

Panjab University Chandigarh
Department of Psychology

THE EFFECT OF INTELLIGENCE AND PERSONALITY ON VERBAL CONDITIONING¹

VIDHU MOHAN & INDIRA DHARMANI

The investigation aimed at determining the effect of three levels of intelligence – bright, average and dull – and four groups of the personality – stable, neurotic and extravert, introvert – on verbal conditioning. On the basis of their scores on two intelligence tests and JPI, 72 children, half of each sex, were experimented through Taffel's Sentence Completion method. The results showed that dull subjects conditioned best, followed by average and bright subjects. The introverts conditioned better than extraverts, supporting Eysenck's theory. The stables conditioned better than the neurotic subjects.

PROBLEM

Since the time Greenspoon (1954) used the Skinnerian (1938) design for verbal conditioning, various designs and techniques to provide appropriate reinforcement to verbal responses, have ensued. Das and Mitra (1962), Stone and Rowley (1965), Jawanda (1965), Mohan and Claire (1968), followed Taffel's (1955) 'Sentence completion Technique' for studying verbal conditioning. The present investigation will be using the same method. As regards forms of reinforcement, these can be broadly grouped as : 1. verbal cues such as 'Mmm-Hmm' (Greenspoon, 1955) and 'good' (Ball, 1952; Taffel, 1955; Krasener, 1958; Das and Mitra, 1962; Mohan and Claire, 1968); 2. gestural cues – such as head-nodding and shaking (Hartman, 1955) or smiling (Verplanck, 1955); 3. mechanical cues such as light flash (Ball, 1952; Greenspoon, 1954; Nutmann, 1957) buzzer (Ball, 1952; Greenspoon, 1954) and a belltone (McNair, 1957).

The past two decades have witnessed the growth of relationship between personality in terms of Eysenck's (1947) (neuroticism and extraversion), and conditioning. However, the exact relationship between the said dimensions and conditioning has given rise to two sets of hypotheses the Eysenck-Franks hypothesis and the Spence-Taylor hypothesis.

Spence and Taylor (1951) working within the Hullian frame work, have assumed like Mowrer (1939), and Miller (1948) that response strength in a conditioning situation is some positive function of the

¹ Proceedings 2nd Conference on Psychology of human learning and problem solving. Prague. 1973.

total Drive which in turn is partly internal anxiety or emotionality. Therefore, individuals with a greater degree of anxiety, possessing greater Drive would condition better than those having less of it. And Neuroticism being highly positively correlated with Taylor's concept of anxiety, should yield similar relationship with conditioning.

The Eysenck (1957), Franks (1957) hypothesis, on the other hand relates conditionability to the excitation-inhibition balance of the CNS (Pavlov, 1927), on which Extraversion is based. The introverts excite quickly but build up inhibition slowly and dissipate it faster as such are expected to condition better than the extraverts, who excite slowly, build up inhibition faster and dissipate it slowly.

According to Madan (1967) the aforesaid two views are not really irreconcilable. It has often been found that anxiety and introversion have a significantly positive relation. Thus the high on anxiety and high on introversion may not be mutually exclusive and therefore cause the confusion. The present study attempts to re-examine the relationship between Neuroticism, Extraversion and verbal conditioning in a group of children instead of adults.

Intelligence, the second variable under study, has been defined by Green (1953) as the 'ability to learn'. It implies that the more intelligent an individual the more readily and extensively he will be able to learn; and the bright and dull individuals thus ought to have diametrically opposite rates of learning. One group of investigators (Wilson, 1928; Ellis et al. 1960) reported bright Ss to be superior to dull ones on rote learning. Krasnogorski (1913) obtained a similar relationship on the conditioning of bright and dull subjects, Girardeau (1959) found bright Ss superior on discrimination learning. The second group of findings reported no difference in the performance on normals and retardates on transfer, verbal learning, serial learning, psychomotor tasks and rote learning (Woodrow, 1917; Cassell, 1957; Johnson, 1958; Johnson and Blake 1910; Berkson and Cantor, 1960 respectively). The third group of investigators maintain that retardates can perform better in certain learning tasks. Johnson (1958) found retardates superior to normals on psychomotor tasks. Cornil and Goldenfoun (1928), and Osipova (1933) reported similar results on kneejerk conditioning and finger withdrawal.

