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# A Dual-Issue Test Format

### By

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# Abstract

A new test format is presented which permits the examiner to cover two equally important issues in a single test. The format uses current psychological concepts to help safeguard against errors through the use of a sacrifice relevant question, and rotating control questions to permit improved differentiation between the issues.

## Introduction

It is generally agreed that chart interpretation is most accurate when all relevant questions deal with the same issue, and that the accuracy of chart interpretation decreases as additional issues are included in the same chart. When two crimes or issues must be covered, one approach is to run two separate tests, one on each issue. That, of course, doubles the number of charts which must be obtained, which may increase the possibility of an inconclusive result on the second test due to fatigue or habituation. There is also the problem of whether to inform the subject of the outcome of the first test, and the psychological effect each of the two alternatives has on the subsequent test. Nonetheless, when the two issues are quite distinct from each other, such as when they concern the subject's possible involvement in two separate crimes, it is generally considered best to conduct two single-issue tests.

However, there may be times when the examiner wishes to cover two separate issues on one test (Arther, 1970) recognizing that the accuracy of the resulting decisions may be decreased somewhat. The federal zone comparison test (Barland & Raskin, 1973) permits the inclusion of a secondary issue at question 10, but there are difficulties with this when the second issue is as important as the first. In the first place, only one question is devoted to the issue. Secondly, the question is at the very end of the sequence, minimizing the subject's reaction capability.

Another approach to the problem is to use the Reid test (Reid & Inbau, 1977). That test evolved from the relevant-irrelevant test (Reid, 1947), and does not incorporate several safeguards into its structure that are present in the Backster test, developed later. The control questions appear relatively late in the format, possibly making it more difficult to clear the truthful subject because of habituation. Two of the relevant

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questions are separated from the control questions against which they are compared. There is no sacrifice relevant question to help safeguard against a false positive error. Finally, it could be argued that the control questions are actually relevant questions, which could increase false negative errors. While there is absolutely no research comparing the accuracy of the Reid test with the Backster test, the safeguards incorporated into the Backster format make it easier to defend the technique in court.

This article presents a test designed to be used when two issues are to be covered in one test. This format incorporates accepted psychophysiological principles intended to guard against errors, particularly false positives.\*

Let us suppose that a check was forged and cashed. The investigation has led to a suspect who is 24 years old, but there is some doubt as to whether the suspect both forged and cashed the check, or whether another person, who is not available for testing, may have either forged or cashed the check. Because the two issues are of about equal importance, the examiner may wish to cover both issues in one test. The dual-issue test was developed for this type of situation.

### The Dual-Issue Test

Irrelevant	1.	Are you sitting down?
Sacrifice Relevant	2.	Are you aware that a forged check with Jim Jones's name on it was cashed at the First National Bank last month?
Control	3.	Before the age of 22, did you ever cheat anyone who trusted you?
Relevant	4.	Did you write Jim Jones's name on that check?
Control	5.	Before moving to Utah, did you ever take anything important that didn't belong to you?
Relevant	6.	Did you cash that forged check last month?
Drug	7.	Have you taken any drugs today in order to beat the polygraph test?

<sup>\*</sup> When this article was being coordinated prior to publication, it was learned that the U.S. Air Force Polygraph Program had independently developed the same test format, in which question 7 is an irrelevant question. The Air Force has successfully used the dual issue format since January 1981, and it has now replaced the Modified General Question Test as used by the Army, which is essentially the Reid test (Hardy, personal communication, March 10, 1983).

Relevant	8. Was it you who wrote Jim Jones's name on that check?
Control	9. Between the ages of 15 & 22, did you ever think about stealing anything at all?
Relevant	10. Was it you who cashed that forged check at the First National Bank last month?

(11). Optional control question or irrelevant question.

# Discussion

The dual issue test format is derived largely from the Reid format, but it has been modified to incorporate many of the psychological principles pioneered by Backster. The Reid test has two control questions, in positions 6 and 10, and four relevant questions, in positions 3, 5, 8, and 9. The dual issue test likewise has four relevant questions (in positions 4, 6, 8, and 10), but has increased the number of control questions to three (in positions 3, 5, and 9). Each relevant question is thus immediately adjacent to (and usually just after) a control question. This should help control for changes in lability during the chart.

Every question on a properly designed test format must meet three requirements. First, it must serve a definite purpose. Second, it must serve it better than any other category of question could; and third, it must best serve its purpose at the assigned location in the sequence. It will be noted that there is normally only one irrelevant question in the sequence, unless the examiner opts to add one as the final question. Its purpose is to absorb the orienting response. The routine use of additional irrelevant questions in a control question test would seem to be uneconomical in view of the limited number of questions that can be asked.

It will be noticed that each of the two issues has two relevant questions. Where possible, the sacrifice relevant (question 2) should mention both issues. The questions for issue I are the first and third relevant qeustions; those of issue II are the second and fourth. Whichever of the two issues is deemed the more emotionally arousing should be placed as issue II (positions 6 and 10), since that allows the truthful subject more opportunity for habituation to minimize the size of his reactions to those relevant questions, which in turn reduces the possibility of a false positive error. The deceptive subject, however, should still react significantly to those questions because of their greater emotional impact for him. In the example above, it is likely that the guilty subject was under greater stress when actually cashing the check than when forging the signature; hence the cashing is treated as the more intense issue II, and is asked later in the sequence (on the average), than the less intense issue I dealing with the forging.

It will be noticed that the two issues are overlapping in the test format, rather than being completely separated. That is, issue I is covered by relevant questions 4 & 8, issue II by questions 6 & 10. The reason for this is that there is only one control question normally located in the second half of the test (in position 9). If issue I were covered by questions 4 & 6, and issue II by questions 8 & 10, then the latter, more intense issue would have only one control question against which that entire issue would be compared, an obviously undesirable situation.

