Validation Studies for the Preliminary Credibility Assessment Screening System (PCASS)

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Abstract

This series of studies evaluated 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. This effort represents the seminal empirical evaluation of the effectiveness of the PCASS. This project was comprised of three experiments. Experiment 1 was designed to evaluate the effectiveness of the mock crime scenario that was used in Experiments 2 and 3. The scenario in Experiments 1-3 required deceptive participants to place a simulated bomb next to a road. Participants in Experiment 1 were tested using an established polygraph technique. Decision accuracy using the polygraph methodology was significantly above chance levels (defined as .500) for Experiment 1, for total decisions (.838) and excluding no opinion decisions (.849). A total of one no opinion decision (.015) was produced in Experiment 1. Experiment 2 was developed to evaluate the accuracy of the PCASS using the same mock bomb placement scenario, producing decision accuracy significantly above chance levels for total decisions (.626) and excluding no opinion decisions (.858). A total of 20 no opinion decisions (.274) were produced in Experiment 2. The purpose of Experiment 3 was to replicate Experiment 2, again using the bomb placement scenario. Decision accuracy was lower in Experiment 3 when no opinion decisions were excluded (.751), though total decision accuracy remained stable (.623). A total of 13 no opinion decisions (.159) were produced in Experiment 3. In both cases, decision accuracy was significantly above chance levels. The source of the decreased performance in Experiment 3 was not clear, though possibly due to variation in PCASS operators. These three studies provided a rapid series of evaluations for the accuracy of PCASS using a sample from a young adult and demographically diverse

population. It is recommended that research continue on the PCASS, with the purpose of adding to the body of knowledge relative to PCASS.

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Introduction

The Preliminary Credibility Assessment Screening System (PCASS) is an innovative technology that offers the potential for easy and rapid information verification. If it is found to be effective, this tool will likely be used in a variety of operational settings. The device, currently in prototype form, is a large hand-held device. The PCASS includes sensors designed to be attached to the hand of a person being questioned, for the purpose of recording physiological responses connected with questions presented by the PCASS operator. 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, deceptive, or no opinion based on the physiological responses to the questions. The algorithm decision thresholds for each decision type are fixed and not adjustable. This information can then be integrated with other intelligence sources and used to direct tactical, strategic, and wide array of operational decisions.

Generally speaking, the PCASS algorithm compares responses produced by relevant questions and those produced by comparison questions, ultimately to produce a decision of truthful, deceptive, or no opinion. Due to the investigative/screening context for which the PCASS was developed, the decision algorithm used by the PCASS is designed to minimize false negative errors. This was accomplished by creating decision thresholds that were more liberal in producing deceptive classifications, and more conservative in producing truthful classifications. Thus, from an operational standpoint, the instrument is geared towards ensuring that most, if not all deceptive individuals are not excluded from a particular investigation. Due to this factor, it was predicted that the PCASS would produce higher accuracy for deceptive participants than for truthful participants.

To date, no research on the effectiveness, accuracy, utility or limitations of PCASS has been conducted. The purpose of the series of experiments is to develop a body of knowledge in these areas, as they pertain to the operational potential and capabilities offered by PCASS. This project represents an initial assessment of the PCASS. A mock crime scenario that is targeted to be similar to field conditions was used to explore multiple aspects of PCASS testing.

For the purposes of this study, accuracy was be defined in two ways: total accuracy and definitive accuracy. Total accuracy was considered in the context of all possible instances. In credibility assessment, there are commonly three types of decisions that can be rendered regarding the truthfulness of an individual; these decisions are truthful, deceptive, and no opinion (not enough definitive information to make a decision of truthful or deceptive). The calculation of total accuracy divided the number of correct decisions by the number of correct, incorrect, and no opinion decisions, per the following formula:

$$\text{Total Accuracy} = \frac{\text{correct decisions}}{\text{correct decisions} + \text{incorrect decisions} + \text{no opinion decisions}}$$

Definitive accuracy only integrated those instances where a decision of truthful or deceptive has been rendered, excluding no opinion decisions. Thus, definitive accuracy was calculated using the following formula:

$$\text{Definitive Accuracy} = \frac{\text{correct decisions}}{\text{correct decisions} + \text{incorrect decisions}}$$

These accuracy calculations were collapsed across performance in the truthful and deceptive experimental conditions, and were also calculated for the two groups individually.

Based on binomial power calculations, it was determined that 28 participants per cell would produce a power of .85 to detect a proportion of correct decisions of .75 at the .05 level of significance (UCLA Department of Statistics, 2004), based on an effect size of .25 (Cohen, 1988, p. 147). The effect size calculations were based on the .75 proposed proportion of correct decisions versus a chance level of .50. Using Cohen's approach, the effect size was simply .75-.50 = .25. The .75 proportion of correct decisions was based on specific-issue polygraph performance, from a multiple laboratory and field-based studies (National Academy of Sciences, 2003). Thus, a minimum 60 participants would be used in Experiments 1-3, including 30 truthful and 30 deceptive participants.

Experiment 1

The purpose of Experiment 1 was to validate the bomb placement scenario. The scenario incorporated successful elements of previous mock crime studies, but also included components that did not exist in previous studies. First, participants completed the scenario in pairs, whereas the majority of previous mock crime efforts had been completed by individuals. Second, the bomb-placement scenario itself was novel, and had not been subject to any sort of evaluation. Experiment 1 served to assess whether these unknown components could be integrated into a successful mock crime scenario.

Method

Participants

Only participants who had not previously taken a polygraph or PCASS examination were allowed to participate in the study. Participants were 69 United States Army basic trainees at Fort Jackson, SC. Thirty-six of these participants were assigned to the truthful condition and thirty-three were assigned to the deceptive condition. Twenty-nine of these participants were female and forty were male. Ages for these participants ranged from 17 to 38, with an average age of 20.8 (SD = 4.5).

Polygraph Examiners

Twelve polygraph examiners conducted polygraph examinations for this study. Polygraph examiners were instructors employed at the Department of Defense Polygraph Institute (DoDPI). Each examiner possessed a minimum of six years of operational polygraph experience and at least one year of polygraph instruction experience. With the exception of four cases, there was one blind scorer who made the final decision for each polygraph examination. This blind scorer had over 25 years of federal polygraph experience. In the other four cases, two polygraph examiners with over 10 years of federal polygraph experience blind scored and produced the final decisions for two cases each.

Design

The experiment took place over four days. Twenty participants were available each day for the study. Pairs of participants were randomly assigned to the truthful and deceptive condition using a block randomization scheme. Participants completed the experiment in pairs due to the “Battle Buddy” concept that is mandated for basic trainees on Fort Jackson (Donald J. Krapohl, personal communication, March 1, 2006). In essence, this policy requires basic trainees

to maneuver around the base in pairs. For each day, five of the ten pairs were randomly assigned to the deceptive condition, with the other five pairs assigned to the truthful condition.

Apparatus

Lafayette (Lafayette, IN) and Axciton (Houston, TX) computerized polygraphs were used, with one examiner using an ink-based analog polygraph. All polygraph instrument use was based on personal preference of each examiner. Computerized instruments were connected to desktop or laptop computers and operate within a Microsoft Windows interface. Each polygraph included two corrugated rubber tubes for monitoring thoracic and abdominal respiration, a standard blood pressure cuff for monitoring cardiovascular information, and two disposable Ag/AgCl sensors with conductance gel for monitoring electrodermal activity from the hands.

Procedure

The experimental procedure was modeled after one that has been used with great success for many years at the University of Utah (Kircher & Raskin, 1988). Much of the success of the procedure is attributed to the complexity and level of engagement that is required of participants. The study was conducted on site at the Department of Defense Polygraph Institute. Participants were initially seated in a large room where they were allowed to watch television or read while they waited for the opportunity to participate in the experiment. Participant pairs were called by name and asked to step outside of the room. Participants were then told to go through a door that led to a long hallway. They were directed to go to a door with a white envelope taped to it, and that the envelope would contain their instructions. These instructions (Appendix A) directed participants (if they chose to participate in the study) to first read and fill out the informed consent form (Appendices B and C), and if they agreed to participate in the study after reading the informed consent, to press play on the tape player (Note that the polygraph and the PCASS

were referred to as ‘lie detectors’ in the participant instructions. Although the term is technically inaccurate, ‘lie detector’ was used in the participant instructions because it is a term generally understood by the lay public).

The room that the pairs entered contained a chair and a desk with a cassette tape player, two informed consent forms, with a pen placed upon each of them. Due to logistical constraints, the rooms also contained a polygraph, polygraph components, a polygraph chair, and a desktop computer. Two such rooms were used in this capacity, with a monitoring room in between from which experimental staff could monitor and record their progress. Pairs received their instructions together in one of the two rooms.

After completing the informed consent forms, participants pressed ‘PLAY’ on the tape player to hear their instructions. For deceptive participants, the tape-recorded instructions (Appendix D) directed participants to obtain a simulated bomb from a hidden location outside of the building and to plant the device at a nearby location across the street that is commonly used for training purposes. They were instructed to place the device in a box next to a dirt road that is in this training area. Participants were instructed to arm the bomb and leave the area. When the participants moved to a safe distance (approximately 30 yards) from the site, an M116A1 Hand Grenade Simulator was detonated by an U.S. Army ordnance specialist. This ordnance produces a 125 decibel blast at a distance of 75 feet (Miller & Ruppert, 2004). The purpose of the detonation was to lead participants to believe the bomb they placed may have exploded. The hand grenade simulator was dropped by the ordnance specialist and detonated in a 2-foot hole surrounded by three levels of sand bags, in a hidden location approximately 10 yards from the location where the participants planted the simulated bomb. The grenade pit was located across the dirt road by which the participants were to place the simulated bomb. The tape-recorded

instructions clearly instructed participants not to cross this dirt road, to prevent participants from coming close to the grenade pit or from seeing the ordnance specialist. No participants violated this instruction. In addition, participants were under constant (covert) observation while outside of the DoDPI building, ultimately to ensure their safety, and also to verify that participants followed instructions.