Perhaps more work is required in this area with greater specification of condition of both the learning task and intelligence. The present study attempts to find the difference, if any, in verbal conditioning when three levels of intelligence are used with children as subjects.

EXPERIMENTAL DESIGN

An experimental design of 4×3 , yielding 12 conditions, was framed. There were four personality groups: Neurotics (N_+), Stables (N_-), Extraverts (E_+), and Introverts (E_-); and three levels of intelligence: Bright, Average and Dull.

MATERIAL

1. Intelligence Tests : The "Standard Progressive Matrices" (Raven, 1960) henceforth called the SPM, consisting of 60 progressively difficult problems, was used. It is a specimen of culture free test. The second was a verbal test called "A Group Intelligence Test" (Mehta, 1962) (henceforth called GIT). It is a timed test for 20 minutes. It consists of 60 questions in Hindi.

2. Personality Test : The JPI (Mohan et al., 1968) was used to measure Neuroticism and Extraversion. It consists of 68 items in Hindi — 34 for each dimension, having parallel form which provides an automatic check for laying through their discrepancy in scores.

3. Apparatus for Verbal Conditioning : Unlike Jawanda (1965) and Mohan and Claire (1968) who exposed the verbal material without any controlling apparatus, the present investigators used an Electric Memory Drum (manufactured by Anand Agencies). It consisted of a 6×6 drum for attaching material, with a $3/4$ " slit to expose the necessary words. The rate of exposure was adjustable and for the present experiment it was regulated at five seconds per exposure. A list of four lettered 100 adjectives was prepared from standard grammar books. Each adjective was surrounded by pronouns : 'I', 'He', 'She' and 'You' in a random order.

SELECTION OF SUBJECTS

The SPM (Raven, 1960) and the GIT (Mehta 1962) were administered to 200 boys and 200 girls of various schools of Chandigarh, according to the instructions provided in the respective manuals. Since the GIT had been used only on the Rajasthan population, fresh means, SDs, and norms were calculated. The sex difference for the age levels along with the parallel norms for SPM taken from the manual (Raven, 1960) and respective scores, are presented in Table 1.

The children falling in the 10-30 percentile were regarded as dull, between 40-60% as average and between 70-90% as bright. The selected 275 subjects were then administered the JPI (Mohan et al., 1968). The range of scores on the JPI according to the age and sex norms, on the basis of which selection of N+, N-, E+ and E- groups were made, is presented in Table 2.

A final group of 72 subjects — 36 boys and 36 girls — ramified into the three intelligence groups and four personality groups, was experimented upon for verbal conditioning.

EXPERIMENT

Pilot study was carried out to determine the reinforcing stimulus and the response to be reinforced. First of all light was used to reinforce the pronoun 'You'. The subjects took the clicking sound of light as

punishment. Ball (1952) and Taffel (1955) too had reported failure of 'Light' as a reinforcer. Besides this Ss, in the present case, identified 'You' with the experimenter and fearing offence, deliberately avoided its uses in the sentence they framed.

Ball (1952) and Greenspoon (1954) had reported positive effect of

percentile points	11 years		12 years		13 years		14 years	
	SPM	GIT	SPM	GIT	SPM	GIT	SPM	GIT
95	50	53	51	50	52	51	53	53
90	47	51	49	49	50	49	52	49
80	—	46	—	47	—	48	—	44
75	41	44	45	46	47	47	48	43
70	—	44	—	45	—	44	—	42
60	—	42	—	43	—	43	—	40
50	35	39	39	42	43	39	44	38
40	—	37	—	38	—	36	—	37
30	—	35	—	35	—	33	—	34
25	26	34	32	34	35	31	38	32
20	—	33	—	31	—	30	—	30
10	16	30	22	27	27	25	28	26

TAB. 1. COMPARATIVE PERCENTILE NORMS FOR SPM AND GIT

'Mmm-Hmm' as a reinforcer in adult subjects. However, in the present case, children failed to condition when 'Mmm-Hmm' was used. Similar negative results have also been reported by Daily (1953), Hildum and Brown (1956).

