

An Investigation of Early Memories.

By

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INTRODUCTION.

The object of this investigation was to study certain aspects of childhood recollections.

A certain amount of work had been carried out previously on the subject of early memories. There had been investigations designed to determine the average age to which a person's earliest memory dates back, (3,4,9,10,15), others had been concerned with the sense modalities (2,9,10,15,16) affective experiences (2,5,7,8,11,16), and emotions (4,10,13,14,15) involved in these fragments remembered.

In a few studies differences among the subjects themselves had been considered in relation to the memories presented by them. There had been investigations to discover whether differences in race, intelligence, age and sex among the subjects concerned play any part in determining the form and contents of the memories presented by them, (1,2,4,10,12).

In this particular investigation certain aspects of early memories have been studied separately, in relation to one another and in relation to personality differences among the subjects, and an attempt has been made to determine some of the factors which may account for the variance in the type of memories recalled.

It should be mentioned that the memories which this investigation was designed to study were not the repressed experiences of early childhood which are recalled with exceeding difficulty, and which are significant for psycho-analytic therapy, but were those memories which might be recalled to consciousness with comparative ease, as will later be seen by

the method involved in obtaining them.

THE SUBJECTS.

In earlier investigations it had been found that the sex, age, and race of the subject all affect the type of memory presented, and for this reason it was decided to confine the subjects chosen to one particular sex, race and age group in order to exclude any differences which might depend solely on these factors.

The subjects selected were European women students of the University of Cape Town, falling into the age group eighteen to twenty-three years. There were, however, two exceptions, since one non-student, and one student belonging to a slightly higher age-group were included.

Since the investigations attempting to link intelligence with early memories (1,4,12) had found correlation only between intelligence and the age of the subject at the time of his or her earliest memory, it was decided to place no restriction regarding intelligence when selecting the subjects. However, since the subjects examined were University students, and had, in every case, passed the matriculation examination, it seems probable that they fell into an intelligence group higher than average.

THE PRELIMINARY AND SECOND INVESTIGATIONS.

THE PRELIMINARY INVESTIGATION.

At the commencement of the investigation it had not yet been determined what method was to be employed both in collecting and studying the material. Previous investigations had, as has been mentioned earlier, made detailed analysis of only a few aspects of the memories presented and for the purpose of this investigation it was decided to draw up a completely new table of analysis.

In order to facilitate this compilation, a preliminary investigation of the memories of seven subjects was undertaken.

COLLECTION OF THE MATERIAL.

Each of the seven subjects was interviewed individually, and prior to the first interview no indication was given of what was to be expected.

At the beginning of each interview the subject was addressed by the investigator as follows:-

"I want you to help me with an investigation that is being carried out. I must ask you to co-operate with me and be perfectly honest in your replies, as otherwise your information will be useless, or may even be harmful to the work being done. There is, however, no need to feel embarrassed, as everything is quite confidential. All that is necessary is that you ask no questions and follow the instructions given in the best way you possibly can.

Now I want you to think back, and, on the spur of the

moment, to tell me your earliest memory."

This was recorded without comment by the examiner, and the subject was again asked to think back and present another of her earliest recollections, this time being given five minutes in which to recall her memory.

Two further memories were then requested, with a five minute interval between each, so that by the end of the first interview four of the subject's earliest memories had been recorded.

The subject was then given a week during which to think back, and recall six other memories, which she felt were, with the four already presented, her ten earliest memories.

She was then interviewed again, and the six new memories were recorded by the examiner.

Both among this first group of subjects and those later examined, there were a number of cases where difficulty was experienced in attempting to recall early memories. When this occurred the subject was encouraged to think of some period which she could remember distinctly, and to work her way back from that point. She was further informed that the age at which the memory was experienced, the type of memory, and its vividness did not matter as long as she considered that the memories presented were the earliest which she could recall.

Care was taken that no suggestion was given by the investigator which might in any way influence the memories recalled. The subjects were given complete freedom in their presentation of the memories, the investigator intervening only

when a point was not clearly expressed, or the examiner wished to hear further details of some particular aspect.

EXAMINATION OF THE MATERIAL.

The seventy memories were then studied, and after consideration of the different experiences involved, the part played by the subject, and other points, a table of analysis was drawn up.

TABLE I. TABLE OF ANALYSIS DRAWN UP DURING PRELIMINARY INVESTIGATION.

SECTION ONE:

- Part I.
- a. single occurrence.
 - b. repeated occurrence
 - c. " " but specific one remembered.
- Part II.
- a. visual
 - b. auditory
 - c. tactile
 - d. other than a,b, or c.
- Part III.
- a. vital movement recalled
 - b. accompanying movement
 - c. no movement.

SECTION TWO:

- Part IV.
- a. no. of people involved (excluding subject)
 - b. no. engaged in major active part
 - c. " " " " passive "

- d. no. engaged in medium active part
- e. " " " " passive "
- f. " " " minor active "
- g. " " " " passive "

Part V

- a. Part played by Subject - active
- b. " " " " - passive

Part VI

- a. Memory wholly pleasant
- b. " partly pleasant
- c. " wholly unpleasant
- d. " partly unpleasant
- e. No affective tone recalled.

SECTION FOUR

Part VII.

- a. Fear
 - (1) of person or thing
 - (2) for person or thing
 - (3) of falling, darkness etc.
- b. liking for someone or something
- c. Dislike of someone or something
- d. interest and curiosity
- e. jealousy and envy
- f. irritation and annoyance
- g. frustration - temper
- h. " - disappointment
- i. pain
- j. excitement at something new or pleasant
- k. bewilderment at something strange
- l. impressed by something unusual

SECTION FIVE.

- Part VIII.
- a. +Extraordinary (out of habitual current of life)
 - b. extraordinary, because for the first time
 - c. usual event

It may be seen that this preliminary table is divided into five sections. The first section is concerned with the form of the memory, and includes items dealing with sense modality and movement involved, and also whether the occurrence was single or repeated. The second section deals with the parts played by the subject and any other people entering into the memory. Section three covers the affective tone of the recollection, whilst in Section four there is an attempt to analyse the emotion and experience undergone by the subject. +The fifth section is concerned with whether the occurrence recalled was likely to have been an extraordinary or usual one.

Both in this and subsequent analyses it was decided to omit consideration of the age of the subject at time of the memory. This was done since information proffered on this point was inclined to be very unreliable, in many cases the subject not being able to limit to less than two years the period within which the event might have occurred.

The seventy memories were then subjected to this analysis, and by observation it was attempted to discover whether there was any correlation to be found between any of the aspects of the memories considered. But the sample used was small, and by mere

observation it was impossible to discover any definite connections between any of the points, with the obvious exception of the positive correlation between parts of Sections Three and Four, that is, between pleasant experiences and pleasant affective tone, and unpleasant experiences and unpleasant affective tone.

The total score for each subject on each point was then computed, and although these scores gave no new indication of any possible correlations between the points considered, they did serve to draw attention to the great variations in scores for the various points obtained by the different subjects.

For example:- in Section One, item 1a. where a point was scored for each memory which depicted an event or state which occurred only once, the scoring of the seven subjects ranged from 9 to 3, with an average of $6 \frac{3}{7}$, (maximum score being 10).

In Section Four, item VIIa the total number of fear memories ranged from 8 to 0, with an average of $2 \frac{5}{7}$, (maximum score being 10).

The chief value of this preliminary investigation lay in its presenting a rough sample of the material to be dealt with, so that suitable methods of analysis might be drawn up.

REVISION OF THE PRELIMINARY TABLE OF ANALYSIS.

After consideration it was decided to make various alterations in the original table of analysis.

In the first section it was decided to exclude the items concerning movement, since in many cases the subjects found difficulty in recalling and presenting any definite information on the matter.

In S ection Two, items were added to determine the kinds of people who had entered into the memories, whether they were intimates of, or strangers to, the subject, or whether they were merely remembered as unspecified crowds of people.

The detailed analysis of the parts played by other people was found to be unsatisfactory since difficulty was encountered in discovering criteria to determine the importance of the parts played. It was therefore decided to restrict this section to a division into major and minor parts, and to exclude the intermediate section, viz: 1Vd. and e. - the number playing medium active/passive parts.

The items concerning the part played by the subject herself were increased, items being added to determine whether the part played by the subject was of importance, of medium import, or of little importance to the contents of the memory, or whether the subject acted as a mere spectator.

The items in S ection Four were revised and amended, and were then rearranged into two parts, being placed according to whether they appeared to be connected with pleasant or

unpleasant affective tone.

It was decided to withdraw the fifth section, dealing with the extraordinariness of the occurrence, it being felt that neither the subject nor the examiner was in a position to judge whether the child had, at that time, considered that particular event to be unusual or not.

It was decided to add a new section, to be devoted to the analysis of certain points in those memories where it seemed obvious that the self of the subject had been affected.

The revised and amended table of analysis ran as follows:-

TABLE 11. REVISED PRELIMINARY TABLE OF ANALYSIS.

SECTION ONE.

1. a. Single occurrence.
- b. Repeated occurrence.
- c. Repeated occurrence, but specific one remembered.