The tape-recorded instructions told participants they had 15 minutes to find and plant the simulated bomb and that they were to return to the room where they received their instructions when they had completed this task. Also, the instructions told participants to prepare an alibi or excuse for being outside, should they be stopped or questioned by anyone. The instructions imparted that someone would meet them and escort them to an area where they would take a lie detector test, focusing on the bomb placement. The taped instructions relayed that if questioned by anyone the participant should indicate that they know that a bomb was placed and detonated nearby, but that they know nothing beyond that. Deceptive participants were instructed to appear truthful during the lie detector test.

Truthful participants were instructed, also via tape-recorded instructions (Appendix D), to leave the contact room and go to a gazebo that serves as a break area behind the DoDPI building. Participants were told to remain at the break area for approximately 10 minutes and to return to the contact room in 15 minutes where they were escorted to a lie detector test (the extra five minutes provided time for participants to travel to and from the break area). The recorded instructions informed truthful participants that a bomb was placed and detonated in a nearby location, but no other details were provided to them. Truthful participants were told to cooperate with the lie-detector operator and to be truthful during the testing process.

Relative to the detonations, the explosions were audible within the building, though not discernable from other training-related explosions that periodically took place near the facility. No truthful participants reported hearing the explosion during the debriefing.

All participants were then individually escorted to a polygraph suite, where they were given a polygraph examination. Prior to data collection, a pretest interview lasting approximately 45-60 minutes, was carried out by a polygraph examiner. The polygraph pretest process involved a structured interview covering the following areas: an overview of the polygraph process, administration of a brief medical/biographical questionnaire (including gathering of personal history) (Appendix E), a brief introduction to the polygraph instrument, its allied components (e.g., corrugated rubber tubes, etc.), and the physiological responses produced when someone lies, a brief discussion of the case facts and a review of the questions to be presented (Appendix F).

The polygraph question list included four types of questions; irrelevant questions, sacrifice relevant questions, relevant questions, and comparison questions. Irrelevant questions are non-emotion evoking questions that were used as buffer items at the beginning of the question sequence. The sacrifice relevant question was also placed toward the beginning of the question sequence and asked whether the participant intended to be truthful about their involvement in the bomb placement. Irrelevant and sacrifice relevant questions were not used for scoring purposes. Relevant questions related to whether the individual placed or participated in the bomb placement. Comparison questions related to previous instances of lying in different contexts. These two question types were used in the polygraph decision-making process described below.

Participants were told, via the tape-recorded instructions, that if the lie detector results indicated that they had been truthful, they would be allowed to complete the process without consequence. Participants were also told that, if found deceptive by the lie detector, they would have to stand before their drill sergeant, their unit, and the staff of the Department of Defense Polygraph Institute and give a speech on honesty, integrity, and loyalty, tying in the mock crime that they had completed. This punishment was not actually administered to participants. This public speaking element is a common form of punishment applied by drill sergeants to troops found guilty of wrongdoing (Harold L. Palmer, personal communication, April 6, 2004). Fear of public speaking is also fairly widespread form of anxiety, and represents an area that has been thoroughly explored in the behavioral literature (Addison, Clay, & Xie, 2003; Anderson, Rothbaum, & Hodges, 2003; Harb, Eng, & Zaider, 2003; Savitsky & Gilovich, 2003; Zohar, Livne, & Fine, 2003; many others). The purpose of this hypothetical punishment was to instill a strong sense of jeopardy in connection to the test outcome, in an effort to model the stakes inherent in real world testing.

Prior to the actual polygraph data collection process, participants were seated in a Lafayette adjustable arm polygraph chair (item number 76871), and sensors were placed on them. Two corrugated rubber tubes were attached to the participant's chest and abdominal areas. The blood pressure cuff was placed on the participant's bicep over the brachial artery. The Ag/AgCl sensors were attached to opposite sides of the palm of the participant's hand.

Following sensor placement, participants were asked to write a number from four to seven (inclusive) on a piece of paper. The participant was then asked about what number they wrote on the paper (e.g., regarding the number you wrote, was it the number 3?), and to lie (by saying 'No') when asked about the number they chose. Questions began with the number that

was three less than the number the participant selected (e.g., one if the number four was selected), and continued in ascending order until the number that was two greater than the selected number was reached (e.g., six if four was selected). These questions were asked every 20-25 seconds, with the total process requiring approximately three minutes. This process follows standard field practice, and allows the examinee to become accustomed to the testing process.

After this preliminary test, the questions listed in Appendix (F) were presented to the participant, with the polygraph components attached. Questions were presented every 20-25 seconds, requiring approximately three minutes of data collection time. After the presentation of each question list, the examinee was provided break of a few minutes during which the blood pressure cuff was deflated. The question list was presented three times. The data collection process required approximately 15-20 minutes.

After the data collection process, the polygraph charts were printed out and then evaluated by the polygraph examiner. Following field practice, the charts were then provided to a blind scorer who also evaluated the charts and decided whether the participant was truthful or deceptive. The blind scorer produced the final decision for each examinee, following recommendations provided by Iacono (1991). Generally, sympathetic physiological responses (e.g., respiratory suppression, electrodermal amplitude, and cardiovascular amplitude) to relevant and comparison adjacent question pairs were compared, within the respiratory, electrodermal, and cardiovascular channels. Because each relevant question was adjacent to two comparison questions, the comparison question producing the larger sympathetic reaction for each channel was compared to the relevant question response. Larger sympathetic responses to the relevant question in a pair resulted in the assignment of a negative value (e.g., -1, -2, or -3, depending on

the magnitude of the difference). Larger sympathetic responses to the comparison question in a pair resulted in the assignment of a positive value (e.g., +1, +2, or +3). No measurable differences between the response magnitudes of the two questions resulted in the assignment of a 0. The scores assigned to each of the two relevant-comparison question pairs were be summed across all presentations. A decision of deceptive was produced if the total for either question pairing was -3 or lower. A decision of truthful required values of +3 or higher for both question pairs. A no opinion decision was rendered in all other cases. If a no opinion decision was produced, the polygraph examiner collected three additional charts using the same question list. In such cases, the decision process was repeated by the blind scorer who produced the final decision.

Following the polygraph process, participants were then fully debriefed by an experimenter (Appendix J). All participants were thanked for their participation and were provided more information regarding the importance of their participation in the project. Deceptive participants were assured that they had, in no way, committed a crime or an act of terrorism. They were told that their actions were crucial toward the evaluation of a new credibility assessment technology, and that they should be proud of their contributions to the research effort. Finally, all participants were asked not to disclose any details of their participation for at least a year, to avoid any contamination of subsequent participants in the continuing series of research studies.

Data analysis focused on the accuracy of the polygraph decision as compared to a known ground truth. Decision accuracy was assessed using total accuracy and definitive accuracy, as described earlier, based on both human scoring. The mock crime scenario was considered to be validated and suitable for PCASS evaluation if the total accuracy rate met or exceeded .700, and

if the definitive accuracy rate met or exceeded .800. These numbers were selected based on previous polygraph research compilations (National Academy of Sciences, 2003). Statistical significance (compared to chance) was assessed using proportion tests (Bruning & Kintz, 1997).

Results

A total of 76 participants began the study, with 38 of these assigned to the truthful condition and 38 assigned to the deceptive condition. Four deceptive participants were eliminated from the study due to experimenter error. Two of these occurred because the simulated bomb was not placed in the proper location and the participants were unable to locate it. Two were eliminated because the instruction tape was not rewound and the participants were confused by the instructions. One deceptive participant confessed to completing the mock crime during the pretest process and was eliminated from the study. Two truthful participants were eliminated due to the project as a whole running out of time late in the day. Thus, 36 truthful participants and 33 deceptive participants successfully completed the study, for a total of 69 participants.

The proportion of agreement between original examiners and blind scorers was .93. The correlation between the two groups of decision makers was $r = .94$. Calculation of Kappa, a statistic used to measure inter-scorer agreement (Viera & Garrett, 2005), given the possibility of chance agreement, resulting in a value of .75. The proportions of agreement, correlation coefficient, and Kappa for these pairwise comparisons were significantly above chance levels (all ps $< .05$).

Tables 1 and 2 show the decision accuracy results for Experiment 1, by total and definitive accuracy, respectively. Effect size calculations using Cohen's (1988) approach for total and definitive accuracy are shown in Table 3. The proportion of correct decisions for

truthful ($z = 4.0$, $p < .001$), deceptive ($z = 3.0$, $p < .01$), and the collective total ($z = 4.9$, $p < .0001$) were significantly above chance levels (50% or .50) for the original examiner. The three categories also significantly exceeded chance levels for the blind scorer ($z = 5.0.$, $p < .0001$, $z = 3.0$, $p < .01$, and $z = 5.7$, $p < .0001$, respectively). For original and blind scorer decisions, decision accuracy for truthful and deceptive participants did not differ significantly (all *p*s > .05). In addition, decision accuracy between original examiners and blind scorers did not differ significantly for truthful, deceptive, or total comparisons (all *p*s > .05).

Table 1.
Total Accuracy Rates for Original Examiners and Blind Scorers as a Function of Participant Veracity (Experiment 1).

