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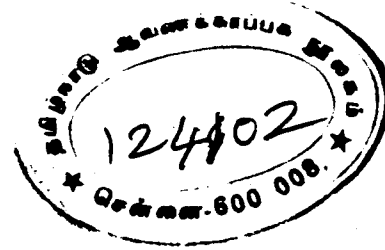
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A Scale for the Measurement of Subjective Duration

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The object of constructing a subjective scale for any sense modality is the establishment of a functional relationship between the physical continuum and the corresponding psychological continuum. In other words, a relation between the subject's evaluation of the magnitudes of physical stimuli expressed in arbitrarily chosen psychological units and the magnitudes of the stimuli themselves in physical units is established to provide a basis for prediction.

Recent years have witnessed varied experimentation carried on by eminent psychologists in this direction. The present author has made an attempt to construct a psychological scale of temporal interval or duration.

Experiment

A psycho-physical experiment on temporal estimation has been performed with 10 post-graduate students of 20-26 years age group as subjects. Four temporal intervals of 400, 800, 1600 and 2400 milliseconds (ms.) are chosen as the standard stimuli which are presented to the subjects visually.

The widely used half-estimation technique has been adopted. The subjects are instructed to produce a temporal interval which seems to him to be half as long in duration as the standard interval given.

In separate sessions hundred observations—fifty for filled and fifty for unfilled interval of the stimulus for each subject have been made for each of the four durations. The method of average error is used.

Subjects are made acquainted with their task in a preliminary practice experiment and all necessary experimental precautions are taken.

Result and Discussion

Medians of observer's judgments for each standard stimulus are calculated. Difference between the median judgments of different individuals as well as that between the median values of judgments at different duration levels are found to be significant. But the magnitude of variations between median judgments for filled and for unfilled presentation of the stimuli is not so significant. As a result, the psychological scales of duration constructed from these two series of data will not differ significantly. So, there is no justification

in the separate treatment of the data; hence all data are combined together.

Now, if the median of the stimuli judged half (S_h) as shown in Table 1 are plotted against the standard stimuli S_s on log-log graph a straight line will be obtained.

TABLE 1

Standard Durations and Median Durations judged half

Standard Durations (S_s)	Median Durations (S_h)
400 ms.	204.1 ms.
800 „	409.4 „
1600 „	820.3 „
2400 „	1274.2 „

The equation of the line, determined by using the method of least square, is $\log S_h = 1.0278 \log S_s - .3790$ or $S_h = 4179 S_s^{1.0278}$

So, the subject's response is a linear function of the stimulus. This finding conforms to the findings of similar investigations in this direction.

From this line we can construct a psychological scale for temporal interval, and determine its relation to the physical scale for the same both (A) graphically and (B) analytically.

(A) *Graphically*: The co-ordinates of any point on the above line indicate the physical interval and the corresponding psychological interval judged half as long. A temporal interval of 524.8 ms. is found to be judged half as long in duration as that of 1000 ms.

Now, a psychological unit for the half-estimated stimulus is to be chosen in order to relate the psychological scale of temporal interval expressed in that unit with the scale of the stimulus expressed in physical units. The temporal interval which is estimated half as long in duration as that of 1000 ms. is arbitrarily chosen as the unit of subjective duration. The unit is named as Dauer (Dauer - German equivalent of duration). So, 1000 ms. corresponds to the subjective interval 1 Dauer (D).

Since the temporal interval of 524.8 ms. is judged to be half as long in duration as that of 1000 ms. (.5) Dauer is assigned to the subjective interval corresponding to 524.8 ms. Following this convention, fractional proportionate Dauer values, i.e., .25 D, .125 D etc. and the corresponding physical intervals are calculated.

Conversely from the graph an interval of 1000 ms. is found to be judged half as long as 1888 ms. So to the subjective interval (1000 ms.) corresponding to the physical interval of 1888 ms. 2 Dauer is assigned and so on. The temporal interval in ms. and the corresponding subjective interval expressed in Dauer is shown in Table 2.

TABLE 2

Physical Durations and Corresponding Psychological Durations

Physical Durations (in ms.) M	log M	Psychological Durations (in Dauer) D	log D
138.0	2.14	.125	T.097
272.3	2.43	.25	T.398
524.8	2.72	.5	T.699
1000	3.00	1.	0.000
1888	3.27	2.	0.301
3500	3.54	4.	0.602

Thus a Dauer scale for subjective temporal interval on duration is constructed.

(B) *Analytically*: To construct the subjective scale of duration analytically a number of empirical equations relating the physical interval (M) with the corresponding psychological interval (D) has been deduced from the graphs drawn with the data of the Table 2.

(1) If the D's (3rd col. of Table 2) are plotted against the corresponding log M's (2nd col.) a parabolic curve is obtained, the equation of which is—
 $D = 34.3333 - 23.8946 \log M + 4.5454 (109 M)^2$

(2) If log D's (4th col.) are plotted against log M's a linear curve is obtained, the equation being—

$$\log D = 1.0750 \log M - 3.2250$$

This equation may be expressed as

$$D = .0006 M^{1.0750}$$

The relation between D and M can also be expressed by the following equation deduced from the method suggested by Harper and Stevens

$$\log D = 21.4995 \log (1 + .2582 \log M) - 4.9708$$

The above equations help to determine the value of subjective duration corresponding to any temporal interval, i.e., physical duration.

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Latent Personality Content of Juvenile Delinquents

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Introduction

The object of the present research is to differentiate some basic personality patterns of delinquents committing different types of offence. Zulliger, Beck Kelly and Flicker, (2) have investigated the personality factors of delinquents by projective tests, mainly with Rorschach plates. Previous workers have tried to assess the personality of delinquents in general comparing it with non-delinquent. The present authors have made an effort to distinguish between delinquents alleged to commit four different categories of crime.

Method and Procedure

In the first group, the juvenile offenders charged with repeated theft, pick-pocketing, house-breaking, etc., are considered. The second group consists of those committing sex and related offences. The third group contains cases related to illicit liquor and allied offences. The fourth group contained delinquents who are caught on the charges of petty offences like creating obstruction in the public places, entering into prohibited areas, etc.

The tests used in the present investigation are the Rorschach test and a Neuroticism questionnaire developed by G. Bose. Individual history sheets which contained family history, and type of serious illness, economic conditions, conditions of living, offences, etc., were also consulted. There were only five subjects in Group II as very few cases of this type can be had in the detention homes. In the remaining groups there were 8 in each. In Group IV S's are all below the age of ten, the range for the other groups being ten to sixteen years.

Rorschach and the Neurotic questionnaire revealed the following results. The method of interpretation was adopted from the techniques used by Mons (3).

Results

From the Rorschach study we have found that the personalities of all the delinquents of different groups show significant differences from the normal personality picture.

(a) *Basic Personality*: Among all the groups the F% is high which shows the constriction or coarctation of personality. The odd distribution

TABLE I
Summary Table of the results

Group	m%	FM%	M%	K%	k%	Fk%	F%	Fc%	c%	Cm%	km%	FC%	CF%	C%	W%	D%	d%	dd%	ddd%
1	2.5	6.0	2.0	4.0	0.2	2.0	68.0	0.8	0.5	1.0	1.0	5.0	5.0	2.0	7.8	62.5	12.2	16.0	1.5
2	2.7	6.0	3.0	4.0	0.4	3.0	62.0	0.6	0.5	3.0	3.8	5.0	2.0	4.0	8.0	62.0	15.0	14.0	1.0
3	3.0	10.0	5.0	4.0	0.2	4.0	62.8	0.5	0.3	0.2	0.0	5.0	2.0	3.0	8.6	62.4	15.0	14.0	0.0
4	5.0	7.0	2.0	4.0	0.4	4.0	63.5	0.3	0.4	0.2	0.2	5.0	5.0	3.0	5.0	60.0	17.0	18.0	0.0

of other determinants on both sides of F shows that these are not the graphs of balanced and well adjusted personalities. The constriction may be due to some anxiety present in all the groups, particularly in the second group. The E. B.s in the first group are significantly different for different groups. And in the third group the mental activity is mostly extratensive. The second is of introvert type. The fourth group consists both of introversive and extratensive types.

(b) *Personality Structure*: Most of the delinquents in the sample are confused and loose in succession. Very few of them are methodical and orderly towards the problems. The first group is more stable emotionally than the second and third groups. But the emotional balance is slightly impaired by the presence of primitive hostile inner forces in the case of the first group. The second group is highly unstable and the primitive hostile impulses are so numerous that there is possibility of violent outburst of emotions. This group is guided by emotions and impulses rather than by intellect. The subjects in the third group are slightly impulsive but primitive hostile inner forces do not crave their mind. In the fourth group these forces are present in some cases and are altogether absent in others.

The first and third produce enough D responses to cope with common-sense and possess good eye for the practical side of life. But these are lesser in the case of the second group. The fourth group consists of both but minor detail (d.dd) responses are numerous to show the petty interests common to their age group.

(c) *Mental Activity*: All the groups are lacking in the normal capacity for abstract ideas. The number of minor details in the case of second and third group obviously indicate the tendency to avoid reality. The proportion W : M points out the most unfavourable balance between the capacity for abstract thought and fantasy life in all the cases. The fantasy life is altogether immature. The excess of FM over M indicates the infantile urges. The primitive drives are far greater than fantasy can deal with in all the cases. Hostile impulses are closely linked up with anxiety (K.m) and emotion (em) in the case of the second group and in the case of a few subjects of the first group.

(d) *Intellectual Level*: Intellectual level is slightly below average with the exception of few cases. But intelligence is overshadowed by the anxiety and primitive hostile inner forces.

(e) *Emotional Life*: (I) *Ties with outer reality*: Subjects are passionate, explosive and unstable in the case of second group and unstable in the case of the 1st and 3rd groups. In Group 4, there are some who are passionate and unstable and others are only unstable.

(II) *Ties with inner life*: These are poor. The fantasy is quite inadequate for dealing with all the emotional impulses. These must then activate the infantile desires and primitive urges with resulting anxiety we find in K. But

the members of the Group 1st and 3rd are trying to make their anxiety more reasonable in touch with reality (FK), which is altogether absent in 2nd group. Most of the members of Group 4 have few FK responses.

Other Factors for Interpretation

The proportion $(H + A) : (Hd + Ad)$ suggests that the 1st group has more self-confidence and concentration than the 2nd and the 3rd groups. The 2nd group lacks self-confidence and concentration. The 1st group is usually susceptible to environmental influence. The 2nd group is very susceptible and the 3rd group is not unusually susceptible to environmental influences. The 4th group comprises all the above varieties. There are few signs of neurosis and hysteria in the 1st group. Several signs of hysteria and neuroses are present in the 2nd and 3rd groups. The 4th group contains all the above varieties. Signs of organic lesion are present in those individuals who have several signs of hysteria and neuroses and all of these individuals are in the 2nd group.

Analysis of the content

Variety of content is average in the 1st group but poor in all the other groups. In colour cards, group 2nd is more sensitive. There are few morbid and schizoid responses in Group 2. There were hardly any sexual responses in the 1st and 3rd Groups. But sexual morbid and Schizoid responses are numerous in the 2nd group. Confabulatory responses are present in some cases. The summary Table 1 of the results are given below.

History sheet

In most of the cases, the economic conditions are bad and the environment is not conducive for the healthy mental growth. Most of the boys have no regular employment. In childhood few of them had the opportunity of school education. Physical examination reveals that many of them suffer strongly from malnutrition. From the very childhood almost all the boys were wayward and all the boys committed crimes several times almost the same type of crime repeatedly. All the boys have the habit of smoking and spend their earnings on smoking and the cinema. In several cases one of the parents is dead and the boys are to live with step-fathers or step-mothers. The relation between father and mother is not happy and lack of parental control is found in almost all the cases. All the homes in which they live are overcrowded and often the whole family has only one small room.

Discussion and Conclusion

According to Beck, in general delinquents tend to show a decrease in colour responses suggesting constriction with an average number of extra-tensive trends. Introversive tendencies result from a suppression of extra-tensive traits and the reverse is true of extra-tensive groups. These children show constricted psychic potentialities, a tendency to rigid adherence to form, increase in Hd, Ad and D responses and increase in shading responses. Beck felt that these children are suffering from anxiety attitudes and inadequate personality developments.