11. a. Visual.
- b. Auditoty.
- c. Tactile.
- d. other than a, b, or e.

SECTION TWO.

III. a. People remembered.

b. Strangers.

c. Intimates.

d. Friends (other than close friends),
and acquaintances.

e. Crowd.

f. Number engaged in major active part.

g. " " " " passive "

h. " " " minor active "

i. " " " " passive "

IV. a. Part played by the subject - active.

b. " " " " " - passive.

c. " " " " " - important.

d. " " " " " - of medium import.

e. " " " " " - unimportant.

f. Subject only & spectator. -

SECTION THREE.

V. a. Memory wholly pleasant.

b. " " unpleasant.

c. Mixture of pleasantness and unpleasantness.

d. No affective tone recalled.

SECTION FOUR.

VI. a. Feelings of Fear.

- (1) of person or thing.
- (2) for person or thing.
- (3) of darkness, falling,
being alone etc.

- b. Dislike of someone or something.
- c. Jealousy and envy.
- d. Irritation and annoyance.
- e. Frustration → temper.
- f. " → disappointment.
- g. Pain.
- h. Unpleasant bewilderment at something strange.

VII. Feelings of

- a. Delight and joy.
- b. Liking for someone or something.
- c. Amusement.
- d. Contentment at something familiar.
- e. Pleasant surprise.
- f. Interest and curiosity.
- g. Excitement at something new or pleasant.
- h. Impressed by something unusual.

SECTION FIVE.

- VIII. Feelings of
- a. Pride at recognition of self by others.
 - b. Being the centre of attention
 - c. Self pride.
 - d. Pride of possession and relationship.
 - e. Creativeness.
 - f. Attainment.
 - g. Striving for self-realisation.
 - h. Assertion.
 - i. Prevention of submission.
 - j. Submission.
 - k. Frustration.
 - l. Pity for self.
 - m. Pity for others.
 - n. Shame, embarrassment.

THE SECOND INVESTIGATION.

Twenty-one new subjects were then interviewed in the same way as the first seven, and the two hundred and ten further memories were recorded.

During the examination of the second group of subjects the investigator had a clear notion of what aspects of the memories were to be analysed. Consequently she concentrated more on those points, and after the memories had been freely presented she would frequently go over

certain of the more salient points to determine more definite information regarding them. For example, in the case of other people entering into the memory (Section Two): The examiner would inquire who the people were, and how many were present, in those cases where the subject had not proffered this information when presenting the memory.

It should be mentioned that the twenty-one subjects were divided into four groups, the memories of each group being recorded and analysed before the next group was interviewed. This was done in order that any improvement of interviewing technique which might be discovered during the recording and analysis of one group of subjects and their memories, might be utilised during the examination of the next groups of subjects.

EXAMINATION OF THE MATERIAL.

When the newly-obtained memories were subjected to the revised table of analysis extreme difficulty was soon experienced, since criteria which had been found applicable when dealing with the original sample in the preliminary investigation, were now discovered to be unsatisfactory. This was due to the fact that as the number of memories increased, the range and type of memory also increased, and the original criteria were found to be too narrow when applied to this larger sample.

For an illustration of this, let us examine part of Section One which appeared both in the preliminary and revised tables of analysis.

- Section One. 1a. Single occurrence.
b. Repeated occurrence.
c. Repeated occurrence, but specific one remembered.

In the preliminary investigation a memory was considered to fall under (a)

- (1) when it occurred only once, and
- (2) when it occurred on only a few occasions within one short period.

A memory of the second type was included in (a) because it was felt that such a memory was likely to be recalled as one single unit. For example: A memory of being ill, and lying in bed for a number of days could be considered as a number of repeated occurrences, but in this investigation it was decided to consider it as a single occurrence, since it is likely that it was recalled as one single memory. Similarly in the case of a child who recalled going to school for four days, after which she did not again go for a year. It is possible that in this case, also, the occurrences were recalled as one single memory, as opposed to a child who might remember that she went to dancing classes every Friday afternoon.

In the preliminary investigation the criterion used to determine whether a memory, which concerned a recurring occurrence could be considered as single or recurring, was

whether the period of time over which the event occurred was short or long. All the recurring recollections in the preliminary investigation, either recurred over some long period, such as a year, or over some short period, such as three or four days, so that the criterion was applicable. But in the new group of memories presented, a few were found in which the period in question did not fit so clearly into these categories, and some arbitrary period of time had to be fixed determining the boundary between single and recurring memories. The time chosen was ten days, and only those experiences likely to be repeated only within any shorter period were considered as single occurrences.

With a number of other items also the criteria had to be altered and widened to suit the increased range of memories.

The memories obtained both in the preliminary and the second investigations were subjected to the table of analysis, and the scoring of the memories on the various points was again studied in an attempt to discover whether any predominant memory-patterns might be found, that is, whether there was any obvious correlation between any of the points considered.

A gain no definite statistical formulae were employed, and mere observation provided no clue concerning the existence of any such correlations.

It was then decided to regard the memories of each subject as the unit, and again great variance in the scores of each subject on each variable was observed. An attempt was then made to discover whether any of these variances might be explained by personality differences which were to be found among the subjects.

For this purpose the subjects were rated on various personality traits, the scores being calculated by the investigator from her own knowledge of the subjects, and also by a few self-rating questions, which were answered by the subjects themselves. (The questions were taken from a questionnaire of J.P. and R.B. Guilford (6), and the traits having high loads on these variables were determined from the re-analysis of the Guilford material by H.A. Reyburn and J.G. Taylor (17).)

The personality traits considered were Surgency, Persistence, Sociability, Nervousness, Tension and Flexibility. An attempt was also made to determine the ratings for each subject on Introversion and Aggressiveness.

Each trait was taken separately, and a note was made of those subjects whose scores fell at the extreme ends of the frequency distribution of the scores for that trait. Here again, by observation, it was attempted to discover whether there was any obvious correlation between any of the personality variables and any of the memory variables. This was done by a study of the total marks on the different memory variables obtained by the subjects who had scores at

the extreme ends of the frequency distribution of the scores of each personality trait.

Since no statistical method was employed at this point in the investigation, no definite results could be obtained. In a few cases it did, however, appear that differences existing in the scores of various subjects on certain memory variables, might, in some way, be linked with personality differences to be found among the subjects. It was, for example, found that those subjects having a high surgency rating tended to have a higher number of pleasant memories than the average, and that those subjects who had high scores for introversion seemed to experience a large number of unpleasant experiences and emotions.

The memories given during the first interview and those given during the second were then compared, but no significant differences in the frequency distribution of the scoring were discovered.

FURTHER EXAMINATION OF THE MATERIAL.

Although, as will be pointed out in the next section, the scoring on the table of analysis in the second investigation could not in every case be accurate, it was felt that the scores were reliable enough for it to be of interest if the following table were computed.

TABLE 111. GIVING (1) THE TOTAL NUMBER OF MEMORIES SCORING ON EACH OF THE ITEMS CONSIDERED.

(2) THIS NUMBER AS A % OF THE TOTAL NUMBER OF MEMORIES (280)

<u>Memory Variable</u>	<u>Total</u>	<u>%</u>
<u>SECTION ONE</u>		
1a. Single occurrence	208	74
b. Repeated occurrence	69	25
c. Repeated occurrence but specific one remembered.	3	1
11a. Visual	266	95
b. Auditory	19	7
c. Tactile	9	3
d. Other than a, b, or c.	4	1
<u>SECTION TWO</u>		
111a. People remembered	204	73
b. Strangers	140	50
c. Intimates	147	52
d. Friends	45	16
e. Crowds	23	8
1Va. Part played by the subject active	151	54
b. " " " " " passive	129	46
c. " " " " " important	140	50
d. " " " " " of medium importance	74	26
e. " " " " " unimportant	66	24
f. Subject only a spectator	52	19

<u>Memory Variable</u>	<u>Total</u>	<u>%</u>
<u>SECTION THREE</u>		
V a. Memory wholly pleasant	106	38
b. " " unpleasant	75	27
c. Mixture of pleasantness and unpleasantness	28	10
d. No affective tone recalled	71	25

SECTION FOUR

VI a. Fear	44	16
b. Dislike	7	3
c. Jealousy and envy	2	1
d. Irritation and annoyance	4	1
e,f, Frustration -> temper, disappointment	12	4
g. Pain	42	15
h. Unpleasant bewilderment	4	1
VII a. Delight and joy	67	24
b. Liking	4	1
c. Amusement	3	1
d. Contentment	2	1
e. Pleasant surprise	2	1
f. Interest and curiosity	17	6
g. Excitement at something new or pleasant	32	11
h. Impressed by something unusual	13	5

SECTION FIVE

VIII a. Pride at recognition of self by others	9	3
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<u>Memory Variable</u>	<u>Total</u>	<u>%</u>
b. Being the centre of attention	10	4
c. Self pride	18	6
d. Pride of possession and relationship	13	5
e. Creativeness	1	0
f. Attainment	10	4
g. Striving for self-realisation	4	1
h. Assertion	1	0
i. Prevention of submission	2	1
j. Submission	5	2
k. Frustration	2	1
l. Pity for self	0	0
m. Pity for others	1	0
n. Shame, embarrassment	7	3

(Percentages correct to nearest whole numbers)

It should be noted that in each part of every section (with the exception of parts I and V) it is possible for each memory to score on more than one item. For example, in Part II certain memories scored on both 11a and 11b, since both the visual and auditory sense modality were involved.

