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DETECTION OF SUPPRESSED INVOLVEMENT WITH INFORMATION THROUGH A FORCED NUMBER-GUESSING TECHNIQUE

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ABSTRACT

Subjects were instructed to learn a 'crime' profile consisting of numerical information, such as the number of the house where the crime was committed, the age of the victim, etc. They were then told not to reveal the information during an interrogation that followed. All the *S*s underwent an interrogation in which they were asked to guess the 'crime' profile. It was found that it was possible to detect efficiently involvement with the suppressed profile through the use of correlations between the guessed profiles and the 'crime' profile as a decision dimension.

1. INTRODUCTION

This study explores the possibility of detecting the involvement of persons with suppressed numerical information through the use of a forced guessing technique. The experiment simulated a police interrogation of a subgroup of subjects who were given advance knowledge of the numerical details of a crime, such as the age of the victim, the hour at which the murder was committed, etc., and of another subgroup, who were given no such information. During the simulated interrogation all the subjects were asked to guess the relevant numbers, the 'guilty' subgroup (who were given the advance information) being instructed to suppress their knowledge of the critical information.

The aim of the study was to discover whether the kind of biases in the number sequences generated would differentiate between the 'guilty' and the 'innocent' subgroups. It was expected that the 'guilty' subjects would use one or both of the following guessing strategies in the interrogation, in order to hide their involvement: (a) Maximize the absolute deviation of the guessed numbers from the crime numbers, (b) Repeat one or more of the actual numbers involved in the crime. This would result from the belief that it would be suspicious if no single critical number appeared in the generated sequence.

Since the 'innocent' subjects were not given the crime information, it was expected that they would give numbers generated according to the most probable hours, ages, etc. of crimes.

It was also expected that even if the 'guilty' subjects were able to avoid using these revealing strategies, they would fail to control second-order resemblances between the guessed and the suppressed data.

2. Method

2.1. *Subjects*

Sixty Hebrew University students served as subjects.

2.2. *Procedures*

The experiment was a simulated police interrogation conducted by two experimenters. Twenty of the subjects were randomly assigned to a 'guilty' category while the remaining forty were assigned to a 'non-guilty' group. The subjects went through two stages. In stage one, the 'guilty' subjects were told that (translated verbatim from Hebrew):

> 'A terrible murder was committed on Herzl Street. The police have caught you as the main suspect in this murder. You are the murderer! I repeat, you are the murderer! The details of the murder are: Number of the house: 72. Age of the victim: 53. Number of bullets fired: 1. Hours of murder: 4 am. Years in Israel of the victim: 22. Monthly earning of the victim: 850 I£.'

The subjects rehearsed these details until they recalled them twice perfectly.

> 'You deny forcefully any connection with the victim and the murder. You claim you didn't know the victim and that you didn't murder him. In a little while a police officer will come to interrogate you. Remember, you have to deny any connection with the murder.'

The non-guilty subjects were told the following:

> 'A terrible murder was committed on Herzl Street. The police have caught you as the main suspect in the murder. You are not the murderer! In a little while a police officer will come to interrogate you.'

The experimenter, who played the role of the interrogator, did not know which of the subjects were guilty or innocent, and proceeded as follows for both subgroups:

> 'Did you commit the murder?'
> 'Did you know the victim?'

'Do you know any details about the murder?'

'O.K. At this stage I accept your claim that you didn't commit the murder. However, we are interested in identifying the real murderer, and we need your co-operation. We have developed a new interrogation method which uses the testimony of several innocent persons. I'll ask you several questions and you have to answer them as soon as possible. The facts I'll ask you about did not appear in the newspapers and they are strictly confidential. You will now be asked to guess the details of the murder. We do believe you that you are innocent, but, nevertheless, try to co-operate.'

At this stage the subject was asked to guess the six above-mentioned numerical details. His reaction time was measured in seconds from the end of each question to the beginning of his report. The interrogator then continued:

'We thank you for your co-operation up to now. Please try to help us in solving a different murder committed many years ago in a different place. We have absolutely no suspicion that you are involved in that murder.'

Once again, the same six questions about the numerical details of the murder were asked in the same order.

