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## A LIE-DETECTOR EXPERIMENT

Henry V. Baesen, Chia-Mou Chung, and Chen-Ya Yang

The experiment upon which this article is based was performed as a class project in an Advanced Deception Detection course under the supervision of Professor Donald F. McCall, State College of Washington, Pullman, Wash. All three authors are graduates of the Police Science Department of the College and have since received as the result of graduate study a Master of Science Degree. Mr. Henry V. Baesen is continuing his advanced studies in this field at Washington State. Both Mr. Chia-Mou Chung and Mr. Chen-Ya Yang were sent to this country by the Chinese government to study police methods. Mr. Chung has returned to China to assume administrative duties in the police system of that country, while Mr. Yang is pursuing further studies in the United States.—EDITOR.

The technique of detecting deception has risen to a professional level. Police departments and commercial businesses possessing or employing a lie detector have expressed praise for its usefulness in detecting the guilty, and in several instances colleges are offering courses for specialization in deception detection as part of their police science curriculum. Then, too, much research and laboratory experimentation is in progress with the objective of furthering the use of the lie detector technique.

### REPORT OF EXPERIMENT

The purpose of this experiment was to differentiate between actual guilt of a mock crime and guilty knowledge only of the same crime. Many offenses are committed by those who confide in others either prior to or following the perpetration of the offense. Others commit crimes, and they are not alone in knowledge of it. Many criminals are accompanied by confederates who are aware of most of the facts but not every pertinent act committed by the actual guilty individual. Because it is necessary to segregate those guilty from those who have guilty knowledge only, we have experimented in a procedure to attempt to determine the guilty person from the person possessing guilty knowledge.

*Procedure.* To begin the experiment, it was necessary to propose some type of offense which would involve two individuals one of which was to be guilty and the other to possess guilty knowledge. In addition, the crime had to be somewhat impressive to the offender. To accomplish this, a mock crime was devised involving an act of theft. Several sums of money were placed in a desk drawer with the intent to have one individual steal one of the several sums of money. Through this procedure, the distant onlooker would have knowledge, and the other subject would be the actual perpetrator.

After developing a suitable crime, two sets of questions were formulated which would be asked of both individuals involved. Eleven questions were constructed for the first set and 18 for the second. Each set possessed relevant questions and a peak of tension series as well as control questions.

The critical questions in order in the first and second set were:

- Set 1, (4) "Does (*the amount stolen*) have particular significance to you?"  
 (8) "Did (*name of accomplice*) steal the money?"  
 (10) "Did you steal the money?"  
 Set 2, (3) "Did you steal the money?"  
 (9) "Does (*the amount stolen*) have particular significance to you?"  
 (12) "Did you watch (*name of accomplice*) steal the money?"  
 (16) "Did (*name of accomplice*) watch you steal the money?"

The peak of tension on the stolen sum was brought about by arranging the questions in consecutive order beginning with two amounts not stolen and then the third question as the critical sum followed by the last sum known not to be critical. With the exception of the peak of tension series of questions, the relevant questions were adequately separated by irrelevant and control questions. The time interval between questions ranged from eight to fifteen seconds.

Fifty pairs of college students comprised the subjects for the experiment. Upon arrival of each pair, they were introduced making sure they knew the name of their partner. Each pair was then completely oriented to the process of the experiment. The instructions were somewhat as follows: "This laboratory experiment involves an act of theft, and its purpose is to differentiate between guilt and guilty knowledge of this crime. In a certain desk drawer, there are several sums of money. When we leave this room, you will decide between yourselves as to whom shall be the guilty person. After the decision, that individual will be escorted by the instructor to the drawer, at which time he will open the drawer, examine its contents thoroughly, remove one of the sums of money and then return to the seat next to his partner. You will not show or tell him (her) the sum taken. We have two sets of questions about the crime to ask each of you. Every question is to be answered "yes" or "no" with no additional comments. Consider your partner as an accomplice but conceal your guilt or guilty knowledge throughout the test."