The format also permits the inclusion of an additional control question at the end of the sequence. This allows the examiner the option of examining the relative size of the subject's reactions to four different control questions on the initial chart. He may then delete that control question which produced the smallest reaction, so that on subsequent charts he would use the three best control questions in positions 3, 5, and 9, thereby reducing the possibility of a false positive error. On subsequent charts the examiner may include a second irrelevant question in the final position, since it has been my experience that, just as most subjects tend to react to the first question in a test, some subjects tend to react to the final question, particularly on the later charts as they recognize the final question as being final. Additionally, the availability of a second, reviewed irrelevant question gives the examiner the option of inserting it elsewhere in the format if the subject unexpectedly reacts or has not completely recovered from a reaction when it is time for another question to be asked.

The least important question in this test format is perhaps Q7, pertaining to the suspect's use of drugs. At the examiner's option it could be replaced by a control question, in which case the relevant question at Q8 would be compared to it. However, to do so would create a sequence of eight questions alternating between control and relevant. By placing a drug question at Q7, which would be viewed by most subjects as being a relevant question, it breaks up the control/relevant sequence, making it harder for the guilty suspect to analyze the format in an effort to try to beat the test. Alternatively, Q7 could appropriately be replaced with the Arther known truth question, in which case the examiner, at some point in his evaluation of the charts, should compare it against all relevant questions. The Arther known truth question was designed to be the first relevant question, however, and as such was intended to serve as a type of sacrifice relevant. Another possibility for Q7 would be an irrelevant question, such as the Air Force uses.

The sacrifice relevant question, Q2, serves to absorb any orienting response to the first relevant question in the test. At the examiner's option, it could be worded along the lines suggested by Backster (1969): "Regarding whether you signed and cashed that check, do you intend to answer the questions about that truthfully?" Where possible, the sacrifice relevant should mention both issues. It is not numerically scored when evaluating the charts.

As with other test formats, the examiner may wish to include some sort of number test or stimulation test. This may be employed at whatever point the examiner would normally put it, such as following the first chart.

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# Scoring Procedures

One of the difficulties in evaluating control question tests is determining which question caused the largest reaction, which the next largest, and so on. The difficulty lies in the fact that, depending upon the format, each relevant question may be evaluated against a <u>different</u> control question. It is not sufficient to look at the numerical scores for each relevant question, for two RQ reactions which are precisely the same size can receive different numerical scores when compared with different control questions.

This difficulty can largely be avoided by rotating the position of the control questions from one chart to the next. Since there are normally three control question in this format, if each control question is rotated one position on each chart, at the end of the third chart each relevant question will have been paired with a different control question each time. This would tend to average out differences in the size of the control question reactions, distributing the "strong" and "weak" control questions about equally between the various relevant questions, although there will always be some variability in the pattern of reactions from one chart to the next.

For example, on the first chart the control questions would appear in the following sequence: 3, 5, and 9. On the second chart, start off with the second control question: 5, 9, and 3. On the third chart the third control question would go first: 9, 3, and 5. By the end of the third chart, the relevant question 4 would thus have appeared against all three control questions: CQ 3 on the first chart, CQ 5 on the second, and CQ 9 on the third. Since all relevant questions will have been paired against all control questions by the end of the third chart, the numerical scores for the individual relevant questions could meaningfully be compared.

In order to standardize the scoring procedure there must be some rules for determining which control question will be compared to which relevant question. Until empirical data suggest a more accurate method, the following convention should be followed to allow standardization: Always compare the relevant question at the number 4 position against the control at 3; the relevant at 6 against the control at 5; and the relevants at 8 & 10 against the control at 9. Thus, with the exception of RQ 8 (which deals with the less intense of the two issues), all relevant questions are evaluated against the preceding control question, which capitalizes on the phenomenon of habituation to reduce false positive errors.

Whenever more than one issue is covered on a test, that is, whenever the subject could theoretically answer truthfully to some relevant questions and lie to others, the examiner should be careful not to render a global opinion covering all relevant questions, based solely upon the total numerical score. On multi-issue tests, the examiner must evaluate each issue separately.

Until research eventually provides the optimal cutoffs, it would seem reasonable to require a score of plus or minus 5 to support a definite decision on either issue separately, when using the federal scoring rules.

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# Dual Issue Test

The score would be obtained simply by adding together the scores for the two relevant questions pertaining to that issue. When applying the Back-ster scoring rules, the cutoff required for a decision would vary according to the number of charts, questions, and physiological measures recorded.

If the examiner concludes that the subject is deceptive to one of the two issues, he should be very cautious in concluding that the subject is truthful to the other issue, due to the possibility that deception to one issue could divert the subject's psychological set from the other issue. In such situations the examiner must evaluate the relative strength of the two issues and the degree of disparity of the respective numerical scores.

## Conclusion

The dual issue test is designed for use in those situations where there are two issues of nearly equal importance which the examiner wishes to resolve on one test. At least three charts should be obtained, and the control questions should be rotated during the test if the scores on the two issues are to be compared. It should be kept in mind that this format has not been validated. It is not known how it compares in accuracy with two separate Backster You-phase tests, one Reid or Arther test involving two issues, or the relevant-irrelevant test. It incorporates a number of theoretical safeguards which are not found in all other tests, but it is not known whether those safeguards make it more accurate than tests which do not incorporate them.

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The Detection of Physical Countermeasures

By

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## Abstract

Polygraph examiners have traditionally held the opinion that physical countermeasures are readily detected from an observation of the subject during the examination and/or from an inspection of the physiological data. Two laboratory mock crime experiments are reported which examined the ability of experienced examiners to detect the use of physical countermeasures. Contrary to the prevailing opinion, examiners were not able to detect the use of physical countermeasures at above chance levels. Possible countermeasure detectors and immplications for field polygraphers are discussed.

