RESULTS OF SOME EXPERIMENTS ON AFFECTION, DISTRIBUTION OF ASSOCIATIONS, AND RECALL

BY C. H. GRIFFITTS

University of Michigan

The data presented in this report represents the result of some preliminary spade-work which has for its goal a means of measuring individual differences in cheerfulness. The immediate stimulus for the first experiment was the appearance in 1917 of the report by Baxter, Yamada, and Washburn,¹ which not only suggested a possible means of measuring temperaments, but also served to re-open the question of the relation between affection and recall. Later, the same year, the present writer gave a free, discrete association test three times to the same subjects, who designated as 'P,' 'U,' or 'I' the nature of the association in each case, hoping to obtain information of the following points: (a) the relation between affection and recall, (b) the relation between scattering or concentration of associations for the three presentations, and recall, (c) the relation between this distribution of associations and the kind of affective response, and (d), the existence or non-existence of a general affective sensitivity. Nothing more was done until the last school year, when other similar experiments were given, partly to check up on the results of the first experiment, and partly to determine the results of correlating the scores of these later tests with self-estimates in cheerfulness. These experiments will be described later.

Baxter, Yamada, and Washburn, in the article just mentioned, reported the results of an investigation in which they used two lists of stimulus-words, to one of which the subjects were required to get pleasant associations, to the other, unpleasant associations. The ratios of the average reaction

¹ 'Directed Recall of Pleasant and Unpleasant Experiences,' *Amer. J. of Psychol.*, 1917, 28, 155-157.

times of the two lists furnished an index which showed some correlation with the estimates of friends who judged the subjects in cheerfulness.

In 1919, Morgan, Mull, and Washburn¹ used a different method, which is best described by the instructions to their subjects. "When I pronounce a word to you, observe what idea that word first calls to your mind, and report whether it is a pleasant or unpleasant idea. If it is neither pleasant nor unpleasant, but indifferent, continue thinking until either a pleasant or unpleasant idea is suggested, and report what it is." No times were recorded, the scores being the number of pleasant and unpleasant words suggested. These scores showed some correspondence with the estimates of friends.

The results of these experiments make possible another explanation of most of the data which have been presented in favor of the theory that unpleasant experiences are repressed, a theory of considerable importance in connection with tests of cheerfulness and depression. In general, three sorts of evidence have been advanced in favor of this theory, one of which is represented by the work of Henderson² and of Myers,³ who asked subjects to recall a number of experiences, or of objects of a certain class, and to indicate which were pleasant or were liked, and which were not. The results agree in showing a greater number of pleasant than of unpleasant objects. But these results may be the result of the operation of any one or more of at least three factors: first, the repression of the unpleasant as such; second, a greater number of pleasant than of unpleasant experiences in the previous life of the subject, and third, the mood of the subjects, most of whom are likely to be rather more cheerful than depressed.

Another line of evidence has been secured by testing the

¹ 'An Attempt to Test Moods or Temperaments of Cheerfulness and Depression by Directed Recall of Emotionally Toned Experiences,' *Amer. J. of Psychol.*, 1919, 30, 302-304.

² 'Do We Forget the Disagreeable?' *J. of Phil., Psychol., & Sci. Methods*, 1911, 8, 432-438.

³ 'Affective Factors in Recall,' *J. of Phil., Psychol., & Sci. Methods*, 1915, 12, 85-92.

ability to memorize lists of pleasant and of unpleasant words. Tait¹ found that ordinarily the 'pleasant' lists are more readily memorized than either 'unpleasant' or 'indifferent' lists. In most cases the memorability of the 'unpleasant' lists is higher than that of the 'indifferent' lists. The results, therefore are not regarded as conclusive evidence that the unpleasant is repressed. They might conceivably be due either to the greater number of pleasant experiences, or to the mood of the subject. That these may be factors is suggested also by the fact that for some subjects the 'unpleasant' lists are remembered best.

Tolman,² using a similar method, found that an average of 11.5 repetitions were required for the 'pleasant' lists, 12.7 for the 'indifferent,' and 13.5 for the 'unpleasant.' His results differ from Tait's in placing the memorability of the indifferent words above that of the unpleasant words.

Somewhat different is the evidence submitted by Tolman and Johnson,³ who determined the average association reaction times to 'P,' 'U,' and 'I' words. They found that the times were longer when the 'U' words were given. Here we may be dealing not so much with a repression of the unpleasant as with a disturbance due to the affective or emotional reaction. The same result might also be expected if we assume that there are more pleasant than unpleasant experiences in the lives of the students who generally act as subjects in these experiments. Tolman and Johnson found their most positive results in the words referring to simple sensory qualities, and it seems to the writer that more of the pleasant than of the unpleasant words used by them would call up experiences which the average college student has actually had. If so, a difference in the reaction times of the two lists would naturally be the result.

