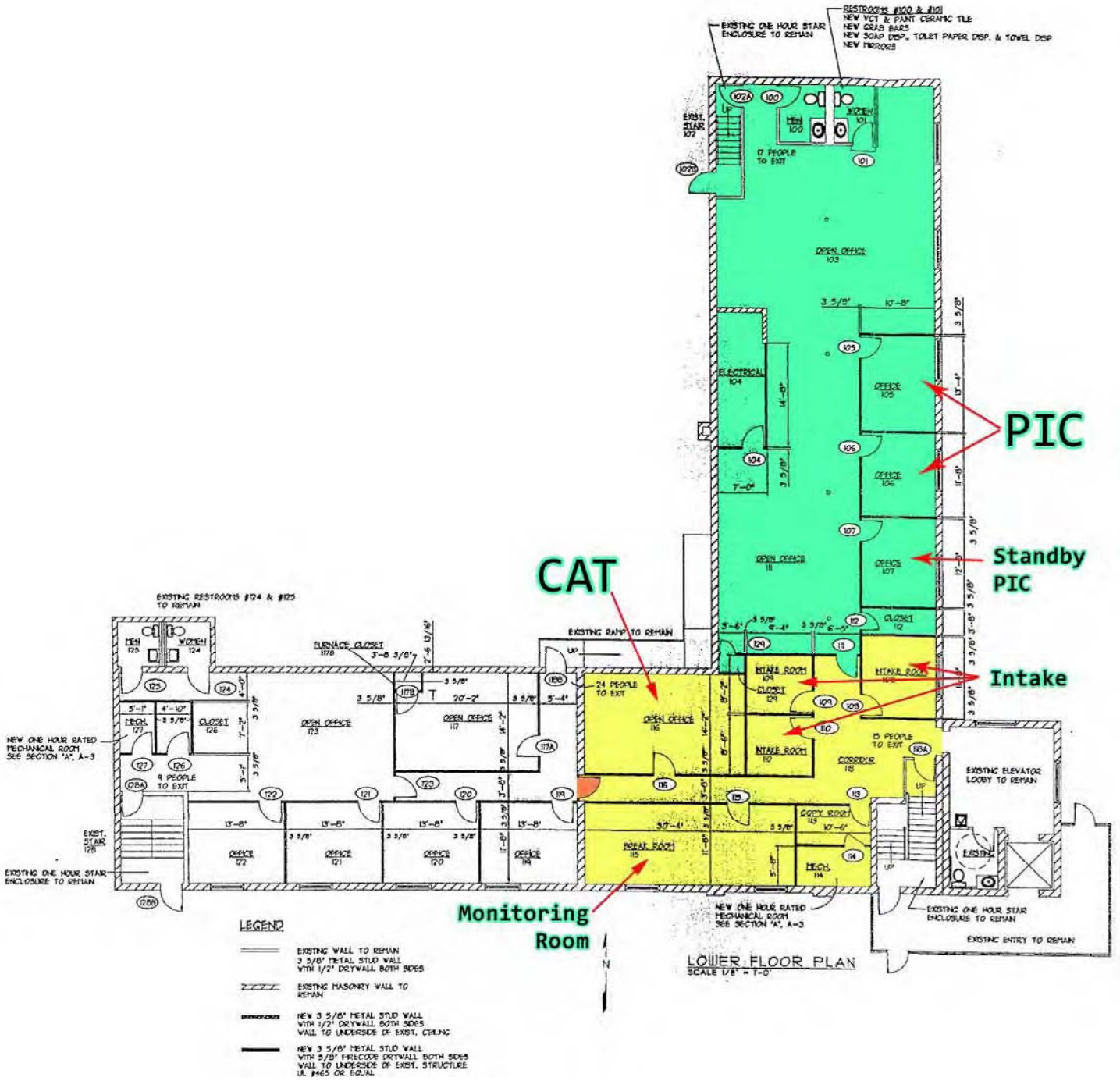


Figure 6. Floor Plan – 1st (Lower) Floor

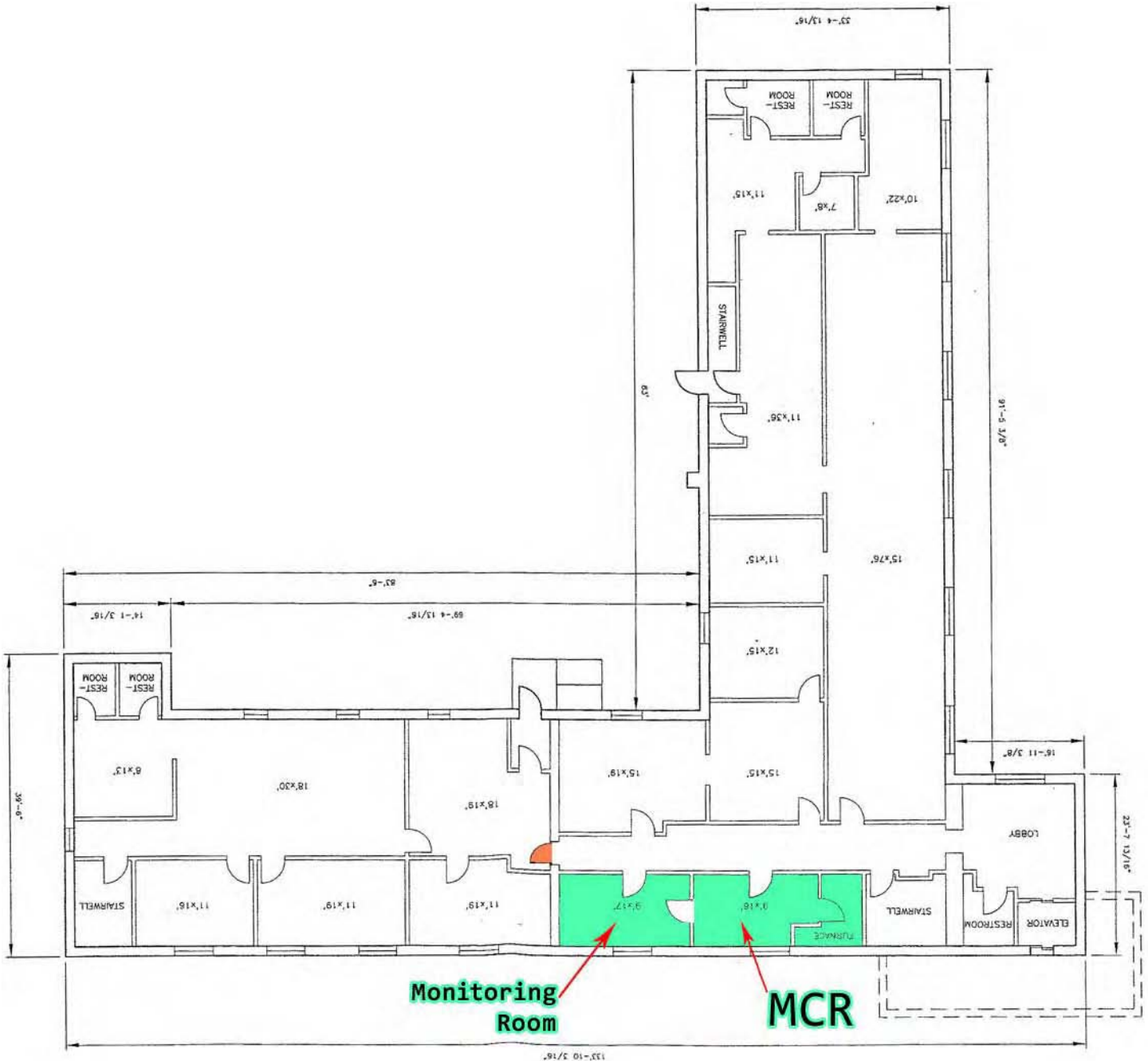


Figure 7. Floor Plan – 3rd (Upper) Floor

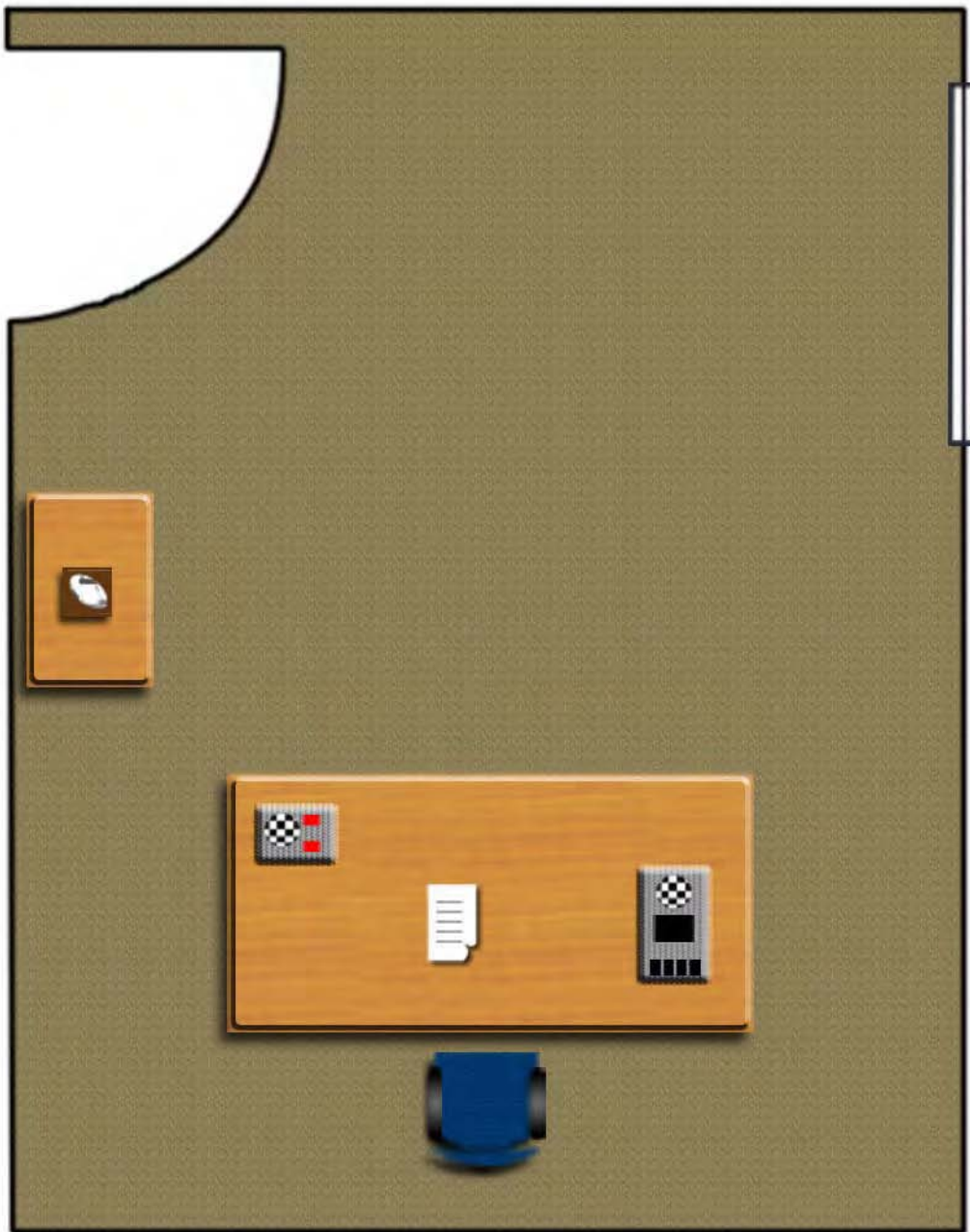