	Truthful			Deceptive			Total		
Decision Method	Cor	Err	NO	Cor	Err	NO	Cor	Err	NO
Frequency									
Original Examiner	30	3	3	25	6	2	55	9	5
Blind Scorer	33	3	0	25	7	1	58	10	1
Proportion									
Original Examiner	.833	.083	.083	.758	.182	.061	.797	.130	.073
Blind Scorer	.917	.083	.000	.758	.212	.030	.841	.145	.015
Average (unweighted) Decision Accuracy									
Original Examiner							.796	.133	.072
Blind Scorer							.838	.148	.015

Note: Cor = correct decision, Err = erroneous decision, NO = no opinion

Table 2.
Definitive Accuracy Rates for Original Examiners and Blind Scorers as a Function of Participant Veracity (Experiment 1).

Decision Method	Truthful	Deceptive	Total
Original Examiner	.909	.807	.859
Blind Scorer	.917	.781	.853
Average (unweighted) Decision Accuracy			
Original Examiner			.858
Blind Scorer			.849

Note: Definitive Accuracy excludes no opinion decisions from accuracy calculations. Cor = correct decision, Err = erroneous decision, NO = no opinion

Table 3.
Effect Sizes for Total and Definitive Accuracy Rates as a Function of Participant Veracity for Blind Scorer Decisions (Experiment 1).

Accuracy Type	Truthful	Deceptive	Total
Total	.417	.258	.341
Definitive	.417	.281	.353

The same pattern of results held with the original examiner for definitive accuracy, with performance for truthful ($z = 3.4$, $p < .001$), deceptive ($z = 4.7$, $p < .0001$), and the collective total ($z = 5.8$, $p < .0001$) significantly exceeding chance levels. This was also the case with the blind scorer ($z = 3.4$, $p < .01$, $z = 4.0$, $p < .01$, and $z = 5.3$, $p < .001$, respectively). As with total accuracy, no differences were found between truthful and deceptive performance or between original examiners and blind scorers (all *p*s > .05).

Table 4 displays the number of examinations and individual accuracy rate produced by each polygraph examiner. Pairwise comparisons showed that the difference in total accuracy was

significant between Examiner 1 and Examiner 7, $z = 3.2$, $p < .01$. However, given that Examiner 7 conducted only a single examination, it is difficult to make assertions from this finding.

Table 4.
Total Accuracy Rates Produced by Polygraph Examiners using Blind Scorer Results (Experiment 1).

	Truthful			Deceptive			Total		
Examiner	Cor	Err	NO	Cor	Err	NO	Cor	Err	NO
Frequency									
1	6	0	0	3	0	0	9	0	0
2	0	1	0	4	0	0	4	1	0
3	5	1	0	1	1	0	6	2	0
4	4	0	0	0	0	0	4	0	0
5	3	0	0	3	1	1	6	1	1
6	2	0	0	2	0	0	4	0	0
7	0	0	0	0	1	0	0	1	0
8	2	0	0	1	0	0	3	0	0
9	3	0	0	1	0	0	4	0	0
10	2	0	0	4	2	0	6	2	0
11	1	1	0	4	1	0	5	2	0
12	5	1	0	2	0	0	7	1	0
Proportion									
1	1.000	.000	.000	1.000	.000	.000	1.000	.000	.000
2	.000	1.000	.000	1.000	.000	.000	.800	.200	.000
3	.833	.167	.000	.500	.500	.000	.750	.250	.000
4	1.000	.000	.000	.000	.000	.000	1.000	.000	.000
5	1.000	.000	.000	.600	.200	.200	.750	.125	.125
6	1.000	.000	.000	1.000	.000	.000	1.000	.000	.000
7	.000	.000	.000	.000	1.000	.000	.000	1.000	.000
8	1.000	.000	.000	1.000	.000	.000	1.000	.000	.000
9	1.000	.000	.000	1.000	.000	.000	1.000	.000	.000
10	1.000	.000	.000	.667	.333	.000	.750	.250	.000
11	.500	.500	.000	.800	.200	.000	.714	.286	.000
12	.833	.167	.000	1.000	.000	.000	.875	.125	.000

Note: Cor = correct decision, Err = erroneous decision, NO = no opinion

A final analysis for Experiment 1 explored the impact of participant sex on decision accuracy. Table 5 shows total accuracy as a function of participant sex and veracity, using the decisions produced by the blind scorer. There was no evidence for a difference in accuracy by participant sex, $z = 0.3$, $p > .05$. For male participants, there was no evidence for differences as a function of veracity, $z = 0.6$, $p > .05$. However, for female participants, total accuracy was significantly higher for truthful participants than for deceptive participants, $z = 2.3$, $p < .05$. However, this result should be viewed with caution, based on the relatively small sample sizes for female participants in the truthful and deceptive conditions (i.e., n = 18 and n = 11, respectively). For Experiment, this analysis was not conducted for definitive accuracy, because the small incidence of no opinion decisions.

Table 5.
Total Accuracy Rates as a Function of Participant Sex and Veracity (Blind Scorer Decisions Only) (Experiment 1).

	Truthful			Deceptive			Total		
Participant Sex	Cor	Err	NO	Cor	Err	NO	Cor	Err	NO
Frequency									
Female	17	1	0	7	4	0	24	5	0
Male	16	2	0	18	3	1	34	5	1
Proportion									
Female	.944	.056	.000	.636	.364	.061	.828	.172	.000
Male	.889	.111	.000	.818	.136	.046	.850	.125	.025

Note: Cor = correct decision, Err = erroneous decision, NO = no opinion

Discussion

The accuracy rates produced in Experiment 1 exceeded the criteria (.700 for total accuracy and .800 for definitive accuracy) for scenario validation. Thus, the stage was set to use the same scenario to explore evidence for credibility assessment accuracy with the PCASS.

Experiment 2

Experiment 2 was identical to Experiment 1, including experimental design and procedures, with a few exceptions. First, the PCASS process was used in place of the polygraph process described in Experiment 1. This process will be described below. Second, Experiment 2 took place over three days, in contrast to Experiment 1, which took place over four days. Third, on two of the three days during which testing occurred, due to ordnance supply complications, M115A2 Ground Burst Projectile Simulators were used in place of the M116A1 Hand Grenade Simulators. The M115A2 produces a 138 decibel blast at 75 feet, in contrast to the 125 decibel blast produced by the M116A1 simulator (Miller & Ruppert, 2004). In addition, the M115A2 produces a whistling noise for 2-4 seconds just prior to detonation, to simulate the experience of an incoming artillery shell.

Method

Participants

Participants were 73 United States Army basic trainees at Fort Jackson, SC. Thirty-eight participants were assigned to the truthful condition and thirty-five participants were assigned to the deceptive condition. Thirty-nine of these participants were female and thirty-four were male. Ages for these participants ranged from 17 to 30, with an average age of 19.7 (SD = 2.8).

PCASS Operators

Seven PCASS operators conducted PCASS examinations for this study. The operators were non-commissioned officers who had received one week of training in the PCASS process. All PCASS operators were counterintelligence special agents. All had prior training in interviewing, interrogation, and conducting investigations. Each PCASS operator conducted from 9-12 examinations, with a mean of 10.4 (SD = 1.4) over the three days of the study.

Design

The experiment took place over three days. Thirty participants were available each day for the study. All other aspects of the design were identical to Experiment 1.

Apparatus

The PCASS is a hand-held credibility assessment device developed by Lafayette Instrument Company (Lafayette, IN). 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 25.4 cm cable for the collection of electrodermal information from Ag/AgCl sensors and a 27.9 cm cable for the collection of vasomotor information from a photo-plethysmograph enclosure, measuring 4.8 cm x 2.5 cm x 1.9 cm. These cables connect to a 10.2 cm x 6.0 cm x 2.5 cm plastic unit that fits on the wrist of the examinee. This component processes the raw electrodermal and vasomotor information before transmission into the main PCASS unit, via a 2.1 m Universal Serial Bus cable.

The operating system, user interface, and data collection software within the PCASS were developed by Lafayette Instrument Company (Lafayette, IN), specifically for the PCASS (Version 1.1.0.0). The decision algorithm (Version 2.1) that integrates electrodermal and

vasomotor responses time-locked with stimulus presentation in order to make a decision was developed by the Johns Hopkins University Applied Physics Laboratory (Baltimore, MD).

Procedure

Prior to data collection with the PCASS, a pretest interview, lasting approximately 15-20 minutes, was carried out by the examiner. The pretest process (Appendix H) involved a brief introduction to the instrument and a review of the questions to be presented (Appendix I). The PCASS data collection process required the placement of two Ag/AgCl sensors on the palm of the participant's hand, using conductance gel, and a photo-plethysmograph inserted over the tip of the middle finger and held in place with a plastic clip. All sensors were attached to the same hand.

During the data collection process the PCASS test questions were presented verbally, every 30 seconds. Three successive repetitions of the question list were presented to the participant, for a continuous data collection time of approximately 10-15 minutes. The participant was seated and asked to remain still during this process. Following the data collection process, the internal PCASS algorithm 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 became the final decision for that examinee.

Results

Eighty-four participants began the study, with forty-two participants assigned to the truthful condition and forty-two assigned to the deceptive condition. Two deceptive participants admitted to participating in the mock crime during the pretest process and were eliminated from the study. One deceptive participant repeatedly answered 'Yes' when asked whether they had placed the simulated bomb during the PCASS data collection process, and was eliminated from

the study. Two deceptive participants were eliminated for placing the simulated bomb in the incorrect location. Two deceptive participants chose not to participate after hearing the recorded instructions. Two truthful participants were eliminated for not following instructions properly (failing to go to a designed location). Finally, two truthful participants chose not to participate after reading the informed consent form. Thus, 35 deceptive participants and 38 truthful participants successfully completed the study, for a total of 73 participants.