Zullinger, (2) described a delinquency pattern which included three primary signs as follows :

- (i) A presence of confabulatory responses (DW)
- (ii) A predominance of crude colour responses (CF+C) over M+Fc+ shading responses and
- (iii) ever present extra-tensive Erlebnistyp. He also indicated 4 secondary syndrome symptoms which are usually present:
 - (a) Confused or loose succession.
 - (b) A strong component of white space responses.
 - (c) A high 'A' %
 - (d) A low 'H' %

Kelly and Flicker (2) found abnormal proportions of W or D; FM predominates over M, and marked aggression is usually shown in the content. The only cases in their study which showed similarity to Zullinger's syndromes were those with unusually low intelligence.

Unlike the previous studies, we have taken for our investigation 4 groups of delinquents based on four different types of crimes. Moreover our results reveal that emotional instability and primitive hostile impulses are numerous in the delinquents specially in sexual offenders.

But unlike Zullinger we have found in our cases insufficient confabulatory and strong component of white space responses. From our study it is shown that D proportions fall within normal range except in the case of group 2 in which it is slightly lesser than normal though Kelly and Flicker found the reverse.

The personality factors of the Group 4 i.e. offenders of petty crimes are of mixed type comprising more or less the traits seen in the other three varieties. We may assume that if these offenders committing petty crimes are not given proper care, protections and psychological help they may be converted into serious offenders in future.

In conclusion we may say that the following are the common signs of delinquent personality which are present in all the cases we have studied

- (a) High F% (particularly F—)
- (b) Increase in Ad responses.
- (c) Decrease in W responses.
- (d) FM predominates over M.
- (e) High 'A' %
- (f) Low 'H' %
- (g) Increase in d, dd, ddd responses.

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Topography of a Group

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Introduction

The present paper is based upon a study in the field of group dynamics. The problem of study was topography of a group. But the group which was studied was not organised or structured in any rigid manner. In other words, it was not a unit consisting of individuals having definite status and role relationships in respect to one another and a set of values or norms regulating the behaviour of the members in respect of group goals or objectives. The members of this group were all final year students of Psychology Honours. All of them had, therefore, a common goal, namely, the goal of securing honours. A few of them were also motivated by a stronger goal of topping the list of successful candidates. But these objectives could not be considered as group goals, as every member locomoted independently towards his goal, and the locomotion of one did not facilitate the locomotion of the group as a whole. The group was of the nature of, what Allport (1) has called, a co-acting group, or, in the language of Sherif (6) a group more characterised by "togetherness situations" than by "dynamic inter-actions", to use Kretch and Crutchfield's (4) words. In spite of all this, the common motive force of securing honours brought the members close to each other and produced inter-actions among them. In addition to this, there was another common platform which served as the basis of inter-actions among the members. These students were all members of the Psychological Society of the college and as members of this society they had occasions to interact for common purposes. But, nonetheless, these contacts were not expected to exert any significant influence for establishing or maintaining a high degree of cohesiveness among the members. Also, as there was no rigid group standard, no strong pressure towards group conformity was in existence. The primary goal of the members was to secure honours and, if possible, to do well in the honours examination, and as such, they were more interested in themselves than in others. It was expected, therefore, that competition rather than cooperation would be the dominant characteristic of their interactions.

The group consisted of twelve members, which was the total strength of the class. Though their mother-tongues were different, they spoke Hindi well. They were all males and belonged more or less to the same age group, and came from families of average socio-economic status.

Aim and Method

The present research aimed to study the underlying structure of the group. Though it was an informal group, it was intended to find out as to the extent its informal structure conformed to the formal one, and also to find out the latent forces which were operative but not visible on the surface.

The technique that best suits a study of this kind is that of sociometry designed by Moreno (5) and Jennings (3). The well-known technique has been employed widely in studying a variety of problems of group dynamics, such as, group cohesiveness, communication pattern, leadership, group attraction, etc. A comprehensive literature on research in this area is reported by Cartwright and Zander (2).

Enquiry

The twelve psychology students were given the sociometric test just on the eve of going on a departmental trip to Naterhat, a place well-known for its scenic beauty in the Palamau district. Each member was asked to write on a piece of paper the names of his friends, in order of preference, with whom he would like to sit during the journey. Also, if there were members in the party with whom one would not like to sit, the names of such members were also to be mentioned.

After the members had given their preferences and rejections in the light of the above instructions, they were asked to quantify the degrees of their preferences and rejections on a scale extending from 100% (maximum rejection) to + 100% (maximum preference). For convenience, the terms 'dislike' and 'like' may also be used for rejection and preference respectively.

The reason why the particular scale was used is this: it was thought that as the students were pretty well familiar with mental estimations in terms of percents which they frequently did in their every-day lives, it would be easy and convenient for them to express their likes and dislikes in percents.

Treatment of the Data

Earlier investigations made by others with the sociometric technique were mainly concerned with finding out the frequency of 'like' and 'dislike' judgments given by each member about others in the group and similar judgments received by him from others. The intensity of 'like' and 'dislike' judgments was overlooked in these studies. But it cannot be denied that the factor of intensity is quite an important one and deserves careful analysis for understanding the topography of a group. For example, let us suppose that 'X' likes 'A', 'B' and 'C' in order of preference. But it will not be justified to assume that on a scale purporting to measure the intensity of 'like' judgments, all the three persons stand at equal distances from one another. If 'A' is asked to express his liking for the three members in percents, he might have

expressed his liking for 'A' as 90%, that for 'B' 70% and that for 'C' 10%. If this quantitative difference is not taken into account, conclusions will be inaccurate to that extent.

In view of the above standpoint, both the frequency and intensity of 'like' and 'dislike' judgments given by each member about other members and the same received by him from others were computed. Table I refers to this aspect of the treatment of the data.

Communication Pattern in the Group

The communication pattern existing in the group is based on the 'likes' given and received by the members. The amount of communication which is expected to flow through a given channel will depend upon the intensity of 'likes'. For a proper understanding of the communication pattern, it is necessary to take into account the frequency of 'likes' given and received which is 50 (Table II), as well as the total amount of 'likes' which is 2502 (Table II). (There is no necessity of making a discount for the frequency and intensity of 'dislike' judgments given and received. Arrows of 'dislikes' indicate where the channels of communication are blocked. They do not, however, adversely affect the positive channels of communication).

As stated above, the total number of channels of communication is 50, with an average of 4.17 for each member. The total amount of communication that will flow through these 50 channels is 2502, with an average of 208.5. The flow of communication is not a one-way traffic. There is a very high positive correlation ($r = .88$, and p is less than .01) between frequencies of 'like' judgments given and received by each. The general picture of the particular group is of social give and take. The overall picture that emerges is one of positive interaction, i. e., the communication pattern in the group brings the majority of the members into free interaction. This finding is not in line with our assumption which we made above. It was assumed that there being no group goal to motivate the members, a feeling of competition among the members will restrict their social interaction and those aspiring for top positions in Honours examination will not be liked by each other, as a feeling of rivalry will be a dominating force and it will interfere with their friendly relationship. But our findings did not substantiate this assumption.

Attractiveness and Cohesiveness

It was stated earlier that the members were motivated by two forces: (a) the motive-force derived from the strong desire to secure honours and (b) the force of interaction and friendship. This may be termed as group cohesiveness. The strength of the first force could not be measured here. But the total strength of the second one, i. e., of cohesiveness was measured. The measurement was based on the difference between the total amount of 'like' and 'dislikes'

TABLE I
Frequency and Amount of Judgments of 'like' and 'dislike' given and received

Subjects → ↓	1	2	3	4	5	6	7	8	9	10	11	12	Frequency		Amount		Balance
													+	-	+	-	
1	...	30	30	80	60	...	30	30	...	30	...	40	8	...	330	...	330
2	...	5	...	80	5	5	...	5	...	...	...	...	5	...	100	...	100
3	...	...	90	...	80	-40	...	...	...	...	...	...	3	-1	240	-40	200
4	...	45	55	50	...	-65	...	40	...	...	...	65	5	-1	255	-65	190
5	...	90	-30	-35	85	...	...	-25	-20	-40	...	80	3	-5	245	-150	95
6	...	...	40	40	...	-10	...	45	40	...	...	...	4	-1	165	-10	155
7	...	...	45	54	...	-5	60	...	75	...	...	54	5	-1	288	-5	283
8	...	55	40	...	35	-50	40	60	...	...	...	...	5	-1	230	-50	180
9	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
10	...	60	...	...	...	50	49	...	...	...	40	...	4	...	199	...	199
11	...	...	80	...	...	...	...	...	80	...	...	...	2	...	160	...	160
12	...	25	70	60	90	-80	...	30	...	15	...	...	6	-1	290	-80	210
Total													50		2502	-400	2102

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TABLE II
Frequency of 'like' and 'dislike' judgments received by each

	6	8	6	6	2	2	6	5	...	3	2	4	50 : Total channels of communication.
+	...	...	-1	-1	...	-6	...	-1	-1	-1	...	...	-11
Balance (I)	6	7	5	5	6	-4	2	5	4	-1	3	2	39/12 = 3.25 average popularity of members.

Amount of 'like' and 'dislike' received by each

+	280	450	314	375	65	100	220	234	...	125	120	229	= 250 2/12 (Total amount of 'like' judgment) = 208.5. average
-	...	-30	-35	...	-250	...	-25	-20	-40	...	...	...	= 400 (Total of 'dislike')
Balance (II)	280	420	279	375	100	100	214	125	229	-40	120	120	= 2102/12 = 175.17 average attractiveness of the members.

Correlation coefficient between 'like' judgments given and received :

$r = .88$

$p = < .01$

as given in the last row (Balance II, Table II). The figure, 2102, may be regarded as the index of group cohesiveness. From the figures stated against Balance I and II, the popularity and attractiveness of each member were also calculated. The ratio of members above the popularity level to the members below the popularity level was found to be 7:5. This shows that seven members in the whole group may be regarded as occupying the central positions in the group.

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Recent Method for Attitude Measurement

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Introduction

In measuring the attitude of an individual through the questionnaire method an investigator comes across a good number of evasive, indifferent or non-committal answers besides the positive and negative ones. These indifferent or non-committal responses form a source of embarrassment to a scientific investigator.

Such evasive replies should not hold up the progress of the work ; rather, they can be made useful in bringing out the desired facts, and the problem has been solved by devising a method, called ' *Factor dividing rating* ', for taking such responses into consideration. An attempt has been made towards this direction (1) by the author and the present paper adds :

- (1) The Utility of the weightage method,
- (2) The Graphic conditions, to the above paper and
- (3) The Deduction of the Formula.

(1) Utility of the Weightage Method

TABLE 1

		Qualitative Responses						Quantitative Values
Persons		Item						
Item	...	I ₁	I ₂	I ₃	I ₄	I ₅	I ₆	
P ₁	...	1		1	1	1		4
P ₂	...		1	1		1	1	4
P ₃	...	1	1		1		1	4

Where P₁, P₂, P₃ are the persons and I₁, I₂, I₃, I₄, I₅ and I₆ are the items of the questionnaire. 1 means the positive answer of the item.

From Table 1, it is evident that although the quantitative values of the response of all the three persons is the same, the qualitative responses are not necessarily equal, because of the individual differences. These individual differences could not be ascertained in the quantitative value given arbitrarily.

The weightage method solves this difficulty by giving proper weight to each response of each person according to the proportion method (1).

TABLE 2.

Persons	Item	Qualitative Response						Quantitative Value
		I ₁	I ₂	I ₃	I ₄	I ₅	I ₆	Total Wt. Value
P ₁		W ₁		W ₃	W ₄	W ₅		W ₁ + W ₃ + W ₄ + W ₅
P ₂			W ₂	W ₃		W ₅	W ₆	W ₂ + W ₃ + W ₅ + W ₆
P ₃		W ₁	W ₂		W ₄		W ₆	W ₁ + W ₂ + W ₄ + W ₆

W₁, W₂, W₃, W₄, W₅ and W₆ are the wt. value of the positive answer to the item I₁, I₂, I₃, I₄, I₅ and I₆ respectively.*

By this method the individual difference observed in the qualitative responses can be derived in the quantitative value also.

In Table 2, it can be seen that the total wt. value (w) of each item (I) of each individual (P) differs due to the individual differences as observed in qualitative response.

