

SHORT NOTE

SPEED AND ACCURACY AS A FUNCTION OF PERSONALITY

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The present study aimed at investigating the speed and accuracy of introverts and extraverts on Choice Reaction Time and Visual Detection Task among 60 university male and female students assigned to meet the requirement of 2×2 between group factorial design. On Choice Reaction Time, the performance was assessed in terms of RT and errors committed; and on Visual Detection Task, the indices of performance were the number of digits detected and errors committed. The data were analysed by ANOVA. The findings of the study are at variance with the contentions of Eysenck: 1. introverts performed better than extraverts on Choice Reaction Time in terms of speed; 2. in Visual Detection Task, for the first 9 minutes extraverts maintained superiority as contended by Eysenck, but in the last minute lost the edge and introverts become better though insignificantly. The results on the Choice Reaction Time and last minute performance on Visual Detection Task controverts Eysenck's original standpoint regarding speed and accuracy in introverts and extraverts.

INTRODUCTION

Speed is the rate of work done by a subject and accuracy is the extent up to which work is correct. There are individual differences in the speed and accuracy with which tasks are performed. Some prefer speed while others prefer accuracy. According to Eysenck (1947, 1957), the individual differences in speed and accuracy are due to temperamental factors. Eysenck (1955, 1957) has related individual differences in Introversion/Extraversion to hypothetical inherited differences in the functioning of Central Nervous System. According to Eysenck's theory, the arousal level of introverts is higher than that of extraverts. Further, introverts excite quickly, accumulate Ir (Reactive-Inhibition, as observed by Hull, 1943) slowly and dissipate it faster, whereas, extraverts excite slowly, accumulate Ir faster and dissipate it slowly (Eysenck, 1955, 1957, 1967; Gray, 1972). Earlier, Eysenck (1947) provided evidence that extraverts were higher on speed whereas introverts placed greater premium on accuracy.

Later, Brebner and Cooper (1974) proposed a simple model of introversion-extraversion. This model made the assumption that the effects of stimulation impinging upon the individual, and the demands

for active responses from him were independent of each other, and that either could have central excitatory or inhibitory effects. From this standpoint, it was suggested that both extraverts and introverts were characterized by an imbalance between the effects of stimulation on the one hand and those of response organization on the other. In the case of introverts, it was hypothesized that stimulation created an excitatory state (S-excitation), whereas R preparation built up an inhibitory state (R-inhibition). The extravert was characterized as a person with the opposite tendency, that is, to generate excitation from the organization and emission of responses (R-excitation), but in the absence of response demands, the effects of stimulation rapidly becoming inhibitory (S-inhibition). Because the introvert tends to generate excitation from stimulation but inhibition from active responding, and the extravert tends to generate R-excitation but S-inhibition, Brebner and Cooper (1974) described the introvert as geared to inspect and the extravert as geared to respond. Thus, the extravert might be more accurately described as response-hungry rather than stimulus-hungry, a term in current use, though it is possible to maintain S-excitation in the extreme extravert with sufficiently varied and intense stimulation.

The present study designed on the basis of the assumption of Eysenck (1947) and those of Brebner and Cooper (1974), was to test whether introverts opt for accuracy and extraverts for speed on perceptual motor tasks, such as the Choice Reaction Time and the Visual Detection.

METHODS

A factorial design of 2×2 (Edwards, 1968) was employed in the present study. There were two personality groups, viz., introverts and extraverts in both males and females. A selected sample of 60 subjects was equally divided into four groups of two Personality and two sexes accounting for 15 subjects in each cell.

In order to select the subjects for the extreme personality conditions, a total of 250 males and females students of Himachal Pradesh University (Shimla) were administered the EPI form A (Eysenck & Eysenck, 1964). Subjects scoring within Mean $\pm \frac{1}{2}$ SD on N, and at the same time scoring above and below Mean $\pm \frac{1}{2}$ SD on Extraversion were termed as extraverts and introverts respectively.

The selected 60 subjects were given the Choice Reaction Time and the Visual Detection tasks.

Choice Reaction Time. The RT apparatus manufactured by Anand

Agencies (Poona, India) was used to obtain Choice RT of the subjects. Forty trials were taken for the Choice RT's. The trials were given in a random order. The wrong attempts, i.e., when the subject released the wrong key, were noted as errors.

Visual Detection Task. The Visual Detection task comprised of figures from 1 to 9, printed in rows on a plain paper. The signal of the digit "5" was scattered randomly in the series. The subject was required to mark the signal with pencil. For this task, the time allowed was ten minutes and the subject was instructed to work quickly to cancel the digit "5". The scoring was done in terms of right and wrong. The right score comprised of the number of digit "5" cancelled, and the attempt was considered wrong when the subject either cancelled other than the digit "5" or left out the required digit to be cancelled.

RESULTS

The ANOVA yielded highly significant F-ratios ($p < .01$) on the variable of personality for errors on CRT (see Table 2). An inspection of means (see Table 1) clearly shows that extraverts committed more errors than introverts.

Tab. 1 — Means of Choice Reaction Time and errors committed on Visual RT and on Visual Detection Task in terms of right and wrong scores in the first nine minutes and the last minute performance for the two personality groups and males/females

	Visual RT		Visual Detection Task			
	scores	errors	first 9 min.		last minute	
			scores	errors	scores	errors
introverts	224.90	1.60	410.70	10.07	44.07	.53
extraverts	232.73	3.73	455.40	24.90	41.33	3.13
males	222.20	2.67	439.73	16.60	42.23	1.73
females	235.60	2.67	426.37	18.37	43.17	1.93

For Visual Detection Task, ANOVA yielded highly significant F-ratios ($p < .01$) on the variable of personality for the right scores and the errors committed in the first 9 minutes, and for the errors in last minute performance (see Table 2).