Figure 8. Point of Initial Contact (PIC) Room



Figure 9. Mock Crime (MC) Room

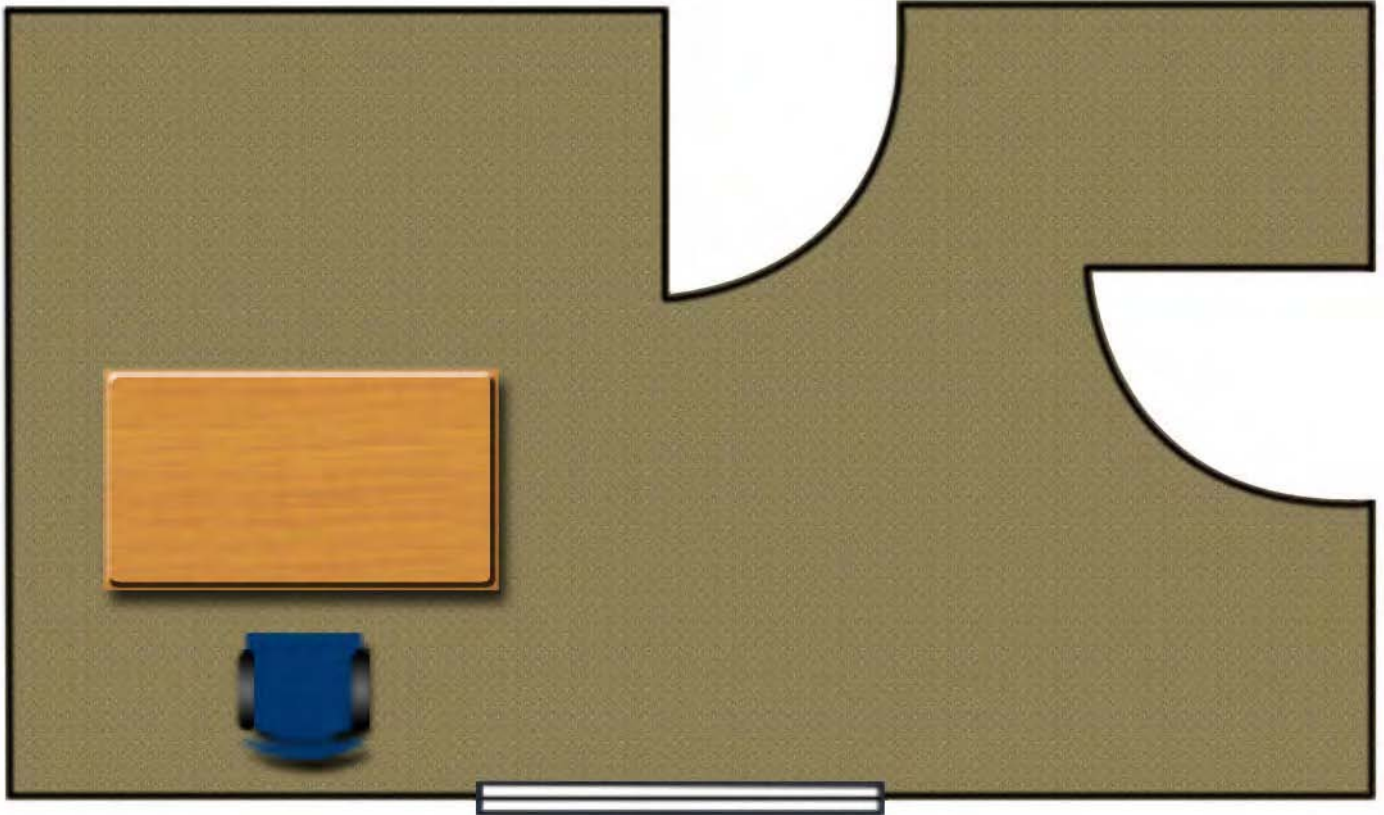


Figure 10. 3rd Floor Monitoring Room (adjacent to MC Room)