Data analysis focused on the accuracy of the PCASS in its decisions compared to a known ground truth, once again using total accuracy and definitive accuracy. Table 6 shows total accuracy decision accuracy for Experiment 2. The proportion of correct decisions for truthful ($z = 2.9$, $p < .01$) significantly exceeded chance levels. However, the proportion of correct decisions for deceptive participants did not ($z = 0.2$, $p > .05$). Total accuracy for combined truthful and deceptive participants was significantly above chance ($z = 2.2$, $p < .05$). Total accuracy for truthful decisions was significantly higher for truthful participants than for deceptive participants ($z = 2.0$, $p < .05$).

Table 6.
Total Accuracy Rates Produced by the Preliminary Credibility Assessment Screening System as a Function of Participant Veracity (Experiment 2).

	Truthful			Deceptive			Total		
	Cor	Err	NO	Cor	Err	NO	Cor	Err	NO
Frequency	28	2	8	18	5	12	46	7	20
Proportion	.737	.053	.211	.514	.143	.343	.630	.096	.274
Average (unweighted) Decision accuracy							.626	.098	.277

Note: Cor = correct decision, Err = erroneous decision, NO = no opinion

Table 7 shows definitive accuracy performance for Experiment 2. Definitive accuracy for both truthful and deceptive decisions were significantly above chance levels ($z = 4.8$, $p < .0001$ and $z = 2.7$, $p < .01$ respectively), but did not differ significantly from each other ($z = 1.6$, $p > .05$). Finally, combined definitive accuracy was significantly above chance levels ($z = 5.4$, $p < .0001$).

Table 7.
Definitive Accuracy Rates Produced by the Preliminary Credibility Assessment Screening System as a Function of Participant Veracity (Experiment 2).

Decision Method	Truthful	Deceptive	Total
Algorithm	.933	.783	.868
Average (unweighted) Decision Accuracy			
Algorithm			.858

Note: Definitive Accuracy excludes no opinion decisions from accuracy calculations. Cor = correct decision, Err = erroneous decision, NO = no opinion

Table 8.
Effect Sizes for Total and Definitive Accuracy Rates as a Function of Participant Veracity for PCASS Decisions (Experiment 2).

Accuracy Type	Truthful	Deceptive	Total
Total	.237	.014	.130
Definitive	.433	.283	.368

Table 8 shows effect size calculations for Experiment 2. Performance by individual PCASS operators is shown in Table 9. Pairwise comparisons revealed no significant differences in total accuracy produced by the PCASS operators.

Table 9.
Total Accuracy Rates Produced by PCASS Operators (Experiment 2).

	Truthful			Deceptive			Total		
Operator	Cor	Err	NO	Cor	Err	NO	Cor	Err	NO
Frequency									
1	4	0	2	2	1	1	6	1	3
2	4	0	1	1	0	3	5	0	4
3	4	0	1	1	1	2	5	1	3
4	3	1	0	3	2	1	6	3	1
5	4	1	0	4	0	3	8	1	3
6	6	0	1	2	1	1	8	1	2
7	3	0	2	5	0	2	8	0	4
Proportion									
1	.667	.000	.333	.500	.250	.250	.600	.100	.300
2	.800	.000	.200	.250	.000	.750	.556	.000	.444
3	.800	.000	.200	.250	.250	.500	.556	.111	.333
4	.750	.250	.000	.500	.333	.167	.600	.300	.100
5	.800	.200	.000	.571	.000	.429	.667	.083	.250
6	.857	.000	.143	.500	.250	.250	.727	.091	.182
7	.600	.000	.400	.714	.000	.286	.000	1.000	.000

Note: Cor = correct decision, Err = erroneous decision, NO = no opinion

The final analysis for Experiment 2 involved an exploration of differences as a function of participant sex. This breakdown by total accuracy is shown in Table 10. There was no evidence for a difference in total accuracy as a function of participant sex, $z = 1.2$, $p > .05$. For both female and male participants, the difference in total accuracy between truthful and deceptive conditions was not significant, ($z = 1.8$, $p > .05$, and $z = 1.3$, $p > .05$, respectively). For truthful cases, no differences were found between male and female participants, $z = 0.5$, $p > .05$. However, for deceptive cases, total accuracy for females was significantly higher than for males, $z = 2.4$, $p < .05$.

Table 11 shows the results of the sex by veracity comparison with definitive accuracy. No evidence was found for differences between males and females with definitive accuracy, z = 0.8, $p > .05$. For both male and female participants, no differences were significant between the truthful and deceptive conditions (z = 0.7, $p > .05$, and z = 1.6, $p > .05$, respectively). For both truthful and deceptive conditions, no differences were found between definitive accuracy for females or for males (z = 0.6, $p > .05$, and z = 1.8, $p > .05$, respectively).

Table 10.
Total Accuracy Rates as a Function of Participant Sex and Veracity (Experiment 2).

	Truthful			Deceptive			Total		
Participant Sex	Cor	Err	NO	Cor	Err	NO	Cor	Err	NO
Frequency									
Female	12	2	7	15	1	2	27	3	9
Male	13	1	6	6	3	5	19	4	11
Proportion									
Female	.571	.095	.333	.833	.056	.111	.692	.077	.231
Male	.650	.050	.300	.429	.214	.357	.559	.118	.324

Note: Cor = correct decision, Err = erroneous decision, NO = no opinion

Table 11.
Definitive Accuracy Rates Produced by the Preliminary Credibility Assessment Screening System as a Function of Participant Veracity (Experiment 2).

Participant Sex	Truthful	Deceptive	Total
Female	.857	.938	.900
Male	.929	.667	.826
Average (unweighted) Decision Accuracy Algorithm			.858

Note: Definitive Accuracy excludes no opinion decisions from accuracy calculations. Cor = correct decision, Err = erroneous decision, NO = no opinion

Discussion

Experiment 2 showed decision accuracy significantly above chance levels, particularly for definitive accuracy. While total accuracy was substantially lower for total accuracy in comparison to Experiment 1, definitive accuracy rates were almost identical across the two studies. The finding that total accuracy was significantly higher for truthful participants than for deceptive participants was unexpected, given the specified tendency of the PCASS to avoid false negative errors. It was speculated that the comparison questions, which dealt with real-world personal issues, that were used in the study may have had greater meaning to the participants in the study, relative to the relevant questions. If this was the case, the comparison questions would have generated larger responses, on average, than the relevant questions, and produced large numbers of true positives and false positives, perhaps relative to a real world context.

Experiment 3

Experiment 3 served as a replication and cross-validation of Experiment 2. Experiment 3 was identical to Experiment 2, using a different sample of participants and operators, drawing from the same populations as Experiment 2. Six PCASS operators were available in Experiment 3, compared to seven in Experiment 2.

Method

Participants

Participants were 82 United States Army basic trainees at Fort Jackson, SC. Forty-four participants were assigned to the truthful condition and thirty-eight were assigned to the deceptive condition. Twenty-eight participants were female and fifty-four were male. Ages for these participants ranged from 17 to 38, with an average age of 19.9 (SD = 3.5).

PCASS Operators

Six PCASS operators conducted PCASS examinations for this study. The operators were non-commissioned officers who had received one week of training in the PCASS process. Each PCASS operator conducted from 13-14 examinations, with a mean of 13.7 (SD = 0.5) over the three days of the study.

Design

The design, apparatus and procedure were identical to Experiment 3. The only exception was that the M116A1 grenade simulator was used exclusively throughout Experiment 3.

Results

Ninety participants began the study. Forty-six participants were assigned to the truthful condition and forty-four were assigned to the deceptive condition. Two deceptive participants were eliminated from the study because of experimenter error (bomb not placed in the proper location). Two deceptive participants were prevented from placing the bomb due to basic training maneuvers being conducted in the area where the bomb was to be placed. Two deceptive participants admitted to participating in the mock crime during the pretest process and were eliminated from the study. Two truthful participants decided not to participate after reading the informed consent form. Thus, 38 deceptive participants and 44 truthful participants successfully completed the study, for a total of 82 participants.

Data analysis again focused on the accuracy of the PCASS in its decision compared to a known ground truth, again using total accuracy and definitive accuracy. Table 12 shows total accuracy performance, for truthful, deceptive, and combined decisions. Total accuracy was not significantly above chance for truthful ($z = 1.5$, $p > .05$) or for deceptive decisions ($z = 1.6$, $p >$

.05), and the two decision categories did not significantly differ from each other ($z = 0.2$, $p > .05$). However, combined total accuracy did exceed chance levels ($z = 2.1$, $p < .05$).

Table 13 shows definitive accuracy performance for Experiment 3. Definitive accuracy for both truthful and deceptive decisions significantly exceeded chance ($z = 2.2$, $p < .05$ and $z = 3.5$, $p < .001$, respectively), but the two categories were not significantly different from each

Table 12.
Total Accuracy Rates Produced by the Preliminary Credibility Assessment Screening System as a Function of Participant Veracity (Experiment 3).

	Truthful			Deceptive			Total		
	Cor	Err	NO	Cor	Err	NO	Cor	Err	NO
Frequency	27	13	4	24	5	9	51	18	13
Proportion	.614	.296	.091	.632	.132	.237	.622	.220	.159
Average (unweighted) Decision accuracy							.623	.214	.164

Note: Cor = correct decision, Err = erroneous decision, NO = no opinion

Table 13.
Definitive Accuracy Rates Produced by the Preliminary Credibility Assessment Screening System as a Function of Participant Veracity (Experiment 3).

Decision Method	Truthful	Deceptive	Total
Algorithm	.675	.828	.739
Average (unweighted) Decision Accuracy Algorithm			.751

Note: Definitive Accuracy excludes no opinion decisions from accuracy calculations. Cor = correct decision, Err = erroneous decision, NO = no opinion

other ($z = 1.4$, $p > .05$). Finally, definitive accuracy for combined decisions was significantly above chance levels ($z = 4.0$, $p < .0001$).