The use of the results of physiological detection of deception (PDD) tests as probative evidence in our courts of law is becoming increasingly more common. However, that use is not without challenge. One of the more serious challenges to the probative value of PDD tests is found in the possibility that deceptive individuals may be able to use countermeasures to defeat PDD tests and produce false negative outcomes. Lykken (1981) has suggested that 50% of deceptive subjects should be able to defeat control question tests (CQT) if they are given information concerning the theory of the CQT and training in the use of some simple physical countermeasures. The probative value of the CQT would be compromised if guilty individuals could be taught to beat the test by the use of countermeasures.

Countermeasures can be conceptualized as fitting into one of two broad categories: (1) those which effect the general state of the subject

The research reported in this paper was presented in part at the Annual Convention of the Society for Psychophysiological Research, Minneapolis, Minnesota, 1982. Experiment I served as partial fulfillment of the requirements of the MS degree for the first author at Virginia Polytechnic Institute and State University.

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throughout the examination and (2) those which produce physiological changes at specific points during the examination. A countermeasure that might affect the general state of the subject would be the use of drugs. Countermeasures which may produce effects at specific points during the examination include mental imagery and physical countermeasures, such as self-induced pain or muscle tension. In considering the potential threat to the accuracy of the CQT posed by these countermeasures, it is important to first consider what a countermeasure must accomplish in order to be effective against a CQT.

To be effective against a CQT, a countermeasure must do two things. First, it must change the direction of the differential reactivity between the relevant and control questions. That is, the countermeasure must produce responses to control questions that are substantially larger than responses to relevant questions. Second, the countermeasure must be performed in such a manner that its use is not readily detectable by the examiner administering the examination.

Polygraphers have tended to dismiss physical countermeasures as ineffective and/or readily detectable. Sparagowski & Ritter (1977) state, "... any attempt at distorting a test is readily apparent and should be discovered by the experienced examiner."(p. 22). Cleve Backster (Note 1), a prominent polygrapher and head of a PDD examiner training school gave a similar opinion but conceded that anyone can produce an inconclusive result by simply failing to sit still during the examination, a tactic that would certainly direct suspicion toward the subject. Matte (1980) apparently has felt that physical countermeasures are unimportant as he has devoted only one paragraph to them in his polygraphy text. Psychologistpolygrapher, Stanley Abrams, commented (1977), "The vast majority of countermeasures ... tend to be quite obvious and easily detected and at most cause only an inconclusive diagnosis."(p. 147). Thus it can be seen that polygraphers are generally of the opinion that physical countermeasures are ineffective and/or readily detectable.

Polygraphers also tend to associate the occurrence of what they perceive as countermeasures with deception on the part of the subject. Magiera (1975) reported a study which reviewed 100 deceptive cases from his files to determine a base rate of countermeasure usage in the field. He reported that 90% of the subjects in specific issue examinations attempted some form of purposeful distortion. Magiera went on to state, "Purposeful distortion only helps a polygraphist evaluate his records." (Magiera, 1975, p. 202). Magiera clearly associates what he interprets as purposeful distortion with deception. The Reid & Inbau (1977) text expressed a similar view.

With respect to attempts at detection evasion by distorting either the respiration or the blood pressure-pulse tracing, or by psychological evasion, the examiner should consider this factor indicative only of deception regarding some important aspect of the case <u>but not necessarily the most critical one</u>. (p. 214).

Jayne (1981) has reported a study which he claims has established a diagnostic relationship between purposeful distortion and deception. However, Jayne's report examines only cases where the original examiner reported

that the subject was purposefully distorting the charts. This leaves open the question of the ability to detect countermeasure usage, since Jayne provided no estimate of the number of subjects who used countermeasures and were not detected. Also, of the cases Jayne reviewed, only 64% were confirmed deceptive with purposeful distortion, that leaves open the possibility that 36% of the examiner's opinions that countermeasures were employed may have been incorrect.

The scientific approach to the question of the effectiveness and detectability of countermeasures would be to consider the problem from both logical and empirical perspectives. With respect to general state countermeasures, it is difficult to imagine a drug that would inhibit the reactions of a guilty subject responding to a salient stimulus such as a relevant question while simultaneously increasing reactions to a less salient stimulus such as a control question. Although there has been no published study of the effects of drugs on the CQT, one recent experiment has reported that both Valium and Ritalin are ineffective as countermeasures against a concealed information test (Boisvenu, Iacono and Fleming, Note 2). This finding has implications for the CQT since the structure of the concealed information test makes it more susceptible to general state countermeasures than the CQT.

In contrast to general state countermeasures, those countermeasures that produce responses at specific points in time offer the possibility of producing the differential responses that are associated with reactions in PDD tests. A few studies have examined the effects of this class of countermeasure on the CQT. Dawson (1980) reported an experiment in which trained method actors attempted to defeat a CQT by employing mental imagery as a countermeasure. Dawson found mental imagery to be ineffective as a countermeasure against a CQT in a laboratory situation. Similarly, Rovner, Raskin, and Kircher (1979) reported that information about the theory of the CQT and possible countermeasures did not significantly alter the outcomes of CQTs for guilty subjects in a laboratory situation even when subjects were given a chance to practice making responses while attached to a polygraph.

Two experiments have made a direct test of the specific physical countermeasures that Lykken (1981) claimed would be effective against the CQT. Honts & Hodes (1982 a,b) informed subjects of the theory of the CQT and trained subjects either to bite their tongues and/or press their toes against the floor during the presentation of the control questions. Among deceptive subjects who pressed their toes against the floor and simultaneously bit their tongues 42% (excluding inconclusives) were able to produce truthful outcomes (Honts & Hodes 1982b). The importance of this finding would be diminished if polygraphers' were correct in their claims that countermeasures are readily detectable.

The remainder of this report is concerned with the obtained rates of detection of countermeasure usage in the Honts and Hodes (1982 a,b) studies. Two questions regarding countermeasure usage and detection will be addressed. First, are trained polygraph examiners able to detect the use of physical countermeasures from an observation of the subject during the examination and/or from the physiological recordings? Second, are the reports of polygraph examiners regarding countermeasure usage a valid index of attempted deception?