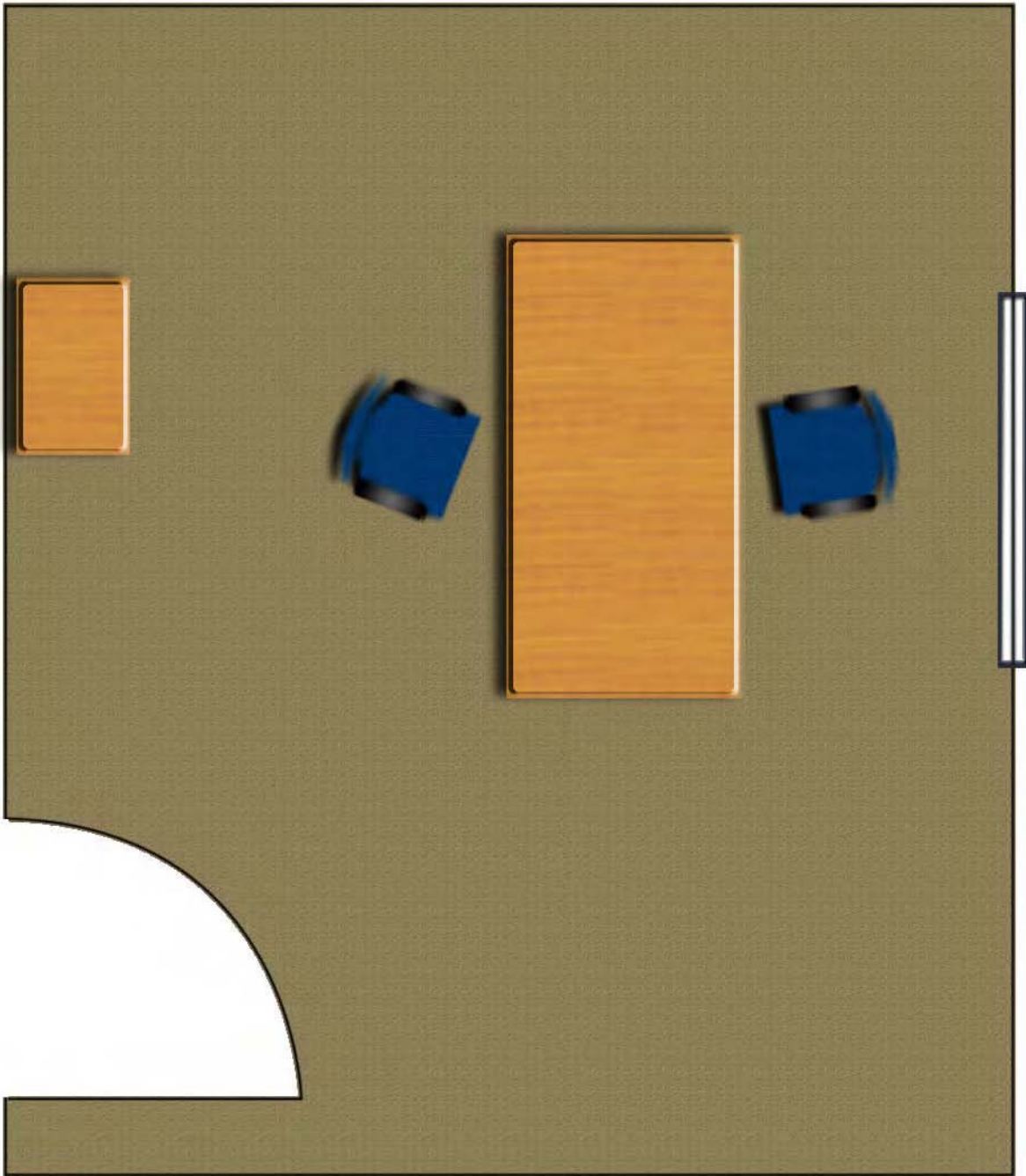


Figure 11. Intake Room

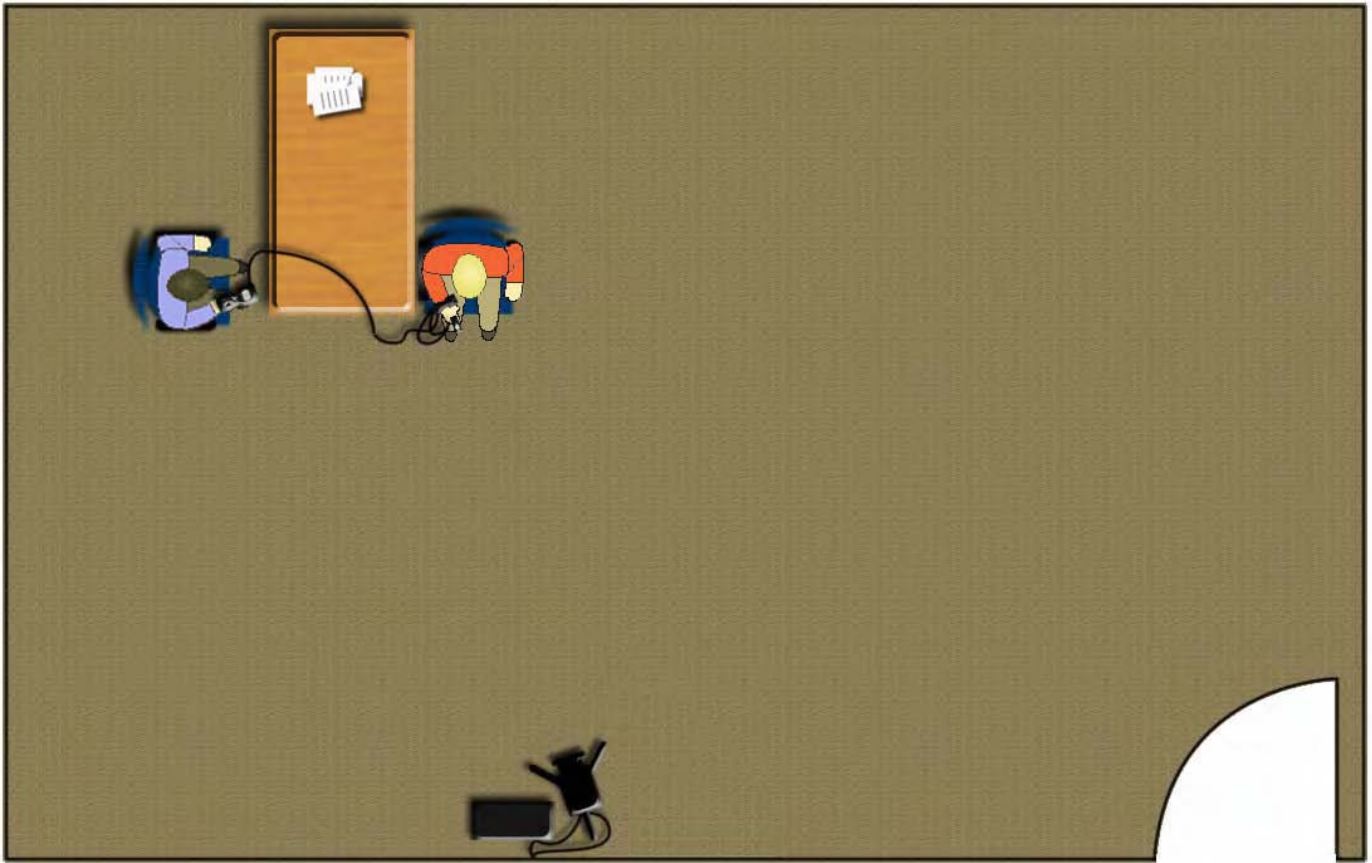


Figure 12. CAT Room – PCASS



Figure 13. 1st Floor Monitoring Room (across hall from CAT room)

Appendix B:

Sample Size Requirements

B-1.0 Power Analysis and Sample Size Requirements

Battelle will collect data on a sufficient number of participants to meet the following two data-quality objectives:

- The probability of incorrectly deciding a technology performs better than chance accuracy when it only performs at chance accuracy should be 5%
- The power of correctly deciding that a technology performs better than chance accuracy should be 80%

The second data quality objective requires a particular “true” value for the accuracy of a technology, for which Battelle has selected a “true” accuracy of 65%, which was chosen to be halfway between the value of 50% associated with chance accuracy and 80% associated with the previous performance of the technologies during development and testing. The target participant sample size for each technology will be 68 participants. The following sections provide a summary of the assumptions, data types, and evaluation method that led to this preliminary sample size estimate. A final “Note” section discusses the power associated with additional analyses concerning sensitivity, specificity, and comparison of efficacies among technologies.

B-1.1 Assumptions

- (1) Individuals will be divided into two equal groups of guilty and innocent subjects.
- (2) The goal of the efficacy study is to compare the performance of each technology to chance accuracy, which is 50%.
- (3) The power of the accuracy analysis is to be 80%.

B-1.2 Data

The data obtained from the study will consist of information about the subject’s innocence and a decision about the innocence based on the technology. Thus, each subject is classified two ways: by his/her true innocence and by the technology assessment. The data for all subjects can be displayed in the manner shown in Table B.1.

Table B.1 Two-Way Classified Data Associated with Technology Evaluation

Truth	Technology Assessment		Total
	Innocent	Guilty	
Innocent	X_{II}	X_{IG}	n
Guilty	X_{GI}	X_{GG}	n
Total	$X_{II} + X_{GI}$	$X_{IG} + X_{GG}$	2n

The first subscript within each cell corresponds to the true innocence, and the second subscript corresponds to the technology assessment. The total number of subjects will be $2 \cdot n$, with n innocent and n guilty subjects.

B-1.3 Method

The effectiveness of a technology is the proportion of subjects that are correctly classified. In terms of the data table, this proportion is equal to $(X_{II} + X_{GG})/2n$. This proportion will be compared to 0.5 (50%), the chance accuracy for the machine. The power of the test to correctly identify a technology with better-than-chance performance depends on the true performance, the significance level of the test (the probability of incorrectly deciding the technology performs better than chance when it only performs as well as chance), and the number of subjects. The formula for calculating the required sample size can be found in most texts discussing statistical analysis of proportional data, such as Devore (2003). Table B.2 shows the sample sizes that are required to attain 80% power (for an error probability of 5% and various true technology performance values). Note that the values in the table represent the total number of subjects for the technology (i.e., $2n$).

Table B.2 Sample Size Requirements to Meet Data Quality Objectives for Comparing Technology Accuracy against Chance Accuracy

True Technology Classification Accuracy	Number of Subjects (Significance level = 5%, Power = 80%)	
	Per Technology	Total
0.55	618	1854
0.60	154	462
0.65	68	204
0.70	38	114
0.75	24	72
0.80	16	48

B-1.4 Recommendation

Based on the sample size analysis results in Table B.2 (shaded row), we recommend that **68 subjects per technology** be selected for the study. This sample size will guarantee a power of 80% to detect a true technology accuracy of 65% or higher.