It may be seen that in Part I there is a great preponderance of single over repeated occurrences recalled. These results are similar to those found by Potwin (16) and Colgrove (2). In this connection it is of interest to note that Colgrove (2) mentions a tendency for females to have better memories than males for

single occurrences, so that some proportion of this preponderance may be due to the fact that only female subjects were used in this investigation.

In Part II, an extreme predominance of the visual sense is in agreement with the results obtained by Henri (9,10).

In Part V it may be seen that a larger percentage of pleasant than unpleasant memories is recalled. These results are in agreement with those of Hall, (7), Colgrove (2), Potwin (16) and Hollingworth (11), although Henderson (8) and Gordon (5) both challenge what Hollingworth terms "the obliviscence of the disagreeable". In the final sections also we find a predominance of the pleasant over the unpleasant.

Dudycha (3,4) has carried out some investigations on earliest recollections, one of the main objects of which was to study the emotions concerned with the memories recalled. In one investigation (4) he found that 30.4% of the memories involved fear, and 27.9% involved joy. It seems likely, however, that under joy would be included not only item Vlla (delight and joy) but also Vllg (excitement at something new or pleasant). The fact that in this investigation there is a larger percentage of joy memories, and a smaller percentage of fear memories than found by Dudycha may be due to the difference between the subjects used. Dudycha employed subjects of both sexes, and found that women experienced a larger number of joy, and a smaller number of fear memories, which may

account for the difference between his results and the results of this investigation, the material for which was obtained from female subjects only.

From the above it would appear that the types of memories obtained during the preliminary and second investigations presented a fair sample of women's earliest recollections.

FINAL REVISION OF THE TABLE OF ANALYSIS

The experience gained during the analysis of the memories considered in the preliminary and second investigations and the results of these investigations both indicated the advisability of a further revision of the table of analysis.

It was decided to exclude item 1c (repeated occurrence, but specific one remembered), since in nearly every case when one specific occurrence of a recurring event was recalled, this might be explained by the fact that some special feature had occurred to make this specific event memorable. Therefore the memory could no longer be regarded as a repeated occurrence, and would fall under item 1a (single occurrence). The decision to abandon this item was supported by the fact that a negligible number of memories fell into this category as compared with the other categories in part 1.

Part 11 was withdrawn since it was often found extremely difficult and unreliable to obtain definite information from people untrained in psychology regarding the sense modality

involved.

It was decided to exclude Part III for lack of satisfactory criteria to determine the importance of the part played by other people. In place of this a new classification was drawn up, this being dependent upon whether there was any recollection of other people being present in the memory.

Part IV, concerning the part played by the subject, was also revised. It was decided to withdraw items IVa and IVb (part played by the subject active/passive), since it was frequently impossible to give a reliable decision regarding into which category the memory should be placed. For example, one subject recalled having her hair brushed vigorously. She could not recall accurately whether she struggled or remained entirely passive throughout the operation. It was also felt that the criteria used to determine the importance of the part played by the subject were not satisfactory, and this classification was replaced by one concerning whether the subject had partaken as an actor or spectator in the memory.

The section analysing the affective tone of the memory was enlarged to include fourteen possible combinations of pleasantness and unpleasantness, and these were placed into three classes depending on whether pleasantness, unpleasantness or neither affective tone predominated.

The classification of the memories according to emotion and experience (Section Four) was abandoned. This was because in a number of cases definite information was not forthcoming

on this point, and frequently when the information was provided, it was found that the "psychologists fallacy" was at work, and the subject was adding to the memories and providing emotional colouring, which, she imagined from her general experience, would probably accompany the incident recalled. Another fact adding to the advisability of abandoning this classification was that the range of items in this section was too large to be dealt with accurately by statistical methods when the sample to be classified was limited to fifty subjects and five hundred memories, which was the number to be employed in the full investigation.

The final section dealing with the part played by the self was also revised, and the items were restricted to those concerning self-appreciation, frustration, depreciation and the extension of the self.

REVISION OF THE METHOD OF OBTAINING THE MATERIAL

In addition to revising the table of analysis, a revision of the method of obtaining the memories was also undertaken.

It was decided to abandon the two-interview method, since observation had shown that no significant differences were to be found between the memories presented during the first and second interviews. Another reason for abandoning this method was that there was no certainty that on reconsideration the subject might not find that the four memories presented at short notice were by no means among the first ten of her memories. That

is to say, instead of her finding six memories, which together with the first four comprised her ten earliest recollections, she might find ten or more memories earlier than the four given during the first interview.

In place of this earlier procedure, a new method was instituted whereby the subjects were given a week to recall their ten earliest memories before the interview during which they were recorded took place.

In connection with personality differences it was decided to present a self-rating questionnaire to each of the subjects, and the Thurstone-Willoughby Neurotic Inventory was chosen for this purpose.

CONCLUSIONS

It had been hoped to draw up a number of hypotheses regarding memory-patterns on the basis of the results obtained from the two preliminary experiments. As has been shown, however, little light was thrown on the subject merely by observation. The results of the investigation did, however, serve to draw attention to the great variations in scores obtained by the different subjects on the different variables.

The main value of these preliminary investigations lay in presenting a sample of the material to be considered, giving the investigator an opportunity to evolve suitable methods of dealing with the material, and to decide which aspects of the memories should be studied in detail.

THE MAIN INVESTIGATIONCOLLECTION OF THE MATERIAL

The twenty-two subjects chosen were told of the interview about a week before it was to take place, and were informed that all that was required of them was to be prepared to present ten memories. These memories might vary regarding type, amount of detail recalled, and the age of the subject at the time, but they should be the ten earliest recollections which the subject could remember.

Each subject was interviewed individually, and was allowed to present her memories quite freely. The investigator might then question the subject for further details on any of the aspects important to the investigation.

After the ten memories had been recorded, the subject was given the Thurstone-Willoughby Self-rating Inventory and asked to rate herself on each question on a five-point scale. It should be mentioned that both in this, and in the previous investigations, the subjects were given no indication, until after the presentation of their memories, that they would be given any personality test, so that this might not in any way affect the memories they supplied.

Those subjects whose memories had already been obtained in the earlier investigations were also required to rate themselves on this Inventory.

THURSTONE-WILLOUGHBY PERSONALITY SCHEDULE

Subjects should rate themselves for each question

according to this scale:-

- 0. very seldom or never
- 1. not often
- 2. average
- 3. quite often
- 4. very often or always

- 1. Do you get stage fright?
- 2. Do you worry over humiliating experiences?
- 3. Are you afraid of falling when you are on a high place?
- 4. Are your feelings easily hurt?
- 5. Do you keep in the background on social occasions?
- 6. Are you happy and sad by turns without knowing why?
- 7. Are you shy?
- 8. Do you day-dream frequently?
- 9. Do you get discouraged easily?
- 10. Do you say things on the spur of the moment and then regret them?
- 11. Do you like to be alone?
- 12. Do you cry easily?
- 13. Does it bother you to have people watch you work even when you do it well?
- 14. Does criticism hurt you badly?
- 15. Do you ever cross the street to avoid meeting someone?
- 16. At a reception or tea do you avoid meeting the important person?
- 17. Do you often feel just miserable?
- 18. Do you hesitate to volunteer in a class recitation?
- 19. Are you often lonely?

20. Are you self-conscious before superiors?
21. Do you lack self-confidence?
22. Are you self-conscious about your appearance?
23. If you see an accident does something keep you from giving help?
24. Do you feel inferior?
25. Is it hard for you to make up your mind until the time for action is past?

ANALYSIS OF THE MATERIAL

The memories of the 22 subjects, together with those of the 28 subjects previously examined were subjected to the revised table of analysis.

TABLE IV. TABLE OF ANALYSIS EMPLOYED IN THE MAIN INVESTIGATION.

<u>VARIABLE.</u>		<u>SCORING</u>	
1.	Recurring Occurrence (R)	1	Recurring occurrence
		0	Single occurrence
11	Subject Actor (A)	1	Part taken by subject - that of Actor.
		0	Part taken by subject - that of spectator.
111	No one else entering (E)	1	No other person recalled
		0	One or more people recalled.
1V	Affective tone of Memory (P)	+1	Pu Pleasantness followed by less unpleasantness.
		uP	Unpleasantness followed by more pleasantness.
		Pu	Both experienced together but pleasantness predominating.
		P	pleasant affective tone only.

