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Nathan J. Gordon*
William L. Fleisher*
Academy for Scientific Investigative Training
Philadelphia, PA
USA

Effectiveness of the Integrated Zone Comparison Technique (IZCT) with Various Scoring Systems in a Mock Crime Experiment by Students

Key Words: Integrated Zone Comparison Technique (IZCT), Data Analysis, Horizontal Scoring System (HSS), 3-Point Manual Scoring System, 7-Point Manual Scoring System, Validity, Polygraph Validation Test (PVT)

The IZCT was developed at the Academy for Scientific Investigative Training in 1987. It is currently used in the fields of law enforcement, intelligence, and private security in numerous countries around the world. It is a modification of the Backster Zone Comparison Technique format, in a structure that

* truthdoctor@polygraph-training.com

closely resembles the zone technique validated at the University of Utah. It is a flexible technique format, allowing it to be used for Single-issue, Multi-faceted and Multi-issue investigations.

IZCT format is a 13-question test consisting of two weak relevant questions (sacrifice relevant, countermeasure indicator), three flexible relevant questions, three probable lie comparison questions consisting of both exclusive and inclusive types, one symptomatic question, and four irrelevant questions:

1. Irrelevant:	Is today Sunday? (No)
2. Symptomatic:	Do you understand I will only ask the questions I reviewed?
3. Weak Relevant:	(Sacrifice) Do you intend to lie to any test question?
4. Irrelevant:	Is today (actual day)? (Yes)
5. Exclusive Comparison:	During the first (-2) years of your life, ...?
6. Flexible Relevant:	Primary or secondary relevant question, depending on case facts
7. Irrelevant:	Right now are you in the (actual country)? (Yes)
8. Inclusive Comparison:	In your entire life did you ever .....?
9. Flexible Relevant:	Primary or secondary relevant question, depending on case facts
10. Irrelevant:	Right now are you in (false country)? (No)
11. Comparison:	Exclusive or Inclusive
12. Flexible Relevant:	Primary or secondary relevant question, depending on type case facts
13. Weak Relevant:	(Countermeasure Question) Have you deliberately done anything to try and beat this test?

The examinee is first informed of his/her rights concerning the polygraph and a consent form is signed. The examiner then asks a series of background questions and establishes rapport by finding common areas of interest with the examinee. The examiner ensures that the examinee is mentally and physically capable of taking the examination. In specific examinations the Forensic Assessment Interview Technique (FAINT) is then utilized.

Following the interview the examinee is then asked what he or she did to prepare to take the polygraph examination, what internet sites he or she used

to research the test, and whether he or she was aware that to take a polygraph examination it requires his or her total cooperation.

The examiner then states, "Would you agree that if you were going to be truthful with me today you would want to cooperate fully? Would you agree that the only person who deliberately would not cooperate would be someone who was going to lie to me? Therefore, do you agree that if you deliberately do not cooperate my opinion should be that you were not truthful?" The examinee is then asked to sign an "Agreement of Cooperation" form, in which he or she agrees to the above.

The examinee is then asked if he or she was aware that not everyone is capable of taking a polygraph examination. That a small percentage of the population cannot be tested because when they lie there is nothing that happens in their body that the computerized polygraph system can identify as deception. "So you will be taking three tests today. The first test will be to ensure you are capable of being tested, that when you lie the polygraph can tell you are lying, and just as importantly, when you tell the truth the polygraph can tell you are being truthful. The second test involves the reason you are here. Then, prior to analyzing any of the data, a third test will be administered to give us insight, if you do have a problem in the second test, into why it may have occurred."

The examiner then conducts a "known" demonstration/acquaintance test and advises the examinee that this is to ensure that when the examinee lies, the computerized system can identify it properly, and just as importantly, that when the examinee tells the truth the computerized system can identify that.

The 13 questions in the IZCT structure are then carefully reviewed and discussed with the examinee in the following order: (1, 4, 7, 10), (6, 9, 12), (5, 8, 11), 13, 3 and 2.