3. Results

Attempts were first made to detect the subjects involved with the suppressed information by:

(a) assigning the 20 subjects giving the nearest values to the crime value for each item to the 'guilty' group. In none of the six items did this procedure produce statistically significant detection rates;

(b) assigning the 20 subjects showing the most deviant values from the crime value for each item. This procedure also did not produce significant detection rates.

Other procedures, such as the presence of identical responses in both sets of numbers, did not produce significant detection rates.

Given these results we concentrated on an analysis, using within each subject correlations between: (a) the actual data of the murder and the data generated at the first questioning; (b) the actual and the second generated numbers; (c) the first and second generated numbers.

We excluded the question on the monthly wages of the victim since it produced high Q correlations, because of the extremely high values demanded by its meaning, in comparison to the other items.

Fig. 1 presents the ROC[1] curves for each of the above-mentioned

[1] For a detailed description of the procedure for obtaining ROC curves see Swets (1964).

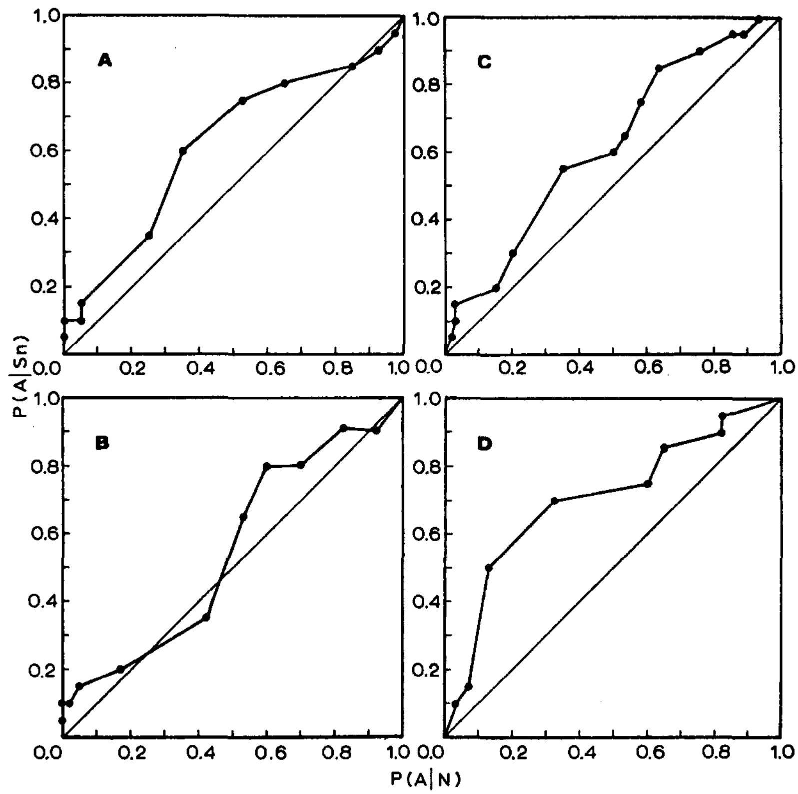

Fig. 1. Receiver operating characteristic curves for (A) Q correlation between the 'crime' profile and the profile generated in the first questioning (B) Q correlation between the profiles generated in the first and second questionings (C) between the 'crime' profile generated in the second questioning (D) the sum of these Q correlations.

$P(A/Sn)$ = rate of correct detection of involvement;

$P(A/N)$ = rate of false alarm;

A = set of all correlations bigger than a given cutoff point.

correlation coefficients and their arithmetic sum as the decision dimension. Minus correlations, when they occurred, were regarded as 1, plus their absolute value, both for the individual ROC curves and for the summing up of the three correlation coefficients. This was done since we assumed that minus correlations are indicative of an effort of falsification or avoidance.[2]

[2] These results were replicated by now on two independent samples of 40 *S*s each.

Table 1 presents the number of 'guilty' and 'innocent' *S*s falling into 8 ordered categories of the decision dimension for detection, where higher sums indicate 'guilt.'

TABLE 1
Number of 'guilty' and 'innocent' *S*s falling into 8 ordered categories of the decision dimension.