VARIABLESCORING

- p Slight amount of pleasantness.
- 0 PU pleasantness followed by unpleasantness.
 UP unpleasantness followed by an equal amount of pleasantness.
 PU both affective tones experienced.
 X neither affective tone recalled.
- 1 pU pleasantness followed by a greater amount of unpleasantness.
 Up unpleasantness followed by a lesser amount of pleasantness.
 PU both affective tones experienced, but unpleasantness predominating.
 U unpleasantness only experienced.
 u slight amount of unpleasantness experienced.
- V Memory concerning (S)+1 the Self scored if memory scores of any one or more of the following variables VI, VII, VIII, IX, X.
- VI Appreciation of (Sa)+1 the Self scored if the memory exhibits any one or more of the following items referring to the subject.
- 1) Ability to perform some activity
 - 2) Pride of status.
 - 3) Pride of possession or relationship.
 - 4) Mastery over something or someone.
 - 5) Feeling of creativeness.
 - 6) Realisation that acting as a force on others.
 - 7) Performances of activity by subject which subject considered clever.
 - 8) Centre of attention (when accompanied by pleasant affective tone).
- VII Depreciation of (Sd)+1 the Self scored if the memory exhibits any one or more of the following items referring to the subject.
- 1) Shame, embarrassment.
 - 2) Awkwardness and shyness
 - 3) Unpleasant feeling of smallness.

VARIABLESCORING

VIII Frustration

(Sf) +1 scored if the memory exhibits any one or more of the following items referring to the subject.

- 4) Loss of pride
- 5) Inability to perform some act.
- 1) Own inability to act.
- 2) Forced to act in undesired way.
- 3) Prevented from acting in desired way.
- 4) Forced to stop during some desirable activity.

IX Extension of the Self

(Se) +1 scored if the memory exhibits any one or more of the following items referring to the subject.

- 1) Pride of possession or relationship.
- 2) Pity in others.
- 3) Fear for someone or something.

X Self and others

(So) +1 scored if the memory exhibits any one or more of the following items referring to the subject.

- 1) Ability to perform some act which no one else can.
- 2) Acting as a force on others
- 3) Self as the centre of attention.
- 4) Shame, embarrassment, in front of others.
- 5) Awkwardness and shyness.
- 6) Desire for attention.
- 7) Pity for others.
- 8) Fear for someone.
- 9) Acceptance of knowledge of other's attitude concerning oneself.
- 10) Incomprehension of another's attitude towards oneself.
- 11) Feeling of smallness when others involved.
- 12) Loss of pride when others involved.

The criterion used to determine whether a memory might be considered a "Recurring" or "Single Occurrence" has already been described.

The criterion used in reference to variable A (Subject - Actor) was that a subject was considered a spectator only if her absence would make no difference to the event or situation described, that is, when the complete occurrence recalled, could be considered without reference to the subject.

A difficulty arose in deciding on the criterion for variable E (no one else entering the memory). In a number of memories the influence, though not the presence, of another person was obvious. An example of this is a memory in which a child realises she must stay in bed, otherwise her mother will punish her. The presence of the mother, however, is not recalled. Since the majority of our actions are, to some extent, influenced by other people, it was decided to consider that a memory should score minus on variable E only when the presence of another person was recalled. The influence of other people, regardless of their presence was analysed in those sections devoted to the analysis of memories concerning the self.

The criteria for the other variables consisted of considering whether one or more of the listed items was exhibited by the memory.

CORRELATIONS BETWEEN THE PERSONALITY VARIABLE AND THE MEMORY VARIABLES

It was then decided to correlate the different memory variables with the Thurstone-Willoughby Inventory. Since the fifty subjects each had only one score for the personality variable, and ten separate scores (one for each memory) on each of the memory variables, it was impossible to use the material as it stood.

It was, therefore, decided to consider the ten memories of each subject as the unit. In variables I, II, III, where the distribution was dichotomous, the subjects score for each variable was taken to be the total number of memories falling into the plus category. In the case of those variables where a certain character might or might not be present (V to X) the total number of memories where this character was exhibited was taken as the score.

In the case of variable IV, the subject might score +1, -1 or 0, depending on whether pleasant, unpleasant or neither affective tone predominated. The score for each subject on this variable was taken to be the total algebraic sum of the scores for her ten memories.

A difficulty arose here since this method of scoring did not seem to admit sufficient indication of the varying proportion of the three different classes. A subject having, for example, five pleasant and five unpleasant memories would have the same total score (0) as one in none of whose memories either tone predominated. It was decided, therefore, that in addition to

the above method of scoring, the subject should also receive a score denoting her total number of pleasant memories, and one denoting her total number of unpleasant memories.

Another difficulty arose during the computation of the b correlations, in the case of variables VII and IX, since there was in variable IX only one case, and in variable VII only two cases where a score of 2 was gained, in all other cases the scores being either 1 or 0. When dealing with these variables it was felt that the product-moment method of correlation would be impracticable, and consequently it was decided for each variable to rate the subjects on a dichotomous classification rating when one or more of these ^{or} memories displayed this characteristic.

The total scores of the subjects on each memory variable was then correlated with their total scores on the Thurstone-Willoughby Inventory.

Pearson's product-moment method was used in all cases except correlations involving variables VII and IX, where the biserial method ($r_{bis} = \frac{(N_p - N) \pm (1 - r)}{2\sigma}$) was employed.

(It should be noted that from hereon the variables will be referred to by initials rather than by numbers. A key to the variable indicated is given here.

N	Thurstone-Willoughby Inventory.	S	Self memories.
R	Recurring occurrence.	Sa	Self-appreciation.
A	Subject - Actor.	Sd	Self-depreciation.
E	No one else enters.	Sf	Frustration.
P	Algebraic score for pleasantness.	Se	Self extension.
		P1	Total of pleasant memories.
		Unpl	" " unpleasant "

TABLE V CORRELATIONS BETWEEN THE THURSTONE-WILLOUGHBY AND THE
VARIOUS MEMORY VARIABLES

	R	P	A	E	S	Sa
N	-.16	-.29	+.05	+.17	-.06	-.09
	Sf	So	Se	Sd	Pl	Unpl.
N	+.24	+.19	-.07	+.29	-.26	+.22.

P.E. Median $r = \pm .09$

It was then decided to ^{combine} continue the two categories Sd and Sf by allowing one mark to each memory displaying either one or both characters. The score for each subject on this new variable (Sdf) was taken as the total number of her memories gaining a mark for this variable. This combined category gave an improved correlation when correlated with N by the product-moment method.

	Sdf	Sf	Sd
N	+.33	+.24	+.29

The results of the different methods of scoring affective tone were then examined, and it was found that the three correlations were much in agreement.

	P	Pl	Unpl.
N.	-.29	-.26	+.22

and it was therefore decided to exclude the two variables Pl and Unpl. from further study.

COMPUTATION OF A CORRELATION TABLE

The next step was the computation of a table of correlations not only between N and the various memory variables, but also between the memory variables themselves. For this purpose the total memories of each subject was considered the unit (rather than using each memory as the unit), in order to be able to compare the results with those obtained from correlations between N and the various memory variables.

Here again the product-moment method was used in every case, with the exception of correlations between Se and Sd and the other variables, when the biserial r was again used.

In the correlation between Sd and Se the tetrachoric method had to be used, since both categories were dichotomously divided. For this purpose the "Computing Diagrams for the Tetrachoric Correlation Coefficient" of Saffir, Cheshire, and Thurstone (19) were employed.

The correlations were low on the whole, but it was, nevertheless, decided to attempt the extraction of factors from the table.

Before this could be done it was necessary to exclude a number of the variables. Since Sa, Sf, Sdf, So, Se, and Sd were each included in S, every memory scoring on any one or more of these former variables would consequently score a point for displaying the S character. Consequently, correlation between any of these variables and S would be the correlation of part with whole, and false coefficients would result. To avoid this it was decided to exclude the S variable from the correlation table.

TABLE VI. TABLE OF CORRELATIONS BETWEEN VARIABLES
N. R. P. A. E. S. Sa. Sf. Sdf. So. Se. Sd.

	N	R	P	A	E	S	Sa	Sf	Sdf	So	Se	Sd
N		-.16	-.29	.05	.17	-.06	-.09	.24	.33	.19	-.07	.29
R	-.16		.32	.04	.51	-.17	-.06	-.16	-.25	-.28	.00	-.18
P	-.29	.32		.19	-.12	-.30	-.06	-.42	-.47	-.28	-.14	-.22
A	.05	.04	.19		-.12	.13	.32	-.03	-.13	.13	.03	-.27
E	.17	.51	-.12	-.12		-.13	-.17	-.01	.05	-.12	-.09	.08
S	-.06	-.17	-.30	.13	-.13		.53	.53	.66	.94	.46	.55
Sa	-.09	-.06	-.06	.32	-.17	.53		-.08	-.05	.49	-.12	-.12
Sf	.24	-.16	.42	-.03	-.01	.53	-.08		.87	.51	.09	.82
Sdf	.33	-.25	-.47	-.13	.05	.66	-.05	.87		.71	.10	.71
So	.19	-.28	-.28	.13	-.12	.94	.49	.51	.71		.46	.54
Se	-.07	.00	-.14	.03	-.09	.46	-.12	.09	.10	.46		.15
Sd	.29	-.18	-.22	-.27	.08	.55	-.12	.82	.71	.54	.15	

P.E. Median $r = \pm .09$

The correlations between Sf, Si, and Sdf, and all the other variables were then compared.