The total quantitative values of the individuals P₁, P₂ and P₃ are Σw_1 , Σw_2 , Σw_3 , Σw_4 , Σw_5 and Σw_6 respectively which differ from each other and the difference is due to the individual difference.

(2) The Graphic Condition

The advantage of giving weight value to each response in regard to each item is that the investigator can have a picture of the accuracy of the data collected prior to following the "Factor dividing rating" technique.

To follow the "Factor dividing rating" technique, the data should be checked in a three point scale; i.e., the positive, the non-committal and the negative response, of the subject to the item of the questionnaire will be recorded. After collecting the data, the weight values of each response in regard to each item will be given. Then the average weight value of the positive, non-committal and the negative responses respectively of the questionnaire will be plotted in a

* f(1); the weight-value of each response has been considered in view of the "proportions" of F, UF, and I, in each item as determined by dividing the frequency of the responses by the number of subjects in the group. For example, let f_x , uf_x , and i_x be the responses of the respective favourable (F) Unfavourable (UF) and indifferent (I) answers given by N subjects in the Xth question.

Therefore, the respective weight values of FUF and I are $\frac{f_x}{N}$, $\frac{uf_x}{N}$ and $\frac{i_x}{N}$ of the Xth question, where X = 1.

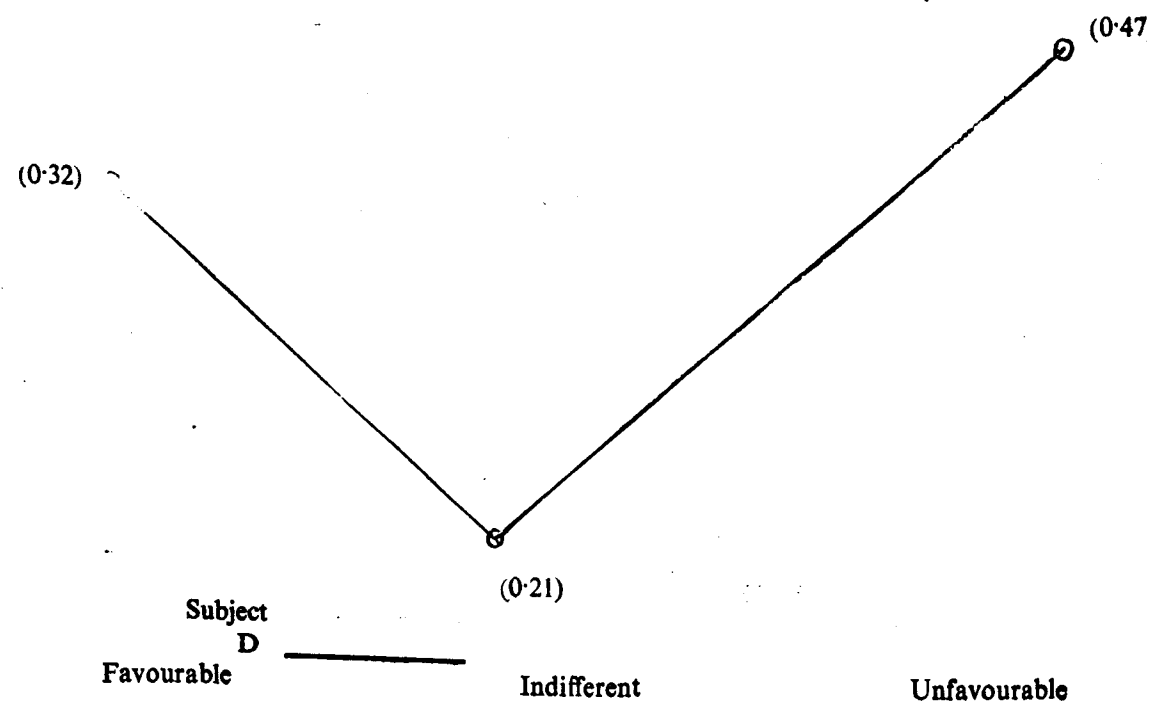
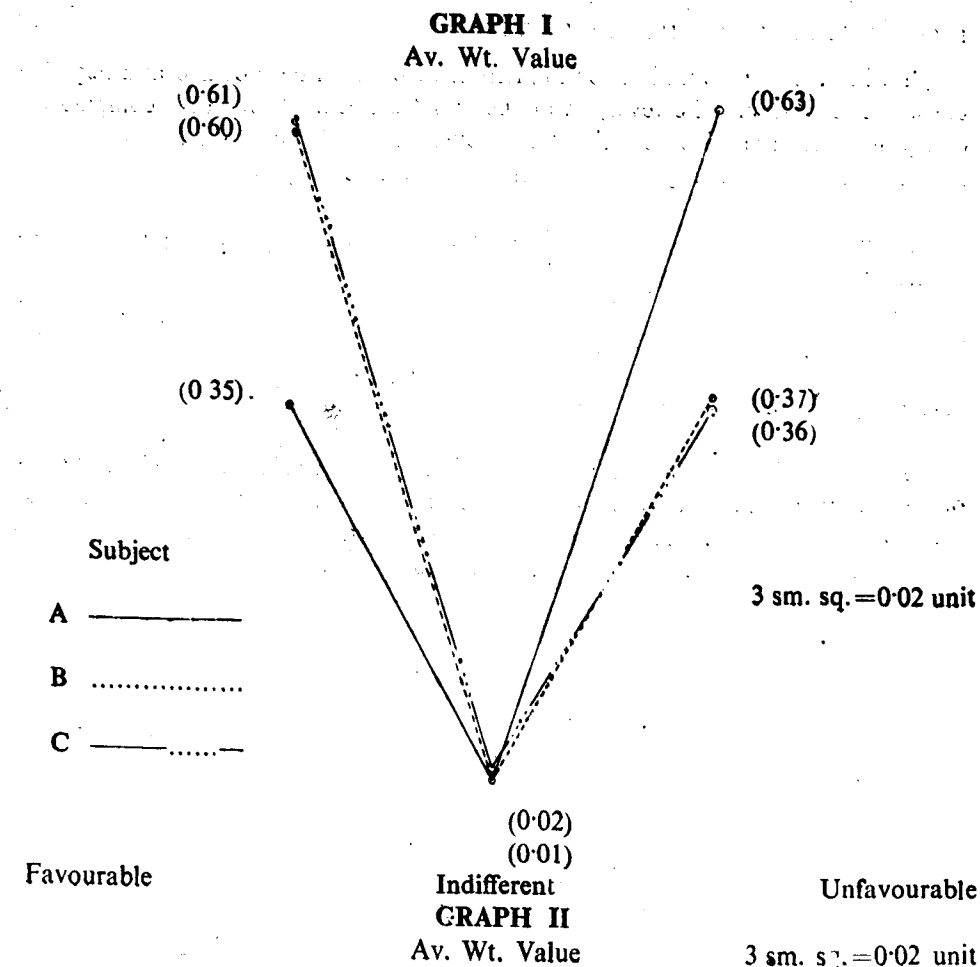
graph with the non-committal or indifferent in between the positive and negative ones. The Graph, however, will be 'V' shaped. From the comparative elongation of the side of the 'V', one can easily find out the positive or negative attitude of the group concerned as the case may be (Graph I).

Another advantage of the 'V' shaped graph is that the surveyor will automatically get the picture of correctness or otherwise of the survey carried out to assess the absolute attitude of the group. This is because the absoluteness of the attitude depends upon the acuteness of the angle between the two arms of the 'V' shaped graph. The absoluteness increases as the Vs angle decreases, (Graph I Vs Graph II).

This was observed by the author in his research work. The weight values of each item of the questionnaire of the different subjects A, B, C and D are shown in Table 3. Their respective average wt. value of the positive, non-committal and the negative responses are also shown.

TABLE 3

	Question No.	Y (wt. value)	I (wt. value)	N (wt. value)
Subject A	1	1.0	...	...
	2	0.51	0.03	0.46
	3	0.03	0.02	0.95
	4	0.79	0.01	0.20
	5	0.12	0.01	0.87
	6	0.02	0.01	0.97
	7	0.01	0.01	0.98
	Av. Wt. Value	0.3543	0.0129	0.6328
Subject B	1	0.98	0.00	0.02
	2	0.28	0.01	0.71
	3	0.76	0.02	0.22
	4	0.98	0.00	0.02
	5	0.03	0.05	0.92
	Av. Wt. Value	0.0160	0.1060	0.3780
Subject C	1	0.76	0.04	0.20
	2	0.33	0.00	0.67
	3	0.75	0.02	0.23
	Av. Wt. Value	0.6133	0.0200	0.3667
Subject D	1	0.11	0.00	0.89
	2	0.53	0.42	0.05
	Av. Wt. Value	0.3200	0.2100	0.4700



The increase in the degree of the angle of the 'V' shaped graph is due either to the fact that (1) the items selected for the questionnaire do not relate to the same topic, or (2) due to the interviewing defect, that is improper appraisal of the responses given by the subject. The two factors may sometimes be jointly responsible for the situation.

The degree of the angle of the 'V' shaped graph is directly proportionate to the average weight value of the non-committal or indifferent response, that is, the greater the average weight value of the indifferent response, the greater will be the degree of the angle of the 'V' shaped graph, see Graph II.

When the angle between the two arms of the 'V' shaped graph is greater, then the result obtained by applying the formula of the *Factor dividing rating* will not coincide with the expected result. For instance a questionnaire (Table 3, subject D) consisting of two questions or items has been used for assessing the attitude of a group. Some individuals gave negative answers to both the questions; some one negative and one indifferent; some both positive and some answers are one positive and one indifferent. The surveyor can presume by seeing the responses that out of two questions the subject who has given two negative answers has the *most* unfavourable attitude and the person who has answered one negative and one indifferent has unfavourable attitude. In the same way he can expect the degrees of favourable attitude. But the result after treating the individual data by the formula of the '*Factor dividing rating*' does not tally with the expected result of the surveyor.

At the time of classifying the individual according to the degrees of attitude it can be seen that the persons who have given two negative answers out of the two questions are the only unfavourable attitude persons where as those whose answer are one negative and one non-committal or indifferent are the *most* unfavourable attitude person. This kind of anomaly can be seen in favourable attitude person also. The reason for the discrepancy is due to the defect mentioned above.

After treating each individual data by the *Factor dividing rating* technique the quantitative value is obtained. Then the quantitative values are grouped according to the degrees of favourableness and unfavourableness, that is, the individuals are distributed in most favourable, favourable, unfavourable and most unfavourable groups. The frequency curve will be *normal* and single peaked but it will be asymmetrical or skewed. Graphs III and IV illustrate positive and negative skewness respectively.

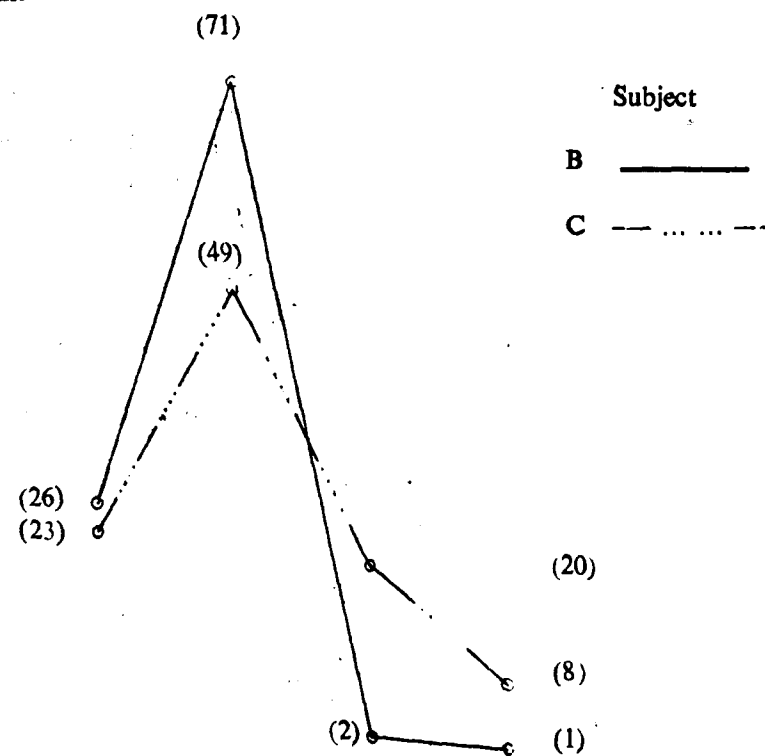
The interesting point is that the normal frequency curve and the 'V' shaped graph have some definite relation. If the normal frequency curve is skewed positively then the left arm of the 'V' shaped graph is longer than the other one. The same case is to be found with the negatively skewed curve also.