Table 14 shows effect size calculations for Experiment 3. Table 15 shows the accuracy rates produced by individual PCASS Operators. Pairwise comparisons showed a significant difference between the total accuracy produced by Operator 1 and Operator 2, $z = 2.2$, $p < .05$.

Table 14.
Effect Sizes for Total and Definitive Accuracy Rates as a Function of Participant Veracity for PCASS Decisions (Experiment 3).

Accuracy Type	Truthful	Deceptive	Total
Total	.114	.132	.122
Definitive	.175	.328	.239

Once again, the final analysis of Experiment 3 explored potential differences between male and female participants. Table 16 shows results as a function of participant sex and veracity. The difference between male and female participants was not significant, $z = 0.2$, $p > .05$. For female and male participants, the difference in total accuracy between truthful and deceptive was not significant ($z = 0.9$, $p > .05$, and $z = 0.8$, $p > 05$, respectively). Isolating the truthful and deceptive conditions, the differences in total accuracy between males and females were not significant ($z = 0.6$, $p > .05$, and $z = 1.0$, $p > .05$).

Table 15.
Total Accuracy Rates Produced by PCASS Operators (Experiment 3).

	Truthful			Deceptive			Total		
Operator	Cor	Err	NO	Cor	Err	NO	Cor	Err	NO
Frequency									
1	4	1	1	8	0	0	12	1	1
2	3	1	1	3	2	3	6	3	4
3	4	2	1	4	0	3	8	2	4
4	4	1	1	4	1	2	8	2	3
5	6	4	0	2	1	1	8	5	1
6	6	4	0	3	1	0	9	5	0
Proportion									
1	.667	.167	.167	1.000	.000	.000	.857	.071	.071
2	.600	.200	.200	.375	.250	.375	.462	.231	.308
3	.571	.286	.143	.571	.000	.429	.571	.143	.286
4	.667	.167	.167	.571	.143	.286	.615	.154	.231
5	.600	.400	.000	.500	.250	.250	.571	.357	.071
6	.600	.400	.000	.750	.250	.000	.643	.357	.000

Note: Cor = correct decision, Err = erroneous decision, NO = no opinion

Table 17 shows definitive accuracy as a function of participant sex and veracity. The overall difference between definitive accuracy for male and female participants was not significant, z = 0.0, $p > .05$. For female participants, the difference in accuracy between truthful and deceptive participants was not significant, z = 0.9, p > .05. For male participants, the difference between truthful and deceptive participants was significant, $z = 2.4$, $p < .05$. Isolating the truthful and deceptive conditions, the differences in definitive accuracy for female and male participants was not significant ($z = 1.3$, $p > .05$ and $z = 1.8$, $p > .05$).

Table 16.

Total Accuracy Rates as a Function of Participant Sex and Veracity (Experiment 3).

	Truthful			Deceptive			Total		
Participant Sex	Cor	Err	NO	Cor	Err	NO	Cor	Err	NO
Frequency									
Female	12	3	3	5	3	2	17	6	5
Male	15	10	1	19	2	7	34	12	8
Proportion									
Female	.667	.167	.167	.500	.300	.200	.607	.214	.179
Male	.577	.385	.039	.679	.071	.250	.630	.222	.148

Note: Cor = correct decision, Err = erroneous decision, NO = no opinion

Table 17.
Definitive Accuracy Rates Produced by the Preliminary Credibility Assessment Screening System as a Function of Participant Veracity (Experiment 3).

Participant Sex	Truthful	Deceptive	Total
Female	.800	.625	.739
Male	.600	.905	.739
Average (unweighted) Decision Accuracy			
Algorithm			.858

Note: Definitive Accuracy excludes no opinion decisions from accuracy calculations. Cor = correct decision, Err = erroneous decision, NO = no opinion

Discussion

In Experiment 3, the PCASS produced decision accuracy above chance levels, though primarily through the exclusion of no opinion decisions, per definitive accuracy calculations. In comparison to Experiment 2, the proportion of correct decisions produced in Experiment 3 did

not differ for total decisions with either total or definitive accuracy ($z = 0.6$, $p > .05$ and $z = 1.8$, $p > .05$, respectively, two-tailed). Deceptive decisions provided no evidence for differences across the two experiments for total accuracy, $z = 1.0$, $p > .05$ or for definitive accuracy $z = 0.4$, $p > .05$. For truthful decisions, no evidence across the two data sets was produced for total accuracy, $z = 1.2$, $p > .05$, but evidence for differences was produced for definitive accuracy, $z = 2.6$, $p < .01$. This difference is attributable to a significant increase in the proportion of false positive decisions (i.e., truthful participants resulting in deceptive PCASS decisions) in Experiment 3 (.295) relative to Experiment 2 (.052), $z = 2.8$, $p < .01$. This was the only significant difference discovered in the proportion of correct, erroneous, and no opinion decision across truthful and deceptive participants between Experiments 2 and 3 (all other ps > .05).

General Discussion

This report provides the first supporting evidence of the efficacy of the PCASS to distinguish between truthful and deceptive participants at greater than chance levels. This statement should be tempered with the fact that this holds true for definitive accuracy in all cases, but only in certain cases for total accuracy. Total accuracy only exceeded chance levels when truthful and deceptive accuracy was combined for Experiments 2 and 3, and for truthful participants in Experiment 2. Furthermore, it is important that this effort be followed by subsequent research into the capabilities and limitations provided by this technology.

Limitations

As with any research effort, a number of factors must be taken into account when considering the results of this series of studies. First, it should be fully understood that the population from which the samples in this effort were drawn were heterogeneous with respect to sex and race, but were relatively homogenous with respect to age. Most participants (183 of 225,

81.3%) ranged from 17-22 years of age. While the race and sex variation exhibited in the sample are of potential value, the restricted age range may limit the generalizeability of the results of this series of studies to other populations.

Second, all participants in this series of studies were English-speaking U.S. citizens. The impact of using the PCASS with non-English speaking examinees, particularly in conjunction with an interpreter, is unknown.

Third, the present set of studies did not explore the impact of countermeasures, deliberate attempts to defeat the PCASS process. Previous studies have shown that the Comparison Question Technique, the polygraph technique upon which the PCASS decision-making algorithm is based, can be susceptible to countermeasures under certain conditions (Honts, Raskin, & Kircher, 1994). Education through increase training in awareness and identification of countermeasure attempts, in addition to the implementation of additional movement sensors may have mitigated the impact of countermeasures on the polygraph in recent years. However, the PCASS in its current form does not include any form of motion sensor and does not integrate extensive capabilities for countermeasure detection. The impact of countermeasures on PCASS decision accuracy remains an unexplored question.

Fourth, the present study used an innovative mock crime scenario, carefully positioned to capture a likely application of the PCASS in the real world. Based on feedback from participants in individual debriefing sessions, the mock crime scenario was engaging and believable. Based on the decision accuracy results produced in all three studies, the implications are that the scenario was arousing and engaging. However, it is unknown how the PCASS would perform with other types of scenarios and operational situations. The degree of generalizeability of the present results to other scenarios and real world contexts is unknown.

Fifth, this series of studies provided evidence for the decision accuracy of the PCASS only. The present effort provided no forays into the assumptions, theory, or algorithmic functioning of the PCASS process. In other word, the present set of studies does not serve to validate the basic premises upon which the functioning and operation of the PCASS is based.

Sixth, the base rate of deception in the present study was approximately 50%. It is likely that in the real world the base rate of deception might be significantly lower. Future studies should explore this problem, perhaps using a lower base rate of deception, thus capturing a situation that may be more akin to the real world circumstances in which the PCASS could be implemented.

Seventh, and perhaps most important, the impact of operator/examinee interactions that take place in the pretest are unknown. The variable results found for truthful participants across Experiments 2 and 3 calls for a closer inspection of the reliability of the PCASS process. The increased proportion of false positive errors produced in Experiment 3 may be attributable to differences between the two sets of PCASS operators, which may have in some way impacted the pretest interactions with participants. Some preliminary analyses of the workload exacted upon each group of operators showed a significant difference in the number of exams conducted by the operators in Experiment 2 (M = 10.4, SD = 1.4), and Experiment 3 (M = 13.7, SD = 0.5), $t(11) = 5.9$, $p < .001$.

To further explore this hypothesis, post hoc comparisons were conducted by time of day and by the actual day of testing. No evidence was found for time of day, comparing morning versus afternoon performance (all ps > .05). To explore possible differences by day, decision proportions were explored by comparing decision proportions from the first and second days to the third day for both experiments. No evidence for differences was found for the two

experiments individually, but collapsing across the two studies showed a significant decrease in definitive decision accuracy when the first and second day were compared to the third day (.854 versus .675, $z = 3.0$, $p < .05$). These results provide some evidence that operator fatigue may have played a role in the decreased performance between Experiments 2 and 3.

Another potential source of variation may exist within the PCASS operators as well. Though the number of examinations produced by each operator was relatively small, some indications of differences in PCASS accuracy were noted with different operators (e.g., PCASS Operator 1 in Experiment 3). Of course, great caution should be taken when attempting to compare individual performances, given the fact that all operators tested different examinees, presenting another source of variation. In addition, the number of operators across the two studies is too small to generate meaningful comparisons. Future scrutiny of the individual PCASS operator results and video-recorded pretest is warranted to attempt to isolate possible differences that may exist between operators.

Finally, a number of significant differences were found across Experiments 1-3 as a function of participant veracity and sex. However, these effects were not reliable across the experiments. These results suggest that future studies that explore participant sex as a variable (or other subject variables, for that matter) should include large sample sizes to more reliably understand the impact of such variables. Ultimately, the fluctuations in decision accuracy for Experiments 2 and 3 engender some degree of concern, as such results do not lend themselves to a clear explanation.