TABLE VII. CORRELATIONS BETWEEN ALL VARIABLES AND VARIABLES
Si, Sf, AND Sdf.

	N	R	P	A	E	S	Sa	Sf	Sdf	So	Se	Sd
Si	+ .29	-.18	-.22	-.27	+.08	+.56	-.12	+.82	+.71	+.54	+.15	-
Sf	+ .34	-.16	-.42	-.03	-.01	+.53	-.08	-	+.87	+.51	+.09	+.82
Sdf	+ .33	-.25	-.47	-.13	-.05	+.66	-.05	+.87	-	+.71	+.10	+.71

P.E. Median $r = \pm .09$

It was felt that the results obtained were similar enough for it to be satisfactory if only Sdf were retained as representative of this group of variables, and consequently Si and Sf were excluded from the table.

The variable Se was also withdrawn because the correlations between it and the remaining variables in the table were extremely low.

The revised table of correlations was as follows:-

TABLE VIII. TABLE OF CORRELATIONS

	N	R	P	A	E	Sa	Sdf	So
N		-.16	-.29	+.05	+.17	-.09	+.33	+.19
R	-.16		+.32	+.04	+.51	-.06	-.25	-.28
P	-.29	+.32		+.19	-.12	-.06	-.47	-.28
A	+.05	+.04	+.19		-.12	+.32	-.13	+.13
E	+.17	+.51	-.12	-.12		-.17	+.05	-.12
Sa	-.09	-.06	-.06	+.32	-.17		-.05	+.49
Sdf	+.33	-.25	-.47	-.13	+.05	-.05		+.71
So	+.19	-.28	-.28	+.13	-.12	+.49	+.71	

Median $r = \pm .17$

P.E. Median $r = \pm .09$

The correlations were low but consistent, and it was reasonable to suppose that factors, although small, were present. It was, therefore, decided to factor analyse the correlation matrix.

COMPUTATION OF A TABLE OF TETRACHORIC CORRELATIONS.

In the previous section the correlations between the characters were computed by the use of values consisting of the total scores obtained by the fifty subjects on the different variables. It was decided that, in addition, another statistical technique should be employed, the values for the variables being determined by the varying scores obtained by the five hundred memories. This procedure should, of course, give the same results as the previous method, unless the different techniques employed in determining the values had in any way altered the character of the variables.

It was decided to institute a dichotomous classification in the case of every memory variable. Variable R was already divided in this manner, and it was decided to accord a plus score to any memory displaying the character "Recurring Occurrence", and a minus score to any memory failing to do so. The same procedure was adopted in the case of variables A and E (subject - Actor) and (No one else entering the memory.)

When dealing with those variables referring to the self (i.e., S, Sa, Sd, Sf, Sdf, So, Se), a memory was scored plus on any variable when it exhibited that character, and minus

and minus when it did not.

The variable referring to the affective tone of the memory was originally trichotomously divided. This character was split up into three variables:-

Fl.	Pleasantness	+ scored when pleasant tone predominated. - scored in every other case.
Unpl.	Unpleasantness	+ scored when unpleasant tone predominated. - scored in every other case.
X	Neutral	+ scored when neither tone predominated. - scored when either tone predominated.

It was impossible to include variable X (Thurstone-Willoughby Inventory) in the calculations, since the values for this variable were the scores gained by the fifty subjects on the test, whereas the values for the memory variables were the scores of the five hundred memories.

The different memory variables were then correlated tetrachorically, the Computing Diagrams (19) again being used for this purpose, and the correlation either being read off directly from the curves presented or obtained by a method of interpolation.

TABLE IX. TABLE OF TETRACHORIC CORRELATIONS

	R	A	E	S	Sa	Sdf	So	Se	Sd	Sf	Pl	Unpl	X	
R		+.04	+.50	-.34	-.13	-.32	-.14				-.28	+.60	-.52	-.15
A	+.04		-.35									00	+.30	-.43
E	+.50	-.35									+.16	-.25	+.08	
S	-.34				x	x	x	x	x	x	-.20	+.35	-.33	
Sa	-.13			x							+.60	-.61	-.10	
Sdf	-.32			x							-.70	-.64	-.20	
So	-.14			x							-.18	+.37	-.34	
Se				x					+.15					
Sd				x				+.15						
Sf	-.28			x									+.63	
Pl	+.60	00	+.16	-.20	+.50	-.70	-.18							
Unpl	-.52	+.30	-.25	+.35	-.61	+.64	+.37				+.63			
X	-.15	-.43	+.08	-.33	-.10	-.20	-.34							

Median $r = .32$ P.E. Median $r = \pm .065$

(Crosses within the table indicate that these correlations were not attempted, since it would involve the correlation of part with whole).

It may be seen that of the seventy-two correlations possible, only in thirty-one cases was any coefficient obtained. This was due to the fact that in every other case either one or both of the distributions had its dichotomy near the tail. For these cases there were no diagrams available from which to obtain correlations directly, and extrapolation near the point of convergence was found to be too inaccurate.

It was decided that an attempt should not be made to apply Pearson's formula to these cases, it being probable that with data of this type the resulting correlations would be too low and their Probable Errors too high for the coefficients obtained to be of much value.

The correlations obtained by the use of each separate memory as the measurable unit, and when the ten memories were considered together, were then compared in those cases where both coefficients were available.

TABLE X. SHOWING THE CORRELATIONS OBTAINED BY THE TWO METHODS

	A	E	S	Sa	Sdf	So	Sf	
R	+.04	+.50	-.34	-.13	-.32	-.14	-.28	each separate memory.
R	+.04	+.51	-.17	-.06	-.25	-.28	-.16	ten memories taken together.
E	-.35							each separate memory.
E	-.12							ten memories taken together.

The tendency for a higher correlation to have been obtained by the tetrachoric method may have been caused by the difference in n when the two methods were used. When each memory was treated separately n was ten times as great as when ten memories were taken together, and since there is a greater tendency for errors to be of a negative character and lower the correlations when the sample is small, it seemed reasonable to suppose that the difference in n accounted for much of the difference between the coefficients.

The results of the comparison between the two sets of correlations strengthens the probability that, in a large number of cases, the correlations in the table to be factor analysed would have been larger, had a larger number of subjects been used.

FURTHER ANALYSIS OF THE MATERIAL (1).

Using the data supplied by the analysis of the five hundred memories, a new table was compiled showing the total number of memories displaying each memory character.

TABLE XI. PRESENTING (1) TOTAL NUMBER OF MEMORIES
DISPLAYING EACH MEMORY CHARACTER
(3) THIS NUMBER AS A PERCENTAGE OF THE
TOTAL NUMBER OF MEMORIES

<u>MEMORY VARIABLE</u>		<u>TOTAL</u>	<u>%</u>
Recurring occurrence	(R)	98	20
Subject - Actor	(A)	409	82
No one else entering	(E)	83	17
Memory concerning the Self	(S)	127	25
Appreciation of the Self	(Sa)	45	9
Depreciation of the Self	(Sd)	22	4
Frustration	(Sf)	41	8
Depreciation and Frustration	(Sdf)	82	12
Extension of the Self	(Se)	15	3
Self and others	(So)	108	22
Pleasantness predominating	(Pl)	237	47
Unpleasantness predominating	(Unpl)	190	38
Neither tone predominating	(X)	73	15

(Percentages taken correct to the nearest whole number)

This table was then compared with Table 111, the data ^{for} in which was supplied by the analysis of only the first two hundred and eighty memories recorded, and the percentages of the comparable items were found to be very similar. Since the figures in Table 111 were much in agreement with those obtained by other investigators, it would appear that the material used throughout this investigation presented a fair sample of women's earliest recollections.

In connection with personality differences it should be mentioned that the mean score obtained on the Neurotic Inventory (total score possible 100) was 50.04 SD 14.14. It would appear, therefore, that the sample used presented an average group in respect to this feature of personality.

FURTHER ANALYSIS OF THE MATERIAL (2)

The correlations were then undertaken between some of the memory variables and certain of the questions on the Neurotic Inventory which appeared likely to bear some connection to these variables.

The product-moment method was used, and the scores obtained by the subjects on the memory variables were correlated with self-ratings on the questions from the Inventory.

P (score for pleasantness) was correlated with question 17 (Do you often feel just miserable?), and the correlation obtained was $-.107$ ($PE = r \pm .09$). Since the correlation was not much larger than the Probable Error, no significant

conclusion could be drawn.

Question 21 (Do you lack self-confidence?) and question 24 (Do you feel inferior) were then correlated with some of the memory variables. The results are shown on the following table.

TABLE XI. SHOWING CORRELATIONS BETWEEN:

- (1) certain of the memory variables and particular questions from the Neurotic Inventory.
- (2) these particular memory variables and the Neurotic Inventory taken as a whole.