N.B.—It should be remembered that if the graph drawn by plotting the average weight value of the total items of the questionnaire, is other than the 'V' shaped, then the *Factor dividing rating* method is not applicable at all.

GRAPH III

Positively Skewed

1 sm. sq. = 1 sunit



Most Favourable Favourable Unfavourable Most Unfavourable

GRAPH IV

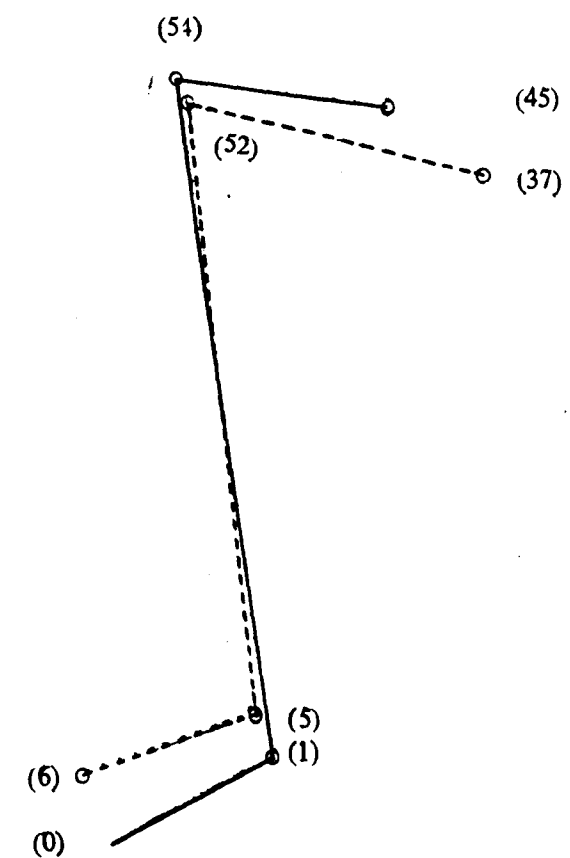
Negatively Skewed

Subject

A —————

D

1 sm. sq. = 1 unit



Most Favourable Favourable Unfavourable Most Unfavourable

(3) The Deduction of the Formula

The details of the construction of the formula has been described in 'A New Technique for the Measurement of Attitude' by the author.* Here only the deduction of the formula is given

The formula for the 'Factor dividing rating' method is

$$= f_y - uf_y + a - b + d - e$$

Where, $a = i_y \frac{q}{x=1} \frac{f_x}{N}$; $b = i_y \frac{q}{x=1} \frac{uf_x}{N}$

$$d = \frac{f_y}{f_y + uf_y} (i_y - a - b) \text{ and } e = \frac{uf_y}{f_y + uf_y} (i_y - a - b)$$

by substituting values,
we get $\frac{f_x}{q} \frac{q}{x=1} \frac{uf_x}{N}$

$$f_y - uf_y + \frac{f_x}{q} \frac{q}{x=1} \frac{uf_x}{N} - i_y \frac{z-1}{q} i_y + \frac{f_y}{f_y + uf_y} (i_y - a - b) - \frac{uf_y}{f_y + uf_y} (i_y - a - b)$$

$$= f_y - uf_y + \frac{f_x}{q} \frac{q}{x=1} \frac{uf_x}{N} - i_y \frac{x-1}{q} + (i_y - a - b) \left(\frac{f_y - uf_y}{f_y + uf_y} \right)$$

$$= f_y - uf_y + i_y \frac{f_x}{q} \frac{q}{x=1} \frac{uf_x}{N} - i_y \frac{uf_x}{q} \frac{q}{x=1} \frac{uf_x}{N} + i_y \left(\frac{f_y - uf_y}{f_y + uf_y} \right) - i_y \left(\frac{f_y - uf_y}{f_y + uf_y} \right) - i_y \left(\frac{f_y - uf_y}{f_y + uf_y} \right) - i_y \left(\frac{f_y - uf_y}{f_y + uf_y} \right)$$

$$= f_y - uf_y + i_y \left(\frac{f_x}{q} \frac{q}{x=1} \frac{uf_x}{N} - \frac{uf_x}{q} \frac{q}{x=1} \frac{uf_x}{N} + i \left(\frac{f_y - uf_y}{f_y + uf_y} \right) - i_y \left(\frac{f_y - uf_y}{f_y + uf_y} \right) \right) + \left(\frac{f_x}{q} \frac{q}{x=1} \frac{uf_x}{N} - \frac{uf_x}{q} \frac{q}{x=1} \frac{uf_x}{N} + \frac{f_y - uf_y}{f_y + uf_y} \right)$$

That is

$$\begin{aligned} & \text{Favourable response} - \text{unfavourable response} + \text{indifferent response} \times \left(\text{general trend towards favourable} - \text{general trend toward unfavourable} \right) \\ & + \text{indifferent response} \times \left(\frac{\text{favourable response} - \text{unfavourable response}}{\text{favourable response} + \text{unfavourable response}} - \frac{\text{indifferent response}}{\text{indifferent response}} \right) \times \left(\frac{\text{favourable response} - \text{unfavourable response}}{\text{favourable response} + \text{unfavourable response}} \right) \\ & \times \left(\text{General trend toward favourable} + \text{General trend toward unfavourable} \right) \end{aligned}$$

Illustration—

An attitude scale consisting of 20 questions was applied to 100 subjects. The responses were recorded on a three-point scale : (1) the favourable, (2) unfavourable and (3) indifferent. Responses given by the subject 'y' were found to be 9, 9 and 2 in the three categories, respectively. The following Table will clarify step by step the final results as obtained by applying the above formula :—

TABLE 4

		F	I	UF
Group trend	...	0.4950	...	0.3875
Responses of Subject y	...	9	2	9
Weighted scores of the responses of Subject 'y'	...	7.0500	1.2500	6.4400

The indifferent responses given by the subject 'y' were 2 and the transformed weighted score is 1.2500 which will have to subdivide according to 'Factor dividing rating' method.

Explanation

Now according to formula the absolute attitude of the subject 'y' is

$$= 7.0500 - 6.4400 + 1.2500 (0.4950 - 0.3875) + 1.2500 \left(\frac{7.0500 - 6.4400}{7.0500 + 6.4400} \right) \\ - 1.2500 \left(\frac{7.0500 - 6.4400}{7.0500 + 6.4400} \right) (0.4950 + 0.3875) \\ = + 0.7510.$$

∴ The quantitative value of the attitude of the subject 'y' is $= (+0.7510)$,

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An Informational View of Mind

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Ever since psychology was recognized as the science of the mind, numerous efforts have been made to define 'mind' in such a way as to make possible its empirical investigation. Rejecting the idea that 'mind' is just another name for 'soul,' psychologists have defined it variously as "consciousness" (the early functionalists), as "experience" (Titchener), and in more recent years as "behavior." The extreme behaviorists, of course, have regarded the concept as being superfluous and have often attempted to rule it out of psychology entirely, with considerable success. Otherwise, they have gone along with Descartes in treating the living organism as a mechanical device and modelled their descriptions after those of physical mechanics. Their stimulus-response model has been successfully applied over a large range of behavior, but it has signally failed to account for such complex processes as human thinking.

Since the advent of modern, high-speed, electronic computers, which have been developed to the state in which they can solve problems of a high order of complexity and also can play games like chess, a new physical analogy is being suggested for the human organism and the human mind. The computer is a device that can be fed information, that can store information, that can use information for generating new information, and that can evaluate the consequences of its actions. This is the kind of model that the writer finds more descriptive and useful in psychology, without concluding that the human being is merely an electronic computer or even that computer and human thinker achieve results in exactly the same ways. The emphasis is upon "information," which will be defined and elaborated upon for psychological purposes in the course of this paper.

Background to an Informational Psychology

The view of mind to be proposed in this paper was achieved through the intensive study of the nature of intelligence. The research method has been that of factor analysis, the technical nature of which should not concern us here. Historically, intelligence has been regarded as a single, monolithic ability primarily concerned with learning. Intelligence was originally set opposite to instinct, the latter providing adjustment to the environment without learning. Curiously, although a number of different instincts were early recognized, it has taken a very long time to accept the idea that there are also components of intelligence. The demonstration of this has been through factor analysis.

A little can be said about factor analysis here. We gain something by knowing in general how it operates. There are a multitude of different kinds of

tasks that can be called "intellectual"; they require mental effort of some kind, in the way of understanding, remembering, thinking, or reasoning. Each task presents its own kind of problem to be solved, simple or complex. A test is usually composed of a number of problems of the same essential kind, for example, arithmetic problems of the type: "If two pencils cost eight cents, how many can be purchased for twelve cents?" Or, in another test, "High is to low as dry is to what?" Or, in still another test, "If John is older than Charles and Henry is older than John, who is younger, Charles or Henry?"

If tests of a great many kinds are given to a group of individuals who are of similar age, sex, and education, on every test there will be quite a variation in scores, where each score is the number of problems done correctly in the time allowed for the test. One of the outcomes of factor analysis is to classify tests into groups. This is possible, because the same individuals make similar scores in the tests of a certain group. In each group of tests, the same individuals are likely to make high scores in all the tests, other individuals are likely to make low scores, and still others make moderate scores. For two tests in *different* groups, many individuals can be good in the one test and poor in the other.

The important conclusion is that tests of each group measure the same ability in common. There is something about the material of the tasks or of the tests in the group that call for the same intellectual ability. There are as many unique abilities as there are such groups of tests.

Factor-analytic results with intellectual tests during the past 25 years in the United States have almost universally failed to find a strong, universal ability like Spearman's a "general" intellectual factor. Instead, it has found a great many, more limited, abilities, often called "group factors," each representing a unique kind of intellectual skill. Most of the work has been done by L.L. Thurstone and his associates at the University of Chicago, by research psychologists in the U. S. Air Forces during World War II, and by factor analysts in the Aptitudes Project at the University of Southern California during the past twelve years.

As of the present date, nearly 60 separate intellectual abilities have been differentiated and defined. A few examples will be given. Oldest and best known of the factors is the ability known as "verbal comprehension," best measured by vocabulary tests, which determine how many word meanings the examinee knows. Another important component of intelligence is the factor called "general reasoning," which is regarded as an ability to understand a system of meanings, such as a verbally stated arithmetic problem, an example of which was given earlier. These two abilities, incidentally, are the dominant components of verbal intelligence tests since the time of Binet. They are the most important abilities for progress in school, hence intelligence tests have sometimes been more appropriately called "academic-aptitude" tests.

The list of 60 known factors of intelligence goes well beyond academic aptitude. As important as the finding of the factors themselves is the realization that there is order and system among them. Comparing the factors and their common properties, we find that they fall into a logically coherent, unitary system, which has become known as the "structure of intellect" (1, 2).

The Structure of Intellect

Efforts to classify the known intellectual factors into categories beginning some six years ago has been rewarded with some degree of success. The result at present is in the form of a three-dimensional model as shown in Fig. 1. The three dimensions pertain to three kinds of categories of abilities. Some of the categories pertain to kinds of information and others pertain to the kinds of operation that are performed in connection with the information.

Information, itself, can be classified in two different ways. First, we recognize some very broad categories. Some abilities are involved with meanings, to which words become attached. The kind of information involved is called "semantic." A different set of abilities function in connection with information in "symbolic" form, that is, in the form of letters, syllables, words, and numbers. This suggests that quite different abilities may be needed to do well in mathematics, spelling, and in the structural aspects of language.

In the model of Fig. 1, concrete information is called "figural," on the ground that perceived material has some degree of organization, even if it is merely a matter of distinction between a figure surface and a ground surface, as Gestalt psychologists have pointed out. The figural, symbolic, and semantic kinds of content are represented by three columns of the model. The fourth column has been added on purely theoretical grounds, no factors involving "behavioral" information having as yet been demonstrated. This column is believed to be needed to represent the large area of social intelligence. We are aware of information concerning the behavior of others and of ourselves; we also retain that information and use it in generating other information and we evaluate the results.