Finally, the meaningful oral reinforcer 'Good', as used by Taffel (1955) Krasner (1958) and Mohan and Claire (1968) to the pronoun 'He' was found to be the most satisfactory. The final experimentation

personality group	11 years		12 years		13 years		14 years	
	boys	girls	boys	girls	boys	girls	boys	girls
N+	17+	15+	17+	17+	16+	17+	16+	18+
E average	14-16	14-16	14-16	14-16	14-16	15-17	14-16	14-16
N-	11-	9-	11-	11-	10-	11-	10-	12-
E average	14-16	14-16	14-16	14-16	14-16	15-17	14-16	14-16
E+	17+	17+	17+	17+	17+	18+	17+	17+
N average	12-16	10-14	12-16	12-16	11-15	12-16	11-15	13-17
E-	13-	13-	13-	13-	13-	14-	13-	13-
N average	12-16	10-14	12-16	12-16	11-15	12-16	11-15	13-17

TAB. 2. RANGE OF SCORES FOR PERSONALITY GROUPS IN DIFFERENT AGE LEVELS

on the 72 subjects was carried out with the standard 'Sentence Completion Technique : (Taffel, 1955) using 'Good' as the reinforcer to 'He'. A total of 100 trials was administered, out of which the first 24 were without any reinforcement, the middle 52 were reinforced and the last 24 were the test trials without reinforcement.