		<u>Question 21</u>	<u>Question 24</u>	<u>N</u>
Memories concerning the Self	(S)	no r	-	-.06
Depreciation and Frustration	(Sdf)	+.27	+.38	+.33
Self-appreciation	(Sa)	-.23	no r	-.09

P.E. Median $r = \pm .09$

The results obtained were in keeping with the fact that the Neurotic Inventory is not a measure of only one factor.

The results also drew attention to the possibilities of connecting certain of the memory variables with various aspects of personality. It seemed reasonable to suppose that a person with feelings of inferiority (question 24) should recall memories of self-depreciation and frustration, and that a person lacking in self-confidence (question 21) should not recall memories involving self-appreciation. It was, however, outside the scope of this study to carry further this line of investigation.

Another aspect of the subject which could not be considered in detail was that relating to the analysis of the affective tone accompanying the recollections. Fourteen patterns of affective tone were considered, and observation gave no indication of how any of these patterns might be connected with any of the variables considered. As will be seen from the following table, the vast majority of the memories were recalled as having either one or neither affective tone throughout. Since so few of the memories fell into each of the other categories, and since the sample used was relatively small, it was felt that a larger sample should be employed before it would be worth while to attempt any correlation between the pattern of affective tone and any other variable.

TABLE XLII. SHOWING THE TOTAL NUMBER OF MEMORIES DISPLAYING EACH PATTERN OF AFFECTIVE TONE

(see table IV for a key to the symbols used)

F ₁	Pu	...	2	X ₁	PU	...	6	U ₁	pU	...	24
2	uP	...	3	2	UP	...	2	2	Up	...	3
3	Pu	...	21	3	Pu	...	8	3	PU	...	4
4	P	...	208	4	K	...	57	4	U	...	152
5	p	...	3	5				5	u	...	7

THE FACTOR ANALYSISCENTROID ANALYSIS.

The factorial analysis of the table of inter-correlations between the variables was then undertaken. The centroid method was employed, and since there were eight variables involved it was possible to extract four factors from the table.

TABLE XIV. CORRELATION MATRIX, WITH GUESSED COMMUNALITIES

	N	R	P	A	E	Sa	Sdf	So
N	(33)	-16	-29	05	17	-09	33	19
R	-16	(51)	32	04	51	-06	-25	-28
P	-29	32	(47)	19	-12	-06	-47	-28
A	05	04	19	(32)	-12	32	-12	13
E	17	51	-12	-12	(51)	-17	05	-12
Sa	-09	-06	-06	32	-17	(49)	-05	49
Sdf	33	-25	-47	-12	05	-05	(71)	71
So	19	-28	-28	13	-12	49	71	(71)

P. E. Median $r = \pm .0926$

(In this and in the following correlation table (Table XVI) the coefficients are taken correct to 2 decimal places, and the decimal point is omitted.)

**TABLE XV. SHOWING REFLECTION OF CORRELATIONS BEFORE THE
EXTRACTION OF THE 1st FACTOR.**

No. of - signs	N	R	P	A	E	Sa	Sdf	So	TOTAL NEGATIVES.
1) before reflection	3	4	5	2	4	5	4	3	30
2) after reflection of P	2	5	2	3	3	4	3	2	24
3) after reflection of R	1	2	1	4	4	3	2	1	18
4) after reflection of E	2	2	2	3	3	2	3	0	16

**TABLE XVI SHOWING REFLECTED CORRELATION MATRIX, WITH 1st
FACTOR LOADS. (R, P, E, reflected)**

	N	R	P	A	E	Sa	Sdf	So	
N	33	16	29	05	-17	-09	33	19	
R	16	51	32	-04	51	06	25	28	
P	29	32	47	-19	-12	06	47	28	
A	05	-04	-19	32	12	32	-13	13	
E	-17	51	-12	12	51	17	-05	12	
Sa	-09	06	06	32	17	49	-05	49	
Sdf	33	25	47	-13	-05	-05	71	71	
So	19	28	28	13	12	49	71	71	
Total of Column	109	205	158	058	109	145	224	291	$\sum r = 12.99$

$$\sqrt{\sum r} = 3.60416$$

$$\frac{1}{\sqrt{\sum r}} = .277457$$

1st
Factor
loads .3924 .5688 .4384 .1609 .3024 .4023 .6215 .8074 $\sum FLs = 3.6041$

TABLE XVII SHOWING RESIDUALS AFTER EXTRACTION OF 1st FACTOR.

	N	\bar{R}	\bar{P}	A	\bar{E}	Sa	Sdf	So	
N	239	-012	157	001	-261	-212	142	-054	
\bar{R}	-012	186	071	-132	338	-169	-104	-179	
\bar{P}	157	071	278	-261	-253	-116	198	-074	
A	001	-132	-261	294	071	255	-230	000	
\bar{E}	-261	338	-253	071	419	048	-238	-124	Median residual = .161
Sa	-212	-169	-116	255	048	328	-300	165	
Sdf	142	-104	198	-230	-238	-300	324	208	
So	-054	-179	-074	000	-124	165	208	058	
Total of Column	000	-001	000	-002	000	-001	000	000	$\leq = -004$

(In this, and in the following correlation tables, the coefficients are taken correct to three decimal places, and the decimal point is omitted.)

TABLE XVIII SHOWING REFLECTION OF RESIDUALS AFTER THE EXTRACTION OF THE 1st FACTOR.

No. of - signs	N	\bar{R}	\bar{P}	A	\bar{E}	Sa	Sdf	So	Total Negatives.
1) before reflection	4	5	4	3	4	4	4	4	32
2) after reflection of \bar{R}	3	2	5	2	5	3	3	3	26
3) after reflection of \bar{P}	4	1	2	1	4	2	4	2	20
4) after reflection of \bar{E}	3	0	3	2	3	3	3	1	18

TABLE XIX. REFLECTED 1st FACTOR RESIDUAL TABLE,WITH 2nd FACTOR LOADS. (\bar{R} , \bar{P} , \bar{E} reflected.)

	N	R	P	A	E	Sa	Sdf	So	
N	239	012	-157	001	261	-212	142	-054	
R	012	186	071	132	338	169	104	179	
P	-157	071	278	261	-253	116	-198	074	
A	001	132	261	294	-071	255	-230	000	
E	261	238	-253	-071	419	-048	238	124	
Sa	-212	169	116	255	-048	328	-300	165	
Sdf	142	104	-198	-230	238	-300	324	208	
So	-054	179	074	000	124	165	208	058	
Total of Column	232	1191	192	642	1008	473	288	754	$\Sigma r = 4.780$
									$\sqrt{\Sigma r} = 2.18632$
2nd Factor loads	.1061	.5448	.0878	.2926	.4610	.2163	.1317	.3449	$\frac{1}{\sqrt{\Sigma r}} = .45739$ $\Sigma FLs = 2.1858$

TABLE XX SHOWING RESIDUALS AFTER THE EXTRACTION OF THE 2nd FACTOR.

	N	R	P	A	E	Sa	Sdf	So	
N	228	-046	-166	-030	212	-235	128	-091	
R	-046	-111	023	-028	087	051	032	-009	
P	-166	023	270	235	-293	097	-210	044	
A	-030	-028	235	208	-206	191	-269	-101	Median residual .115
E	212	087	-293	-206	203	-148	177	-035	
Sa	-235	051	097	191	-148	281	-328	090	
Sdf	128	032	-210	-269	177	-328	307	163	
So	-091	-009	044	-101	-035	090	163	-061	
Total of Column	000	-001	000	000	-003	-001	000	000	$\Sigma e = -005$

TABLE XXI SHOWING REFLECTION OF THE RESIDUALS AFTER THE
EXTRACTION OF THE 2nd FACTOR.

No. of - signs	N	R	P	A	E	Sa	Sdf	So	Total Negatives.
1) before reflection	5	3	3	5	4	3	3	4	30
2) after reflection of A	4	2	4	2	3	4	2	3	24
3) after reflection of P	3	3	3	1	2	5	1	4	22
4) after reflection of Sa	2	4	2	0	1	2	0	5	16
5) after reflection of So	1	3	1	1	0	1	1	2	10

TABLE XXII. REFLECTED 3rd FACTOR RESIDUAL TABLE, WITH

	<u>3rd FACTOR LOADS.</u> (A, P, Sa, sO reflected.)								
	N	R	P	A	E	Sa	Sdf	So	
N	228	-046	166	030	212	235	128	091	*Diagonals replaced because residuals in these cases are negative.
R	-046	*087	-023	028	087	-051	032	009	
P	166	-023	270	235	293	097	210	044	
A	030	028	235	208	206	191	269	-101	
E	212	087	293	206	203	148	177	035	
Sa	235	-051	097	191	148	281	328	090	
Sdf	128	032	210	269	177	328	307	-163	
So	091	009	044	-101	035	090	-163	*090	
Total of Column	1044	123	1292	1066	1361	1319	1288	095	
									$\sqrt{\sum r} = 2.75463$
3rd Factor loads	.3790	.0447	.4690	.3870	.4941	.4788	.4676	.0345	$\frac{1}{\sqrt{\sum r}} = .36303$ $\leq FLs = 2.7547$

TABLE XXIII SHOWING RESIDUALS AFTER THE EXTRACTION
OF THE 3rd FACTOR.