For each of the four broad kinds of information there are six kinds of what have been called "products"; ways in which that information comes or forms in which it is cast. Some items of information are in the form of units. A unit is a segregated piece of information, with "thing" character. A perceived object is a figural unit; a printed word or syllable is a symbolic unit; and a concept or idea conceived in verbal form is a semantic unit. A class is a set of units having common properties. There are classes of numbers and letters as well as of perceived objects and of meaningful words.

Relations are a third kind of product. In the item mentioned earlier, "High is to low as dry is to what?," the same relation (opposition) applies between the two pairs of words. Systems are a fourth kind of product. Systems are organized

combinations of interrelated or interacting parts. The arithmetic problem mentioned earlier is a semantic system, involving two quantities of pencils and two prices. If the examinee grasps the system he is on his way to solution of the problem.

A fifth kind of product is a transformation, that is to say, some kind of change, metamorphosis, or redefinition of information. This is shown when we visualize an object being converted into something else or into another position or when we see that a brick can also be a hammer. Finally, the sixth kind of product is an implication. Given information carries with it many possibilities for extensions and extrapolations; we expect certain consequences or suspect certain antecedents. Abilities to see implications come under the popular heading of foresight. The six kinds of products are represented in Fig. 1 as layers in the total model.

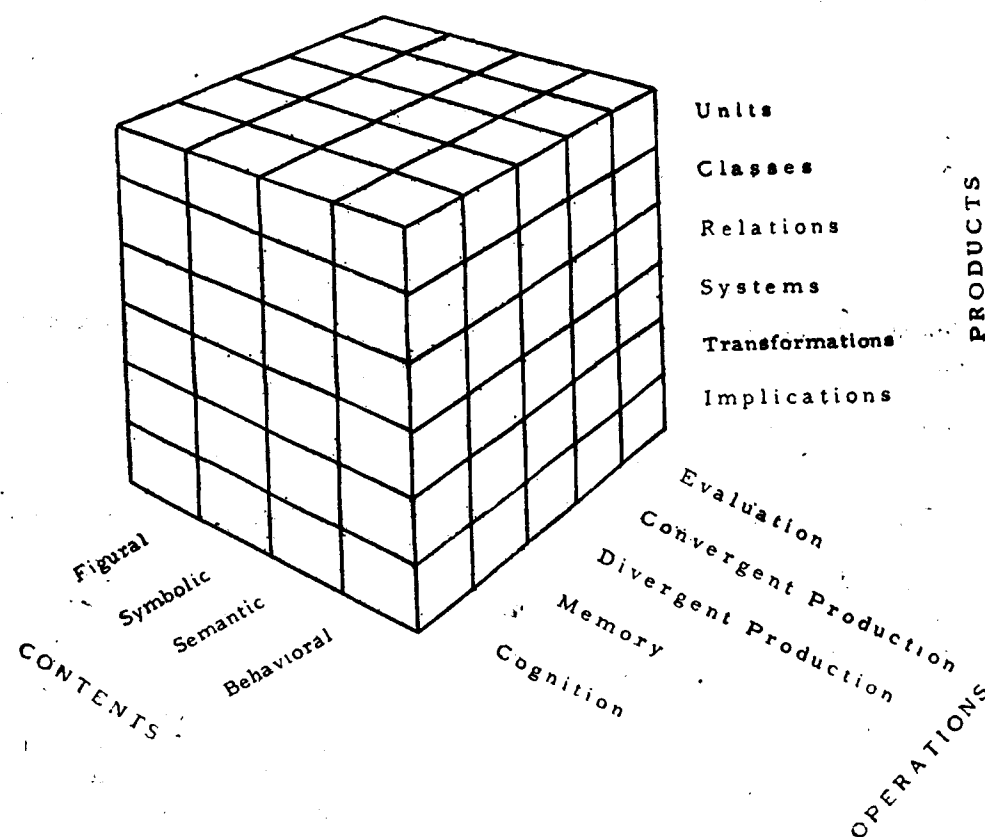


Fig. 1. A three-dimensional morphological model for the structure of intellect.

At this point we are ready for a definition of 'information.' For the purposes of an informational psychology, 'information' can be defined simply as that which the organism discriminates. Discriminations can be made because items of

information are different. They differ along the lines of the kinds of content and also along the lines of the kinds of products. But even within any combination of content and product, as with figural units, there are numerous discriminations possible. This definition of 'information' is consistent with that in the field of information theory, but it is a broader conception. Information need not be conscious, for the organism makes some discriminations automatically and without consciousness. It may be suggested, however, that, consciousness provides enormously increased potentialities for making discriminations, and hence for information. Perhaps this is its excuse for having been developed in the course of biological evolution.

The vertical slabs in the model, in order from front to back, represent the basic kinds of operations that may be performed on information. The most fundamental operation is that of cognition, which may mean discovery of information, understanding or comprehension, or recognition. Parallel to the set of abilities having to do with cognition is a set of abilities having to do with retention or storage of information; the memory abilities. We are definitely not equally good in remembering different kinds of information. Since other abilities, in the production categories to be discussed next, have to do with the utilization of stored information, it is likely that goodness of retention, with readiness for use, is as far as the memory abilities go.

Two major kinds of operation have to do with the generation of new information from given information. For the example item given earlier, "High is to low as dry is to what?" the correct answer is naturally "wet." Two different abilities are prominently involved in such an item; first, the ability to realize what relation exists between the first two words (cognition of semantic relations), and second, given the unit "dry" and the relation of opposition, the unit "wet" is produced. In the item about the ages of the three boys, John, Charles, and Henry, two relations are given from which the examinee is to deduce the third: Charles is younger than Henry. In either of these two illustrative items, only one right answer will do, for it is completely determined by the given information. This kind of production is therefore known as "convergent" production. The information converges upon one acceptable answer. The convergence may be by logical necessity or by conventional rules.

There is another kind of production ability known as "divergent" because the end result is a variety of answers. For example, instead of giving the item "What is the opposite of 'good'?" we might give the item "What words mean almost the opposite of 'good'?" There are number of possible answers to this item other than "bad," answers such as "poor," "sinful," "awful," and "terrible." Divergent-production tests commonly call for evidences of such qualities as fluency of thinking, flexibility, originality and elaboration. It is consequently believed that the divergent-production abilities account for an important part of what is commonly known as creative thinking (3). It is safe to say that in everyday life the majority of problems that we meet have no unique answers,

hence divergent thinking is commonly called for. Even when the well-determined answer is possible, as in mathematics, we are often forced to resort to considerable divergent thinking before the right or acceptable answer comes.

The fifth operation category is that of "evaluation." Information that is cognized, or recalled from memory, or produced either convergently or divergently, must often be evaluated as to its correctness, soundness, suitability, or as to other criteria of acceptability. Is this visual object identical with that one? Is this name spelled exactly like that one? Does this conclusion follow logically from the given information? Is the system complete and internally consistent? These are but a few of the kinds of questions that can be asked in items that can be given to measure abilities to evaluate. Ability to evaluate, as for any other kind of operation, depends upon the kind of information dealt with and the kind of product of information. The model in Fig. 1 forecasts as many evaluative abilities as there are for cognition and each of the other kinds of operation.

In order to lend credence to the model as it now stands, it can be said that except for the behavioral category, all others are represented by known factors. In fact, about two-thirds of the cells outside the behavioral area now contain known unique abilities or factors. Since the model was first conceived, about 20 of the known factors have been recognized or discovered and they have logical places within the model. The model has been successfully used in recent studies as the basis for predicting new factors, with marked success. Many of the factors, which are usually found by testing adult subjects, have been found to apply to children. How far down the ontological scale they apply is still to be determined, but there is much confidence that many of them will be found differentiated even at pre-school level.

Implications for Psychological Theory

The most significant aspect of the structure of intellect for general psychological theory is that kinds of information—contents and products—play such a prominent role in the taxonomy of intellectual abilities conceiving of the living organism as a kind of information processing agent is a quite reasonable general outcome. The parallel to electronic computers has already been mentioned. Although the living nervous system may not accomplish its information processing in ways that are identical with those of computers, the basic kinds of operations—cognition, memory, divergent and convergent production, and evaluation clearly apply to both. If we want to keep the concept of 'mind' in psychology, it can be regarded as a set of operations applied to different kinds of information, yielding certain kinds of products. We also have a complete empirical reference for any combination of operation, content, and product, in terms of a unique kind of task, its material and what it demands of the individual.

Some of the traditional concepts connected with 'mind' take on more definite meaning and significance or are superseded by other concepts, when we take

the informational point of view. Since Aristotle, the concept of association has been perhaps the most widely used, by mentalists and behaviorists alike. This time-honored concept can be superseded by the six kinds of products of the structure of intellect. The idea of association never did take care of such products as units, classes, relations, systems, and transformations, for the reason that all of these products have a totality aspect that goes beyond ideas of mere connections. Association by contiguity could be best invoked to account for implications, for experiencing things or events in close proximity is probably the best condition for the formation of implications. Association goes part of the way in accounting for two things entering into a relationship, but a relation is something more than a linkage by juxtaposition. Association by similarity has some explanatory value in connection with the formation of classes and class concepts, but class ideas go beyond mere association by similarity. The six products thus provide us with a much greater wealth of concepts and offer bases for descriptions of practically any kind of mental structure.

Some of the other traditional concepts can be given more definite meanings in terms of informational concepts (4). Take the concept of 'reasoning,' for example. This concept has never been pinned down or tied to univocal empirical operations or events. It is possible to do this in terms of structure-of-intellect concepts. First, let us consider the traditional distinction between induction and deduction. Induction has usually implied the discovery of information having somewhat general status from particular instances or items of information. The term "discovery" is used rather than "derivation," because the latter may be interpreted as the generation of new information from given information, which would put induction in the production category of operations. I believe induction can best be confined to the cognition category.

What products that are merely cognized would qualify as involving some degree of generalization and hence induction? Units are particular mental objects or even *s* and hence do not qualify. More than one unit seems logically necessary before we speak of induction. Classes, relations, and systems obviously qualify, for they go beyond single units. Transformations do not, for in this instance it is a matter of the same unit with revisions. Implications, however, do involve more than a single given unit, hence may be said to represent a kind of induction. We may therefore distinguish four kinds of induction: classificatory, relational, systemic, and implicational. Because all the abilities of cognition involved pertain to particular kinds of tasks, these four kinds of induction gain empirical reference. It goes without saying that they apply to all four kinds of content.

Deduction, by its nature, suggests the generation of new information from given information and hence productive operations. Furthermore, a deduction is usually regarded as being logically and rigorously, if not uniquely, derived, hence we are concerned with *convergent* production. Although there are possible grounds for extending the term 'deduction' to divergent productive thinking, in matters of definition we are permitted to be somewhat arbitrary at some point. The writer's inclination is to limit 'deduction' to the convergent-production category.

There remains to consider which of the kinds of products are involved in deduction. A deduction is a conclusion or inference. Two products therefore seem to qualify—relations and implications. The item used as an illustration above, "High is to low as dry is to what?" calls for the production of a correlate ("wet") to complete a relationship. The production of correlates under such conditions is reasoning by analogy. A convergently-produced implication is like the answer to another illustrative item: "If John is older than Charles and Henry is older than John, who is older, Charles or Henry?" The two statements of fact makes inevitable the implication "Charles is younger than Henry," a clear case of deduction. Considering the application of the term 'deduction' to two kinds of product, we may say that there are two kinds of deduction: relational and implicational.

Other important aspects of thinking behavior cannot be so well localized within the system of intellectual abilities because they are too varied in composition. I refer to problem solving and creative performance, two large areas of behavior which, of course, overlap. A problem may be one of numerous kinds, involving any kind of content, any of the basic kinds of operations from cognition to evaluation, and any kind of product, depending upon the circumstances. Being aware that a problem exists is a matter of evaluation; a judgment or decision that things are not as they should be or as one might wish. Understanding the problem, even incompletely, involves cognition. Thinking of solutions is productive thinking. Evaluation may enter in the form of testing the cognitions or the outcomes of productive thinking. Stored or remembered information is called upon. As stated earlier, creative thinking depends more conspicuously upon the divergent-production functions (abilities) of fluency, flexibility, originality and elaboration. But, as in problem solving in general, we cannot get along without other kinds of fundamental operations in the processes of invention, including the operations of cognition, memory, and evaluation.