Note: While the primary objective of the study is to determine whether the technologies perform better than chance, there may be some interest in three other types of inference:

- Estimating the sensitivity of the technology
- Estimating the specificity of the technology
- Comparing the accuracies among technologies

The sensitivity is defined as the proportion of all guilty subjects that the technology correctly identifies as guilty and can be estimated from the data table as X_{GG}/n . The specificity is defined as the proportion of all innocent subjects that the technology correctly identifies as innocent. This can be estimated from the data table by X_{II}/n . For a study using the recommended sample size, the power of a test comparing sensitivity to chance performance would have approximately 92% power when the true sensitivity is 75%. The power of the specificity test will be the same as the sensitivity test.

B-1.5 References

Devore, JL (2003) *Probability and Statistics for Engineering and the Sciences*, Sixth edition, Duxbury Press, Duxbury, Massachusetts.

Appendix C:

Participant Solicitation Information

Classified advertisements

Deception Study

Individuals needed. For your time and effort, you can receive \$15 per hour for up to 4 hours and the potential to earn a bonus of \$50. Call xxx-xxx-xxxx for info.

Deception Study. *For your time and effort, you can receive \$15/hr for 1-4 hrs & chance for \$50 bonus. Call xxx-xxx-xxxx!*

Answering machine message

Thank you for your interest in the deception study. We will be recruiting people to participate on a first come, first served, basis. You must be between 19 and 60 years of age and must have completed at least one college or continuing education course beyond the high school level to participate. If you have ever taken a polygraph exam or held a government security clearance above “confidential,” you are not eligible for this study. You will be asked to disclose any prescription medication that you might be taking. All information collected will be maintained in a confidential manner. Please leave your name and a phone number where you can be reached between 8 AM and 5 PM. We will return your call as soon as possible. We must talk with a person and will not leave a message. We will not be able to contact you if your phone has call blocking. You have 20 seconds to leave your name and number. Please speak slowly and distinctly. Wait for the tone.

Answering machine message – project end

Thank you for your interest in the deception study. We no longer need volunteers for the study. We have attempted to return all calls. Unfortunately, we have not been able to contact everyone who left a message. We will not be able to respond to any future messages. Thank you for your interest.

Appendix D:

First Call Checksheet

Call Date: _____ Time: _____ AM PM Caller: _____

Last Name: _____ First Name: _____ Sex _____

Address: _____

Phone Number(s): Home: _____ Work: _____

Cell: _____ Other _____

Best Time/Place to be reached: _____

- How old are you (*19 to 60 only*)? _____
- Are you a United States citizen? Yes No
- Have you ever had a polygraph examination? Yes No
- Have you ever had a government security clearance (*above confidential*)? Yes No
- Are you personally related to or acquainted with anyone involved in this project? Yes No
- Are you willing to answer questions about your medical history, including prescription drug usage? Yes No
- How did you learn about this project? _____ Other Advertisement
In which newspaper? _____
- Do you have a high school diploma or equivalency? Yes No
- Have you taken any classes since receiving your high school diploma or equivalency? Yes No
If so, where? _____
- Can you climb stairs unassisted? Yes No

*Statement if the participant does not meet the above criteria – deliver it graciously following the disqualifying response, without completing the questions (**bold underlined** answers are required):*

*“I’m sorry; you don’t meet the criteria for the study. (**Do not explain why**). Thank you for calling. Goodbye.”*

Appendix E:

Script for Scheduled Participants

Here's what you will do. Be sure to write these times and addresses down so you don't forget. Report to the [BUILDING NAME] building in Columbus at [TIME] on [DAY & DATE]. Can you be there at this time? It is located at [ADDRESS]. Drive into the ____ side parking area and pull around to the back lot. There is no charge for parking. Enter the building using the ground level door facing the rear parking lot. Go downstairs to room [NUMBER]. The door will be unlocked. Enter the room and close the door. There will be an envelope on the desk with your name on it. Follow the instructions and complete the forms in the envelope. Also, make sure that you bring your driver's license or some other form of photo ID. You will not be permitted to use a cell phone during the study, so please turn it off before you enter the building. Please do not wear heavy make-up, or high-collared clothing such as a turtle-neck. Make sure that you bring a watch because you will need to keep track of time as you go through the study. Make sure that you are on time. If you are late, you will not be able to participate in the study.

Appendix F:

Participant Instructions

When participants arrive at the specified room, they will enter the room and find a note addressed to them on the table. The text of the note will be as follows:

There is an envelope on the table with your name on it. The envelope contains an Informed Consent Form and a Biographical & Medical Questionnaire. The consent form explains what you can expect to happen during this study and describes the rights you have and benefits you can receive for participating. The questionnaire asks questions about your health and medical history. If you would like to participate, you must complete the questionnaire and read and sign the Informed Consent Form. If you choose not to participate, you may leave now. When you are finished, place both forms back in the envelope. Leave the envelope containing the completed forms on the table. Do not take them out of this room. Later, you will receive a copy of the Informed Consent Form. After you complete the forms, press play on the tape recorder to hear your instructions.

Participants should enter the room and close the door, and then complete the forms as instructed. The tape player will provide instructions to participants as to how they are to complete the remainder of the study.

The purpose of this participant instruction method is fourfold. First, because minimal human contact is involved, the process will be consistent for all participants, thus removing a potential source of variability. Second, because participants have only notes and recorded instructions to direct their actions, the process should heighten their arousal because no one will be physically present to greet them, answer questions, or reassure them. Third, because the process requires that participants act independently with minimal instructions, the process is self-selecting. That is, individuals who are unable or unwilling to act independently are expected to withdraw from the project. Finally, the participants must be able to understand and follow instructions. Again, those who cannot do this are expected to self-select and withdraw from the project. Participants will be instructed in the Informed Consent Form to use the intercom on the table to contact and ask questions of a project staff member if desired. In addition, all participants will receive a full and complete disclosure during the final debriefing; all of their questions will be answered.

Appendix G:

Informed Consent Form

{PCASS Control Group – group will not be displayed on actual form}

Please read this consent form carefully before you decide if you would like to participate in this research study. If you have questions you would like to ask of a project staff member, please use the intercom to do so at any time.

Project Title: Efficacy of Prototype Credibility Assessment Technologies.

Research Project Explanation

You are invited to participate in this research study to help us test new types of devices and instruments which are designed to tell if you are being deceptive when you answer questions relating to a pretend or mock crime. The title of the study is “Efficacy of Prototype Credibility Assessment Technologies,” and is sponsored by the U.S. federal government under the direction of Battelle. The instrument you are invited to help us test uses two sensors attached to the palm of your hand and fingertip to measure changes in your skin and your pulse as you answer certain questions. We will obtain these measures during what is called a Credibility Assessment Test, where an examiner will interview you and record your responses and those of the instrument being tested.

Before the test begins, you will be asked to complete a biographical & medical questionnaire on your health and medical history, and sign a Credibility Assessment Examination Consent Form. Before you take the test, a project staff member will briefly review your medical history and you will be required to honestly answer questions regarding treatment by a physician, psychiatrist, or psychologist, and the use of drugs that could interfere with the results of the credibility assessment test. These questions are necessary to determine your suitability for participation in this project. Your answers will be confidential, to the extent required by law.

As the credibility assessment test begins, the examiner will explain how the test works and what you are to do. The test will take about one-half hour to complete. You may be monitored by audio or video at any time during this project and will be recorded during the credibility assessment test.

Your job is to convince the examiner that you are being truthful. You have been randomly selected to participate in this project as an innocent subject. The examiner does not know if you are being truthful; he or she is relying on the results of the testing. Again, your job is to convince the credibility assessment examiner that you are being absolutely truthful.

Restrictions

You must be between 19 and 60 years old to participate in this study. You must have completed high school and enrolled in some form of post high school educational training such as college or a technical school. You should not participate in this project if you suffer from low or high

blood pressure; cardiovascular; or other problems which prevent you from sitting comfortably for five minutes at a time. After signing this form, the testing process will begin and you will not be allowed to smoke cigarettes, use a telephone, or contact people outside of the study until your participation for the day is complete (except for emergencies).

Risks

There are no known dangers or risks associated with your participation in this study. The two low power sensors placed on the palm of the hand are safe and do not cause any pain or discomfort. They attach to the skin with a self-adhesive backing. Before the sensors are placed on your hand, a special gel is applied to the skin to improve the measurement. The gel is safe and approved for application to the skin. The sensor placed on the fingertip is safe and does not cause any pain or discomfort. It attaches to the fingertip with a small Velcro band.

Some individuals find the credibility assessment examination to be highly stressful. If you are uncomfortable, you may choose to end your participation at any time.