# Experiment I

# Method

<u>Subjects</u>. Subjects were 48 college students enrolled in Introductory Psychology classes at Virginia Polygechnic Institute and State University during the Spring Quarter of 1981. Subjects received extra credit points toward their final grade as compensation for their participation in this experiment.

<u>Apparatus</u>. Physiological responses were recorded on a 4-channel Lafayette Datagraph, Model 76102. Respiration was transduced by means of a pneumatic tube placed around the subject's abdominal or thoracic area, dependent upon which location produced a better tracing. Skin resistance repsonses (SRR) were recorded from two field type stainless steel electrodes placed on the distal phalanx of the index and third fingers of the right hand. In accordance with standard field practice, no electrolyte medium was used. Vasomotor activity in the form of finger pulse amplitude (FPA) was recorded by means of a Lafayette reflectance photoplethysmograph attached by a velcro band to the palmar surface of the subject's right thumb.

<u>Procedure</u>. This experiment was conducted in two sessions separated in time by approximately one week. During the first session subjects were randomly assigned to one of four groups. The members of three of these groups were required to take part in a mock crime of stealing an examination. Two of these groups of guilty subjects received training in the use of a physical countermeasure. The guilty control group did not receive training. The innocent subjects were informed that an examination had been stolen but were given no details of the crime. All subjects were motivated to produce truthful outcomes on the polygraph test by an offer of twice the number of credit points if the examiner reported them as truthful.

The mock crime required the subject to enter a closed laboratory, search through a desk, and steal a copy of an examination from the desk. Guilty subjects were required to maintain possession of the stolen examination and to have it with them when they took the PDD examination. After receiving an appointment for the PDD examination Guilty Control and Innocent subjects were permitted to leave.

The members of the other two guilty groups were then asked to participate in training that might enable them to beat the upcoming PDD examination. These countermeasure subjects were then fully informed about the theory of the CQT. Countermeasure subjects were told that the only way they could defeat the test was to produce reactions on the control questions that were larger than their reactions to relevant questions. The members of the Pain Countermeasure group were instructed to lightly bite their tongues in order to produce reactions the examiner would mistake for genuine reactions to the control questions. The members of the Muscle Countermeasure group were instructed to press their toes against the floor in order to produce similar reactions. The members of both countermeasure groups were instructed to apply the countermeasure as soon as they recognized a control question, stop just long enough to answer, and then resume the countermeasure and continue it until the next question began.

Countermeasure subjects were instructed to try to relax as much as possible during the presentation of the relevant questions but they were given no specific strategies for reducing responses to relevant questions.

Countermeasure subjects were warned that if the examiner detected the use of countermeasures, they would be reported as deceptive. Countermeasure subjects were required to demonstrate their countermeasure for an assistant who coached them on how to perform the countermeasure unobtrusively. A maximum of 15 minutes was spent training each subject.

During the second session all subjects were given a field type CQT by an experienced polygraph examiner. The examiner was aware of the details of the experiment, including a knowledge of the base rates of guilt and the countermeasures that would be attempted. The examiner was blind to group assignment of any individual subject. Four charts were obtained from each subject using a standard, Backster (Note 1) You Phase examination with two relevant and two control questions. At the conclusion of the examination, the examiner made a yes/no decision regarding the subject's use of countermeasures. This decision was based on the examiner's observation of the subject during the examination and on a brief (less than 5 minutes) inspection of the charts. An assistant debriefed the subject and obtained information about the employment of countermeasures by that subject.

After all subjects had been tested, the original examiner blindly evaluated the charts using the Backster (Note 1) semi-objective numerical scoring technique. The examiner reached a classification of deceptive, inconclusive, or truthful using the standard Backster (Note 1) cutoffs. The examiner also made a second yes/no decision regarding a subject's countermeasure usage based on an extensive inspection of the charts. A second examiner of considerable experience with the Backster technique, who was blind with respect to all the details of the experiment also evaluated the charts and made a forced choice decision regarding countermeasure usage.

## Results

The classifications of truth and deception by the original examiner were 52% correct, 6% incorrect, and 42% inconclusive. Analyses of the semi-objective scores and categorical classifications yielded no statistically significant differences produced by the use of countermeasures. A statistically significant effect for the use of countermeasures was found in the analysis of the objectively quantified FPA data (Honts & Hodes, 1982a).

Table 1 presents the percentage of correct decisions made by the two examiners regarding subjects' use of countermeasures. The decisions of the two examiners as to who was using a countermeasure were very poorly correlated, Kappa = .13. An examination of the percentage of correct decisions across the groups indicates that neither examiner was able to detect countermeasure usage at above chance levels.

# Table 1

Group		Original Ev	Blind Evaluator	
<b>r</b>	<u>n</u>	Observation & Scan	Charts Only	Charts Only
Innocent	12	67	75	92
Guilty	12	92	67	83
Pain Countermeasure	12	33	33	17
Muscle Countermeasure	12	42	42	33
Total:	48	58	54	56

Percent Correction Decisions Regarding Countermeasure Usage\*

\* The criterion for countermeasure usage was based on the subject's post examination report of countermeasure usage.

# Discussion

The results of Experiment 1 failed to support the claims of polygraphers that the use of physical countermeasures is readily detectable from an observation of the subject's overt behavior during the examination and/or from the physiological data. The low Kappa correlation indicates that the two examiners had little reliability in what they classified as countermeasure activity. This is an interesting finding since it implies that these two examiners either had no standard criterion for the classification of charts as countermeasure charts or they were unable to apply their countermeasure criteria consistently. Additional research is required to substantiate this finding of low reliability of countermeasure usage classification. The low validity of countermeasure usage decisions is not surprising in the light of this low reliability. The importance of these findings is qualified by the fact that subjects were unsuccessful in their countermeasure attempts. There should be little reason for concern about failing to detect countermeasures which are ineffective.