The concept of 'learning' has dominated much of modern psychology. It is, of course, the crux of controllable mental development. It is generally agreed that learning is a matter of relatively enduring changes in behavior consequent to behavior. The traditional "mentalistic" psychologist has depended very much upon association-formation as the chief explanatory concept in his theory of learning. The behaviorist has also staked everything on the same kind of concept, except that he has narrowed its meaning to stimulus-response connections. It was pointed out earlier that 'association' is a much too limited concept to account for behavior and it is likewise limited in dealing with learning.

According to the informational view, what is learned is in the form of new products, of the kinds we have already discussed. Accounting for all forms of information, they can also account for changes (5). Learning involves the derivation of new information, and information, according to the given definition, is some form of discrimination. Learning thus essentially entails new discriminations. The relation of any information to the organism's reacting mechanisms, involves

that organism's information concerning his own reacting mechanisms, their potentialities and their limitations. Plans of action may be regarded as behavioral systems that the individual also learns. There are certain congruencies (isomorphisms) and incongruencies between behavioral systems and other systems (figural, semantic, and symbolic). The noting of such congruencies or lack of them is a matter of evaluation of systems.

In theoretical explanations of how learning occurs, most thinkers on the subject utilize a concept such as "effect" or "reinforcement." "Right" responses are followed by success, "wrong" responses by failure and the need for further effort. Effect or reinforcement has been variously interpreted; as drive reduction (C. L. Hull), as satisfier or annoyer (E. L. Thorndike), and as "confirming reaction" (Thorndike). There is recent evidence that pleasurable stimulation may serve as a positive effect (6). Regardless of the interpretation, effect may be regarded as evaluation, from the informational point of view. "Feedback information" is now a more commonly used expression. It is an information that pertains to the outcome of any action of the organism. Using information as a basis for assessing the action is the operation of evaluation.

Treating feelings of satisfaction and of pleasure and pain as information concerning the state of affairs of the organism suggests that all feelings and emotions may be regarded as varieties of information. They are in the behavioral category and keep the individual appraised of his internal condition. Thus, the informational view can take into account emotions and motive as well as the so-called intellectual or cognitive aspects of mental life, fitting them all into a single scheme.

Some aspects of the general theory that have been mentioned may seem close to common sense. This is no necessary damaging argument against the theory. Physicists have gone a very long way on the basis of such common-sense concepts as "mass," "time," and "energy." It is what they did with those concepts that mattered. Thus, a science showing *uncommon* sense can be built on the foundation of *common* sense. It is the uncommon problems one can see in connection with commonly experienced events that makes for scientific advancement.

Some of the concepts involved in the structure-of-intellect model are very old; some are not. The old ones are given very new significance within a systematic theory or frame of reference. There is still very much to be done in connection with all of them, old and new. Although the findings that have been made under the concepts of association and stimulus-response connections will have to be reinterpreted, there is every reason to believe that they can be appropriately reinterpreted. In the process, and with new findings, stimulated by new questions generated by the structure-of-intellect theory and the informational approach, we can go successfully beyond the confining limitations of the association principle and the stimulus-response model.

Summary

The informational view of mind and the informational psychology proposed in this paper stem from the studies of the differentiation of unique intellectual abilities by the method of factor analysis. Efforts to classify the unique abilities or factors in this large domain have yielded a three dimensional, morphological model, the "structure of intellect," in which three varieties of intersecting categories are represented.

Abilities differ in terms of the basic kind of operation-cognition, memory, divergent production, convergent production, and evaluation. For each of these operation categories, abilities differ according to the kind of content of the task or material of the test-figural (perceptual), symbolic, semantic, and, by theoretical analogy, behavioral (psychological or social). The third kind of category depends upon the variety of product involved: unit, class, relation, system, transformation or implication.

The last two modes of variation pertain to information. The content categories are broad classes of information; the "raw materials" of mental life. The product categories are forms that any of the kinds of content may take. They are different kinds of items of information.

Implications for general psychological theory are numerous. Traditional concepts are better defined; for example, the basic kinds of operations, and are given empirical reference, which is so necessary in science. Inductive and deductive reasoning can be localized within the system of abilities. Such concepts as 'problem solving,' 'creative thinking,' and 'learning' cannot be localized, for they vary according to the environmental and organismic circumstances. But the concepts connected with the structure-of-intellect model promise to be descriptive and explanatory of these complex human activities wherever they occur.

The substitution of the structure-of-intellect model for the prevailing stimulus-response model of U.S. behaviorism suggests that the organism is an information-processing agent rather than a passive, touch-and-go mechanism. If a mechanical model is to be applied at all to the living, human individual, it would be that of a modern, high-speed, electronic computer.

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Development of a Tool to Appraise Socio-Economic Status

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Patna

The appraisal of socio-economic stratum of individuals is considered immensely important in the field of psychology, sociology, education and allied disciplines. In fact, the problem is of profound significance in understanding human responses with regard to adjustment to the external world. But the more imperative it appears, the more intriguing it becomes with respect to its evaluation. This problem is not so exacting in the west, but ours is slightly different from theirs. Ordinarily, the economic level is coupled with social status in other parts of the globe. But in this country, this is not always true. With the small population in the counted cities of India the proposition may hold true, but to a vast multitude, the cultural anchorage is a great determining factor. Scores of families are available which present conflicting pictures; superior socio-cultural status and inferior economic level and *vice versa*. Those who have had the chances of dwelling in rural parts of the country particularly are quite familiar with such state of affairs. The principal reason behind this disparity has been the social immobility and rigid structure of the social classes (4). Above all the feudal economy till late has been greatly responsible for this.

Even in the United States the need for differentiation of socio-economic status into social and economic components has been felt. It has been supported by the results of a factor analytic study of all socio-economic indices available (1). It goes to say that although a single factor may account for the bulk of co-variance among 18 indices, it is possible to discern two empirical clusters of indices which generally differentiate educational and occupational items from more directly intercorrelated items. The best measures of the former (social) cluster are mother's and father's educational level (years of schooling) for the latter (economic) cluster, the best measurement is provided by house exterior, living room, family accommodation, neighbourhood and special equipment as elicited by items of Berekly Social Rating Scale.

The complex nexus of socio-cultural and economic structure of any society, particularly in consonance with the march of time, has led the students and researchers in socio-economic forces to make a shift in their approach from a single index of occupation to multiple-item-indices. Warner Index of status characteristics in U. S. A. serves as an example of such an effort.

In India, a couple of attempts have been made in this regard. Lewis and Dhillon (3) developed one such scale for the rural agricultural population

including housing, landownership, income from outside, employment and family literacy, as a part of their project on group dynamics study. Another study is reported by Kuppaswamy (2) from South India bringing out his socio-economic status scale using three variables—occupation, education, and income further subdivided into seven categories under each with differential weight for every subdivision. But in view of the fact that these aforesaid Indian scales may not adequately serve the assessment of people in this part of the country, an attempt was made to develop a socio-economic schedule in Hindi.

The following procedure was adopted to prepare the draft of the schedule:—

(a) An empirical analysis of all material culture was made, that is articles owned by the family, even through heritage, which could make differentiation in social stratum in this part of country and items were framed on them.

(b) Details of information regarding the composition of family, educational level of members particularly female members, sources of income, relatives and their social positions, etc., were worked out and items were prepared on them.

(c) Some items were constructed to reflect the family attitude toward socio-cultural practices.

Form of the Schedule

The items covering these areas were garbed in a few direct but largely indirect question forms. Further, multiple but forced-choice items were constructed with these indirect questions.

The items of different areas were spread haphazardly over the schedule. The arrangement was such that the schedule could be split into four parts to yield part scores irrespective of numerical variation. Of the four parts, the one could give subjective estimate of the status, but the rest could be harnessed to turn out objective and quantitative scores.

Scoring of the Schedule

Each of the items in the scorable part of the schedule could be indicative of an individual's position on a five-point scale—very high, high, average, below average and low; one being the position of very high and five of low. The items were empirically assigned values ranging from one to five in accordance with the socio-economic gradation. The values on items checked by the candidate are summed up in terms of frequency. The scores under different socio-economic categories are then converted on one base, for the respective items were unequal in number. Besides, they were to be multiplied by 4, 3, 2, 1, and 0 respectively. The resultant score could be read in the manner given below.

- | | | |
|----|--------------|----------------|
| 1. | 100—132 | very high |
| 2. | 67—99 | high. |
| 3. | 34—66 | average. |
| 4. | 33 and below | below average. |

Pilot Study

The schedule was administered individually to fifty pupils randomly selected from high schools of the State of Bihar. These pupils were of comparable age and scholastic grade.

Reliability Study

The expedient method of determining reliability of this schedule could be the internal-consistency of its different parts. The following Table would show the correlation coefficient found out between various part scores of the schedule as well as between each of the part scores and the total score of the schedule

TABLE 1

	1	2	3	4
1. Part I		.467	.523	.583
2. Part II			.624	.639
3. Part III				.521
4. Total score on the schedule				

The correlation values are significant at 1 per cent level.

The correlation values in Table 1 are highly suggestive of the association between different parts of the socio-economic schedule. Further, the relationships of the part scores with the total score present another index of internal consistency of the schedule and satisfy the prerequisite of reliability of an instrument.

Validity Study

In the context, validity implies immediate validity and not the distant predictive one which is of striking significance to other psychological measures. Thus the concurrent validity with the external criterion of assessor's ratings of the socio-economic status was worked out.

The assessors who rated the socio-economic status of pupils were counsellors in the school familiar with the technique of rating. Besides, they were given to understand the various points on the socio-economic gradation and its economic and social implications.

The following Table shows the relationship between the total score on the socio-economic schedule and assessor's rating:—

TABLE 2

	r	df	p
Total score and assessor's rating	.289	49	0.5

Conclusion.

The reliability and validity indices of the socio-economic schedule reveal that there is a promise in the tool which may further be utilised in appraising and understanding the individual as well as his family's socio-economic position in society at a particular time.

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Standardisation of Jalota's General Mental Ability Test on the Nepalese Population

PART I

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Introduction

The present study has been carried out to standardize a test on Nepalese-speaking students of Nepal. So far no standardized psychological test had been constructed in the Nepalese language. In India, however, a standardized test of general mental ability was developed by Dr. S. Jalota on Hindi-speaking students. Could his test, if carried out in Nepal, produce similar results? This was an impetus to follow a course of research to study the standardized test on the Nepalese population and to provide norms for school-going students of Nepal. For these reasons, Jalota's G. M. A. Test was translated into Nepalese without introducing any alteration except in the vocabulary items; such decisions were definitely determined by practical consideration, namely, the best assessment of vocabulary can be had, if vocabulary items are prepared with the help of a Nepalese Dictionary.

The concept of general mental ability as used in the present test is that the general mental ability is "common to all mental activity" and "is expressed by all individuals, but in varying degrees.....since mental tasks differ in respect to their demands upon general intelligence" (1).

The Sample

As the standardization sample must be fairly representative of the Nepalese population, non-sectarian institutions of Nepal Terai were selected. These institutions are situated near the northern border of India. They are largely homogeneous in administration and teaching. At present, the common people are not much interested in female education; so the number of High Schools for girls is much smaller than the number of High Schools for boys. Because of this fact, in the preliminary and the first try-out much smaller number of girls than that of boys in three classes, i. e., VIII, IX and X could be had.

The standardization study was done in Kathmandu, the capital of Nepal. The students belonging to various scales of the social ladder and from different parts of the country come to the capital, because there are facilities for education. Thus the fairly representative sample includes children of various

high ranking to low ranking Indian and Nepalese officials, agriculturists and others.

Procedure

The procedure laid down in the Manual of Directions for the General Mental Ability Test (4) has been followed with certain necessary modifications in language, etc.

In the preliminary study, the printed test-sheets containing the fifty vocabulary items (25 synonyms and 25 antonyms) were distributed to a sample of 468 students of classes VIII to X of both sexes. In the first try-out, the test booklet consists of 100 items of seven elements (synonyms : 10 items; antonyms : 10 items; number series: 20 items; classification : 20 items; best answers : 10 items; reasoning : 10 items; and analogies : 20 items). The items were arranged with the help of playing cards. The procedure was that the cards were shuffled and dealt out to allot items and alternatives to their positions (6). The test was administered to a sample of 356 students of the same classes and sexes. In the first revision (standardization), the test was given to a sample of 1644 students of the said sexes and classes.