On completion of the crime, one subject was placed on the lie detector, and the other subject was removed from the room in

order that the questions could not be heard. After both subjects were tested, the records were carefully interpreted and charted. The answers were submitted to the instructor who kept a record of the guilty and guilty knowledge individuals.

Following each test, the records were posted with regard to reactions from the answer submitted for each critical question. As an illustration, in set two the first critical question was, "Did you steal the money?" If the guilty individual answered "yes" and a reaction was noted, a plus sign was posted indicating a true statement. The accomplice received an "F" indicating a falsehood, when he answered "yes". If the answers were "no" for each individual, the signs would be the reverse. In the event that no reaction was detectable, the space for posting was left blank. Frequently, a slight reaction occurred, and in such cases where there would be doubt as to its significance, a "Q" for questionable, was posted. In instances where a misinterpretation was made from the graph, it is indicated on the chart by circling the error.

The Keeler Polygraph was used throughout the experiment. Only cardiograph and pneumograph recordings were taken. Consideration of the peak of tension pulse rate changes, sudden and delayed drops in blood pressure, duration of rise or fall in blood pressure, location of the dicrotic notch and continued eradicacy or smoothening of the records as the test continued were made for interpretation of the tests. Notice was taken of changes in the respiration base line, blocking and suppression of respiration either prior to, during, or immediately following the question.

*Results.* A total of 200 sets of test questions were administered to the fifty pairs of subjects resulting in 86 per cent correct interpretation. If each subject had received only one set of questions instead of two, the percentage would decrease because definite conclusions were impossible in the majority of tests based upon a single set of questions. In addition, testing only one of the subjects would have resulted in a lower percentage. The lack of sufficient means to produce extensive emotional reactions in a laboratory experiment may be singled out as the most probable reason why the test was conducted in the manner previously cited. It cannot be stated at this time that additional sets of questions to each subject would yield 100 per cent correct interpretations. To be sure, the percentage would greatly increase, but allowance must be made for cases where irregular emotional or nervous reactions make interpretation impossible. In addition, it is known that interroga-

tion by the examiner prior to and following the tests would yield better results.

In approximately 75 per cent of the cases, the guilty individual produced the majority of evidence for identification. This was verified through examination of the charts for peaks of tension and responses to critical questions. The answers to critical questions in set one show that as testing continues the marked reactions of the guilty subject increase, whereas the questionable and negative reactions decrease. Reactions of the associate, however, do not follow a definite pattern. In the second set of critical questions, the answers of the guilty subject follow the same pattern as the guilty subject in the first set. Here, the individual possessing guilty knowledge shows a decrease in outstanding and questionable reactions and an increase in the number of negative reactions as the testing continues.

Because there are fewer reactions to the initial critical questions of the test, there is no indication that the questions are worded incorrectly or located poorly. The answer may be that as the test progresses the guilty individual increasingly fears self exposure, and as he attempts to inhibit this fear, his emotional responses mount. In regard to the subject having guilty knowledge, he, at first, fears exposing the guilty individual, but as the test continues, his consciousness of not being guilty decreases his emotional reactions. Critical questions that are improperly constructed and not placed psychologically within the series of questions will affect the results.

Irrelevant questions as well as critical questions must be of sound construction and used in a psychological manner. The complete use of the irrelevant questions in the experiment in accordance with the revised questioning technique of Reid's<sup>1</sup> may have resulted in a higher percent of correct interpretations of tests administered. Several irrelevant questions asked were of the type which the true answers were not known by the operator. If in every instance he was in the position to compare falsehood reactions and had been able to point them out in the first set of questions to the subject, it would have produced a psychological effect toward the second set of questions. This would undoubtedly be to the operator's advantage because the subject would have only two alternatives in the second set of questions. He would either resort to the truth or try harder to inhibit his emotions when he lied. In the end, either alternative is a disadvantage to the subject and an advantage to the operator.