After this question review, the questions are saved and the examiner begins recording a chart as he or she asks the examinee which question or questions the examinee perceives as being most important. The examiner then explains that a polygraph test is different than an academic test. In an academic test scoring a 98 is excellent. In a polygraph test answering 98% of the questions truthfully will result in a failure. The polygraph test is more like a pregnancy test. In that test you are either pregnant or you are not. You cannot be a little

bit pregnant. In a polygraph test you are either answering all of the questions truthfully, or you are lying. You cannot be a little bit truthful. This will add to the saliency of the Comparison Questions for the innocent examinee. The examiner then explains how the polygraph works. At the conclusion of this explanation the chart collected is saved as an anti-countermeasure chart, which establishes the "normal" breathing patterns for the examinee.

The first IZCT chart is collected as a Silent Answer Test (SAT), which is cognitively stimulated by instructing the examinee that during the test he or she is to remain silent and listen to the questions carefully to make sure he or she is comfortable with them, understands them, and most importantly, does not remember anything he or she has not told the examiner about, as this will be his or her last opportunity to make changes in questions before verbal answers are recorded. The SAT questions are asked in the following sequence: 1, 2, 3, 4, C5, R6, C8, R9, C11, R12, 13. Irrelevant questions 7 and 10 are not used, unless they are needed to re-establish a norm during the examination, or used due to an artifact committed by the examinee during the examination.

The sequence for the second chart is: 10, 2, C5, R12, C8, R6, C11, R9, 3 ("Did you lie to any test question?"), 13. To focus the examinee on his or her zone of threat, when the examiner begins this chart the examinee is instructed to make sure he or she answers each question truthfully, since the charts will be numerically evaluated, and lying to any question in the test, no matter what it is about, could cause them to fail the entire examination.

The third IZCT chart is administered with the relevant questions being asked before the comparison questions and the relevant questions being rotated in the same manner. The sequence is: 1, 2, 3, R9, C5, R12, C8, R6, C11, 13.

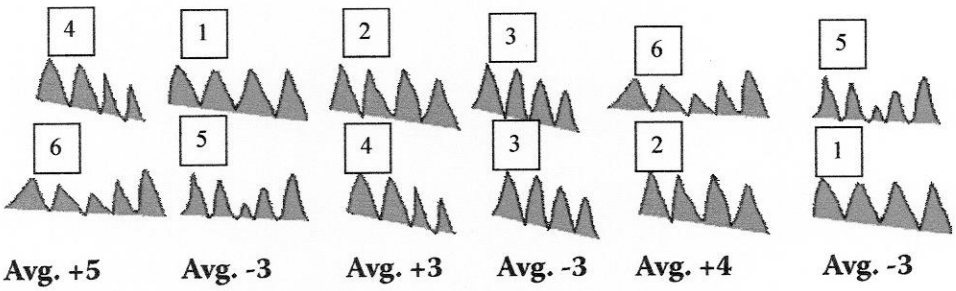
If the need appears for additional data to be collected to reach a clear decision, or if there seem to be deliberate distortions, Chart 4 of the IZCT is used, where all of the questions, 1 through 13, are asked.

In the 3-point and 7-point system each relevant question will be compared with the comparison question that precedes it. This allows for each relevant question (RQ) to be asked paired with each comparison question (CQ) once after three charts are administered. Using the 3-point system each parameter in each RQ will be scored +1 if the reaction in the CQ being used for scoring is greater, 0 if there is no difference, and -1 if the reaction in the RQ is greater.

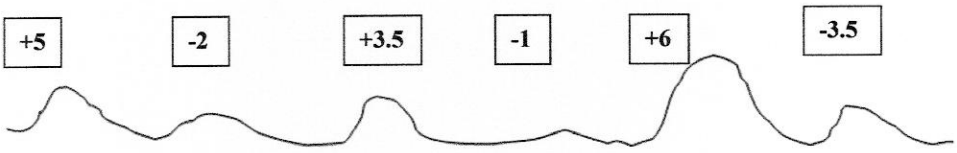
Using the 7-point system a 0 is given for no difference between the reaction in the CQ and RQ, + or – 1 for a slight difference, + or – 2 for a clear difference, and + or -3 for a extremely great reaction versus a lack of reaction, if upgrading rules (involving proper timing, clean charts, no artifacts, etc.) are met. In both systems decisions of truthfulness were made when total examination scores were +6 or higher, and deception when -6 or lower.