A second experiment was conducted to determine if subjects who receive additional training and practice and employ both countermeasures simultaneously can defeat the CQT. In addition, one polygraph expert had suggested that the low rate of countermeasure detection in Experiment 1 may have been due, in part, to the lack of the standard cardio measure obtained from an inflated cuff (Backster, Note 3). To test this possibility a cardio cuff was added in experiment 2.

## Experiment 2

## Method

<u>Subjects</u>. Subjects were 57 college students enrolled in the Introductory Psychology classes at Virginia Polytechnic Institute and State University during the Winter and Spring Quarters of 1982. Subjects received extra credit points toward their final grade as compensation for their participation in this experiment.

Apparatus. The apparatus was the same as that described for Experiment 1 with the addition of a Lafayette Electro-Cardio unit. All subjects were run with a cardio cuff on the upper arm inflated to a pressure of 60mm Hg.

<u>Procedure</u>. The procedure for Experiment 2 was the same as that described for Experiment 1 except as noted below. During the first session subjects were randomly assigned to one of three groups of equal size. The members of two of these groups were required to take part in the mock crime. One group of these guilty subjects received training in the use of countermeasures and the other did not. The members of the Innocent group were given no information except the general nature of the crime. The mock crime required subjects to enter a professor's office while he was out, but his office open. They were then instructed to steal an examination from a folder on his desk.

Countermeasure subjects were trained in the simultaneous use of both of the countermeasures described in Experiment 1. In addition to the information subjects received in Experiment 1, subjects in Experiment 2 were also given a practice examination containing questions similar to those in the actual examination. Countermeasure subjects were required to use the countermeasures during the control questions in this practice examination. A maximum of 30 minutes was spent training each subject. Countermeasure subjects were also encouraged to practice their countermeasures at home.

The second session was the same as in Experiment 1 with the following exceptions. A card test was conducted with all subjects prior to the administration of the first chart. Three charts were then collected from each subject using a Backster (Note 1) You Phase examination with three relevant and three control questions. Data were reduced in the same manner as for Experiment 1.

#### Results

The categorizations of the original examiner were 51% correct, 14% incorrect, and 35% inconclusive. Five countermeasure subjects were incorrectly classified as truthful giving a false negative rate of 42% (excluding inconclusives) as compared to 0% false negatives in the Guilty Control group (Honts & Hodes, 1982b). Statistically significant differences were found between the Guilty Control and the Countermeasure groups in the analyses of the numerical scores, categorical classifications, and in the objectively reduced measures (Honts & Hodes, 1982b).

Table 2 presents the number and percentage of correct decisions made by the original examiner regarding the use of countermeasures. An examination of the percentage of correct decisions across the groups indicates that the examiner was not able to detect countermeasure usage at better than chance levels.

# Table 2

Percent Correct Decisions Regarding Countermeasure Usage\*

Group	<u>n</u>	Observation & Scan	Charts Only
Innocent	19	73	89
Guilty Control	19	63	73
Countermeasure	19	53	53
Total	57	63	72

#### Experiment 2

\*The criterion for countermeasure usage was based on the subject's post examination report of countermeasure usage.

Table 3 shows a breakdown of examiner assessment of countermeasure usage according to examiner classification of subject truthfulness. These data indicate that when subjects were able to apply the countermeasure successfully they were very difficult to detect as countermeasure users. No evidence was found to support the notion that the cardio measure may be used to discriminate countermeasure users.

# Table 3

Percent Correct Assessments Regarding Countermeasure Usage According to Examiner's Classification of Countermeasure Subjects in Experment 2

Examiner Classification	<u>n</u>	Observation & Scan	Charts Only
Truthful	5	20	20
Inconclusive	7	43	71
Deceptive	7	86	71

# Discussion

Both experiments fail to support polygrapher's claims that physical countermeasures are readily detectable. This finding is particularly noteworthy since the original examiner was aware of the base rates and of the types of countermeasures that would be attempted. This optimal situation certainly does not exist for the examiner in the field.

The finding that physical countermeasures are not readily detectable should be of considerable interest to field polygraphers since they have the impression that physical countermeasures are readily detectable (Abrams, 1977; Backster, Note 1; Jayne, 1982; Magiera, 1975; Reid & Inbau, 1977; Sparagowski & Ritter, 1977). This misconception on the part of field polygraphers may in part arise from the fact that many subjects in the field setting who do attempt some physical countermeasure do so without a knowledge or consideration of the factors involved. It is not surprising that such things as moving the arm under the cardio cuff and gross hyperventilation are readily detected. However, any assumption of ignorance and lack of preparedness on the part of the general public and the criminal element in particular can no longer be accepted. Lykken's (1981) claims about the ways in which the CQT can be "beaten" are well disseminated to the public through his book, his and other publications in the popular press, and by his appearances on popular TV talk shows. Extensive information about the structure of the CQT and possible countermeasures is available in many libraries. It is imperative that examiners not be lulled into a false sense of security by the misconception that physical countermeasures can be readily detected.

A second issue raised in the introduction of this paper concerned the validity of examiners' conclusions of deception based on their opinion that a subject employed a countermeasure. Based on his observation of the subject during the examination and on a brief inspection of the charts, the original examiner concluded that 27-33% of the innocent subjects had used a countermeasure during the examination, even though these innocent subjects reported no countermeasure attempts. This finding certainly challenges Jayne's admonition, "Never report as truthful subjects who engage in acts of PNC [purposeful noncooperation] on portions of the test or throughout the test." (Jayne, 1982, p. 173). On the contrary, the results of these two experiments suggest that about 1/3 of the innocent subjects that are tested might be expected to be misclassified as countermeasure users while about 1/2 of the actual countermeasure users might go by undetected. Further support for this point is provided by Raskin (Note 4) who indicated that a substantial number of innocent subjects in laboratory studies at the University of Utah show breathing patterns which would likely be interpreted as countermeasure attempts according to practices which are common among field polygraph examiners.