The table of means (see Table 1) clearly shows the superiority of extraverts in total scores but in the process they committed more errors as the means indicate. In the last minute performance on the Visual Detection Task, the speed of extraverts decreased and the errors increased in comparison to those of introverts.

Tab. 2 — Analysis of variance on visual RT and errors and on Visual Detection Task for right and wrong scores for two personality groups and males/females

source of variation	scores			errors	
	df	mean square	F-value	mean square	F-value
VISUAL RT					
personality	1	920.40	1.32	68.26	32.22**
sex	1	2760.80	3.95	.00	.00
pers. × sex	1	4150.00	5.94 *	2.40	1.31
within	56	698.14		2.12	
total	59				
VISUAL DETECTION TASK (first 9 min.)					
personality	1	30420.00	8.80**	3300.42	20.45**
sex	1	2816.00	.82	46.82	.29
pers. × sex	1	5742.00	1.66	390.15	2.42
within	56	3455.09		161.39	
total	59				
VISUAL DETECTION TASK (last minute)					
personality	1	112.06	1.52	101.40	23.25**
sex	1	13.06	.18	.60	.14
pers. × sex	1	106.68	1.46	.07	.02
within	56	72.91		4.36	
total	59				

** = significant at .05 level;

* = significant at .01 level.

In RT, the interaction between personality and sex has been found to be significant at .05 level.

The obtained interaction clearly suggests that introverted males perform significantly better in comparison to other groups (see Table 3).

Tab. 3 — Mean results for the interaction between the two personality groups and males/females in Visual RT

	Visual RT	
	males	females
introverts	209.80	240.00
extraverts	234.27	231.20

DISCUSSION

The present experiment was primarily designed to test Eysenck's (1947) hypotheses with regard to speed and accuracy in introverts and

extraverts. Later, Brebner and Cooper (1974) suggested that introvert was known as "geared to inspect" and extravert as "geared to respond". Brebner and Flavel (1978) have shown that extraverted subjects made more commissive errors on simple RT with the introduction of catch trials. Though on initial trials, the two groups did not differ significantly, the extraverts gave shorter RT's than the introverts. These results were in consonance with the theoretical model of Brebner and Cooper (1974). In the present study on Choice Reaction Time, the results show the superiority of introverts over extraverts (see Tables 1 and 2). As far as speed is concerned, the obtained results on CRT controvert Eysenck's original position. In Choice Reaction Time, introverts give shorter runs of RT's because of the fact that the element of choice between two lights creates an obstruction in the free responding of extraverts. Hence, the performance decrement in extraverts. The present results on Choice Reaction Time are very much comparable to those of Brebner and Flavel (1978) who have shown that RT increases as the catch trial rate rises.

On the Visual Detection Task, the results are very much in accordance with the assumptions of Eysenck (1947) and those of Brebner and Cooper (1974), i.e., extraverts are higher on speed and introverts on accuracy in first 9 minutes of work period (see Tables 1 and 3). This is borne out by the highly significant F-ratios ($p < .01$). But on the last minute performance there is a complete crossover in performance as far as the speed is concerned. In the last minute, it seems introverts remain steady and extraverts develop Ir. The results on the Visual Detection Task do not fit in well with the earlier contention of Eysenck (1947), but these certainly do with his later theoretical position (Eysenck, 1955, 1957, 1967). It may be suggested that in Choice Reaction Time and in last minute performance on Visual Detection Task, the extraverted subjects might have developed S-inhibition (Brebner & Cooper, 1974) since the disturbing element was introduced in the experimental situation. This is not for the first time that such results have been obtained. Earlier, Kumar (1975) in a problem-solving situation has clearly shown that on easier tasks extraverts were significantly superior to introverts, but as the problems became difficult, the introverts became significantly superior in both trials and time taken. Mohan and Kumar (1974, 1976) have clearly shown that on simpler sets of SPM extraverts were superior, whereas on difficult sets introverts performed significantly better.

In the present study, the interaction between personality and sex has been found to be significant in the Choice RT. It is seen that introvert

males perform significantly better than other groups. The main difference lies between introvert males and introvert females. However, males as a group, perform better than females. Such kind of differences in problem solving ability has been obtained in males and females (Kapila and Kumar, 1986). One of the possible explanations for the obtained interaction may be that males do much more with speed than females. Secondly, in the present investigation the females are not as introverted as the males (the means for the two sexes are: males = 4.76 and females = 6.94). The findings of the present study, in terms of speed and accuracy in introverts and extraverts clearly suggest that if the arousal level of introverts is higher (Eysenck, 1967; Gray, 1972) extraverts may not be able to maintain superiority in speed for a very long time. This has already happened in Visual Detection Task because of Ir, since extraverts are especially prone to it. Hence, Eysenck's original views regarding speed and accuracy in introverts and extraverts need be modified.

For future research, it may be suggested that the tasks chosen to test speed and accuracy in introverts and extraverts should be such as to not create obstruction in free responding of the subjects. In the light of present results, it may be inferred that studies undertaken in this area can obtain results either way, e.g., Bucklew (1973) proposed that extraverts would have long RT's since introverts have lower sensory thresholds. On the other hand, Brebner and Flavel (1978) have shown that prior to the introduction of catch trials, extraverts were better. Thus it may be suggested that Eysenck's position regarding speed and accuracy may be very general and not something specifically applicable in a particular experimental situation.

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