In the Horizontal Scoring System all four physiological channels of each relevant and comparison question are ranked horizontally from greatest to least, based on their significance in the chart. If the question format utilizes three comparison and three relevant questions, the most significant reaction in each channel is given a "6", and the least significant reaction is given a "1". If only 2 comparison and 2 relevant questions are used the channels are ranked from "4" to "1".

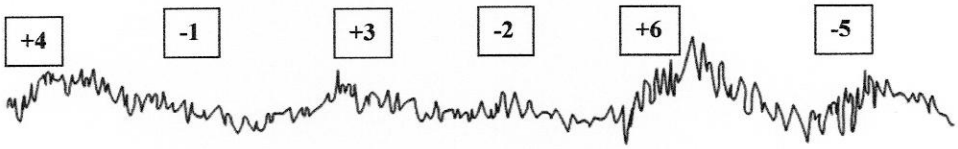
The below diagram shows Thoracic and Abdominal channels ranked horizontally from 6 to 1. Each question's abdominal and thoracic score is then averaged to ensure that the pneumo tracings only account for 1/3 of the question's total score. Comparison question scores receive a positive numerical value and relevant question scores receive a negative value.



The electrodermal responses are ranked horizontally from 6 to 1. In case questions are equal in significance in any parameter they are given the average of the rank positions they are competing for. In the electrodermal example below comparison question 8 and relevant question 12 are about equal. They are competing for the ranks of 4 and 3. Each question is given the average of those ranks, 3.5.



The cardio responses are ranked horizontally from 6 to 1.



C5	R6	C8	R9	C11	R12

The average rank score for each question's pneumo channel can then be combined with the question's electrodermal and cardio ranks for a total question score. In the above example we have the following scores:

Average Pneumo					
+5	-3	+3	-3	+4	-3
EDA					
+5	-2	+3.5	-1	+6	-3.5
Cardio					
+4	-1	+3	-2	+5	-5
Total Question Scores					
C5	**R6**	**C8**	**R9**	**C11**	**R12**
+14	-6	+9.5	-6	+15	-11.5
SPOT SCORE: +8 (14-6)			**+3.5** (9.5-6)		**+3.5** (15-11.5)
SINGLE ISSUE CHART SCORE: +15 (Combination of all Spot Scores)					

In the first two charts the rank of the relevant question is subtracted from that of the comparison preceding it. In the third chart we compare each relevant question with the comparison question that follows it.

The cut-offs using the Horizontal Scoring System (HSS) in this study were established in an earlier study of HSS used with Federal Zone Comparison cases, which indicated that accuracy for single-issue tests, where three charts of data are collected consisting of three relevant and three comparison questions in each chart, would be highest when decisions of truth were made for examinations with a total score of -1 or higher, and deception when total examination scores were - 13 or lower.