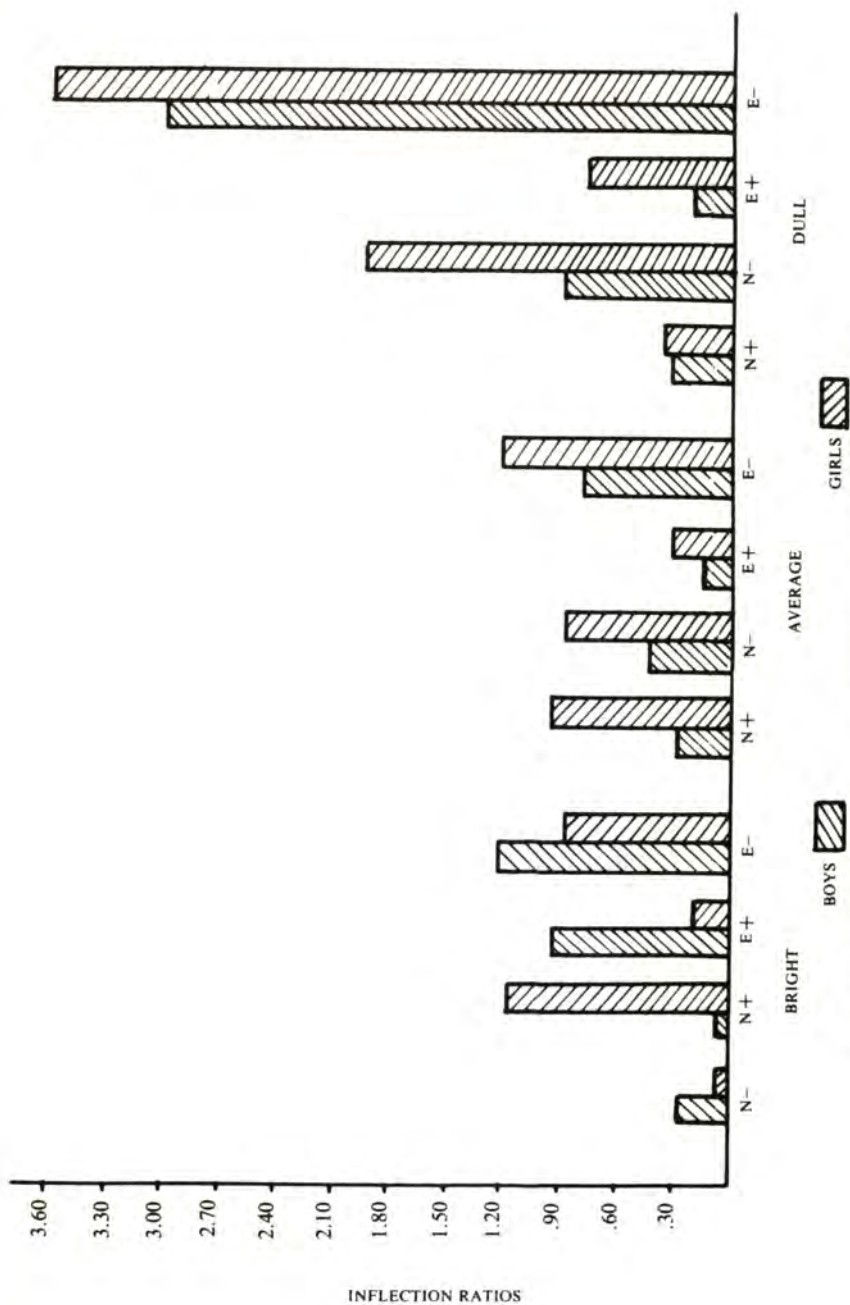


FIG. 1. EFFECTS OF INTELLIGENCE AND PERSONALITY ON VERBAL CONDITIONING

RESULTS

The evaluation of the performance on the test trials against the initial trials was done by calculating the inflection ratios by the method used earlier by Jawanda (1965) and Mohan and Claire (1968). The mean inflection ratios for the three intelligence, four personality and two sex groups are graphically presented in Fig. 1.

The mean inflection ratios for bright, average and dull subjects on the intelligence were .60, .65 and 1.37 respectively. Analysis of variance was performed to statistically test the differences in various intelligence and sex groups. The results are summarized in Table 3. Since the *F*

source of variance	sum of squares	df.	mean square	F-ratio	significance
between groups	12.32	5	2.46	1.67	
between intelligence	9.40	2	4.70	3.19	.05
between sex	1.65	1	1.65	1.12	
between intelligence sex	1.27	2	0.63		
error	97.08	6	1.47		
total	109.40	71			

TAB. 3. ANALYSIS OF VARIANCE PERFORMED ON THE INFLECTION RATIOS OF THE THREE LEVELS OF INTELLIGENCE

ratio for between intelligence just missed significance, *t*-ratios were calculated between dull and average subjects and dull and bright subjects. The respective *t*-ratios were 5.6 and 27.3, both significant at .01 level.

On the variable of personality, the two separate statistical analyses were required to test the differences in the inflection ratios of *N*⁺ and *N*⁻ groups and the other for *E*⁺ and *E*⁻ groups. Hence two analyses of variance were performed for *N*⁺, *N*⁻ intelligence levels and for *E*⁺, *E*⁻ intelligence levels. The results of both analyses of variance are presented in Table 4. The stables conditioned significantly better than the neurotics; the introverts had significantly higher inflection ratios than the extraverts.

DISCUSSION

INTELLIGENCE AND VERBAL CONDITIONING

The relationship between intelligence and learning has often been presumed to be linear and positive. Whether this relationship would hold true in all the areas of learning has not as yet been conclusively proved. The present results show an inverse relation between intelligence and verbal conditioning, the dull subjects having the highest inflection

ratio followed by average and then bright subjects. In the earlier studies, Ellis et al. (1960), Ellis (1963), and Girardeau (1959) using rote learning found bright ones to be superior to the dull ones. On the other hand, Wallin (1929) using tasks of counting backwards, Osipova (1933) using

source of variance	sum of squares	df.	mean square	F-ratio	significance
between groups	5.18	5	1.36	3.24	
between neuroticism	2.38	1	2.38	5.67	.05
between intelligence	1.33	2	.56	1.57	
intelligence & neuroticism	1.47	2	.73	1.74	
error	12.55	30	.42		
total	17.70	35			
between groups	36.21	5	7.24	4.33	
between extraversion	14.99	1	14.99	9.97	.01
between intelligence	15.27	2	7.63	4.56	.05
extraversion & intelligence	5.95	2	2.97	1.78	
error	49.94	30	1.67		
total	86.15	35			

TAB. 4. ANALYSIS OF VARIANCE PERFORMED ON THE INFLECTION RATIOS OF NEUROTICS (N+) AND STABLES (N-) AND EXTRAVERTS (E+) AND INTROVERTS (E-)

kneejerk conditioning and finger withdrawal, Laycock and Stenley (1942) with reproductive tasks, found the retardates and dull subjects superior to normals.

The present and the earlier similar findings that dull subjects perform better on certain learning tasks, may be explained through the dynamics of motivation for different levels of intelligence. Cromwell (1963) found retardates to have a higher expectancy of failure which spurs them to additional effort to achieve success. In the present study too, it was observed that even the teachers took failure of retardates for granted, whereas the bright subjects took success for granted. This expectancy of failure in the case of dull subjects might have motivated them more and thus their better verbal conditioning. Another reason why retardates perform better, may be that positive reinforcement after success motivates dull subjects more than the normals (Gardner, 1957, and Heber, 1957). In the present experiment the use of 'Good' as the reinforcer might have acted as a reward or praise which was of greater value to the dull subjects than the other groups.