Scoring

After the administration of each study, the items were scored by the stencil key according to the scoring system given in the Manual of Directions; that is, assigning a score of 1 to each correct response and a score of zero to each wrong response, each unattempted items and double-underlinings were also treated as wrong. The sum of all right and wrong were statistically treated, as situation required, for item analysis, reliability, validity, norms, etc.

Results and Discussion

The construction of 50 vocabulary items (25 synonyms and 25 antonyms), each item with four alternatives, was based on the following principles:

- (a) Correct answer, (b) Word associated in meaning with the correct answer, (c) Associated word with stimulus word 1 or 2 above, (d) A word with no connection with the stimulus or the correct response.

The item difficulty was calculated by the formula (6)

$$\frac{I}{D} = \frac{W+U}{T} \quad (T=R+W+U)$$

When the item-difficulty-values of synonyms and antonyms of the preliminary study were determined, the items having difficulty values between 25% and 75% of average difficulty value were selected for the first try-out on the ground that "if there are n alternatives for an item, $\frac{1}{n}$ of the subjects would

probably get the item correct by guessing alone. Consequently, it is not expected to find items with difficulty levels below $\frac{1}{n}$. The minimum expected difficulty for five alternatives is 20%, for four alternatives 25%, and so on (7, P 146). The selected 10 items out of 12 (when statistically treated, there were 12 items within the range of 25% to 75%, out of 25 items) were arranged according to their difficulty values; the easiest item at the beginning and the hardest one at the end of the test (8).

The method of determining the item difficulty of the first try-out is analogous to the preliminary study. When the per cent difficulty values were determined, the items were rearranged in an ascending order for the first revision (standardization). The difficulty values range from 8.0% to 87.0%. The correlation among different classes (VIII to X) were also found in the standard time (20 mins.). The correlations are very high ranging from +.95 to +.97.

For reliable and useful norms for the school-going population, the modal age-grade-group (Modal Age-Grade-group means the age-group of the largest number of students in a given class) was selected (5). For this the data were analysed and the following table prepared:

TABLE 1
Showing average scores (the number is shown in brackets) of different age-groups for the various classes

Grades	Age in years : 11 yrs. = 10 yrs. 6 months to 11 yrs. 5 months										Total
	11	12	13	14	15	16	17	18	19	20	
VIII	29.79 (43)	28.95 (69)	27.39 (104)	29.53 (102)	27.91 (65)	33.17 (47)	26.92 (23)	20.77 (17)	...	...	28.29 (470)
IX	...	32.98 (65)	34.41 (68)	29.57 (104)	29.34 (124)	29.56 (95)	30.40 (38)	28.25 (32)	28.10 (43)	...	30.23 (569)
X	...	39.16 (26)	37.73 (63)	38.91 (76)	34.01 (125)	35.65 (122)	37.51 (93)	28.10 (42)	25.00 (16)	28.19 (42)	34.61 (605)
Total (X/N)	29.79 (43)	33.70 (160)	33.18 (235)	32.67 (282)	30.42 (314)	32.79 (264)	31.61 (154)	25.71 (91)	26.55 (59)	28.19 (42)	

When this Table is closely examined, the largest number of students fall in age 13, 14 and 15 (corresponding to grades VIII to X), numbering 104, 104 and 125 respectively. These maintain regularity and form modal age-grade groups

for the said classes. The average scores for these modal age-grade groups are also in an increasing order, i.e., 27.39, 29.57 and 34.01 respectively.

The reliability was established by the Equivalence Method and the formula given by Garret (2) and also by the technique, which gives the lower bound of the expected reliability, of Gulliksen (3). The reliability thus obtained is shown in the following Table:

TABLE 2
Showing age-wise reliability of the test
(Modal age-grade group N = 333)

			Ages 13	14	15
Reliability coefficient (2)	...	...	.89	.83	.87
Reliability coefficients (3)	...	...	.89	.84	.87

To find out the validity of the test, elements were grouped under high, medium and low discrimination(6) 1. For this the top (30%) and bottom (30%) groups were taken. On the basis of the total scores the success of the bright group was compared with that of the dull group. The following results show the percentage of discrimination between the dull group and the bright group on the seven elements.

TABLE 3
Showing relative discrimination for different classes, giving difference in percentage of scores for bright and dull groups

Class	Number	Elements							
		Syn.	Ant.	N.S.	Class	B.A.	R	Anal	
VIII	...	104	35.7	33.7	36.8	31.2	29.3	33.7	18.4
IX	...	104	35.5	29.6	23.6	31.0	21.2	29.9	13.2
X	...	125	28.7	22.0	41.1	35.6	24.8	34.0	24.3
Total	...	333	97.9	85.3	104.5	97.8	75.3	92.6	55.9
Average	...		32.6	28.4	34.8	32.6	25.1	30.6	18.6

G-saturations as found by Spearman's technique yield figures ranging from .541 to .762 and the reliability index is .90.

The norms can be prepared in a variety of ways, as age norms, grade norms, percentile rank, C-scale, stanine scale, etc., but owing to the short span of time the grade norms, percentile scale and stanine scale were established. In this article only modal age-grade norms (intelligence grade norms) have been mentioned as shown in the following Table.

TABLE 4

Probable error	Grade	Modal Age		
		13	14	15
		Range of score	Range of score	Range of score
	A	47 +	46 +	55 +
+ 1	B	37-46	38-45	45-54
+ 1	C	19-36	22-37	27-44
- 1	D	9-18	14-21	17-26
	E	0-8	0-13	0-16

Conclusion:

It is clear from all these facts and figures that this verbal group test of general mental ability in Nepalese will prove useful to the Nepalese school-going population. If further testing supports the above obtained reliability and validity, it might be argued that the G. M. A. Test is a culture-free test.

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Ethical Discrimination as Related to Intelligence, Age and Sex—A study of Moral Development in Children

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Conformity to ethical standards depends on a knowledge of what is right and wrong. Studies have shown that the development of ethical discrimination depends on a wide variety of factors. The pioneering work of Piaget has shown the regular dependence of capacity for ethical discrimination on chronological age. Spauldings in a study of High School Students found that general mental ability bore little relationship to social and civic attitudes (5). However Wilson's study showed that young people with high I. Q.'s proved consistently superior in completion of social terms, history, etc., but showed little superiority in civic attitudes (7). Studies of Lockhart and Harrower revealed definite age trends in the development of ethical discrimination (1, 3, 4).

Psycho-analytic theories which emphasise sex-difference as a basic factor in personality development would lead one to expect, sex-differences in ethical discrimination when other factors like age, intelligence and socio-economic status are matched. The studies of Lockhart cited above however produced negative results. On the whole, investigations in this area have been comparatively few which prevents one from arriving at any definite conclusion.

Aim of the investigation

The investigation is conducted with an aim to study the relationships between ethical discrimination and factors like intelligence, age and sex.

Sample

The present study was done on 151 children, 92 boys and 66 girls, from nursery to lower primary classes, ranging in age from 3+ to 8+, belonging to six different schools in the city of Madras. They formed a representative sample. Table 1 gives the number of cases studied in each age-group.

TABLE 1
Subjects in the study

Age	No. of children
3 + and 4 +	41
5 + and 6 +	70
7 + and 8 +	47

Tests

Two tests are administered to the sample :

1. A test of ethical discrimination.
2. An intelligence test.

Description of the test

The ethical discrimination test used in the present investigation is a modified version of Koh's test of ethical discrimination. It consists of four sub-tests. (a) Social relations, (b) Moral Judgment, (c) Offence evaluation, (d) Moral problems.

Social relations

It consists of eight items, each item representing a situation involving social relations and having three possible answers. The subject is asked to choose the best answer among the three alternatives. The items are so made that the children may be able to identify themselves with the child in these situations. The answer that indicates the highest level of ethical development is given a score of 2, the next best a score of 1, and the worst a score of 0. The highest possible score that can be obtained in this test is 16.

Moral Judgment

This is a Pressey type of test consisting of six items, each item consists of three words out of which the subject was asked to pick out the worst word. Koh's test contained five words in each item but as it was found unsuitable to the sample in question, the number was cut down to three. Care was taken to see that the words chosen were simple and did not present any difficulty to the children in understanding. The scoring scheme adopted here is that if the subject rightly ticks out the worst word, he is given a score of one. The highest possible score that can be obtained in this test is six.

Offence evaluation

The test comprised of ten words, representing the qualities that are good and evil and also some neutral words. The children are asked to evaluate whether each word is good, bad or neutral. Koh's test gave six alternatives for each word, namely,—praise, nothing, scold, jail, prison, and kill but this type of evaluation was found to be too high for the present sample and hence had to be simplified.

The most moral answer is given a score of two, the next best is given a score of one and the worst a score of zero. The highest possible score that can be obtained on this test is 20.

Moral problems

This test consisted of six items, each item presenting a problem in moral development and having 3 possible answers. The subject is asked to choose the best answer among the three alternatives. The scoring scheme is similar to that made use of in social relations—a score of two for the most moral answer, one for the next best and zero for the worst. The highest possible score in this test is 12.

Total ethical discrimination score

When the scores in the four different sub-sections are summed up, it is a total score on ethical discrimination. The highest possible score that can be obtained is 54. The higher the score the greater is the capacity for ethical discrimination.

Intelligence test

The intelligence test used in the present investigation is Kuhlmann's Tests of Mental Development. It is perhaps one of the most satisfactory tests available for the age-group under study and covers completely the age range of children selected for the present investigation. The battery has a good discriminative capacity and also provides a variety in nature of tests and objectivity in scoring.

Results and Discussion

TABLE 2

Correlations between intelligence and ethical discriminations for each of the sub-tests and for the test as a whole

Ethical discrimination tests			Correlation with intelligence
Social relations	...	...	— .04
Moral judgment	...	...	— .04
Evaluation	...	...	— .06
Moral problems	...	...	— .06
Total ethical discrimination score	...	...	— .07

Table 2 presents the correlations (Pearson's, *r*.) between intelligence and the different sub-tests of ethical discrimination, and also the total ethical discrimination score. The correlations are found to be insignificant though negative in direction. It only shows that ethical discrimination or knowledge of right and wrong does not bear much of relationship with intelligence. Spaulding and Wilson (6, 7) have also pointed out in their studies that though the more intelligent students had mastered factual material much better than the average, their insight into and concern about the social problems were far from commensurate with their mental abilities or general scholastic achievements. The present results also bear evidence to the same of finding.

Age and ethical discrimination.*Social relations.*

TABLE 3

Social relations—means, standard deviations and critical ratios for the different age groups

Age	N	M	SD	CR
3-4	41	10.58	2.54	4.13**
5-6	70	12.48	1.96	0.18
7-8	47	12.40	2.54	3.31**
3-4	41	10.58	2.54	

** Significant at .01 level.

Table 3 gives the mean, standard deviations and critical ratios between means in social relations according to the age of the sample. It is seen that the score is at its minimum in the 3 to 4 age-group. At the age level of 5 to 6, there is seen a sharp increase which is found to be highly significant. At 7 to 8, the scores decrease slightly but it is too slight to be taken into any account.

According to Hurlock (2) it is from 3 to 6 years of age that the foundations of moral conduct and the basic moral attitudes of the social group should become established. At this time the child is made to understand that his behaviour should conform to the social standards but is not told why a particular act is wrong. A child before he is five or six does not suffer from any guilt feelings when he does what is wrong. Even when he is caught in a wrong act, he only gets embarrassed or frightened of possible punishment. At this stage it is mainly the fear of punishment that prevents him to commit a wrong act. But as the child gets older, as he gets more and more socialised, he realises the social consequences of a wrong act. Moreover his larger fund of learned concepts of right and wrong relating to different situations enables him to make a fine discrimination.

Moral Judgment.

TABLE 4
Moral judgment—means, standard deviations and critical ratios
for the different age groups

Age	N	M	SD	CR
3-4	41	2.68	1.67	4.03**
5-6	70	3.89	1.27	2.29*
7-8	47	4.28	0.84	5.71**
3-4	41	2.68	1.67	

**Significant at .01 level.

*Significant at .05 level.