Sum of correlation	Guilty	Innocent
3.00 – 3.24	2	1
2.75 – 2.99	1	2
2.50 – 2.74	7	2
2.25 – 2.49	4	8
2.00 – 2.24	1	11
1.75 – 1.99	2	2
1.50 – 1.74	1	7
1.25 – 1.49	2	7
TOTAL	20	40

The decision dimensions is the arithmetic sum of the 3 Q correlations obtained from the 2 interrogation. A chi square computed on table 1 was found to be significant at $\alpha < 0.05$ ($\chi^2_{(7)} = 15.39$). Note that the ROC curve presented in fig. 1D was generated from table 1, and thus is also significantly different from chance detection.

Fig. 2 presents the ROC curve for the sum of the reaction-times to the items in the first questioning, including the question regarding the salary of the victim.

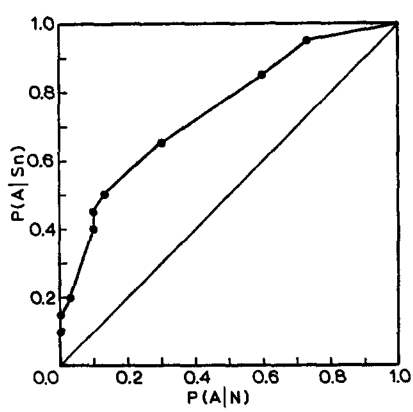

Fig. 2. ROC curve for the sum of response time in the first questioning. Abbreviations as in fig. 1.

4. Discussion

The results indicate the possibility of detecting people involved with a given set of numbers through the use, as a decision dimension, of the amount of correlation between this set and a generated set. This possibility is increased by the repetition of the guessing procedure and the simple addition of the Q correlations obtained through this procedure.

Using any absolute distance function such as the nearest or most distant numbers from a given suppressed value did not produce significant detection rates, nor did any index of intrusions or repetitions of critical items. This indicates that at least with the reported length of data and number of repetitions, subjects manage to control their responses in a fashion that does not produce differential biases which could be used as tools in the detection of involvement with suppressed data.

In general, the Q correlations obtained between the original and the generated profiles were high, both in the 'guilty' and the 'innocent' persons. The median correlation between the objective and the first generated data was 0.80 for the 'guilty' group and 0.70 for the non-involved. The high correlations occurred because the *S*s of both groups took into consideration the meaning, and therefore the prevalent range, of the numbers they were asked to reproduce. It should be stressed that in no way were the *S*s actually instructed to remain within any limits, realistic or other. E.g., they could have generated age: two thousand, or a negative number of the house. It is of interest to note that negative Q correlations were highly indicative of 'guilt' but occurred rarely. They indicate use of a strategy in which S tries to mask his involvement with a profile by systematically changing the order of magnitude of the individual items.

In general, the 'guilty' *S*s produced the highest positive correlations, indicating the preservation of the order between the magnitude of the items. This is a second order influence of the objective profile on the generation process. Even with this small number of items, the involved person could not control the reproduction of this second-order characteristic of the profile.

It is obvious that the natural ranges of the numbers facilitated this reproduction of the ordering of the items. Nevertheless, this cannot explain by itself the difference between the two groups. At this stage we have no explanation for the mechanism through which this sort of bias is produced, but we are strongly reminded of similar phenomena in the field of word-association as a means of detecting information on the history of the organism (Jung, 1918; Luria, 1960).

In this context it is of interest to note that the reaction times produced an efficient ROC curve which is in line with the word-association approach. The longer RT's indicate that some kind of deliberation is carried out by the involved person.

The ROC curves obtained in this study, especially the one using the sum of correlations as the decision dimension, are very similar in efficiency to the one produced by using an autonomic index (e.g., GSR) as the decision dimension (LIEBLICH et al., 1970).

The results point to the possibility of using the generation of number profiles as a means for detection of involvement with a critical suppressed profile. In addition, they call for further research on the effect of suppression of given numerical characteristics on the number distributions generated. It is clear that experiments which would manipulate item ranges, could produce information on the characteristics of the number generation mechanism, on its biases and limitations. This knowledge is essential for the understanding of any procedure which calls for the emission of numbers such as in the production of absolute judgments, subjective probabilities, etc.

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