PERSONALITY AND VERBAL CONDITIONING

The present results statistically support Eysenck-Frank's hypothesis that the introverts condition better than extraverts. Eysenck (1959), Johs and Quay (1962), Howrath (1963), and Jawanda (1965), too had found introverts to be superior to extraverts on verbal conditioning.

This superiority of the introverts has been explained in terms of their facilitative excitatory tendencies in contrast to inhibitory tendencies of the extraverts.

On the dimension of the Neuroticism the present results refute Spence-Taylor's hypothesis. The stables instead of neurotics showed significantly higher inflection ratios on verbal conditioning. Madan (1967) had earlier given an extensive explanation of the better performance of the stable subjects on the basis of the Yerkes-Dodson Law. According to this explanation, with the increase in the task difficulty a negative relationship is expected to appear between neuroticism and performance.

REFERENCES

- BALL, R.S. *Reinforcement conditioning of verbal behaviour by verbal and non-verbal stimuli in a situation resembling a clinical interview*. Unpublished doctoral dissertation, Indian University, 1952.
- BERKSON, G., & CANTOR, G.N. A study of mediation in the mentally retarded and normal school children. *Journal of Educational Psychology*, 1960, 82-86.
- CASSELL, J.T. Serial verbal warning and retroactive inhibition on aments. *Journal of Clinical Psychology*, 1957, 13, 269-72.
- CORNIL, L., & GOLDENFOUN, F. Sur les reflexes associés chez les enfants anormaux. *C.R. Soc. Biol.*, 1928, 99.
- CROMWELL, R.L. A social learning approach to mental retardation. In N.E. ELLIS (Ed.), *Handbook of mental deficiency*. New York: McGraw Hill, 1963, 41-91.
- DAILY, J.M. Verbal conditioning without awareness. *Dissertation Abstracts*, 1953, 13, 1247-48.
- DAS, J.P., & MITRA, A.R. Relative effectiveness of electric shock and praise and reproof in verbal conditioning. *Journal of General Psychology*, 1962, 67, 141-46.
- ELLIS, N.R. The stimulus trace and behaviour inadequacy. In N.E. ELLIS (Ed.), *Handbook of mental deficiency*. New York: Mc Graw Hill, 1963.
- ELLIS, N.R., PRYER, & DISTEFANO. Learning in mentally defective, normal and superior subjects. *American Journal of Mental Deficiency*, 1960, 63, 304-306.
- EYSENCK, H.J. *Dimension of Personality*. London: Routledge & P. Kagan, 1947.
- EYSENCK, H.J. *The dynamics of anxiety and hysteria*. London: Routledge & P. Kagan, 1957.
- EYSENCK, H.J. Personality and verbal conditioning. *Psychological Reports*, 1959, 5, 507.
- FRANKS, C.M. Personality factors and the rate of conditioning. *British Journal of Psychology*, 1957, 48, 119-126.
- GARDNER, C.I. *Effects of interpolated success and failure on motor task performance in mentally defectives*. Paper read at the South East Psychological Association, Nashville, Tennessee, 1957.
- GIRARDEAU, F.L. The formation of discrimination learning sets in mongoloid and normal children. *Journal of Comparative and Physiological Psychology*, 1959, 52, 566-70.
- GREEN, C.W. The relationship between intelligence as determined by intelligence tests and the ability to learn as determined by performance on learning test. *Journal of Educational Research*, 1953, 47, 191-200.
- GREENSPOON, J. The effects of two non-verbal stimuli on the frequency of members of two verbal response classes. *American Psychologist*, 1954, 9, 384.