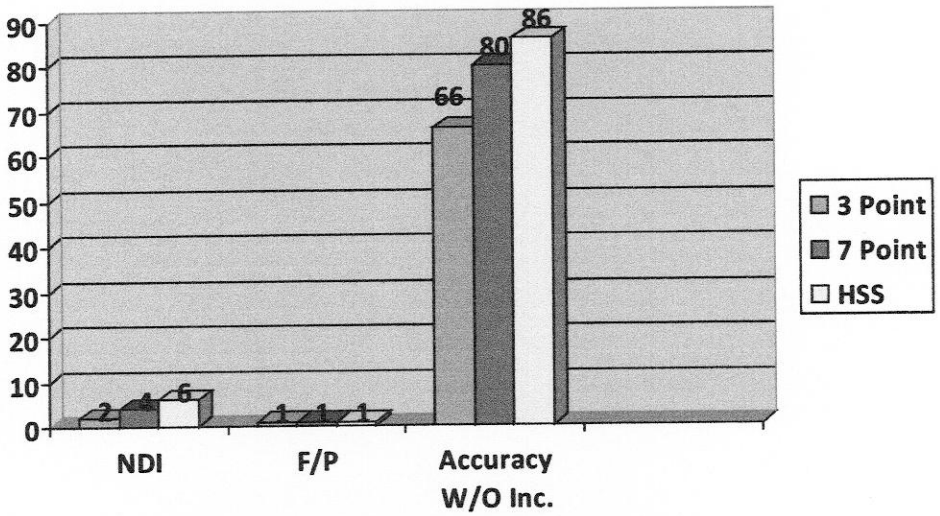
Method

All examinees were volunteers from the South African Air Force. All examiners were students in their 7th and 8th weeks of basic polygraph course training. Sixteen examinations were administered. Half of the examinations (8) consisted of examinees that had been instructed to commit a theft, and half of the examinees (8) had no involvement or knowledge in the thefts. All of the examinees were instructed to maintain they had not committed a theft, and all were promised a financial reward if they had truthful results. Therefore, as in real life, both truthful and deceptive examinees were given rewards for coming out truthful.

The student examiners did not know whether they were testing truthful or deceptive examinees, or how many truthful or deceptive examinees there were. All examinations were administered as "single-issue" IZCT tests. The Limestone Computerized System was used in eight (8) of the examinations, and the Lafayette LX-4000 Computerized System in the other eight (8) examinations. Thoracic and abdominal respiration, electrodermal activity, cardiovascular changes, and movement were recorded in all examinations. The data of all of the examinees were then analyzed by the student examiner using the 3-point, 7-point, and Horizontal Scoring Systems.

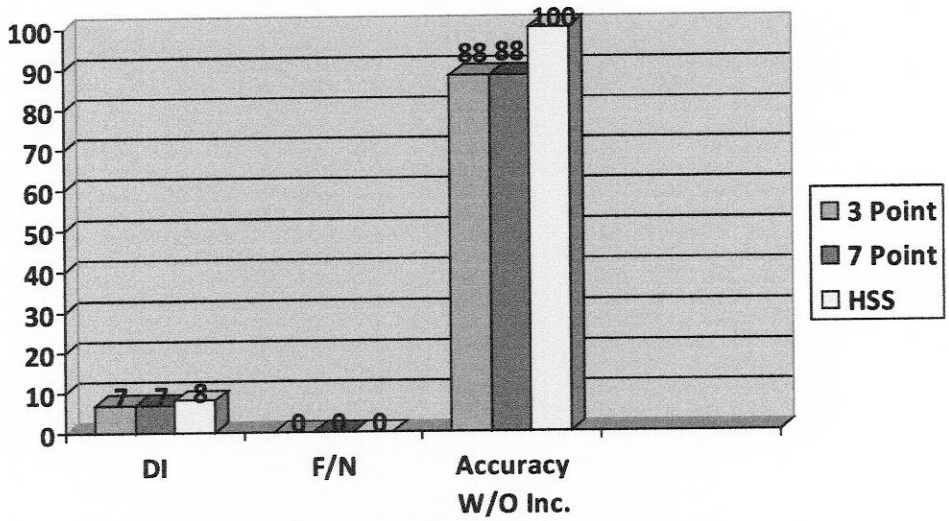
Results

IZCT TRUTHFUL	EXAMINEES				
	NDI	False/Positive	Inconclusive	Accuracy Without/With Inconclusive	
3-Point 2	1	5		66%/25%	(Inc. Rate 62%)
7-Point 4	1	3		80%/50%	(Inc. Rate 38%)
HSS	6	1	1	86%/75%	(Inc. Rate 12%)