Polygrapher's association of deception with countermeasure usage also assumes that only guilty subjects will attempt countermeasures. It would seem likely that some percentage of innocent subjects might attempt countermeasures in an effort to assure their passing the test, even though there are data that suggest that it might be counterproductive for them to do so (Rovner, Raskin, and Kircher, 1979). Additional research is required to determine the rate of countermeasure usage by innocent subjects in the field. It is possible that closer observation of the subjects by an uninvolved assistant or by videotape might have increased countermeasure detection rates. However, it seems likely that these procedures might also increase the rate of false positive errors. It is also possible that a device like the special chair described in Reid & Inbau (1977) might be effective for detecting gross body movements but it seems unlikely that such a device would be sensitive to subtle countermeasures like biting the tongue. Electromyographic recordings might be useful for that purpose.

The implications of these two studies may be summarized as follows. It is possible for some deceptive individuals to defeat CQTS in a laboratory situation under low motivation conditions. It is difficult for examiners to detect the use of physical countermeasures even under the optimal conditions found in the laboratory. In these experiments the examiners' judgments regarding the use of countermeasures were not reliable and did not discriminate well between innocent subjects and guilty countermeasure users. Therefore, examiners should avoid placing too much weight on what they perceive as attempts to distort the test since a substantial portion of innocent subjects may be incorrectly classified as deceptive countermeasure users.

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# Use of Polygraph By Law Enforcement Agencies

### A Survey

By

# Delvin H. Kendrick\*

## Abstract

There were 91 local and state law enforcement agencies that responded to a questionnaire about their use of the polygraph; which was approximately 80% of those contacted. 85% of those departments have polygraph facilities and personnel to conduct examinations. 92% of them conduct polygraph examinations for outside agencies who do not have facilities of their own, and most of them do not charge the other department a fee. 84% of the departments said that their examiners were trained at APA accredited polygraph schools. Only 10 departments pay additional compensation to their examiners. About half of the departments schedule a maximum of two examinations a day for each examiner. 43% of the departments use polygraph testing as a part of their employment screening process, but of those which have their own polygraph operations, slightly half give preemployment tests. Approximately 80% of the departments use the polygraph during the course of internal departmental investigations. More than 95% of the departments use commissioned officers as examiners.

# Replies to the Survey of the Use of Polygraph Testing By Law Enforcement Agencies

Does your Department have facilities and personnel available to conduct Polygraph Examinations?

	Yes	No	Total Responding
Municipal	44	5	49
State	33	9	42
Total	77	$1\overline{4}$	91

If your Department does <u>not</u> have Polygraph capabilities, do you have arrangements for the testing of subjects by another organization?

<sup>\*</sup> The author is a Lieutenant, Polygraph Division, Houston Police Department. For reprints, write to him at the Houston Police Department, 61 Riesner Street, Houston, Texas 77002, or to his company, Fact Finders Polygraph Service, P.O. Box 1753B, Alvin, Texas 77551.

	Yes	No	Total Responding		
Municipal State Total	5 <u>7</u> 12	$\frac{0}{\frac{2}{2}}$	5 <u>9</u> 14		
Arrangements with Enforcement Ageno	n Law Cy	Civilians	Others	Total Responding	
Municipal State Total	4 <u>6</u> 10	$\frac{1}{0}$	$0\\\frac{1}{1}$	5 7 12	

Do you pay a fee for this Service?

Yes	No	Total Responding
3	2	5
2	5	7
5	7	12
	Yes 3 <u>2</u> 5	Yes No 3 2 <u>2 5</u> <u>7</u>

Of those paying a fee the Rate varied with some paying an hourly rate and others a Flat Rate.

Does your Department have a written procedural policy relative to Polygraph testing?

	Yes	No	Total Responding
Municipal	29	14	43
State	21	12	33
Total	50	26	76

Are Polygraph Examinations conducted by your Department for outside Agencies who do not have Polygraph facilities of their own?

	Yes	No	Total Responding
Municipal	40	4	44
State	31	2	33
Total	71	6	77

Is a fee charged fo	r this S	ervice?	
	Yes	No	Total Responding
Municipal	10	30	40
State	1	30	31
Total	11	60	$\overline{71}$

To what functional unit is the Polygraph Unit assigned within your departmental structure?

	Criminal Investigation	Laboratory	Technical Po Services	ersonnel
Municipal State Total	22 22 44	10 _4 _14	6 0 6	2 2 4
	Separate Divi- sion or Unit	Other	Combination	n
Municipal State Total	$\frac{1}{3}$	9 9 18	$\frac{7}{\frac{3}{10}}$	

How many active Polygraphists are employed by your Department?

The number varied from those not having a full time Examiner to Agencies with 15 or more Examiners.

	Commissioned Police Ex- aminers	Civilians	Total Responding
Municipal State Total	41 32 73	2 <u>1</u> <u>3</u>	43 <u>33</u> 76
	Commissioned Only	Civilians Only	Combination
Municipal State	34 <u>29</u> 63	2 <u>1</u> 3	$\frac{7}{\frac{3}{10}}$

How many examinations were conducted by your Department during the year 1982?

This varied greatly with some Departments conducting 3,000 or more examinations. Almost every Department conducted more Criminal examinations than the other type of examinations combined.

What type of training have the Polygraphists received?

	Accredited Polygraph School	On Job Training	Other	Combination Training	of
Municipal	43	7	4	11	
State	33	4	2	5	
Total	76	$\overline{11}$	6	16	

This is probably misleading as most States have Licensing Laws requiring intern supervision which certainly entails on-the-job training.

What technique(s) do the Polygraphist use?

	Municipal	State	Total
I&R	20	13	33
Control	32	22	54
Zone of Comparison	24	18	42
Other	12	6	18
I & R Only	3	4	7
Control Question Only	6	6	12
Zone of Comparison Only	5	4	9
I/R & Control Question	5	2	7
I/R & Zone of Comparison	1	4	5
Control & Zone of Comp.	5	4	9
Combination	28	18	46

If Examiners are Commissioned Police Personnel, do they receive additional Compensation?