<sup>1</sup> Reid, John E., "A Revised Questioning Technique in Lie-Detection Tests," *Jour. C. Law and Crim.*, 37(6):543 (1947).

No definite reliance was placed on any single criterion for identification of the guilty party. Peaks of tension regarding the stolen money used in the experiment were greater at times on the individual who was not guilty. Because the money used was of common denominations (\$10, \$5, \$1, .50), it occurred that the sum stolen would be the amount which had a greater concern to the innocent associate for some personal reason. This produced a decided peak of tension on the money stolen for the associate, but in the test on the actual guilty subject, a peak of tension on the critical sum may have been questionable. Occasional coincidents of this nature made it necessary to evaluate all reactions to critical questions and peaks of tension on the four tests to which the two subjects were subjected. In actual crime cases, it is possible to question the suspect and at times ascertain the reason for such occurrences, but it is somewhat impossible to ask the college student personal questions to determine the reason for such reactions. Nevertheless, through the experiments, several tests have given indications of information other than that of the mock crime although no personal questions were used in the test series.

Lie detector records of each individual were first interpreted as a whole, that is, more attention was placed on simultaneous reactions in blood pressure and respiration. Care was taken in not relying too heavily on respiratory responses because respiration may be somewhat controlled. Simultaneous pneumograph and cardiograph reactions to the critical questions were more than three times as frequent in occurrence than were non-correlated responses. Respiratory blocking and changes in the respiration wave from the base line were most frequent in the individual tests. Respiratory suppression was nearly as frequent as blocking of respiration.

Cardiograph criteria was especially significant for detection of deception. The critical question to the guilty subject concerning the sum of money stolen furnished the main responses for detection. The peak of tension at this point was usually built up gradually as the questions concerning the money continued, and following the critical amount, there was usually a gradual descent in blood pressure. This was more noticeable in the second set of questions. Responses in blood pressure of the guilty subject to other critical questions were built up more rapidly. In addition, the duration of blood pressure rise was longer than that of the subject possessing guilty knowledge. Frequently, the individual who was not guilty would show an increase of blood pressure response at the mention of money, but

it was seldom that a noted peak of tension appeared on the critical sum. The individual having guilty knowledge furnished the most emotional response for detection when he was asked if his partner took the money. This was the second critical question in the first series.

It warrants mention at this point that we did not have an ideal room in which to administer the tests. The experiment was conducted in the office and laboratory of the Police Science and Administration Department. Besides material distractions, the room was neither soundproof or free from other intrusions. The importance of an ideal room cannot be stressed enough. Every possible means should be used to make lie detector examinations successful. This includes the verification of truth as well as falsehood without employing third degree methods.

#### CONCLUSION

The purpose of this experiment was to attempt to differentiate between actual guilt of a mock crime and guilty knowledge only of the same crime. From the experiment, differentiation of guilt from guilty knowledge resulted in 86 percent correct interpretation from the 50 cases of 200 tests. The experiment proved that a second set of questions to each subject was essential for this percentage of correct interpretation. Additional sets may produce an even higher percent.

In approximately 75 percent of the cases, the guilty subject produced the majority of evidence for identification. In regard to the guilty individual, a definite pattern of reactions was found as testing continued. The marked reactions increase, whereas the questionable and negative reactions decrease. The subject possessing guilty knowledge does not follow a definite pattern in the first series of questions, but in the second set, there is an increase in the number of questionable and negative responses and a decrease in outstanding responses as testing continues. Fewer reactions to the initial critical questions of the test does not indicate that the questions are improperly constructed or located poorly within the series of questions. Irrelevant questions as well as critical ones are important for obtaining maximum results.

Simultaneous cardiograph and pneumograph recordings were three times as frequent as the non-correlated reactions. Peaks of tension offered the main criteria for detection. These occurred most frequently on the critical sum when questioning the guilty individual. The second critical question in the first set produced the most emotional reaction for the subject possessing guilty knowledge.