Participation Benefits

There are no direct benefits to you for your participation in this study. You will indirectly receive the benefit of learning what a credibility assessment examination is like and the satisfaction of participating in research that could significantly improve current procedures; making credibility assessment examinations simpler to perform and more accurate.

Recruitment Incentive

If you choose to participate in this study, you will be paid \$15 per hour for participating. Partial hours will be paid in quarter-hour increments, except for the first hour, which will be paid in full. You will receive a bonus of \$50 if you are found to be truthful during the credibility assessment test. If you choose not to complete the study you will be paid \$15 per hour for your time, but you will not receive a bonus. If you do not follow instructions you could be disqualified by a project staff member. In case of disqualification you will be paid \$15 per hour, but will not receive a bonus. All payments will be made in cash at the study facility. We will not send payment to you.

Time Commitment and Withdrawal from the Study

Your participation is voluntary and you may quit at any time without any penalty or punishment. If you decide not to complete the study, please pick up the intercom and tell the project staff member. Be sure to tell us if you are leaving so we can arrange payment. Payment will be made only to you, in person, in cash, on site. If you are with study personnel and wish to quit, please tell them and your participation will end. You will be asked to stay a few extra minutes, for which you will be paid, so we can explain the project and answer any questions you may have. If you quit before completing all of the testing, you will be paid for the time you have spent, and no bonus will be awarded to you.

You are expected to participate for approximately 2 hours, although the total length of time could be shorter or longer. You will complete all of your participation today and will not be asked to return for any additional days.

You may be dismissed from the study if you fail to keep appointments, if you fail to follow instructions, if the experimenter or credibility assessment examiner determines that you are unsuitable for testing (e.g., unable to sit still, unable to continue because of health, sleepiness, or medications), if you appear to be under undue stress, or if you discuss study procedures with individuals outside of the project.

Information Confidentiality

Your ability to provide us with accurate and honest information is critical to the success of this project. For this reason, we have established rigorous procedures to protect your confidentiality in this study. Information obtained from consent forms, questionnaires, and interviews will be stored in locked file cabinets and will only be available to project staff, although certain government agencies do retain the right to inspect project records to ensure your safety. You will be assigned a code number and your identity will never be physically linked with records of this study. The audio or video records that we collect will be provided to our client so they can verify that the testing procedures were performed correctly and to further ensure your safety. Your face will be visible and your voice will be audible on these records. These records will be held in confidence in archival storage by the client and will be destroyed seven years after the research project has been completed. The results of this research study may be presented at meetings or in publications; however, your identity will not be disclosed. Between 275 and 300 individuals will be tested so it is unlikely that you could be identified because you participated.

Contact Persons

If you have questions regarding this study or believe you have become injured or ill as a direct result of the study contact Mr. David Salyer, Project Manager, 614-424-5082 or Dr. Robert J. Woods, Principal Investigator, 508-647-1972.

Battelle will not provide you with medical treatment or financial compensation in the event of personal injury resulting directly from the research procedures, *except as provided through remedies available at law*. In spite of all precautions, you might develop medical complications or encounter an injury from participating in the study (e.g., trip and break a leg). If such complications arise, the project staff will assist you by contacting emergency medical services, but all associated costs for such services remain your responsibility.

If you have any questions about your rights as a research participant, you may contact Mr. Gary Sapp, manager of the BSTI Institutional Review Board, at 614-424-7648.

If you have questions regarding this consent form or your participation in the study, please use the intercom in this room to discuss your questions with a project staff member. If you would like to speak with Mr. Salyer, Dr. Woods, or Mr. Sapp now, use the intercom to contact a project staff member and ask to use the telephone to call the numbers provided.

Authorization

I have read and understand this consent form, and I volunteer to participate in this research study. I may choose to end my participation at any time. I understand that I will receive a copy of this form and that I will receive an outgoing briefing that provides additional information about the end-purpose of the study. I understand that my consent does not take away any of my legal rights in case of negligence or other legal fault of anyone who is involved in the study. I further understand that nothing in this consent form negates any federal, state, or local law regarding informed consent.

Name of Subject (Printed)		
Signature of Subject	Date	Time

Informed Consent Form

{PCASS Experimental Group – group will not be displayed on actual form}

Please read this consent form carefully before you decide if you would like to participate in this research study. If you have questions you would like to ask of a project staff member, please use the intercom to do so at any time.

Project Title: Efficacy of Prototype Credibility Assessment Technologies.

Research Project Explanation

You are invited to participate in this research study to help us test new types of devices and instruments which are designed to tell if you are being deceptive when you answer questions relating to a pretend or mock crime. The title of the study is “Efficacy of Prototype Credibility Assessment Technologies,” and is sponsored by the U.S. federal government under the direction of Battelle. The instrument you are invited to help us test uses two sensors attached to the palm of your hand and fingertip to measure changes in your skin and your pulse as you answer certain questions. We will obtain these measures during what is called a Credibility Assessment Test, where an examiner will interview you and record your responses and those of the instrument being tested.

Before the test begins, you will be asked to complete a biographical & medical questionnaire on your health and medical history, and sign a Credibility Assessment Examination Consent Form. Before you take the test, a project staff member will briefly review your medical history and you will be required to honestly answer questions regarding treatment by a physician, psychiatrist, or psychologist, and the use of drugs that could interfere with the results of the credibility assessment test. These questions are necessary to determine your suitability for participation in this project. Your answers will be confidential, to the extent required by law.

As the credibility assessment test begins, the examiner will explain how the test works and what you are to do. The test will take about one-half hour to complete. You may be monitored by audio or video at any time during this project and will be recorded during the credibility assessment test.

Your job is to convince the examiner that you are being truthful. You have been randomly selected to participate in a “pretend” or “mock” crime, and then to lie to the examiner about what you did. No actual crime will be committed, but the examiner does not know that and you will try to convince the examiner that you are innocent. The examiner does not know if you are being truthful; he or she is relying only on the results of the testing. Again, your job is to convince the credibility assessment examiner that you are being absolutely truthful, even though you will be lying to the examiner.

Restrictions

You must be between 19 and 60 years old to participate in this study. You must have completed high school and enrolled in some form of post high school educational training such as college or a technical school. You should not participate in this project if you suffer from low or high blood pressure; cardiovascular; or other problems which prevent you from sitting comfortably for five minutes at a time. After signing this form, the testing process will begin and you will not be allowed to smoke cigarettes, use a telephone, or contact people outside of the study until your participation for the day is complete (except for emergencies).

Risks

There are no known dangers or risks associated with your participation in this study. The two low power sensors placed on the palm of the hand are safe and do not cause any pain or discomfort. They attach to the skin with a self-adhesive backing. Before the sensors are placed on your hand, a special gel is applied to the skin to improve the measurement. The gel is safe and approved for application to the skin. The sensor placed on the fingertip is safe and does not cause any pain or discomfort. It attaches to the fingertip with a small Velcro band.

Some individuals find the credibility assessment examination to be highly stressful. If you are uncomfortable, you may choose to end your participation at any time.

Participation Benefits

There are no direct benefits to you for your participation in this study. You will indirectly receive the benefit of learning what a credibility assessment examination is like and the satisfaction of participating in research that could significantly improve current procedures; making credibility assessment examinations simpler to perform and more accurate.

Recruitment Incentive

If you choose to participate in this study, you will be paid \$15 per hour for participating. Partial hours will be paid in quarter-hour increments, except for the first hour, which will be paid in full. You will receive a bonus of \$50 if you are found to be truthful during the credibility assessment test. If you choose not to complete the study you will be paid \$15 per hour for your time, but you will not receive a bonus. If you do not follow instructions you could be disqualified by a project staff member. In case of disqualification you will be paid \$15 per hour, but will not receive a bonus. All payments will be made in cash at the study facility. We will not send payment to you.

Time Commitment and Withdrawal from the Study

Your participation is voluntary and you may quit at any time without any penalty or punishment. If you decide not to complete the study, please pick up the intercom and tell the project staff member. Be sure to tell us if you are leaving so we can arrange payment. Payment will be made only to you, in person, in cash, on site. If you are with study personnel and wish to quit, please

tell them and your participation will end. You will be asked to stay a few extra minutes, for which you will be paid, so we can explain the project and answer any questions you may have. If you quit before completing all of the testing, you will be paid for the time you have spent, and no bonus will be awarded to you.

You are expected to participate for approximately 2 hours, although the total length of time could be shorter or longer. You will complete all of your participation today and will not be asked to return for any additional days.

You may be dismissed from the study if you fail to keep appointments, if you fail to follow instructions, if the experimenter or credibility assessment examiner determines that you are unsuitable for testing (e.g., unable to sit still, unable to continue because of health, sleepiness, or medications), if you appear to be under undue stress, or if you discuss study procedures with individuals outside of the project.