	N	R	\bar{P}	\bar{A}	E	\bar{S}_a	Sdf	\bar{S}_o	
N	084	-063	-012	-117	025	054	-049	078	
R	-063	085	-044	011	065	-072	011	007	
\bar{P}	-012	-044	050	053	061	-128	-009	028	Median residual .054
\bar{A}	-117	011	053	058	015	006	088	-114	
E	025	065	061	015	-041	-089	-054	018	
\bar{S}_a	054	-072	-128	006	-089	052	104	073	
Sdf	-049	011	-009	088	-054	104	088	-179	
\bar{S}_o	078	007	028	-114	018	073	-179	089	
Total of Column	000	000	001	000	000	000	000	000	= +001

TABLE XXIV SHOWING REFLECTION OF THE RESIDUALS AFTER THE
EXTRACTION OF THE 3rd FACTOR.

No. of - signs	N	R	\bar{P}	\bar{A}	E	\bar{S}_a	Sdf	\bar{S}_o	Total Negatives.
1) before reflection	4	3	4	2	2	3	4	2	24
2) after reflection of N	3	2	3	1	3	4	3	3	22
3) after reflection of \bar{S}_a	2	1	2	2	2	3	4	4	20
4) after reflection of \bar{S}_o	1	2	3	1	3	2	3	3	18

**TABLE XXV. REFLECTED 3rd FACTOR RESIDUALS TABLE,
WITH 4th FACTOR LOADS. (N, Sa, So reflected.)**

	\bar{N}	R	\bar{P}	\bar{A}	E	Sa	Sdf	So	
\bar{N}	084	063	012	117	-025	054	049	078	
R	063	085	-044	011	065	072	011	-007	* Diagonal replaced because residual was negative.
\bar{P}	012	-044	050	053	061	128	-009	-028	
\bar{A}	117	012	053	058	015	-006	088	114	
E	-025	065	061	015	*089	089	-054	-018	
Sa	054	072	128	-006	089	052	-104	073	
Sdf	049	011	-009	088	-054	-104	088	179	
So	078	-007	-028	114	-018	073	179	089	
Total of Column	432	256	223	450	222	358	248	480	$\leq r=2.669$
									$\sqrt{\Sigma r}=1.63371$
4th Factor loads	.2644	.1567	.1365	.2754	.1359	.2191	.1518	.2938	$\frac{1}{\Sigma r} = .61211$ $\leq FLs=1.6336$

TABLE XXVI SHOWING RESIDUALS AFTER THE EXTRACTION OF THE 4th FACTOR.

	\bar{N}	R	\bar{P}	\bar{A}	E	Sa	Sdf	So	
\bar{N}	014	022	-024	044	-061	-004	009	000	
R	022	060	-065	-032	044	038	-013	-053	Median residual .043
\bar{P}	-024	-065	031	015	042	098	-030	-068	
\bar{A}	044	-032	015	-018	-022	-066	046	033	
E	-061	044	042	-022	071	059	-075	-058	
Sa	-004	038	098	-066	059	004	-137	009	
Sdf	009	-013	-030	046	-075	-137	065	134	
So	000	-053	-068	033	-058	009	134	003	
Total of Column	000	001	-001	000	000	001	001	000	$\leq = 000$

For the sake of simplification of the tables, certain checks, which were used, have been omitted.

These include (1) algebraic sum of the rows of the correlation tables to check the sums of the columns.

(2) in the tables showing reflections, the total reduction in the number of minus signs after the reflection of each variable = twice the reduction in negative signs in the column reflected.

The tables compiled at each stage by the cross-multiplication of the factor loads have also been omitted from the group of matrixes presented.

The median residual, after the extraction of the 3rd factor, was .054, which was considerably smaller than .0926, which was the probable error of the median correlation of the original correlation table. This would suggest that these residuals might have been due to chance, but there remain the possibility that they were significant. It was therefore decided to extract a 4th factor, which could, if necessary, be discarded.

From the results of the centroid analysis a factor matrix was compiled.

TABLE XXVII CENTROID MATRIX, SHOWING THE FACTOR LOADINGS
FOR THE FOUR FACTORS.

	1.	11.	111.	1V.	h^2
N	30	11	38	-26	.3141
R	-57	54	04	16	.6437
P	-44	09	-47	-14	.4422
A	16	29	-39	-28	.3402
E	-30	46	49	14	.5613
Sa	40	22	-48	22	.4872
Sdf	62	13	47	15	.6447
So	81	34	-03	29	.8567

(Factor loads taken correct to 2 decimal places, with decimal point omitted.)

ROTATION OF THE AXES.

In order to give psychological significance to the factors it was necessary to rotate the axes. The procedure here adopted was that presented in a paper by H.A. Rayburn and J.G. Taylor (18).

A hypothesis was formulated regarding one factor, with the axis passing through variable So.

The direction cosines necessary for the writing of an orthogonality transformation were found by multiplying each load of So by a constant, $\sqrt{\frac{1}{\sum x^2}}$ (x = load of So)

TABLE XXVIII. FIRST ORTHOGONAL TRANSFORMATION MATRIX.

875	-367	032	-313
367	875	313	032
-032	-313	875	367
313	-032	-367	875

(In this and the following orthogonal transformation matrix the figures are correct to 3 decimal places, and the decimal point is omitted.)

The following factorial matrix was then computed.

TABLE XXIX. FACTORIAL MATRIX AFTER FIRST ROTATION.

	1.	11.	111.	1V.	h^2
N	209	-124	472	-178	.3135
R	-252	664	127	350	.6430
P	-381	392	-346	-154	.4423
A	171	326	-143	-429	.3400
E	-066	355	512	411	.5614
Sa	515	189	-419	-102	.4869
Sdf	622	-266	417	114	.6445
So	925	000	000	000	.8556

(Factor loads taken correct to 3 decimal places, and the decimal point omitted.)

A hypothesis was then formulated concerning a second factor which would have heavy loads on both variables P and Sa.

The direction cosines for this transformation were found by multiplying each \mathbf{a} by the constant $\sqrt{\frac{1}{\sum x^2}}$ when x = product of the loads of the two variables P and Sa. An orthogonal transformation matrix was then computed.

TABLE XXX. SECOND ORTHOGONAL TRANSFORMATION MATRIX.

584	-813	000	-
-769	-553	313	
-258	-186	-947	

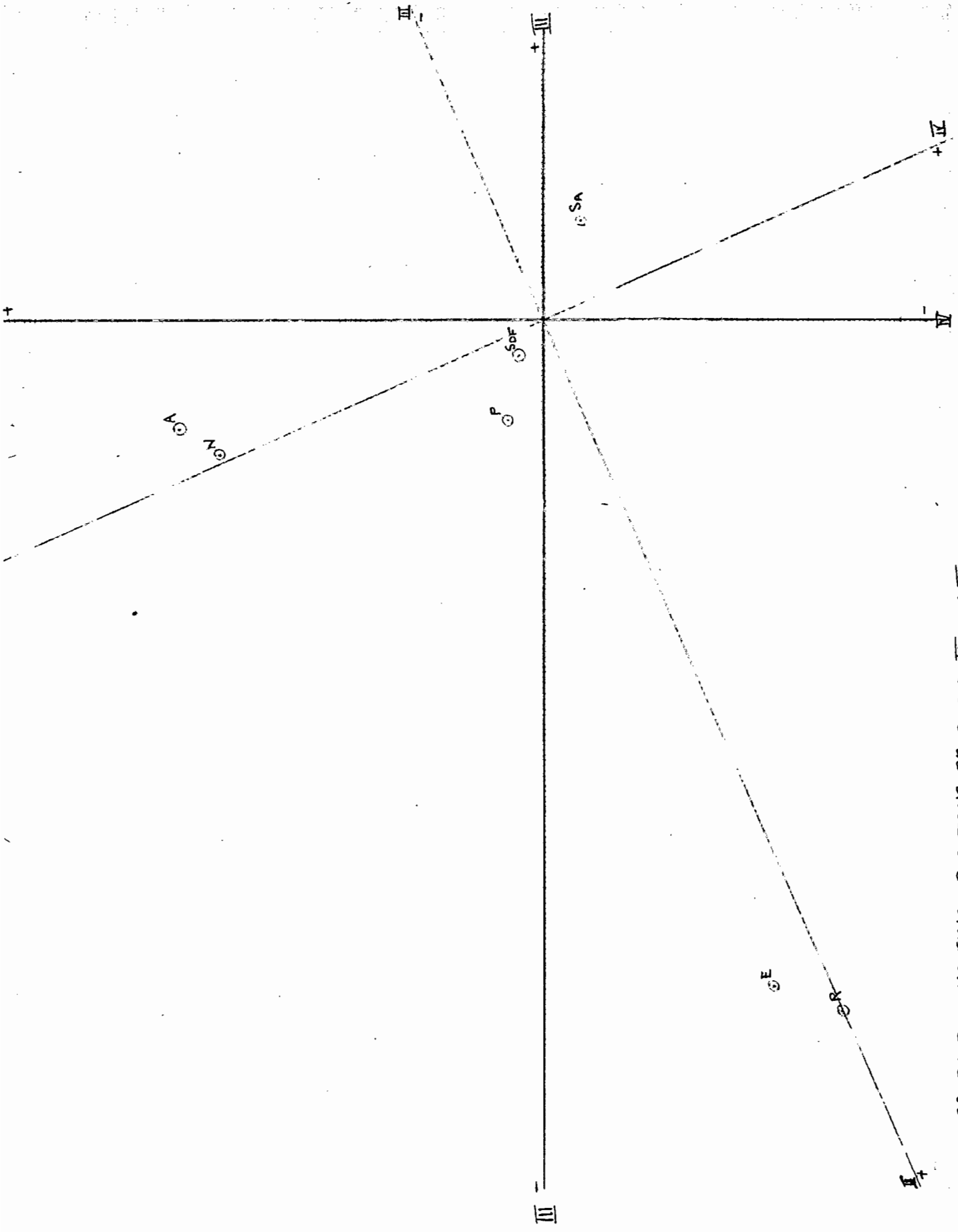
A second orthogonal factor matrix was then computed.