	Yes	No	Total Respondin	g
Municipal	6	35	41	
State	4	29	33	
Total	10	64	74	

The most common practice among those receiving additional compensation is to pay Specialist pay.

What	is	the	maximum	number	of	examinations	scheduled	daily	for	each
Examiner?								-		

	<u>1</u>	2	3	4	Varies	Total Responding
Municipal	1	19	8	7	5	40
State	0	17	9	3	2	31
Total	1	36	17	$\overline{10}$	7	71

Is Polygraph testing used in your Department as a part of the employment screening investigation of job applicants?

	Yes	No	Total	Responding
Municipal State Total	24 15 39	24 <u>27</u> 51	48 <u>42</u> 90	
	Commis	sioned	Civilians	Commissioned Personnel Only
Municipal State Total	24 <u>15</u> 39		$13$ $\frac{6}{19}$	$\frac{11}{9}$

Was the routine Polygraph testing of job applicants ever used by your Department and then discontinued?

	Never Used	Use and Discontinued	Total Responding
Municipal	15	8	23
State	21	5	26
Total	36	13	49

If Polygraph testing is used in your employment process, are examinations conducted by Department or outside Examiners?

	Departmental Examiners	Outside Examiners	Total Responding
Municipal	23	1	24
State	14	1	15
Total	37	2	39

If Polygraph testing is used in your employment process, at what stage and in what areas are examinations conducted?

Mu	nicipal	State	Total
Pre-Background	15	7	22
Post-Background	8	4	12
All Applicants	16	8	24
Selected Applicants	1	5	6
All Areas of Background	18	11	29
Selected Areas of Background	1 5	2	7

Are Polygraph examinations conducted on Department employees during the course of Internal Departmental Investigations.

	Yes	No	Total Responding
Municipal	41	7	48
State	<u>32</u>	<u>10</u>	42
Total	73	17	90
	Commis	sioned	Both Commissioned
	Person	nel Only	and Civilians
Municipal	4		33
State	<u>10</u>		22
Total	14		55

If used who conducts the Examination?

	Municipal	State	Total
Departmental Examiners	33	25	58
Outside Law Enforcement	6	8	14
Outside Civilian Examiners	s 6	1	7
Departmental Examiners Onl	ly 29	23	52
Outside Law Enforce. Only	3	7	10
Outside Civilians Only	5	0	5
Departmental and Outside			
Law Enforcement	3	1	4
Departmental and Outside			
Civilians	1	1	2

Do you have any type "Quality Control" or review procedures on Polygraph testing?

	Yes	No	Total Responding	Review by Other Examiners or Supervisor
Municipal	31	13	44	23
State	17	<u>16</u>	33	8
Total	48	29	77	31
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Is your Department now conducting or has it recently conducted any type of research relative to Polygraph?

	Yes	No	Total Res	ponding
Municipal	5	44	49	
State	3	38	41	
Total	8	82	90	

If your Department does not have in house Polygraph capabilities, do you have plans to institute this in the future?

	Yes	No	Total Resp	onding
Municipal	0	5	5	
State	1	8	9	
Total	1	13	$\overline{14}$	

If Polygraph testing is not used by your Department as a part of the employment screening investigation of job applicants, is it being considered for the future?

	Yes	No	Total Respondi	ng
Municipal	4	19	23	
State	7	14	21	
Total	11	33	44	

# Participating Municipal Agencies

Birmingham Alabama Police Department Phoenix Arizona Police Department Los Angeles California Police Department San Diego California Police Department Denver Colorado Police Department Wilmington Delaware Police Department Miami Florida Police Department Honolulu Hawaii Police Department Chicago Illinois Police Department Indianapolis Indiana Police Department Wichita Kansas Police Department Louisville Kentucky Police Department New Orleans Louisiana Police Department Portland Maine Police Department Baltimore Maryland Police Department Detroit Michigan Police Department Minneapolis Minnesota Police Department Jackson Mississippi Police Department St. Louis Missouri Metropolitan Police Department

Billings Montana Police Department Omaha Nebraska Police Division Newark New Jersey Police Department Albuquerque New Mexico Police Department New York City New York Police Department Rochester New York Police Department Charlotte North Carolina Police Department Bismarck North Dakota Police Department Cincinnati Ohio Police Division Cleveland Ohio Police Department Oklahoma City Oklahoma Police Department Tulsa Oklahoma Police Department Philadelphia Pennsylvania Police Department Pittsburgh Pennsylvania Police Department Providence Rhode Island Police Department Sioux Falls South Dakota Police Department Chattanooga Tennessee Police Department Austin Texas Police Department Dallas Texas Police Department Fort Worth Texas Police Department Salt Lake City Utah Police Department Norfolk Virginia Bureau of Police Richmond Virginia Bureau of Police Burlington Vermont Police Department Seattle Washington Police Department Metropolitan Police Department, Washington, D.C. Chevenne Wyoming Police Department Jacksonville Florida Sheriff's Office

# Participating State Agencies

Arizona Department of Public Safety Arkansas State Police California Highway Patrol Colorado State Patrol Connecticut State Police Department Delaware State Police - Department of Highway Safety & Motor Vehicles Florida Highway Patrol Georgia Department of Public Safety \* Kauai County Police Department \* Maui County Police Department \* Hawaii County Police Department Idaho Department of Law Enforcement Iowa Division of Criminal Investigation Department of Law Enforcement, Divison of Support Services, State of Illinois Kansas Bureau of Investigation Kentucky State Police Louisiana State Police

<sup>\*</sup> The State of Hawaii does not have a state police force. Law enforcement responsibilities have been delegated to each of the island county police departments.