Differences in Polygraph and PCASS Decision Accuracy

A notable difference between the results of Experiments 1 versus 2 and 3 were the large proportion of no opinion decisions in Experiments 2 and 3. The difference in the proportion of

no opinion decisions was statistically significant between Experiment 1 and Experiments 2 and 3 ($z = 4.4$, $p < .0001$, and $z = 3.0$, $p < .01$, respectively), but did not differ between Experiments 2 and 3, $z = 1.8$, $p > .05$. One possible explanation for this discrepancy could be the different amounts of time required in the pretest for the polygraph and PCASS processes. The polygraph pretest typically required 45-60 minutes, while the PCASS pretest required 20-25 minutes. Perhaps the additional time required in the polygraph pretest helps the diagnostic value of the process, reducing the number of no opinion decisions.

A second explanation is the reduced diagnostic value of the physiological data collected by the PCASS. The polygraph collects physiological data from three channels (respiratory, electrodermal, and cardiovascular [blood volume and pulse rate]) that each have demonstrated value in distinguishing truthful and deceptive individuals (Harris, Horner, & McQuarrie, 2000, Kircher, Gardner, Kristjansson, & Webb, 2005, Kircher & Raskin, 1988, many others). The PCASS collects physiological data using only two channels (electrodermal and cardiovascular [beat-to-beat interval]). The reduction in diagnostic channels likely reduces the ability of the PCASS algorithm to produce definitive decisions.

A third explanation could be the discrepancy in the ability of the newly trained PCASS operators to provide an effective pretest, relative to their polygraph counterparts. The polygraph examiners had literally decades of experience in conducting polygraph pretest interviews, thus were likely more adept at producing definitive results. A fourth explanation is that the developers of the PCASS algorithm have programmed liberal thresholds for no opinion decisions, therefore reducing the number of definitive decisions produced by the PCASS. Setting a more narrow range for no opinion decisions would increase the proportion of no opinion decisions and might increase total accuracy rates as well.

In reality, it is reasonable that each of these explanations for the increased proportion of no opinion decisions produced by the PCASS contributed to the observed difference between the two processes to some degree. Based on the results of Experiments 1 and 2, this difference represents a key difference in the effectiveness of the two approaches.

Conclusions

This series of controlled laboratory studies provide initial evidence for the diagnostic value afforded by the PCASS approach. Across two studies, the PCASS produced definitive accuracy rates (e.g., excluding no opinion decisions) that significantly exceeded chance levels for both truthful and deceptive participants. These results should be taken into consideration in light of the limitations and concerns described above. Additional and continuous research efforts are required to address knowledge gaps regarding factors that may impact PCASS performance.

The results of this series of studies also provide a preliminary comparison between the PCASS and the polygraph. The polygraph produced higher total accuracy than either of the PCASS studies (ps < .01), though was not significantly different in terms of definitive accuracy (ps > .05). Possible sources of this difference in total accuracy were discussed in the previous section. While providing a significant decrease in total accuracy, the PCASS affords the benefit of relatively brief training (1 week), in comparison to the polygraph (13 weeks). This provides an advantage in both time and training costs. In terms of overall costs, PCASS units were purchased for $7500 per unit, somewhat more expensive relative to the cost of a field polygraph system at around $5500. In sum, the PCASS requires substantially less training, is somewhat more expensive per unit, and offers reduced total accuracy in comparison to the polygraph.

As with any new technique or technology that is under consideration for operational use, it is vital that proper mechanisms for policy, administration, training, and implementation of the

PCASS be established and closely monitored. In this case, a centralized oversight mechanism to ensure consistency of application and implementation will help to ensure success of any operational fielding of the PCASS.

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Appendix A
Preliminary Instructions
DoDPI06-P-0030

After you enter this room, be sure to close the door behind you. You will find another form on this desk which you must read before starting the experiment. If you wish to participate in the experiment, you must fill out the form and sign it. Leave the form on the desk. After you have signed the form, turn on the tape recorder (press the button labeled play) to hear your instructions.

Appendix B
Informed Consent Form 1
(DoDPI06-P-0030)

Current Date (M/D/Y):____/____/____ Participant #:_____

Name:_____ SSN:_____

Date of Birth (M/D/Y):___/___/___ Place of Birth:_____

Home Address:_____

_____

Home Phone Number:_____

This form is affected by the Privacy Act of 1974.
AUTHORITY: 10 USC 3013, 44 USE 3101 and 10 USC 1071-1087, and E.O. 9397.
PRINCIPLE PURPOSE: To document voluntary participation in a DoD Polygraph Institute Research Program.
ROUTINE USES: The SSN and home address will be used for identification and locating purposes. Information derived from the study will be used to document the study, decisions regarding claims, and for mandatory record keeping associated with human use in government research. Information may be furnished to federal agencies.
VOLUNTARY DISCLOSURE: Failure to furnish requested information will prevent your voluntary participation in this investigational study.

Research Project Explanation

You are invited to participate in a study designed to evaluate the effectiveness of a new piece of equipment that is being considered for use within the Federal Government. The study is titled Validation Studies for the Preliminary Credibility Assessment Screening System (PCASS). The study is sponsored by the Department of Defense Polygraph Institute, Fort Jackson, SC, and is under the direction of Dr. Stuart Senter.

If you agree to participate in the study, you will be asked to take a lie detector test. You have been randomly selected to participate in a mock crime, and then lie about what you did. Prior to taking the lie detector test, you will be asked to go outside, locate a mock bomb, and place it next to a nearby road. During the lie detector test, your job will be to lie about the incident to the lie detector operator and convince the operator that you are telling the truth. For the lie detector test, the operator will first explain how the test works and discuss the questions you will be asked. The lie detector operator will then attach sensors to you. These sensors may include an attachment that will be placed on your wrist using a Velcro band, to process physiological information that will be collected from your hand. A sensor on a Velcro strap may

be attached to a finger tip to collect vasomotor information. You may have two corrugated rubber tubes attached to your chest and abdominal area to monitor your breathing activity. These tubes will be held in place using a thin chain and connector. You may also have a blood pressure cuff placed on your arm to monitor cardiovascular information. The blood pressure cuff will be held in place using a Velcro strip. Two sensors, using a conductance gel and adhesive circles, will be attached to your palm to record how much your hands are sweating.

The signals measured from these sensors will help the lie detector determine if you are being truthful. While these measures are being recorded, you will be asked to remain still for a few minutes at a time while questions are asked. You may be audio or videotaped at any time during this project. Recordings are required to ensure that research procedures have been followed and so that a record of project activities can be retained.

Restrictions

You must be at least 17 years old to participate in this study. You should not participate in this project if you suffer from blood pressure, cardiovascular, or other problems which prevent you from remaining still for a few minutes at a time. Pregnant females will not be tested during this study because most Federal polygraph programs do not permit testing of pregnant females. 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 completed.

Risks

There are no known dangers or risks to participation in this study. The physiological measurements collected during testing, and procedures similar to those you will experience, have been used in previous years, both in research studies and in real world cases without incident. You will also be required to lie to the lie detector operator, and some individuals are uncomfortable with lying. Finally, be advised that, excluding minor traffic violations, the lie detector operator may be obliged to report violations of the law to the proper authorities.

Participation Benefits

You will receive the satisfaction of assisting your government in protecting national security.

Time Commitment and Withdrawal from the Study

Your participation is voluntary and you may quit at any time without any penalty or punishment. Please understand that participation is not required by the military and you will not face repercussions from the military or from the Department of Defense Polygraph Institute for withdrawing. If you decide not to complete the study, please call (803) 751-9167, or tell your study contact or the lie detector operator. If you are with study personnel and wish to quit, please let them know and your participation will end. You will be asked to stay a few extra minutes, so we can explain the project and answer any questions you may have.

The entire study will take approximately two hours of your time. You may be removed from the study if you fail to follow instructions, if the lie detector operator determines that you are unsuitable for testing (e.g., unable to sit still, unable to continue because of health, sleepiness, or medications), or if you discuss study procedures with individuals outside of the project.

Information Confidentiality

While we will make every effort to maintain confidentiality, it cannot be absolutely guaranteed. Records that identify you and the consent form signed by you may be inspected by a regulatory agency (e.g., Institutional Review Board, Surgeon General, Inspector General). The results of this research study may be presented at meetings or in publications; however, your identity will not be disclosed. While any video or audio recordings collected in this study will be maintained for records and internal research purposes, your identity will not be revealed as a participant in any such recordings.

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:

Dr. Stuart Senter	DoD Polygraph Institute
	7540 Pickens Ave.
or	Fort Jackson, SC 29207
Mr. Don Krapohl	Tel: 803-751-9100
	Fax: 803-751-9108

The Department of Defense Polygraph Institute cannot provide financial compensation in the event of personal injury resulting directly from the research procedures. 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 research staff will assist you in obtaining appropriate medical treatment.

If you have any questions about your rights as a research participant, you may contact:

Thomas Coggins
Office of Research Compliance
University of South Carolina
Columbia, SC 29208
Tel: 803-777-7093

By your signature below, you are indicating that you understand this consent form and have agreed to participate in this project.

_____ _____

Participant Signature Date

_____
Printed Name

Validation Studies for the Preliminary Credibility Assessment Screening System (PCASS) Consent Form 1, version 10Feb06 (DoDPI06-P-0030).
NOTE: A copy of this form (marked COPY) is or will be provided to you.