TABLE XXXI. FACTORIAL MATRIX AFTER SECOND ROTATION.

	11.	111.	1V.	h ²
N	-389	-127	319	.2692
R	200	-674	-291	.5789
P	535	-098	036	.2971
A	411	-106	361	.3105
E	-292	-648	-226	.5562
Sa	459	097	-037	.2215
Sdf	-505	-036	025	.2569

(Factor loads taken correct to 3 decimal places, and the decimal point omitted.)

The remaining two axes were graphically plotted, and by inspection it was decided to plot the third axis through variable R.



GRAPH SHOWING FINAL POSITIONS OF AXES III and IV

Throughout the procedure of rotation the following checks were employed.

- Transformation matrix (1) Sum of the squares of each row or column = 1.
- (2) Sum of the products of any two rows or columns = 0.
- Factorial matrix (1) h^2 for every variable was checked to equal that on the original centroid matrix.
- (2) Those elements immediately adjacent to the diagonal, i.e. r_{12} , r_{23} , r_{34} , etc. were checked to equal those found from the original centroid matrix.

The factor matrix showing the final positions of the four axes is shown below.

TABLE XXXII. ORTHOGONAL FACTOR MATRIX SHOWING FINAL POSITIONS OF THE FOUR AXES.

	1.	II.	III.	IV.	h^2
N	209	-389	-009	-340	.3107
R	-252	200	735	000	.6437
P	-381	535	074	-068	.4415
A	171	411	-045	-369	.3363
E	-066	-292	670	-048	.5408
Sa	515	459	-070	073	.4861
Sdf	622	-505	020	-035	.6435
So	925	000	000	000	.8556

(Factor loads taken correct to three decimal places, and the decimal point omitted.)

INTERPRETATION OF THE FACTORS.

The first factor. There are heavy loads on So (concerning the self and others), Sdf (self-depreciation and frustration) and Sa (self-appreciation). It would appear that this factor was concerned with the recollection of memories concerning the self as compared to, and influenced by, other people. There is a higher load on Sdf, characterising decrement to self-esteem than on Sa, characterising increment to self-esteem, which may account for the negative load on P (pleasantness) of this factor. +The negative load on R, the tendency to recall the stability ^{and regularity} of the world, may be partly explained by the dominance of Sdf over Sa, since the recollections of stability would hardly go with those concerning self-depreciatory interaction with other people. Variable E (no one else entering) has a negligible negative load, but is in the correct direction, since a social factor would tend to have a negative load on a variable concerning the absence of other people. The low positive loads on N (neurotic variable) and A (subject takes part as an actor) seem in accordance with the conception of this first factor as one of social interaction.

The second factor. The fairly heavy positive loads on P (pleasantness) and Sa (self-appreciation) and the equally heavy negative load on Sdf (self-depreciation and frustration) identify this factor as positive self-feeling. There are also positive loads on A (subject takes part as an actor) and R (recurring occurrence): these are understandable, since

such a factor would tend to have a positive load on a variable concerning the activity of the subject, and also a positive load on a variable characterising stability. The negative load on N (neuroticism) is explained by the fact that the neurotic is unlikely to recall cheerful recollections characterising stability and an increment to self-esteem. The negative load on E (no one else entering) is also understandable since there will be a tendency for others to enter into situations allowing for an increment to self-esteem by the comparison with others.

The third factor. The only significant loads on this factor are the heavy positive loads of R (recurring occurrence) and E (no one else entering). From the insignificance of the loads on all those variables relating to the subject (P, A, Sa, Sdf, N) it would appear that this is both an asocial factor and one referring to the objective rather than the subjective world. This factor describes the tendency to recall memories of recurring events into which no other person enters and so appears to be concerned with these regular events and situations which are unconnected with other people, and independent of the subject.

The fourth factor. This factor has no high loads and the only ones which might be considered significant are the negative loads on A (subject takes part as an actor) and N (neuroticism).

Taken from the opposite end this factor might be described as Morbid Self-interest. Those variables referring to the self have no significant loads on this factor, which seems reasonable when one considers that these variables are concerned with social interaction, whilst there is a neurotic tendency to regard one-self independent of one's orientation within a social environment.

These four factors account for certain of the variances of the variables studied in this investigation. From the h^2 of each variable it may be seen that these factors account for more than 64% of the variance in the case of variables R, Sdf and So, and for more than 44% in the case of variables P, E and Sa. For variables N and A only a little over 30% of the variance is accounted for by these factors.

SUMMARY AND CONCLUSIONS

Object To study certain aspects of early recollections, and to consider these aspects both in relation to one another, and in relation to personality differences among the subjects in order to isolate, and determine the nature of, the common factors involved in the recollection of memories.

Procedure The earliest ten memories of fifty subjects were analysed to discover the presence or absence of certain characters. These memory variables were then intercorrelated, and also correlated with a neurotic inventory. The resultant correlation matrix was then subjected to a factorial analysis.

Results and Conclusions Four independent factors have been found to be involved in the recollection of memories. These are:-

1. **Social interaction** This factor may be described as the tendency to recall memories concerning the self as compared to and influenced by other people. There is a slightly heavier load on the self-depreciatory than on the self-appreciatory character, with the result that the memories tend to be accompanied by unpleasant affective tone.
2. **Positive Self-feeling** which may be described as the tendency to recall pleasant memories concerning the increment of self-esteem in which the subject takes an active part. On the

other hand, and in consequence, there will be a tendency not to recall memories of a self-depreciatory nature.

3. Asocial objective factor which may be described as the tendency to recall memories of recurring events into which no other person enters. It has reference to neither the subject nor the effect of the social world upon the subject.

4. Morbid Self-interest. may be described as the neurotic tendency to recall events in which the subject takes an active part, quite independent of the interaction between the subject and the social world.

These four factors may be said to account for certain of the variance of the aspects studied in this investigation.

From the results of the analysis of the memories, it would seem that, concerning the earliest ten recollections -

1) There is a far greater tendency to recall memories of events which occurred only once, than to recall ones which recurred on a number of occasions.

This is in agreement with results obtained by other investigators, and might, perhaps, be due partly to the fact that the recurring occurrence lacks the novelty which makes the single event outstanding.

2) There is a far greater tendency to recall memories in which the presence of other people is remembered, than to recall those into which no other person enters.

3) There is a far greater tendency to recall memories in which the subject takes part, than to recall memories in which he remains a spectator throughout.

4) There is a slightly greater tendency for predominatingly pleasant than for predominatingly unpleasant memories to be recalled, and in comparatively few cases is neither affective tone likely to be recalled, or recalled as being dominant.

In only 25% of the recollections does the memory concern aspects of the self dealt with here, and in practically all these cases it is the social aspect recalled. This is, however, probably due to the fact that the items considered are mainly concerned with the self as compared to and influenced by other people. From this a fifth conclusion might be put forward that:-

5) There is a comparatively slight tendency to recall memories of social interaction referred to the self. Social interaction resulting in self-depreciation and frustration is more commonly recalled than that resulting in increment to self-esteem, but the predominance of the former appears to be very slight.

Since the above conclusions were made as the result of the analysis of the memories of only a particular portion of the population, it should be borne in mind that these conclusions may be characteristic of only that portion of the population from which the subjects were chosen, viz, European women, University students between the ages of eighteen and twenty-three years.

A number of lines of investigation fell outside the scope of this investigation. These include:-

- 1) The analysis of the memories of other samples of the population in order to determine the extent to which the conclusions reached are applicable to other portions of the population, and to the population as a whole.
- 2) The detailed study of certain aspects of early memories which were only lightly touched on during this investigation. These include certain of the items appearing in the preliminary tables only, and also the patterns of affective tone.
- 3) The more detailed study of the connection between personality and the type of memory recalled. The correlations found between parts and the whole of the Neurotic Inventory and the memory variables, and also the size of the loads of the neurotic variable on the four factors serve to draw attention to the existence of this connection, and would also suggest that part of the variance of the different memory characters might be accounted for by personality factors not dealt with in this study.

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