Department of Public Safety, Maine State Police Maryland State Police Michigan State Police Mississippi Department of Public Safety Missouri State Highway Patrol Montana Highway Patrol (Department of Justice) Nebraska State Patrol Nevada State Investigation Division New Jersey State Police New Mexico State Police New York State Police North Carolina State Highway Patrol North Dakota Highway Patrol Ohio State Highway Patrol Oklahoma Department of Public Safety South Dakota Division of Criminal Investigation Tennessee Highway Patrol Texas Department of Public Safety Utah Highway Patrol Vermont State Police Virginia Department of State Police-Bureau of Criminal Investigation Washington State Patrol West Virginia Department of Public Safety Wisconsin State Patrol Wyoming Highway Patrol

STATE

LICENSING LAW

ADMINISTRATION OF EXAMINATION REGULATED BY LICENSING BOARD OR LAW

Alabama	Yes	Yes
Arizona	Yes	Yes
Arkansas	Yes	Yes
California	No	Yes
Colorado	No	No
Delaware	No	Yes
Florida	Yes	Yes
Georgia	Yes	Yes
Hawaii	No	Yes
Idaho	No	No
Illinois	Yes	Yes
Indiana	No	No
Iowa	No	Yes
Kansas	No	No
Kentucky	Yes	Yes
Louisiana	Optional	No
Maine	Yes	Yes
Maryland	No	Yes
Massachusetts	Yes	Yes
Michigan *	Yes	Yes
Minnesota	Yes	Yes
Mississippi	Yes	Yes
Missouri	No	No
Montana	No	Yes

STATE	LICENSING LAW	ADMINISTRATION OF EXAMINATION REGULATED BY LICENSING BOARD OR LAW
Nebraska	Yes	Yes
Nevada	Yes	Yes
New Jersey	Yes	No
New Mexico	Yes	Yes
New York	No	No
North Carolina	Yes(not required)	Yes
North Dakota	Yes	Yes
Ohio	No	No
Oklahoma	Yes	Yes
Pennsylvania	No	Yes
Rhode Island	No	Yes
South Dakota	No	No
Tennessee	Yes	Yes
Texas	Yes	Yes
Utah	Yes	Yes
Vermont **	Yes	Yes
Virginia	Yes	Yes
Washington	No	Yes
West Virginia	No	No
Wisconsin	No	No
Wyoming	No	No
District of Columbia	No	Yes
Puerto Rico	No	No

\* The January-February 1983 issue of the American Polygraph Association Newsletter reports Michigan Governor James Blanchard, citing serious economic problems, has proposed the elimination of the State Board of Forensic Polygraph Examiners.

\*\* The January-February 1983 issue of the American Polygraph Association Newsletter reports a recent decision that the Vermont Polygraph licensing law no longer exists as it was not properly continued by sunset legislation.

\* \* \* \* \* \*

# Analysis of Polygraph Charts - A Bibliography

#### By

# Norman Ansley

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#### Book Review

#### By

## Dr. Douglas Grimsley\*

Perspectives in Cardiovascular Psychophysiology, edited by John T. Cacioppo and Richard E. Petty. New York: The Guilford Press, 1982.

Cardiovascular psychophysiology composes one of the major areas of concern for polygraph examiners and a new book edited by John Cacioppo and Richard Petty contributes significantly to our understanding of the issues surrounding cardiovascular (CV) functioning. Not only is the book technically complete, containing extensive information about both instrumentation and procedural issues, it enjoys a readability, clarity of presentation, and unity that should make it of interest both as a resource and reference book and as a stimulus to research.

The first two chapters of the book provide a significant review and overview of CV functioning. Included is a discussion of techniques for measuring, quantifying, analyzing and interpreting CV functioning. Each measurement approached is described and its strengths and weaknesses explored. Sphygmomanometry and plethysmography, for example, are traced from their historical roots through the state-of-the-art technology currently in use.

While the entire book is relevant and informative to polygraph examiners, readers of the journal will be especially interested in several specific chapters. In Chapter 4, Drs. Shapiro and Reeves discuss the use of biofeedback as a means of augmenting or reducing heart rate changes occurring in anticipation of stimulation (by an electric shock or cold stress). Based upon their research and that of others, they reach the conclusion that the normal or predictable increase in heart rate to stress may be reduced through biofeedback training. These findings have important implications to polygraph examiners as it suggests a mechanics by which a person can attenuate responding of the CV system in stressful or arousing situations. Since biofeedback is adaptable to any physiological system, the procedures must be considered as a potential countermeasure which may affect polygraph interpretation in general.

Drs. Cacioppo and Petty argue effectively in Chapter 5 that CV responses must be interpreted in the context of not only other physiological responses but also must consider the individuals psychological perception of the situation. For example, if a subject detects a physiological change (becomes aware of a change) in a certain situation, it can affect his psychological perception of the situation and result in related bodily responses. This has been and continues to be an area of concern for many people who attempt to provide an objective interpretation of polygraph records.

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The modification of CV responses by conditioning procedures is addressed in Chapter 9. Though geared toward the clinical applications of such procedures, the approach does provide the possibility of these procedures also being used to train CV control (perhaps as a countermeasure).

The summary chapter by Gary Schwartz attempts to unify the book coverage by utilizing a systems approach to describe the complex and multivariate nature of CV psychophysiology. The chapter discusses such significant topics as the "best" CV measure, when is a response not a response, behavior in a systems approach, levels of measurement, and other matters. This approach offers a powerful way of viewing CV issues as a complex, interactive, integrated system that is best viewed from the top of a tower, not through the window of a particular floor.

Though appropriately technical in places, most readers will find this book to be a current, comprehensive, and advanced analysis and review of the theory and research involving psychophysiological issues in CV functioning. The editors have brought together the proper blend of psychologists and physiologists, theorists and practioners, researchers and clinicians to insure that the major issues are addressed. Polygraph examiners, having read this book, will gain a much better understanding of the mechanisms underlying a significant component of their work.

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