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Response Inhibition and Deviant Social Behaviour in Adult Mental Defectives

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Introduction

This investigation is an extension of a study carried out recently (Lowe, 1966) with educationally subnormal school children.

Response inhibition is defined as the individual's capacity to refrain from responding in ways that are inappropriate. In some individuals the normal developmental increase of this capacity does not occur. For example, Luria (1959), using an experimental measure of response inhibition, found that certain children, whom he described as 'cerebro-asthenic', were unusually impulsive and distractible; or alternatively were unusually passive and 'inert'. Tizard (1962), using Luria's experimental method, found that similar impulsivity showed in some normal children, and related its occurrence to the age, sex, and personality of the child. Stott (1960) found that certain children who were socially maladjusted behaved 'inconsequentially'; that is, they reacted to their immediate social situation with excessive and indiscriminate behaviour. Lowe (1966), comparing the response inhibition of backward and normal children of both sexes and of different ages in relation to their respective personality attributes, found that (a) the greater a child's inability to withhold inappropriate response the more his psychosocial behaviour was regarded as maladjusted; (b) children whose response inhibition was impaired tended to have fairly specific personality characteristics, viz. indifference to adult approval, lability of affect, attention-demanding and distractible behaviour, and defiant, aggressively outgoing behaviour; (c) response inhibition varied significantly with age, and with the type and rate of stimulation.

The present study was designed to extend these experimental investigations to the mental defective adult population.

Method and Procedure

The subjects were 56 mental defective patients, subdivided into 28 subnormal (Group S) and 28 severely subnormal (Group SS) individuals. In Group S the WAIS I.Q.s ranged from 69 to 55, with a mean I.Q. of 61·85 (S.D. 4·78). In Group SS the WAIS I.Q.s ranged from 54 to 40, with a mean I.Q. of 47·42 (S.D. 3·28). In both groups the age range was 19 to 45 years, Group S having a mean age of 33·21 (S.D. 8·45) and Group SS having a mean age of 31·07 (S.D. 7·24).

The apparatus measuring response inhibition was designed to present auditory stimuli from a bell and a buzzer, each stimulus lasting 0·4 seconds. The presentation of stimuli was programmed by a tape reader, and both stimuli and responses were recorded electronically by a Rustrak pen recorder.

Each subject in turn was seated at a table, holding in his preferred hand a toy sawn-off Luger pistol with a sensitized trigger which was connected to the recording unit. He was instructed to press once when he heard the positive stimulus, but to refrain from responding to the negative stimulus. With one half of each subgroup of subjects the positive stimulus was the bell, and the negative stimulus the buzzer; with the other half of each subgroup positive and negative stimuli were reversed.

During the practice period stimuli were presented in the order: 20 positive slow, 20 negative slow, 40 randomly mixed slow, 40 randomly mixed fast. Practice was not continued beyond this point. In the experimental condition there were 4 blocks of 40 randomly mixed positive and negative stimuli, the blocks of stimuli being presented in the order: slow, fast, fast, slow. Each rest pause between blocks of stimuli, in both the practice period and the test proper, was approximately 30 seconds.

Two tests of psychomotor ability were administered

to each subject: Kendrick's Digit Copying Test, and Gibson's Spiral Maze. Both Luria and Stott interpreted their findings as being due in part to organic impairment in their subjects; and these tests have been shown (e.g. Kendrick and Post, 1967) to discriminate brain-damaged and non-brain-damaged individuals whose I.Q.s were comparable to those of the subjects used in the present study. The subjects' habitual behaviour and social attitudes were assessed by appropriate members of the hospital nursing staff, using Stott's Bristol Social Adjustment Guide. Test items in this guide assess the individual's over-readiness to give maladjusted social responses.

Results

In the test for response inhibition, errors could be either commissive or omissive, and analyses of variance for both types of error were carried out. The Digit Copying Test was scored for errors only (Kendrick and Post, 1967), and the Spiral Maze Test was scored for both errors and time (Gibson, 1964, 1965). From the nurses' rating of patient's behaviour on the Bristol Guide, a total score for maladjustment was derived for each patient (Stott, 1962).