Information Confidentiality

Your ability to provide us with accurate and honest information is critical to the success of this project. For this reason, we have established rigorous procedures to protect your confidentiality in this study. Information obtained from consent forms, questionnaires, and interviews will be stored in locked file cabinets and will only be available to project staff, although certain government agencies do retain the right to inspect project records to ensure your safety. You will be assigned a code number and your identity will never be physically linked with records of this study. The audio or video records that we collect will be provided to our client so they can verify that the testing procedures were performed correctly and to further ensure your safety. Your face will be visible and your voice will be audible on these records. These records will be held in confidence in archival storage by the client and will be destroyed seven years after the research project has been completed. The results of this research study may be presented at meetings or in publications; however, your identity will not be disclosed. Between 275 and 300 individuals will be tested so it is unlikely that you could be identified because you participated.

Contact Persons

If you have questions regarding this study or believe you have become injured or ill as a direct result of the study contact Mr. David Salyer, Project Manager, 614-424-5082 or Dr. Robert J. Woods, Principal Investigator, 508-647-1972.

Battelle will not provide you with medical treatment or financial compensation in the event of personal injury resulting directly from the research procedures, *except as provided through remedies available at law*. In spite of all precautions, you might develop medical complications or encounter an injury from participating in the study (e.g., trip and break a leg). If such complications arise, the project staff will assist you by contacting emergency medical services, but all associated costs for such services remain your responsibility.

If you have any questions about your rights as a research participant, you may contact Mr. Gary Sapp, manager of the BSTI Institutional Review Board, at 614-424-7648.

If you have questions regarding this consent form or your participation in the study, please use the intercom in this room to discuss your questions with a project staff member. If you would like to speak with Mr. Salyer, Dr. Woods, or Mr. Sapp now, use the intercom to contact a project staff member and ask to use the telephone to call the numbers provided.

Authorization

I have read and understand this consent form, and I volunteer to participate in this research study. I may choose to end my participation at any time. I understand that I will receive a copy of this form and that I will receive an outgoing briefing that provides additional information about the end-purpose of the study. I understand that my consent does not take away any of my legal rights in case of negligence or other legal fault of anyone who is involved in the study. I further understand that nothing in this consent form negates any federal, state, or local law regarding informed consent.

Name of Subject (Printed)		
Signature of Subject	Date	Time

Appendix H:

Biographical and Medical Questionnaire

Please carefully answer all of the questions below:

Name (please print): _____

Date: _____

Gender: Male () Female ()

Age: _____

Race: _____

Occupation: _____

- Normal number of hours of sleep: _____
- Number of hours of sleep last night: _____
- Please indicate (*circle*) whether you have ingested any of the following substances within the last 24 hours. If so, please write the approximate time and amount:

Nicotine (<i>any form</i>)	Yes	No	Time: _____	Amount: _____
Caffeinated coffee / tea	Yes	No	Time: _____	Amount: _____
Caffeinated soft-drinks	Yes	No	Time: _____	Amount: _____
Energy drinks	Yes	No	Time: _____	Amount: _____
Chocolate	Yes	No	Time: _____	Amount: _____

- How would you describe your present health and physical well being?
Excellent () Good () Fair () Poor ()

- Are you presently taking any prescription medication? Yes () No ()

If so, please identify for what condition, the type of medication, dosage, and last time taken:

- Are you presently experiencing any pain or discomfort? Yes () No ()

If so, please identify the reason for the pain or discomfort: _____

Appendix I:

Recorded Instructions to Control Group

Please listen to these instructions carefully and make sure that you understand exactly what you are to do. Feel free to replay this tape if necessary. You should make a few notes to help you remember what to do as you carry out these instructions. There are writing materials next to this tape recorder. You must conceal any notes that you take with you before you leave this room.

This is a research study to help us test new types of devices and instruments which are designed to tell if you are being deceptive when you answer questions we will ask you. You will be taking a credibility assessment test today. You will receive a bonus of \$50 in addition to the \$15 per hour that you are receiving for the study only if you are found truthful on the credibility assessment test. Some other participants are instructed to commit a mock theft. They are told to go to a room and search a desk until they find a cash box. From that cash box they take an envelope containing a ring. They are instructed to take the ring out of the envelope, conceal it on their person, and leave the room. They then take a credibility assessment test. You are not one of those participants. You are an innocent suspect. Therefore, it is in your best interest to be truthful during the test.

When you have finished this tape recording and understand the instructions, please proceed to room number ____ [Intake Room] following the directions described. A project staff member will meet you at there and ask you some questions, then escort you to the Credibility Assessment Test Room. An examiner will give you a Credibility Assessment Examination while psychophysiological measurements are taken. The examiner will not know if you are truthful or deceptive. This means that the decision about your truthfulness will be based entirely on the credibility assessment instruments. You will receive the \$50 bonus only if the examiner finds you truthful. So, you must convince the examiner that you are indeed truthful. When the test is over, if the examiner decides that you are deceptive, or if the examiner can't decide whether you are truthful or deceptive, then you will not receive the bonus.

Here's what you are supposed to do. Conceal any notes you've made before you leave this room. Do not talk to anyone you encounter about this study while on your way to room number ____ [Intake Room]. Do not make any cell phone calls to anyone. Go directly to room number ____ [Intake Room] without stopping along the way. Here are your directions for how to get where you're going. You will leave this room, go up the stairs, and go back out the door you entered from the back parking lot. Follow the building around to your right and enter at the main entrance at the front of the building. Enter the stairway in the lobby and go down to the basement floor. Exit the stairway alcove and turn right to room number ____ [Intake Room]. Enter the room, take a seat at the table, and wait for a project staff member to arrive.

Those are your instructions. Leave all of the completed forms in the envelope on the table. Do not take them from this room. You must follow those instructions exactly if you are to remain eligible to receive the bonus. If you do not wish to participate in this experiment, please use the intercom now to speak to a project staff member, and inform them that you are terminating your

participation in the study. If you are not entirely sure of what you are to do, press the 'stop' button on the tape player and then press the 'rewind' button. Then push the 'play' button to hear the instructions again. When you are finished, press the 'stop' button. Make sure to conceal any notes that you make before you enter the credibility assessment room. Again, open the door and proceed to room number ____ [Intake Room]. That is all. Please press 'stop' on the tape player now.

Appendix J:

Recorded Instructions to Experimental Group

Please listen to these instructions carefully and make sure that you understand exactly what you are to do. Feel free to replay this tape if necessary. You should make a few notes to help you remember what to do as you carry out these instructions. There are writing materials next to this recorder. You must conceal any notes that you take with you before you leave this room.

This is a research study to help us test new types of devices and instruments which are designed to tell if you are being deceptive when you answer questions we will ask you. You will commit a pretend or mock crime. You will not commit any actual crime. You will then be given a credibility assessment test. You will receive a bonus of \$50 in addition to the \$15 per hour that you are receiving for the study only if you are found truthful on the credibility assessment test. Therefore, you must deceive the examiner and the credibility assessment instruments into deciding that you are innocent of the crime. Be sure to keep track of the time. You have 10 minutes from the time you leave this room to complete the crime and arrive at the testing area. When you have finished this tape recording and understand the instructions, please begin.

Here's what you are supposed to do. Conceal any notes you've made before you leave this room. Do not talk to anyone you encounter about this study while on your way to the target room. There may be a security guard roaming the building – do not draw attention to yourself. Do not make any cell phone calls to anyone. Go directly to the offices of Gordon and Associates, located in room number 307 [Mock Crime Room]. You will enter the room and tell the receptionist that you have an appointment with a Mr. Carlson. That's Carlson, spelled C--A--R--L--S--O--N. There is no Mr. Carlson in the office, but the receptionist is new will have to leave the room to confirm this. When the receptionist leaves the room, you will steal a diamond ring from an envelope contained within a metal cash box in the receptionist's desk drawer. You will take the ring, conceal it on your person, and destroy the envelope. You must be careful not to leave any fingerprints. You must also make up a cover story in case someone asks you questions or you are caught. You must hurry because the receptionist could return at any time. If you are caught, you should tell the receptionist the cover story and leave the office as soon as possible.

You will then proceed to room number ____ [Intake Room] following the directions described below. A project staff member will meet you at there and ask you some questions, then escort you to the Credibility Assessment Test Room. An examiner will give you a Credibility Assessment Examination while psychophysiological measurements are taken. The examiner will not know if you are truthful or deceptive. This means that the decision about your truthfulness will be based entirely on the credibility assessment instruments. You will receive the \$50 bonus only if the examiner finds you truthful. So, you must convince the examiner that you are indeed truthful. When the test is over, if the examiner decides that you are deceptive, or if the examiner can't decide whether you are truthful or deceptive, then you will not receive the bonus.