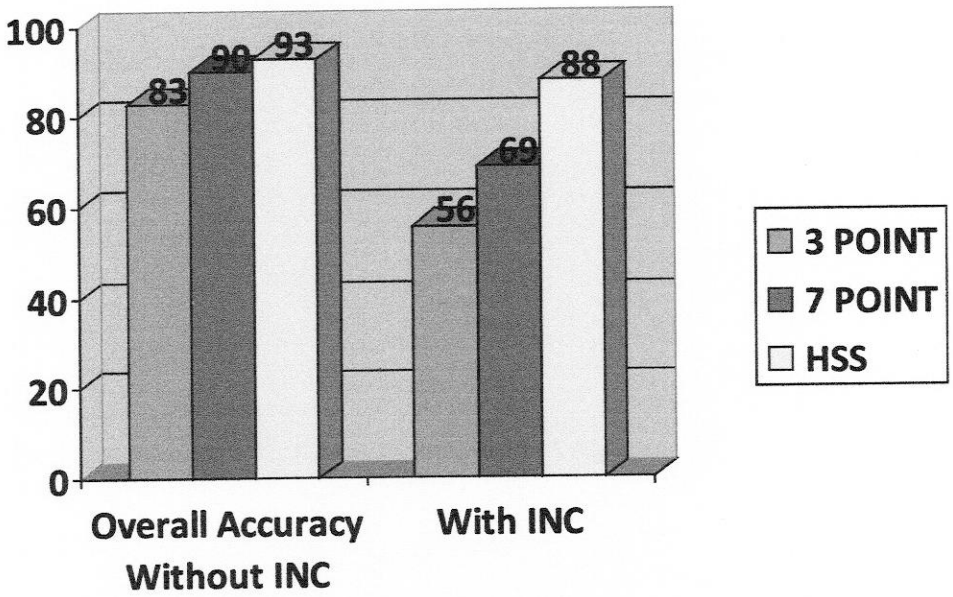


Deceptive examines

	DI	False/Negative	Inconclusive	Accuracy Without/With Inconclusive
3-Point	7	0	1	100%/88%
7-Point	7	0	1	100%/88%
HSS	8	0	0	100%/100%



The overall accuracy of the 3-Point System was 83% without Inconclusives and 56% with Inconclusives counted as errors. The overall accuracy of the7-Point System was 90% without Inconclusives and 69% with Inconclusives counted as errors. The overall accuracy of the HSS was 93% without Inconclusives and 88% with Inconclusives counted as errors.



Polygraph Validation Test (PVT)

After three charts of IZCT data were collected the examinees were informed they were about to take the third examination (PVT). The PVT was introduced in 2003 by the authors, and recently researched by Tuvia Shurany. The method was introduced to identify possible false positive results, verify deceptive results, and in the latter case assist in breaking a deceptive examinee's objections. The PVT is administered as a Peak Of Tension Test, or more correctly, a Guilty Knowledge Test, providing the examinee different possible reasons for why he or she may have had problems with the IZCT test, while monitoring which of the reasons he or she is focusing on.

Examinees were instructed to answer each of the following questions, "No," and a single chart of data was collected:
If you had problems in your test today was it because:
1. You were tired?
2. You were afraid I would ask a question I didn't review?
3. You did not understand all of the test questions?
C4. You lied I response to a question about theft unrelated to today?
R5. You lied about your thefts today?
C6. The test results were incorrect?
7. You did not believe the polygraph worked?
8. You were nervous?

Data was scored using the HSS where rankings were made in each parameter of C4, R5 and C6, with the greatest reaction in each parameter receiving 3 and the smallest 1. The question with the highest total score was considered to be most salient to the examinee, and a subsequent decision made by the examiner.

TRUTHFUL EXAMINEES

NDI	FALSE/POSITIVE	INCONCLUSIVE
7	0	1

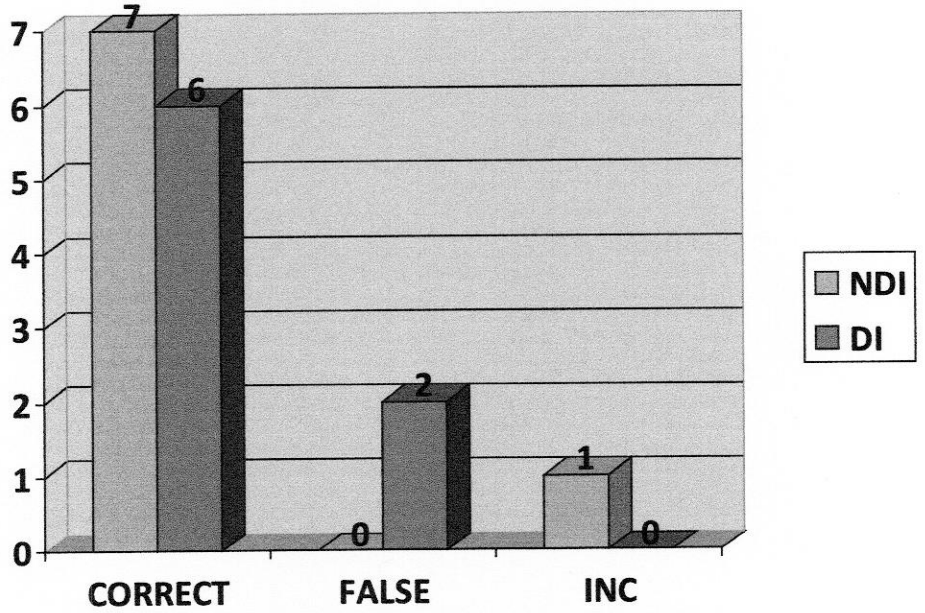
Accuracy for the PVT for truthful examinees was 100% without Inconclusives and 88% when Inconclusive results were considered as errors.