- GREENSPOON, J. The reinforcing effect of the two spoken sounds on the frequency of two responses. *American Journal of Psychology*, 1955, 68, 409-16.
- HARTMAN, C.H. Verbal behaviour of schizophrenic and normal subjects as a function of types of social reinforcement. *Dissertation Abstracts*, 1955, 15, 1652-53.
- HEBER, R.F. *Expectancy and expectancy change in normal and mentally retarded boys*. Unpublished doctoral dissertation, Ann Arbor, Michigan University, 1957.
- HILDUM, D.C., & BROWN, R.W. Verbal reinforcement and interviewer bias. *Journal of Abnormal and Social Psychology*, 1956, 53, 108-111.
- HOWRATH, E. Some laboratory measures of extraversion and introversion. *Perceptual and Motor Skills*, 1963, 17, 55-60.
- JAWANDA, J.S. *Age, sex, and personality variables in verbal conditioning and its modifications by drugs*. Unpublished doctoral dissertation. Panjab University, 1965.
- JOHNSON, G.C. *Comparative studies of some learning characteristics in mentally retarded and normal children of the same mental age*. Syracuse University, Research Institute, 1958.
- JOHNSON, G.O., & BLAKE, K.A. Learning performance of retarded and normal children. *Special Education and Rehabilitation Monograph Series*, Syracuse University Press, 1960, No. 5.
- JOHS, J.H., & QUAY, H.C. The effect of social reward on verbal conditioning in psychopathic and neurotic military offenders. *Journal of Consulting Psychology*, 1962, 26, 217-20.
- KRASENER, L. Studies of the conditioning of verbal behaviour. *Psychological Bulletin*, 1958, 55, 148-70.
- KRASNIGORSKI, K. In RAZRAN, G., Conditioned responses in children: A behavioural and quantitative critical review of experimental studies. *Archives of Psychology*, 1913, No. 148.
- LAYCOCK, S.R., & STANLEY, C. The comparative performance of a group of old-dull and young-bright children on some items of revised Stanford-Binet scale of intelligence form L. *Journal of Educational Psychology*, 1942, 33, 1-12.
- MADAN, V. *The relation of neuroticism and extraversion to intelligence and educational attainment at different age levels*. Unpublished doctoral dissertation, Panjab University, 1967.
- MENAIR, D.M. Reinforcement of verbal behaviour. *Journal of Experimental Psychology*, 1957, 53, 40-46.
- MEHTA, P. *Manual of a General Intelligence Test*. Dehli-6, Mansayan, 1962.
- MILLER, N.E. Studies on fear as an acquirable drive. 1. Fear as motivation and fear reduction as reinforcement in the learning of new responses. *Journal of Experimental Psychology*, 1948, 38, 89-101.
- MOHAN, J., & CLAIRE, C. An experimental study of the personality determinants of verbal conditioning. *Manas. Journal of Scientific Psychology*, 1968, 15, 87-93.
- MOHAN, V., SINGH, S.D., & KALRA, S. A junior personality inventory. *Psychological Research*, 1968, 12(1).
- MOWRER, C.H. A stimulus response analysis of anxiety and its role as a reinforcing agent. *Psychological Review*, 1939, 46, 553-65.
- NUTHMANN, A.M. Conditioning of a response class on a personality test. *Journal of Abnormal and Social Psychology*, 1957, 54, 19-23.
- OSIPOWA, C. In RAZRAN, G., Conditioned responses in children: A behavioural and quantitative critical review of experimental study. *Archives of Psychology*, 1933, No. 148.
- PAVLOV, I.P. [*Conditioned reflexes*] (ANREP, trans.). London, Oxford University Press, 1927.
- RAVEN, J.C. *Guide to the Standard Progressive Matrices A, B, C, D, and E*. London Lewis & Co., 1960.

- SKINNER, F. *Behaviour of organism*. New York : Appleton-Century-Crofts, 1938.
- SPENCE, K.W., & TAYLOR, J. Anxiety and strenght of UCS as the determiners of the amount of the eyelid conditioning. *Journal of Experimental Psychology*, 1951, 42, 183-88.
- STONE, F.B., & ROWLEY, V.N. The effect of number of choice alternatives in the Taffel techniques upon the rate of conditioning and awareness in children. *Journal of Psychology*, 1965, 181-184.
- TAFFEL, C. Anxiety and conditioning of verbal behaviour. *Journal of Abnormal and Social Psychology*, 1955, 51, 496-501.
- VERPLANCK, W.S. The control of the content of conversation. Reinforcement of statements of opinion. *Journal of Abnormal and Social Psychology*, 1955, 51, 668-676.
- WILSON, F.T. Learning of bright and dull children. *Teacher's College Contributions to Education*, 1928, No. 292.
- WOODROW, H. Practice and transference in normal & feeble minded children. *Journal of Educational Psychology*, 1917, 3, 85-96; 151-165.

Department of Psychology
Panjab University
Chandigarh (India)

Received August 1975