Here are your directions for how to get where you're going. You will leave this room, go up the stairs, and go back out the door you entered from the back parking lot. Follow the building around to your right and enter at the main entrance at the front of the building. Enter the stairway in the lobby and go up to the 3rd floor. Exit the stairway alcove and go straight down the hall to room number ____ [Mock Crime Room]. The receptionist works in that office. Enter the room to begin speaking to the receptionist. When you have stolen the ring, leave the office immediately and turn right to go back to the stairway. Enter the stairway and go down to the basement floor. Exit the stairway alcove and turn right to room number ____ [Intake Room]. Enter the room, take a seat at the table, and wait for a project staff member to arrive.

Those are your instructions. Leave all of the completed forms in the envelope on the table. Do not take them from this room. You must follow those instructions exactly if you are to remain eligible to receive the bonus. If you do not wish to participate in this experiment, please use the intercom now to speak to a project staff member, and inform them that you are terminating your participation in the study. If you are not entirely sure of what you are to do, press the 'stop' button on the tape player and then press the 'rewind' button. Then push the 'play' button to hear the instructions again. When you are finished, press the 'stop' button. Make sure to conceal any notes that you make before you enter the credibility assessment test room. Again, open the door and proceed to room number ____ [Mock Crime Room] on the 3rd floor. That is all. Please press 'stop' on the tape player now.

Appendix K:

Credibility Assessment Examination Consent Form

Place: _____ **Date:** _____ **Time:** _____

Before we begin the Credibility Assessment Examination you must understand your rights.

YOUR RIGHTS

- You have the right to refuse to take the examination.
- If you agree to take the examination, you have the right to stop the examination at any time.
- If you agree to take the examination, you have the right to refuse to answer any individual questions.

WAIVER AND CONSENT

I have read this statement of my rights and I understand what my rights are. I voluntarily agree to be examined by means of credibility assessment instruments during this interview. I understand and know what I am doing. No threats or promises have been used against me to obtain my consent to administer this examination.

I certify that I am presently in good health and that I am not being treated by a physician, psychiatrist, or psychologist for any physical or mental disorder (except as listed below). I further declare that I am not now being, nor have I ever been, treated for serious diseases of the heart, lungs, or central nervous system (except as listed below).

I certify that I have provided the examiner with the following exceptions:

I know of no medical reason why I should not undergo a credibility assessment examination at this time.

PARTICIPANT SIGNATURE

DATE (MM/DD/YY)

WITNESS SIGNATURE

PRINTED NAME

PRINTED NAME

Appendix L:
Veracity Questionnaire

Name (*please print*): _____

Date: _____

To be read aloud to the participant by a project staff member

(1) You know you are going to be tested about a crime committed in this building today. Were you involved in the crime in any way?

(2) Is there any reason why your fingerprints should be on a desk on the 3rd floor of this building?

(3) How do you think the credibility assessment examination will come out on you today?

(4) How do you feel about taking the credibility assessment examination?

Appendix M:

PCASS Pretest Interview Outline

I. The purpose of this procedure is to verify information that you are providing regarding the theft of a valuable item. The process will consist of an interview and PCASS test. The instrument will be able to tell whether you are lying or being truthful by recording and analyzing your body signals. To pass the test you must be truthful to all questions asked.

II. Overview

I will explain how the instrument works and will review with you all questions before the test. The questions will ask about your personal background and the theft of a valuable item.

III. Health Questions

A. How would you rate your health, excellent, good, fair, or poor? -----

B. Are you currently under a physician's care? -----

C. Have you experienced any of the following?

1. Heart problem-----

2. High blood pressure-----

3. Respiratory or lung problems-----

4. Recent surgery-----

5. In the last 24 hrs have you taken any medications? -----

6. Have you been prescribed any medication that you should be taking but have not? -----

7. Are you experiencing any physical discomfort? -----

8. How many hours sleep did you get last night? -----

IV. PPD Examinations.

1. Have you ever had a Polygraph test? -----

2. Have you ever had a truth detection test? -----

V. Honesty / Integrity / Moral Standards Self-Rating

1 2 3 4 5 6 7 8 9 10
Lowest Highest

VI. Family Background

1. Mother/ Father (name, age, occupation, moral standards)
2. Brothers / Sisters
3. Spouse / Children (names, ages, length of marriage, moral standards)
4. Who were you guardians during childhood and early teens? -----
5. Who is the one person you respect the most? -----

VII. Education

1. Highest grade completed-----
2. Last school, attended-----
3. Diploma / degree-----

VIII. Employment

A. Employer-----

1. Position, Month, Year, reason for leaving-----

IX. Leisure activities / sports-----

X. Discuss operations of PCASS device (e.g., passive only, measures cardiovascular and nerve sensitivity).

XI. Go over mock theft scenario.

At some time today, after you arrived at 751 Northwest Boulevard, a ring was stolen from a secretary's desk drawer in a third-floor office. The ring was in a white envelope, which was part of the lost and found inventory. Our information at this time indicates you were in the building at the time of the alleged theft. As a result of the theft, you have agreed to undergo a PCASS process to reach a resolution of the issue.

- XII. Review test questions, only YES or NO answers; pause between each question is normal.
- XIII. Give PCASS test.

Appendix N:

PCASS Test Questions

(RQ-1) Relevant-1: **Did you steal that ring?**

(RQ-2) Relevant-2: **Did you participate in stealing that ring?**

(CQ-1) Comparison-1: **Before this year, did you ever lie to someone who trusted you?**

(CQ-2) Comparison-2: **Prior to 2007, did you ever steal anything?**

(CQ-3) Comparison-3: **Before today, did you ever lie to keep out of trouble?**

(IR-1) Irrelevant-1: **Are you now in Columbus?**

(IR-2) Irrelevant-2: **Is today _____?**

(SR) Sacrifice Relevant: **Regarding the stolen ring, do you intend to answer each question truthfully?**

PCASS Test Question Presentation Order

- (1) Irrelevant-1
- (2) Sacrifice Relevant
- (3) Comparison-1
- (4) Relevant-1
- (5) Comparison-2
- (6) Relevant-2
- (7) Irrelevant-2
- (8) Comparison-3
- (9) Relevant-1
- (10) Comparison-1
- (11) Relevant-2
- (12) Irrelevant-1
- (13) Comparison-2
- (14) Relevant-1
- (15) Comparison-3
- (16) Relevant-2
- (17) Irrelevant-2
- (18) Comparison-1
- (19) Relevant-1
- (20) Comparison-2
- (21) Relevant-2
- (22) Comparison-3

Appendix O:
Debriefing Questionnaire

Participant Name: _____

Date: _____

Time: _____

Examiner: _____

(1) Do you think the examiner believed you were truthful regarding the crime committed?

Yes

No (explain why) _____

(2) During this study, did you commit a mock crime before your credibility assessment examination?

No (*Go to question 6*)

Yes

(3) On a scale of 1 to 5, with 1 being *Not at All* and 5 being *Very Realistic*, how realistic did the mock crime scenario seem to you?

Not at All

1

2

3

4

Very Realistic

5

(4) On a scale of 1 to 5, with 1 being *Not at All* and 5 being *Very Exciting*, how exciting was the role you played during the mock crime scenario?

Not at All

1

2

3

4

Very Exciting

5

(5) What could we do to make the scenario more exciting?

(6) Do you think you could beat the credibility assessment instrument if you wanted to?

No

Yes (explain how) _____

(12) If you were a criminal, what could we have done or asked to identify you that we didn't do?

(13) Did you make any kind of hidden movements during the credibility assessment examination?

No

Yes (what type) _____

(14) Did you try to create any reactions to beat the credibility assessment examination?

No

Yes (what type) _____

(15) Have you taken any medication today that you have not previously reported?

No

Yes (what type) _____

(16) Did any of the questions you were asked cause you to feel uncomfortable? If so, what were they?

(17) Do you have any other comments regarding this study that you'd like to pass on to the scientists who designed it?

(18) On a scale of 1 to 5, with 1 being *Not at All* and 5 being *Very Comfortable*, how comfortable did you feel with the examiner?

Not at All

1

2

3

4

Very Comfortable

5

(19) You are requested to refrain from discussing the details of the study with anyone before October 1, 2007, when the study is completed. Will you discuss this study with anyone before that date?

No I will not discuss study details with others before October 1, 2007.

Yes I intend to disclose study details to others before October 1, 2007.

Participant Signature

Date

Appendix P:

Exit Briefing

{Control Group – group will not be displayed on actual form}

To be read aloud by the project representative, signed by the participant and the project representative, and a copy provided to the participant. Form serves as remuneration disbursement record.

On behalf of the entire project staff, I would like to take this opportunity to thank you for participating in this project. Your participation here today was more important than you may realize. Depending on the results of this study, we may be able to significantly improve current procedures; making credibility assessment examinations simpler and more accurate.

Your role in this project was very important. No credibility assessment format is useful if it improperly identifies truthful people as deceptive.