1. *Test scores*

Mean test scores for groups are given below in Table I.

(a) *Response inhibition.* Group SS made significantly more omissive errors than Group S ($F = 7{\cdot}38$; $p < {\cdot}01$). This relationship was not affected by stimulus condition, by the rate or order of stimulus presentation, or by the age or sex of the subjects. Regarding commissive errors, there was no significant difference between groups ($F = 2{\cdot}44$; $p > {\cdot}05$). Where commissive errors occurred, however, both groups tended to make significantly more errors at the fast rate of stimulus presentation (Condition × Rate Interaction: $F = 5{\cdot}00$; $p < {\cdot}05$) than at the slow rate.

(b) *Digit copying.* Group SS made significantly more errors ($t = 3{\cdot}46$; $p < {\cdot}01$) than Group S.

(c) *Gibson maze.* Group SS made significantly more errors ($t = 2{\cdot}16$; $p < {\cdot}05$), and took significantly longer to complete the test ($t = 2{\cdot}01$; $p < {\cdot}05$) than Group S.

(d) *Bristol guide.* Maladjustment scores were significantly higher for Group S than for Group SS ($t = 3{\cdot}04$; $p < {\cdot}01$).

2. *Relationship between measures*

Since the response inhibition of the groups was significantly different only regarding omissive errors, relationships between response inhibition and other measures were calculated for omissive errors only.

In the total group, omissive errors and nurses' behavioural rating were significantly correlated (r. bis $= -0{\cdot}48$; $p < {\cdot}01$). The greater the number of omissive errors, the less severe the rating of maladjustment.

There were, however, no significant correlations between omissive errors and the other test scores.

3. *Personality of impaired patients*

Although the main result above demonstrated an inverse relationship between omissive errors and socially deviant behaviour, it did not demonstrate what form the deviant behaviour took. Accordingly, Bristol Guide scores were examined to see which specific items were characteristic of poor as compared to good test performances. The group was divided into two subgroups according to whether the omissive error scores lay above or below the median. When these groups were compared

Table I

Mean test scores

	Response inhibition errors				Digit copying Errors	Gibson maze		Bristol guide
	Commissive		Omissive			Errors	Time	Maladjustment score
	Slow	Fast	Slow	Fast				
Group S	10·61	8·96	1·36	7·25	194·6	6·9	144·5 s.	167·07
Group SS	15·64	12·00	5·78	13·21	311·4	17·1	188·8 s.	111·61

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it was found that certain items in the Guide had been rated significantly more often in respect of subjects who had done relatively badly on the test.

The items rated most often clustered under the following heads, which are listed in descending order of frequency:

Unforthcomingness: described by Stott as 'inhibition, or lack of confidence before any difficulty or new situation; a defect of natural assertiveness and curiosity; usually congenital'.

Depression: 'in its lightest form'.

Hostility: 'a mild rejecting attitude which may be incipient hostility or merely depression.'

Indifference to approval.

These behavioural categories appear to be reducible to one general behavioural trait, namely, passivity or unresponsiveness.

Discussion

In previous studies (Lowe, 1966; Tizard, 1962), where the I.Q.s of the subjects were in the 70s or above, the typical failure of response inhibition took the form of commissive errors (over 90 per cent). In the present study, where the mean I.Q. was 62 for Group S, and 47 for Group SS, more than one-third (36·6 per cent) of all errors were omissive, and it was only in respect of these omissive errors that the two groups showed a significant difference. Summarizing these findings, it seems likely that (a) above an I.Q. of 70, failures in response inhibition take the form of commissive errors which are unrelated to I.Q.; and (b) below an I.Q. of 70, the significant errors are omissive and *are* related (inversely) to I.Q.