Appendix C

Informed Consent Form 2
(DoDPI06-P-0030)

Current Date (M/D/Y):____/____/____ Participant #:_____

Name:_____ SSN:_____

Date of Birth (M/D/Y):___/___/___ Place of Birth:_____

Home Address:_____

_____

Home Phone Number:_____

This form is affected by the Privacy Act of 1974.
AUTHORITY: 10 USC 3013, 44 USE 3101 and 10 USC 1071-1087, and E.O. 9397.
PRINCIPLE PURPOSE: To document voluntary participation in a DoD Polygraph Institute Research Program.
ROUTINE USES: The SSN and home address will be used for identification and locating purposes. Information derived from the study will be used to document the study, decisions regarding claims, and for mandatory record keeping associated with human use in government research. Information may be furnished to federal agencies.
VOLUNTARY DISCLOSURE: Failure to furnish requested information will prevent your voluntary participation in this investigational study.

Research Project Explanation

You are invited to participate in a study designed to evaluate the effectiveness of a new piece of equipment that is being considered for use within the Federal Government. The study is titled Validation Studies for the Preliminary Credibility Assessment Screening System (PCASS). The study is sponsored by the Department of Defense Polygraph Institute, Fort Jackson, SC, and is under the direction of Dr. Stuart Senter.

If you agree to participate in the study, you will be asked to take a lie detector test. You have been randomly selected to participate in this project as a truthful suspect. For the lie detector test, the operator will first explain how the test works and discuss the questions you will be asked. The lie detector operator will then attach sensors to you. These sensors may include an attachment that will be placed on your wrist using a Velcro band, to process physiological information that will be collected from your hand. A sensor on a Velcro strap may be attached to a finger tip to collect vasomotor information. You may have two corrugated rubber tubes attached to your chest and abdominal area to monitor your breathing activity. These tubes will be

held in place using a thin chain and connector. You may also have a blood pressure cuff placed on your arm to monitor cardiovascular information. The blood pressure cuff will be held in place using a Velcro strip. Two sensors, using a conductance gel and adhesive circles, will be attached to your palm to record how much your hands are sweating.

Restrictions

You must be at least 17 years old to participate in this study. You should not participate in this project if you suffer from blood pressure, cardiovascular, or other problems which prevent you from sitting comfortably for five minutes at a time. Pregnant females will not be tested during this study because most Federal polygraph programs do not permit testing of pregnant females. 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 completed.

Risks

There are no known dangers or risks to participation in this study. The physiological measurements collected during testing, and procedures similar to those you will experience, have been used in previous years, both in research studies and in real world cases without incident. You may also be required to lie to the lie detector operator, and some individuals are uncomfortable with lying. Finally, be advised that, excluding minor traffic violations, the lie detector operator may be obliged to report violations of the law to the proper authorities.

Participation Benefits

You will receive the satisfaction of assisting your government in protecting national security.

Time Commitment and Withdrawal from the Study

Your participation is voluntary and you may quit at any time without any penalty or punishment. Please understand that participation is not required by the military and you will not face repercussions from the military or from the Department of Defense Polygraph Institute for withdrawing. If you decide not to complete the study, please call (803) 751-9167, or tell your study contact or the lie detector operator. If you are with study personnel and wish to quit, please let them know and your participation will end. You will be asked to stay a few extra minutes, so we can explain the project and answer any questions you may have.

The entire study will take approximately two hours of your time. You may be removed from the study if you fail to follow instructions, if the lie detector operator determines that you are unsuitable for testing (e.g., unable to sit still, unable to continue because of health, sleepiness, or medications), or if you discuss study procedures with individuals outside of the project.

Information Confidentiality

While we will make every effort to maintain confidentiality, it cannot be absolutely guaranteed. Records that identify you and the consent form signed by you may be inspected by a regulatory agency (e.g., Institutional Review Board, Surgeon General, Inspector General). The results of this research study may be presented at meetings or in publications; however, your identity will not be disclosed. While any video or audio recordings collected in this study will be maintained for records and internal research purposes, your identity will not be revealed as a participant in any such recordings.

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:

Dr. Stuart Senter	DoD Polygraph Institute 7540 Pickens Ave.
or	Fort Jackson, SC 29207
Mr. Don Krapohl	Tel: 803-751-9100 Fax: 803-751-9108

The Department of Defense Polygraph Institute cannot provide financial compensation in the event of personal injury resulting directly from the research procedures. 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 research staff will assist you in obtaining appropriate medical treatment.

If you have any questions about your rights as a research participant, you may contact:

Thomas Coggins
Office of Research Compliance
University of South Carolina
Columbia, SC 29208
Tel: 803-777-7093

By your signature below, you are indicating that you understand this consent form and have agreed to participate in this project.

_____ _____
Participant Signature Date

_____
Printed Name

Validation Studies for the Preliminary Credibility Assessment Screening System (PCASS)
Consent Form 2, version 10Feb06 (DoDPI06-P-0030).
NOTE: A copy of this form (marked COPY) is or will be provided to you.

Appendix D

Tape Recorded Instructions
DoDPI06-P-0030

Deceptive Participants

Please listen to these instructions carefully and make sure that you understand exactly what you are to do. Replay this tape if necessary. You may 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.

This is a lie detection experiment. You will place a pretend bomb in a location outside of this building. You will then be given a lie detector test on whether you were involved in the placement of the bomb. Your goal is to beat the lie detector by appearing innocent. If you fail to beat the lie detector you will have to stand in front of your unit and deliver a 10-minute speech on honesty and integrity, and why the mock crime you committed was wrong. Here is what you are to do.

Leave this room, take a left and head to the back of the building. Go in the direction that is opposite from the elevator and reception area. Proceed through the door at the end of this hallway and exit the building through the door immediately on your left. Go out the door and turn to your left. Walk toward the front of the building. As you come to the front of the building you will see a white retaining wall. Move to a tree that is between the retaining wall and the building. At the base of the tree is a small cardboard box. Make sure that no one can see you behind the retaining wall. Open the cardboard box. Inside the box will be a bomb with dynamite sticks and a timer, in addition to a bag. Place the bomb in the bag so that it is hidden from sight. Leave the cardboard box under the tree where you found it.

Your next task is to put the bomb in a location across Marion Avenue, the street on the opposite side of the DoDPI building from its parking lot. On the corner of Pickens Avenue and Marion Avenue, there is a training area known as Dragon City. Walk along Pickens Avenue, the road that passes in front of the DoDPI building, along the stretch of razor wire until you come to the end of the razor wire that allows you to take a right and walk into the Dragon City area. The opening in the razor wire is right next to a parking lot with a chain link fence. Be sure to stay on the sidewalk on the opposite side of the street from the razor wire while walking along Pickens avenue.

Once in the Dragon City area, walk past the yellow building with doors and glass window so that it is on your right side, keeping the brown building on your left. Beyond these buildings, there is a blue truck with the words ‘Security Force’ written on it with white letters. Continue past the truck and you will see a small cardboard box is lying next to a road. Be sure not to cross this road. At this point, you will take the bomb out of the bag, you will arm the bomb and place it in the cardboard box. There are two switches, one silver and one red, on the bomb that you must push to arm the bomb for later detonation. Two small lights will turn on to indicate the bomb is armed. One will stay on and the other will flash. Arm the bomb and place it in the cardboard box.

Once you have done this, immediately get away from the area as quickly as you can, trying not to draw attention to yourself. Be sure to follow the same path that you took to get into the Dragon City compound. Return to this room in the DoDPI building using exactly the same route. Before you leave this room, check the time. You have up to 15 minutes to complete the bomb placement.

While carrying out this task, be sure to work together as a team. Be sure to have an alibi prepared, because you may be stopped by individuals who are not aware you are involved in a study. You must be sure to convince anyone that questions you that you are not doing anything wrong or secretive. If you are questioned and the person does not believe you, or if you are seen placing the bomb, you will be eliminated from the study.

This is important. At no point are you to provide any written or verbal indication that you are involved in placing the bomb in the Dragon City area, beyond that you have heard that a bomb was found in a location outside the DoDPI building.

After completing the task, wait in this room until someone comes to get you. Individually, you will be given a lie detector test by a lie detector expert. He will not know if you are innocent or guilty because a portion of the participants in the experiment are innocent and have not participated in the placement of the bomb. This means that he will have to make his decision entirely on the basis of the lie detector test. If the examiner concludes that you are deceptive, you will have to deliver a 10-minute speech to your unit, describing what you did, why it was wrong, and on the importance of honesty and integrity. You must actually convince the operator that you are innocent. You must cooperate completely with the testing process.

Also, you must not make the lie detector operator suspicious when he/she is interviewing you during the initial portion of the test. The innocent participants in this experiment simply spend a few minutes in a waiting area. They do not know any details of the crime such as where the bomb was placed. They know that the guilty participants have placed a bomb in some location outside of the DoDPI building. They don't know anything else. You could easily give yourself away by revealing any other details. So, when the lie detector expert asks you questions about any other details about the placement of the bomb, you must deny knowing anything beyond the fact that it was discovered in a location outside of the building. You must do so sincerely so that the lie detector operator doesn't become suspicious. If at some point you believe you blew it, don't give up, because you may still be able to beat the test. If you confess to your involvement in placing the bomb, you will be eliminated from the study. The best strategy for passing the test is to be friendly and cooperative. The lie detector operator will not test uncooperative individuals, so you must cooperate to pass the test.

Those are your instructions. You must follow those instructions exactly. If you do not wish to participate in this experiment, please inform Stuart Senter, Don Krapohl, Lanard Palmer, or any study personnel. If you are not entirely sure of what you are to do, push the stop lever on the recorder and rewind the tape by pressing the review lever. Then push the play lever to hear the instructions again. When you are done, push the stop lever. You may take any notes you made before leaving this room, but be sure to keep them concealed, especially during the polygraph examination. Once you leave this room, you should return in 15 minutes or less. Be

sure to make a plan and discuss an alibi before leaving the room. That is all. Please press the stop lever on the tape recorder.