The process of having you complete a Credibility Assessment Examination Consent Form and make disclosures regarding health and medical information was the same that would be followed if anyone suspected of a crime were to undergo a Credibility Assessment Examination. Again, your answers will be confidential, to the extent required by law.

We hope you enjoyed your participation. We hope you were not made uncomfortable in any way. If you have any questions or concerns, please feel free to bring them to the attention of ---- (Tel: XXX-XXX-XXXX), or to the attention of ---- (Tel: XXX-XXX-XXXX). You should keep this form for a few days, in case there are any questions.

We ask that you please do not discuss what you did here today, with anyone, before the end of the project on October 1, 2007. Many people from the community will be participating in this project, perhaps relatives or friends of yours. It is very important that they do not have any prior information regarding the project. Knowledge of the study might seriously damage the results of this project. Thank you for your understanding and cooperation.

Do you have any additional questions? {Will not be displayed on actual form}

Total amount disbursed to participant: \$ _____

PARTICIPANT SIGNATURE

DATE (MM/DD/YY)

PROJECT STAFF SIGNATURE

PRINTED NAME

PRINTED NAME

Exit Briefing

{Experimental Group – group will not be displayed on actual form}

To be read aloud by the project representative, signed by the participant and the project representative, and a copy provided to the participant. Form serves as remuneration disbursement record.

On behalf of the entire project staff, I would like to take this opportunity to thank you for participating in this project. Your participation here today was more important than you may realize. Depending on the results of this study, we may be able to significantly improve current procedures; making credibility assessment examinations simpler and more accurate.

We would like to assure you that you in no way violated any rules or laws. The activities were strictly for the purpose of deceiving the examiner. We want to emphasize that you have broken no laws and performed no illegal acts. All of the role players you encountered (for example, the receptionist) were project staff members.

The process of having you complete a Credibility Assessment Examination Consent Form and make disclosures regarding health and medical information was the same that would be followed if anyone suspected of a crime were to undergo a Credibility Assessment Examination. Again, your answers will be confidential, to the extent required by law.

We hope you enjoyed your participation. We hope you were not made uncomfortable in any way. If you have any questions or concerns, please feel free to bring them to the attention of ---- (Tel: XXX-XXX-XXXX), or to the attention of ---- (Tel: XXX-XXX-XXXX). You should keep this form for a few days, in case there are any questions.

We ask that you please do not discuss what you did here today, with anyone, before the end of the project on October 1, 2007. Many people from the community will be participating in this project, perhaps relatives or friends of yours. It is very important that they do not have any prior information regarding the project. Knowledge of the study might seriously damage the results of this project. Thank you for your understanding and cooperation.

Do you have any additional questions? {Will not be displayed on actual form}

Total amount disbursed to participant: \$ _____

PARTICIPANT SIGNATURE

DATE (MM/DD/YY)

PROJECT STAFF SIGNATURE

PRINTED NAME

PRINTED NAME

Exit Briefing

{Disqualified Participants – group will not be displayed on actual form}

To be read aloud by the project representative, signed by the participant and the project representative, and a copy provided to the participant. Form serves as remuneration disbursement record.

I would like to thank you for your interest and willingness to participate. Our scheduled participants have arrived so we will not need your participation today.

If you have any questions or concerns, please feel free to bring them to the attention of ---- (Tel: XXX-XXX-XXXX), or to the attention of ---- (Tel: XXX-XXX-XXXX). You should keep this form for a few days, in case there are any questions.

We ask that you please do not discuss what you did here today, with anyone, before the end of the project on October 1, 2007. Many people from the community will be participating in this project, perhaps relatives or friends of yours. It is very important that they do not have any prior information regarding the project. Knowledge of the study might seriously damage the results of this project. Thank you for your understanding and cooperation.

Do you have any additional questions? {Will not be displayed on actual form}

Total amount disbursed to participant: \$ _____

PARTICIPANT SIGNATURE

DATE (MM/DD/YY)

PROJECT STAFF SIGNATURE

PRINTED NAME

PRINTED NAME

Appendix Q:

Instructions for Experimenters

Inappropriate and/or non-uniform interaction with human subjects can bias and/or invalidate the results of a study. For this reason, the experimenter occupies one of the most sensitive and important positions in data collection. You should interact with all participants in a pleasant, professional manner. Keep all conversation as formal and impersonal as possible – do not chit-chat or be overly friendly with participants. While it is understood that this cannot be done precisely, you should attempt to say the same things, at the same time, and in approximately the same manner to each participant. Every attempt should be made to interact with males, females, minorities, control group, and experimental group participants in exactly the same manner. If you are unsure what to do in a particular situation or cannot answer a question, the Principal Investigator (PI) or Project Manager (PM) should be contacted to resolve the issue. You should document the event if you need to contact the PI or PM to resolve the problem to ensure appropriate credit for the decision.

During this study, the experimenter is required to perform the following activities:

- (1) Before the arrival of each participant:
 - a) Ensure that the Participant Instructions, Informed Consent Form, and Biographical & Medical Questionnaire forms are ready and placed on the table in the Point of Initial Contact (PIC) Room. Check the schedule to determine that the proper version of the Informed Consent Form (control vs. experimental) is used.
 - b) Ensure that the tape recording of the Recorded Instructions to Participants is rewound and placed in the tape recorder on the table in the PIC Room. Check the schedule to determine that the proper version of the Recorded Instructions to Participants (control vs. experimental) is used.
 - c) Ensure that black ink pens and note cards are present on the table in the PIC Room. [Black ink pens will be used for all hand-written data recording].
- (2) Meet the participant at the Intake Room.
- (3) Introduce yourself and direct the participant to sit at the table.
- (4) Ask the participant to read and sign the Credibility Assessment Examination Consent Form – you must witness and also sign the form. Read aloud the questions on the Veracity Questionnaire to ensure they understand their role in the project. If they answer the questions incorrectly or otherwise reveal their participation in the theft, they will be debriefed and paid for their time only, and their participation in the project is terminated.
- (5) Answer the participant's questions as appropriate.

- (6) Ask if the participant needs to use the restroom or would like a drink of water. If so, guide the participant or give directions as appropriate.
- (7) Escort the participant to the Credibility Assessment Testing (CAT) Room and direct them to take a seat and wait for the examiner.
- (8) Return to the PIC Room and collect and label completed forms (first check the schedule to avoid interacting with arriving participants). Begin at step 1 and replenish the room with the proper forms and tape recording for the next scheduled participant.
- (9) Take the completed Informed Consent Form you just collected at the PIC Room and make a photocopy. This copy must be given to the participant before they are dismissed.
- (10) As appropriate, either dismiss or assign standby participants. Dismissed standbys will be read aloud the Exit Briefing for Standby Participants, and paid. Standbys who are needed for the study will be directed to a prepared PIC Room, and begin the procedures as a regular participant.
- (11) Complete the procedures for early dismissal of participants. Some participants will choose to end their participation; while others will be dismissed for cause by project staff. Both types will be given the Exit Briefing, paid for their time, and dismissed. Note: Participants who are to be dismissed for cause (e.g., late arrival [more than 10 minutes], violation of instructions, or other behavior deemed by project staff to require early dismissal) will not be informed of their early dismissal by any project staff member while alone. Have the participant wait in an appropriate room and get another staff member to accompany you through the dismissal. This will minimize the risk of confrontation between participants and staff during the early dismissal process.

Appendix R:

Participant Responses to Some Debriefing Questions

Frequency of Truthful Participant Responses (N = 35) to Some Debriefing Questions

<u>Value</u>	<u>Number</u>
Do you think you could beat the credibility assessment instrument if you wanted to?	
No	27
Yes	8
Did you make any kind of hidden movements during the credibility assessment exam?	
No	34
Yes	1
Did you make any kind of reactions to beat the credibility assessment instrument?	
No	30
Yes	5
On a scale of 1 to 5, with 1 being <i>Not at All Effective</i> , and 5 being <i>Very Effective</i> , how effective was the \$50 bonus in motivating you to complete the study?	
1	5
2	3
3	3
4	7
5	17

Frequency of Deceptive Participant Responses (N = 36) to Some Debriefing Questions

<u>Value</u>	<u>Number</u>
Do you think you could beat the credibility assessment instrument if you wanted to?	
No	14
Yes	22

Did you make any kind of hidden movements during the credibility assessment exam?	
No	36
Yes	0

Did you make any kind of reactions to beat the credibility assessment instrument?	
No	20
Yes	16

On a scale of 1 to 5, with 1 being *Not at All Realistic*, and 5 being *Very Realistic*, how realistic did the mock crime scenario seem to you?

1	1
2	0
3	11
4	12
5	12

On a scale of 1 to 5, with 1 being *Not at All Effective*, and 5 being *Very Effective*, how effective was the \$50 bonus in motivating you to complete the study?

1	1
2	0
3	5
4	12
5	18
