

On the new equipment, the breathing pattern will be sensed by a strain gage and cable tied around the chest rather than by a pneumograph. Blood pressure changes will be sensed by a piezo-electric crystal on the wrist rather than by the cardio-sphygmomanometer. Conventional GSR sensing is retained. This polygraph will produce a record very similar to the present one and its primary utility, in contrast to other equipment, will be its ease of portability.

(2) *Rapid computer processing of involuntary responses*

The Air Force Office of Scientific Research is supporting a project for rapid and accurate evaluation of psychophysiological responses by means of computer analysis.⁷ The purpose of the study is to devise methods which will provide an interviewer with reliable indications of the kind of information carried by the person being interviewed. Nine involuntary reactions will be studied:

- Muscle action potential voltage.
- Intersystole time.
- Finger pulse amplitude.
- Respiration cycle duration and amplitude.
- Skin resistance.
- Skin temperature.
- Body-weight shifts.
- Reaction time.

The equipment required by this project has been assembled and is being checked out; up to now, no data have been collected. This project has been referred to, erroneously, of course, as one in which a "red light tells when the subject is lying."

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(4) *Lie detection methodology*

Dr. Joseph Kubis (1962)⁸ of Fordham University is conducting a series of studies to improve the methodology of lie detection also on project 5534. * * *. The study consists of four parts, some of which have been described earlier in this report. The following summary is based on a conference with Dr. Kubis at RADO on January 2, 1962, and represents his preliminary conclusions:

(a) Sham theft (360 subjects, 5 examiners):

Examiners can correctly detect "innocent" or "guilty" students in 73 to 92 percent of the cases. Raters who worked only with polygraph charts (and did not see the "suspects") were as accurate as the examiners who performed the interrogations. In 112 sessions, 2 "innocent" students were called "guilty."

Of the three measures used by Kubis, the GSR response provided by far the greatest accuracy (about 90 percent for discriminating the "guilty" from "innocents"), while the other two indices (respiratory and plethysmographic) produced accuracies of only about 60 to 70 percent.

When discriminant functions are calculated based on the ratings of different individuals analyzing the same data, they are found to differ appreciably in the assignments of weights to the three response indices. This lack of homogeneity among various discriminant functions suggests inherent difficulties for the development of computer techniques to provide objective indications of guilt or innocence.

However, considering the low objectivity realized by visual interpretation of respiratory and plethysmographic responses, computer techniques may well be a valuable adjunct to lie detection in the following respects:

- (i) Differentiating among complex physiological patterns.
- (ii) Developing new indexes or criteria of deception.

(b) Denial of a previously committed crime by ex-criminals on parole (23 cases): Since all subjects were known to be guilty, the experiment consisted of judging the type of crime committed. The subjects were told to deny a specific previous crime and each record contained two "lies." In 40 percent of the cases, the examiner was able to detect both lies in the records of the ex-prisoners; in 48 percent of the cases one of the two lies; and in 12 percent of the cases neither of the two lies. In a retest of the same subjects, 29 percent were detected in both lies, 57 percent in one of the two lies, and 13 percent in neither of the two lies. (Based on averages of 3 examiners.)

⁷ Grant AF-AFOSR 62-110 with the University of Georgia; the principal investigator is Herbert Zimmer.

⁸ Dr. Kubis' final report, noted in the bibliography, became available while this report was being printed.