Nondeceptive Participants

Please listen to these instructions carefully and make sure that you understand exactly what you are to do. Replay this tape if necessary. You may 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.

This is a lie detection experiment. A portion of the people in this experiment are instructed to place a bomb in a location outside of this building. Then they report back for a lie detector test. Their goal is to be found innocent on the lie detector test.

You are not one of those people. You are not to commit a crime. You are innocent suspects. Your goal is to appear innocent on the lie detector test. However, if you are found guilty on the lie detector test, you will have to deliver a 10-minute speech in front of your unit on the importance of honesty and integrity. Therefore, it is in your best interest to be truthful during the tests and deny having anything to do with the placement of the bomb.

Before you leave this room, check the time. You are to leave this room for approximately 10 minutes and then return for the lie detector test. Leave this room, take a left and head to the back of the building. Go in the direction that is opposite from the elevator and reception area. Proceed through the door at the end of this hallway and exit the building through the door immediately on your left. Go out the door and turn to your right. Walk toward the back of the building. As you go around the back of the building, you will pass a dumpster and you will see a wooden gazebo structure. Wait near the gazebo for ten minutes. Then, return this room, returning exactly the same way you left. After you have returned, wait in the room until someone comes for you.

Individually, you will be given a lie detector test by a lie detector expert. He will not know if you are innocent or guilty. This means that he will have to make his decision entirely on the basis of the lie detector test. You must convince the examiner that you are innocent of the crime, which of course, you are. The best strategy for passing the test is to be friendly and cooperative. The lie detector operator will not test uncooperative individuals, so you must cooperate to pass the test.

The examiner will ask you if you know anything about the placement of the bomb. It is okay to let the examiner know that you are aware that a bomb was found in an area outside the building. Understand that the fact you are aware that a bomb was found does not make you guilty.

Those are your instructions. You must follow those instructions exactly. If you do not wish to participate in this experiment, please inform Stuart Senter, Don Krapohl, Lanard Palmer or any study personnel. If you are not entirely sure of what you are to do, push the stop lever on the recorder and rewind the tape by pressing the review lever. Then push the play lever to hear the instructions again. When you are done, push the stop lever. Please throw away any notes you

made before leaving this room. Once you leave this room, you should return in 15 minutes or less. That is all. Please press the stop lever on the tape recorder.

Appendix E

Medical, Biographical and Personal History Questionnaire

CRIMINAL PDD EXAMINATION
INTERVIEW WORKSHEET

DEPARTMENT OF DEFENSE
POLYGRAPH INSTITUTE

PERSONAL HISTORY OF EXAMINEE

Examinee Name		AKA	SSN
DOB	POB	Race	Sex
Height	Weight	Eyes	Hair
Complexion	Build	Scars, Marks and/or Tattoos	

MEDICAL HISTORY

How would you rate your health (excellent, good, fair, poor)? _____
Are you presently under a physician's care? _____
Have you ever experienced any:
- Heart Problems? _____
- High Blood Pressure? _____
- Respiratory or Lung Problems? _____
- Recent Surgery? _____

In the last 24 hours have you taken any medications? _____
Have you been prescribed any medications that you should be taking but have not? _____
In the last 24 hours have you used any alcohol? _____

Are you experiencing any physical discomfort? _____
How many hours of sleep did you get last night? _____

(**FIT/UNFIT)**

PDD EXAMINATIONS

Have you ever been given a PDD examination before? _____
When? _____
Where? _____

****

Honesty/Integrity/Moral Standards 1 2 3 4 5 6 7 8 9 10
Lowest Highest

FAMILY BACKGROUND
Mother/Father (Name, Age, Occupation, Moral standards)

Brothers/Sisters (Names, Ages)

Spouse/Children (Names, Ages, Length of Marriage, Moral standards)

Who were your guardians during childhood and early teens?

Who is the one person you respect the most?

EDUCATION
Level Last School Attended Diploma/Degree-Major

EMPLOYMENT
Employer, Position, Month/Year, Reason for Leaving

Employer, Position, Month/Year, Reason for Leaving

Employer, Position, Month/Year, Reason for Leaving

Employer, Position, Month/Year, Reason for Leaving

Employer, Position, Month/Year, Reason for Leaving

MILITARY HISTORY

Rank, Job, Date of Enlistment

LEISURE ACTIVITIES

Hobbies/Sports

Appendix F

Polygraph Test Questions

I1 Are the lights on in this room?

I2 Are you now sitting down?

SR Regarding the placement of that bomb, do you intend to answer truthfully each question about that?

C1 Did you ever make a promise that you had no intention of keeping?

R1 Did you participate in placing that bomb near that road?

C2 Did you ever tell a lie to someone who trusted you?

R2 Did you place that bomb near that road?

C3 Did you ever lie to take advantage of a friendship?

Alternative comparison questions:

Did you ever blame someone for something you did?

Did you ever cheat anyone out of anything?

Appendix G
PCASS Pretest
DoDPI06-P-0030

INTRODUCTION

The purpose of the test is to verify your involvement in the placement of a bomb on a car outside of this building.

This instrument will be able to tell whether you are lying or being truthful by recording your own body signals.

To pass the test you must be truthful to all the questions asked.

OVERVIEW

I will explain the instrument and how it works.

I will review all the questions prior to each exam

The questions will consist of personal background questions and questions relating to the security of US Forces.

INSTRUMENT

This instrument records signals coming from your body. You know whether you are being truthful or lying at a particular question. If you lie I will know right away. Also if you are being truthful I can confirm that information at the same time. I will be placing sensors on your hand to record your body signals. It is important that you sit still and don't move around during the test. It you move during the test I will think you are being deceitful and not trust you. To pass this test you must be honest to all the questions.

QUESTION REVIEW

Now we will go through the Questions I will ask you on the first test. I will review the questions concerning the placement of the bomb first (explain in detail to the subject the scope and meaning of each question thoroughly. Once that is done read all the questions back to the subject and get a yes or no answer).

Review relevant questions

At this time I will now review the personal background questions I mentioned earlier. While you are with us, we want to verify that what you are telling us is the truth. In order to do this, I will ask you some questions about what you know and whether you have been an honest person during your life. If you have lied before meeting us, then we will believe that you will also lie to us about the placement of that bomb.

These questions are important, since they will help us determine whether we should continue speaking with you.

Review comparison questions

The last set of questions I will review with you are called known truths. They allow me to see what your truthful answers look like at all times during the test.

Review irrelevant questions

FINAL QUESTION REVIEW

At this time I will now review all the questions one more time that will be on the test. (Review the relevant questions first, then the comparison questions and last the irrelevant questions. Get the subject to commit to yes or no answers again.)

CONDUCT THE TEST

(Remind the subject that during the test the questions will be asked in a random order. All the questions will be repeated several times. It is important to sit still, look straight ahead and don't move around during the test. Attach the sensors to the subject and start the test.)

Appendix H

PCASS Test Questions and Question Sequence

Relevant questions:

Regarding the placement of that bomb, do you intend to answer truthfully each question about that?

Did you place that bomb near that road?

Did you participate in placing that bomb near that road?

Comparison questions

Did you ever bring shame upon yourself or your family?

Are you the type of person who would lie to get out of trouble?

Did you ever cheat anyone out of anything?

Before today, did you ever lie to anyone in a position of authority?

Alternative comparison questions:

Did you ever blame someone for something you did?

Did you ever cheat anyone out of anything?

Irrelevant questions:

Are you now sitting down?

Are the lights on in this room?

Are you now in South Carolina?

Question Sequence

X THE TEST IS ABOUT TO BEGIN, PLEASE LISTEN VERY CLOSELY TO THE FOLLOWING QUESTIONS.

I1 Are the lights on in this room?

I2 Are you now sitting down?

SR Regarding the placement of that bomb, do you intend to answer truthfully each question about that?

C1 Did you ever lie to anyone in authority?

R1 Did you participate in placing that bomb near that road?

C2 Did you ever tell a lie to someone who trusted you?

R2 Did you place that bomb near that road?

C3 Did you ever tell a lie to cover up something?

XX THE TEST IS NOW OVER

Appendix I

Participant Debriefing Statement
DoDPI06-P-0030

Now that you have completed your examination, the entire project staff sincerely thanks you for your help. Your work here may be more important than you realize. Understand that regardless of the outcome of the lie detector test, YOU WILL NOT HAVE TO GIVE THE SPEECH.

During this study, some of you would asked to be truthful during the lie detector test, while others were asked to participate in a mock crime and then lie about it during the lie detector test. If you participated in attempting to deceive the lie detector operator, please be assured that you in no way violated any rule or law. The deception was required for investigational purposes only. Regardless of the role you played, it is our hope that you were made to feel as comfortable as possible throughout the study. If you do have concerns or questions regarding your participation, please make them known to the individual conducting your debriefing, or to the principal investigator, Stuart M. Senter, Ph.D., Research Psychologist, (803)751-9167, Department of Defense Polygraph Institute.

If you did participate in the mock crime, I would like to ask you a few questions about your experience.

1. On a scale from 1 to 5, with 5 being the highest, how would you rate the:

Excitement of the scenario? _____

How believable was the scenario? _____

What recommendations would you suggest to make the scenario more exciting and believable?
_____
_____
_____
_____

Finally, it is VERY IMPORTANT that you DO NOT discuss the details of this study with anyone else. Other individuals in your unit may participate in this or a similar study someday. If they know the details of the investigation process, they could be disqualified from participating in a study and/or unconsciously influence the results of the study using their knowledge.

Please sign this form in the space provided to indicate that you understand the instructions provided above.

_____ _____
Participant Signature Date

_____ _____
Printed Name Participant #