DECEPTIVE EXAMINEES

DI	FALSE NEGATIVE	INCONCLUSIVE
6	2	0

Accuracy for the PVT for deceptive examinees was 75%. There were no Inconclusive decisions.

Overall accuracy for the PVT was 87% when Inconclusives were not considered and 81% when they were considered as errors.



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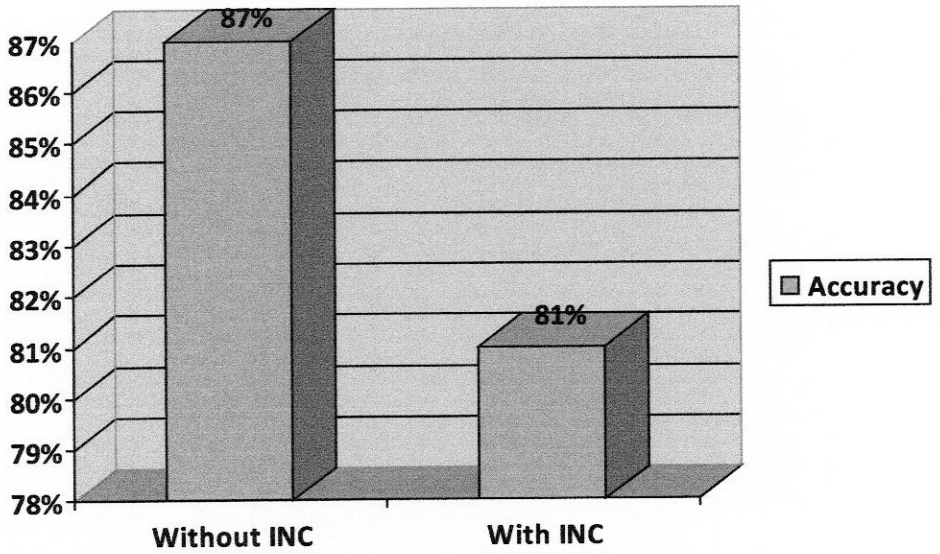

It should be noted that the PVT, like the Direct Lie Comparison Test and Positive Control, invites countermeasures which could result in False/Negative decisions by inexperienced examiners.

Conclusion

In studies of the accuracy of any technique and system for analyzing polygraph data there is always the question of the competence of those involved in the study and the ability to generalize their results to the larger body of field examiners who may not be as competent as those involved in the study. In this study of the IZCT with various scoring systems, students were used to conduct the entire examination from start to finish. The students were totally blind as to the truthfulness of the examinees or how many of the examinees were actually truthful or deceptive.

The results indicate that the IZCT with both the 7-point scoring system and HSS meet the requirements of 90% accuracy or above required for "evidentiary testing," and the 3-point scoring system meets the requirements of 80% accuracy or above required for "investigative testing," when inconclusive results are not considered.

The HSS had a .06% inconclusive rate. The 3-point scoring system had a 38% inconclusive rate, and the 7-point system had a 25% inconclusive rate. Both the 3 and 7-point system failed to meet the standard set by the American Polygraph Association of no more than a 20% inconclusive rate.
In addition, a single chart of data was collected from each examinee using the PVT. Overall accuracy for the PVT was 87% when Inconclusives were not considered and 81% when they were considered as errors.

Previous studies of the IZCT by experienced examiners showed dramatically lower rates of Inconclusives when using the 3-point scoring system. This difference may have been caused by the subjectivity involved in the selection of a numerical value to be used in a comparison of CQ and RQ for inexperienced examiners in contrast to their lack of experience. The HSS appears to have eliminated this problem, since it employs a much more objective way of analyzing and comparing data.

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