In the present study, omissive errors were not due to mere psychomotor inefficiency, i.e. test errors did not vary with the difficulty of the task. Nevertheless, all patients in the present study were significantly below normal on both tests of psychomotor ability (Digit Copying and Gibson's Maze), and Group SS were significantly lower than Group S. Since the Digit Copying Test has been found (Kendrick and Post, 1967) to discriminate brain-damaged and non-brain damaged individuals of low I.Q., the present findings lend some support to the assumption that below a certain level of I.Q. (e.g. 55) there is usually some degree of brain damage. Present findings of course do not in themselves clarify the assumption, e.g. by specifying the nature, locality, time of onset or cause of brain damage. They merely confirm a possible concomitant occurrence of brain damage, as shown in tests, with very low I.Q.s.

The assumption that brain damage, as measured by psychomotor tests, tends to occur more frequently in individuals whose I.Q. is below 55 does not rule out the possibility that concomitant brain damage may occur also with I.Q.s above that level. In fact, in the present study the scores of Group S on all psychomotor tests, while significantly above those of Group SS, were nevertheless significantly below normal. (In the absence of any general norms, the response inhibition test performances of the control group in a previous study (Lowe, 1966) are here regarded as 'normal'.) Summarizing present findings, therefore, in the light of the above considerations, it seems likely that while psychomotor inefficiency and brain damage are inter-related, (a) psychomotor inefficiency is not related to response inhibition at any level of I.Q. studied so far; (b) there may be, with I.Q.s decreasing below 70, a continuum of increasing degree of concomitant brain damage, and of omissive failures in response inhibition, although these continua are not significantly related to each other.

The criteria for diagnosing mental deficiency include not only low intelligence but also social maladaptation. In the present study maladaptation was assessed in relation to the institutional setting. It is of considerable interest that the subjects who were judged least maladapted were those who made the most omissive errors, and who showed in their social behaviour a general passivity or unresponsiveness. These individuals, who fail to respond to stimulation both in an experimental and an institutional setting when it is appropriate to do so, may be the 'inert' individuals observed by Luria and Stott. Since 'inertness' was not observed in other studies (e.g. Lowe, 1966; Tizard, 1962) it seems likely that 'inert' defects

of response inhibition predominate only below a certain level of I.Q. Above that level failures in response inhibition take the form of over-responding to stimulation, and a much more active type of asocial behaviour. Generally, it seems that under-responding, whether understood in a relative or an absolute sense, is preferred to over-responding, at least among the staff of institutions such as schools and mental deficiency hospitals. In Lowe's (1966) study, for example, the school children rated as more maladjusted were the ones who over-responded most, and who presumably gave the staff most trouble.

Whether or not this preference extends to ordinary society remains an open question. Gibson (1964, 1965) found that 'good' and 'naughty' boys were discriminated by Maze scores which were either 'quick and careless' or 'slow and careless', and that delinquent boys, especially the older ones, did tend to sacrifice accuracy for speed. Certainly it is plausible to assume that over-responders will tend quickly to come into direct conflict with any stable social setting, whether inside or outside an institution, and hence come to be regarded as 'delinquent'. But under-responders, although well adapted to some institutions, may nevertheless become delinquent outside their institution through their very passivity. Their helplessness often leads to their being taken advantage of by others (perhaps the over-responders), and hence to similar types of anti-social behaviour; while within the institution their under-responsiveness, preferred by staff, leads to their vulnerability being safeguarded.

Summary

The main findings of this study were that (a) significant failures in response inhibition among adult mental defective patients took the form of under-responding rather than over-responding to stimuli, and was typical of patients with lower I.Q.s. (b) Patients who under-responded were rated significantly less severely for social maladjustment by the staff. (c) The tendency to under-respond was not affected by the stimulus condition, the rate or order of stimulus presentation, or the age or sex of the subject. Findings are discussed in relation to previous studies, in terms of I.Q., brain damage, psychomotor inefficiency, and the evaluation by society of different forms of failure in response inhibition.

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