Table 4 presents the scores for moral judgment. It is seen that as the age increases, scores in moral judgment also increases. Moral judgment score is least in the 3 to 4 age-group and highest in the 7 to 8 age-group. The young child is not able to differentiate between the abstract concepts. His concepts are more concrete and are in the nature of immediate personal relationships. But as he advances in age, the concepts become more generalised and his capacity for ethical discrimination becomes final. Macaulay and Watkins (5) after asking 2,500 children to make a list of the most wicked things anyone could do, reported that up to the age of 9 years, the child's concepts were definite and concrete rather than abstract but after 9 years of age the concepts became more generalised, as for example, stealing is wrong rather than it is wrong to steal a ball. The results obtained in the present investigation point the same way. Moral judgment is found to improve as the child grows older.

Evaluation.

TABLE 5
Evaluation—means, standard deviations and critical ratios
for the different age groups

Age	N	M	SD	CR
3-4	41	6.90	2.66	5.78**
5-6	70	9.50	1.26	5.78**
7-8	47	9.90	0.92	2.00*
3-4	41	6.90	2.66	6.67**

**Significant at .01 level.

*Significant at .05 level.

Table 5 give the scores in evaluation. It is found that as in moral judgment, here also the scores increase significantly as the age increases. Evaluation scores are lowest at the 3 to 4 age-groups and highest in the 7 to 8 age-groups. In the younger ages the verbal fund of moral concepts is small and moreover the concepts they have mostly relate to some specific situations. As such when general concepts are given and the child is asked to discriminate between them, he is at a loss. But as he matures and learns more and more to formulate standards of conduct in terms of the general rule, it is only to be expected that his scores will increase.

Moral problems.

TABLE 6
Moral problems—means, standard deviations and critical ratios
for the different age groups

Age	N	M	SD	CR
3-4	41	4.70	1.98	3.00**
5-6	70	5.96	2.32	2.71**
7-8	47	7.10	2.22	5.33**
3-4	41	4.70	1.98	

**Significant at .01 level.

Table 6 gives the scores in moral problems. As in the other sub-tests it is found here also that the scores increase with age. It is true that a young child, though he may possess a knowledge of right and wrong, will not know why he should not act wrongly. The knowledge of "whys and wherefores" behind ethical standards can be acquired only as the child matures. It advances from the most concrete—a fear of punishment if he acts wrong—through the less concrete—ridicule and ostracism by the group,—to the abstract a developed ethical code.

Total ethical discrimination score

TABLE 7
Total ethical discrimination score—means, standard deviations
and critical ratios for the different age groups

Age	N	M	SD	CR
3-4	41	24.80	6.35	5.78**
5-6	70	31.45	4.75	1.83
7-8	47	33.15	5.00	6.79**
3-4	41	24.80	6.35	

**Significant at .01 level

Table 7 gives the means, standard deviations and the critical ratios between means for each age-group when the scores in each sub-test are summed up so as to procure a total score in ethical discrimination. As in the sub-tests here also the scores are found to increase as age increases. The scores at 5 to 6 age level is significantly higher than that at the 3 to 4 age level; it increases a little more at the 7 to 8 age level but the difference does not reach the level of significance. The principles of right and wrong in an abstract, verbal form are too advanced for a young child to grasp. He has to wait until he is mentally mature enough to see the relationship between an abstract principle and concrete cases and to associate these with memory images of specific situations. As he grows older he learns to judge his own conduct as good or bad first in terms of the personal consequences of his acts and then in terms of social consequences, regardless of personal ones. Learning to discriminate between right and wrong comes through actual personal experiences and not through moral teaching of right and wrong. As the child's capacity for comprehending relationship increases, his ethical concepts develop from their specific form into more generalised ones, and the child is able to recognise a common element in a variety of situations. This capacity develops only if the child has actual personal experiences with real situations. He cannot be expected to understand general moral concepts if they are taught to him as such but they gain meaning only if the child associates them with real experiences.

Sex and ethical discrimination

TABLE 8

Means, standard deviations, and critical ratios between means in the different sub-tests and in the total score according to sex

Tests	Boys		Girls		CR
	M	SD	M	SD	
Social relations	11.70	2.40	12.32	2.46	1.59
Moral judgment	3.62	1.43	3.79	1.42	0.17
Evaluation	8.98	1.86	8.90	2.26	0.23
Moral problems	5.92	2.16	6.04	2.64	0.30
Total ethical discrimination score	29.85	5.90	30.80	6.65	0.91

Table 8 gives the means, standard deviations and critical ratios between means for each of the subjects and also for the test as a whole, according to sex. The results show that there is no significant sex difference in any of the tests on ethical discrimination. Girls show a slightly higher score in almost all the tests but the difference is too slight to warrant an explanation. It

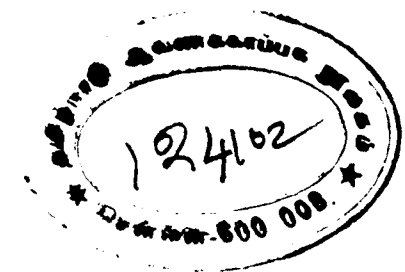
can only be said that no significant sex differences are found to occur as regards the capacity for ethical discrimination. The results obtained here suggest that if there is difference in ethical behaviour between boys and girls, it is not due to a difference in the capacity to discriminate between right and wrong.

Conclusions

1. No significant relationship is found to exist between intelligence and ethical discrimination.
2. Capacity for ethical discrimination is found to improve as age increases.
3. No significant sex difference is found as regards the capacity for ethical discrimination.

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Hereditry and Environment in the Development of Mental Activity

(A research by the Psycó-Statistic Centre in Palermo University)

In the Psychological Laboratory—directed by Prof. G. MIGLIORINO—annexed to the Statistics School of the University of Palermo, a research is being carried out concerning the intellectual level and development of character in school-age children of depressed areas.

10,000 children have been examined and on 4,000 of them, chosen by the method of "stratified sampling" by social classes, a set of mental tests (by Gille, Goodenough, Prudhommeau, Toulouse-Pieron, Koch) has been used.

The research has brought into evidence differences in the mental development of children according to their different socio-economic level. From the statistical analysis it resulted that those differences were not casual, but they depended on systematic reasons.

From the examination of these 4,000 subjects, divided as "wealthy", "middle-class" and "poor", it has been found out that: (a) the highest grades were reached by the first two groups, and mostly by the first one; (b) there is a negative correlation between the intelligence of children and the size of family: the highest grades were reached by children whose family consisted of 4 members (father, mother and 2 children). The I. Q. of the children regressed about 2 points for every additional member in the family.

The existence of a negative correlation between the I. Q. of the child and the size of the family might suggest some perplexity. However, it is to be remarked that a correlation of—0.25, as it has been found, involves only 60% of the cases in agreement with the tendency, while the 40% remain discrepant from it.

The results of the Centre in Palermo, confirm those already obtained in similar researches, conducted, in Scotland, by Sir G. Thomson (who discovered a correlation of—0.28 between results to the tests and size of the family) and, in France, by Heuyer, Pieron and Coll who discovered, between pupils belonging to families of only one child and pupils belonging to families of 9 children or more, differences ranging from 1–2 years of mental age.

The above data may have three different interpretations: (1) *hereditary* factors might be involved. Parents less intelligent would transmit their deficiencies to their children and, on the other hand, they would be inclined to

procreate many children; (2) it could be a matter of diversity of *environment*. Given for granted the tendency of less intelligent parents to procreate many children, the low intellectual level of both, parents and children, could depend on the *environment* where they have been living, and not on hereditary (id. cerebral, structural) reasons; (3) A third interpretation could be that the phenomenon is due to *the size of the family itself*: a larger family means reduced funds per person, available for education, food, medical treatment and other environmental conditions.

In summary, as a result of the researches in Palermo it was discovered: (1) the existence of a *positive* correlation between the socio-economic level of the parents and the intellectual level of children; (2) the existence of a *negative* correlation between I. Q. of the children and the size of the family; (3) the tendency for larger families in lower social classes. From these conclusions it arises for our country too, the problem, already weighing on others, that *differential fertility might, with the passing of generations, result in a lowering of the intellectual quotient average of the population.*

Some reserve must, however, be made even with regard to our own research. That is to say: (1) the correlation between intellectual level and size of the family has been calculated taking into account only the results to tests given by the *children*. For a more thorough investigation of the problem, it would be necessary to complete the research, studying the relation between the I. Q. of the *parents* and the number of their children; (2) the kind of research which we carried out could only take into account the number of children present in the family *at the moment of the inquiry*. To the end of obtaining reliable results it would be necessary to investigate families definitely *complete*, which could be done choosing, for example, families in which the mother has reached the critical age, and where, therefore, the possibility of later increase in the number of children is excluded.

Nobody can be unaware of the great social and human interest of the research in question. Perhaps, rather than by an organization of limited possibilities, such as a University Laboratory, a deeper study of problems of this kind should be faced by public authorities. In Italy, the Centre of Psycó-Statistics of Palermo University has repeatedly called the attention of the Minister of Public Health to this problem.

The aim of this summary is to establish relationship with colleagues working in other countries on the same field. Please, apply for details and the complete reprints to *Psychological Laboratory of the University Via Marchese Ugo 56, Palermo (Italia).*

Book Review

Silver Jubilee Volume, Vidhya Bhavan Society, Udaipur

Ed. P. S. NAIDU

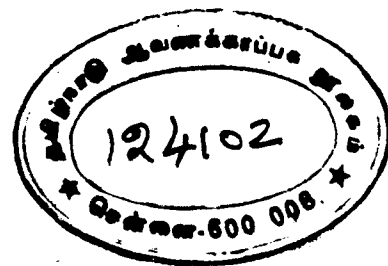
Professor P. S. Naidu and the Vidhya Bhavan deserve to be congratulated on bringing out the Silver Jubilee Volume, commemorating the 25th year of the Vidhya Bhavan.

The Volume is divided into three parts, Part I being concerned with the growth and expansion of the Vidhya Bhavan, a detailed account of its steadily expanding spheres of activity and service. Parts II and III are of greater interest to the general reader, the former dealing with a review of recent researches in Education and allied fields and Part III with the contemporary scene in Education. This last part consists of reflective articles.

The contributions in Part II, include interesting and valuable contributions by distinguished authors. The articles cover almost all the fields of education and child development. It may be mentioned however, that one important area, 'Moral and Social Development' has been comparatively neglected. Further, all the articles in this section are not research articles or reviews of research. However, the contributions doubtless represent mature, thoughtful and organised presentations of the particular subjects.

Part III, well fills the need for thinking and theory in contemporary psychological and educational research which of late has been showing a tendency to be drowned in oceans of numbers. It may be pointed out however that Dr. Fleming's article on delinquency might have been more fitting in Part II.

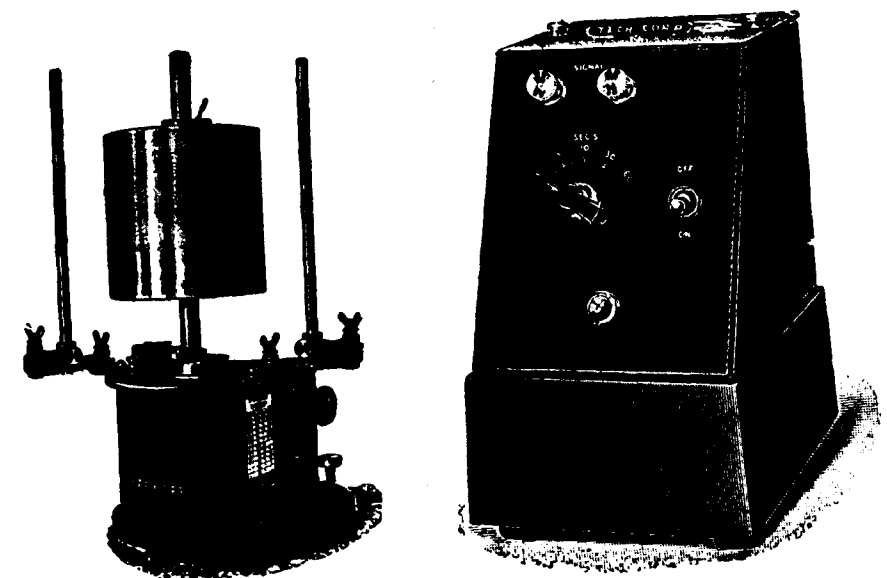
Part II, may well serve as the beginning step in the publication of regular annual reviews of researches in these fields. The Institute will be doing a valuable job if they can produce such regular reviews of educational and psychological researches in the country and also bring out abstracts of such researches. The need for such collated works in our country cannot be exaggerated too much.



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