Peters⁴ used a discrete association method, requiring his

¹ 'The Effect of Psycho-physical Attitudes on Memory,' *Studies in Abnorm. Psychol.*, Series 4, 10-38.

² 'Retroactive Inhibition as Affected by Conditions of Learning,' *Psychol. Monog.*, 1917, 25, No. 107, pp. 22 ff.

³ 'A Note on Association-time and Feeling,' *Amer. J. of Psychol.*, 1918, 29, 187-196.

⁴ 'Gefühl und Erinnerung,' *Psychol. Arb.* (Kraepelin), 1911, 6, 197-260.

subjects to respond to the stimulus words by recalling some previous experience, followed by the description of the feeling tone of the original experience as well as of the memory itself. He found more pleasant than unpleasant associations. Perhaps there were more to be recalled.

In all the above experiments,¹ a difficulty arises from the fact that we cannot always control the nature of the affective reaction by our choice of stimulus-words. The result of this, however, would be rather to obscure results than to give spurious results. In the experiments about to be described an effort was made to get around this particular difficulty.

Kate Gordon² showed a series of figures to her subjects and later tested their ability to recognize the ones previously shown. She concludes that "Das Wiedererkennen der früher gesehenen Figuren ist gleich gut für die gefälligen, missfälligen und gleichgültigen."

In the light of the above experimental data and of the various possible interpretations in most cases, no definite answer can as yet be given to the question regarding the repression of the unpleasant.

METHOD

Experiment I.—A list of fifty words, half adjectives and half nouns was prepared, about equally divided between those which might be expected to call up pleasant associations and those which might be expected to call up unpleasant associations. The instructions to the subject were as follows: "I have a list of fifty words, which will be pronounced one at a time at intervals of thirty seconds. When a word is given, you are to wait until it suggests some previous experience when you are to write in the proper space some word connected with the associated idea. You will also record, in the third column, whether the association called up was pleasant, unpleasant or indifferent." The nouns were given first, fol-

¹ No attempt has been made to cover the whole field of literature bearing on this subject: representatives only of the different methods have been selected. Tait gives a rather extensive bibliography.

² 'Ueber das Gedächtnis f. affectiv bestimmte Eindrücke,' *Arch. f. d. ges. Psych.*, 1905, 4, 437-459.

lowed immediately by the adjectives. The whole set was given three times, in immediate succession, in different order. Three separate responses were therefore obtained for each word. Then, after a series of group mental tests had been given, requiring about an hour, the subjects were asked to recall as many as possible of the stimulus words used in this test. This was wholly unexpected by the subjects. There were thirty-six subjects, all of whom were beginning students in psychology.

A separate blank had been prepared for each presentation, with a numbering system to facilitate the tabulation of the nature of each of the three responses to each stimulus-word. It may readily be seen that any one word might evoke three 'P,' 'U,' or 'I' responses, two of any one response and one of either of the other two, or one each of the three. There were therefore ten possibilities to consider in tabulating the nature of the affective responses.

It is also evident that the reaction-word (if such it may be called) might be the same in each of the three responses; that there might be but two different reaction-words, one of these being repeated; or that there might be three different associations. Since the distribution of associations might affect the recall of the stimulus word, and because it seemed advisable to determine the relation between this distribution of associations and the nature of the affective responses, three tables were prepared, headed *D1* (the same reaction-word each of the three times); *D2* (two associations, one twice, the other once); and *D3* (three separate associations, each appearing once). Under each of these three main headings, there are ten columns, one for each of the possibilities noted in the preceding paragraph. In tabulation, the results for each subject were kept separate, by using a different row in the tables for each subject. This row was divided by a fine line. If the stimulus word were recalled, the mark in the table indicating the particular combination of affective and associative (ideational) responses was placed above this line; if the stimulus word were not recalled, this mark was placed below the line. This large table, when completed, was to-

talled both by columns and by rows. The totals by rows indicated the number recalled and forgotten by each subject, for each of the three possible distributions of associations. The totals of the columns showed the number remembered and forgotten for each of the possibilities with regard to affective responses; that is, the totals showed the number of marks 'above the line,' and the number of marks 'below the line.' The totals of the affective responses were determined for each subject by a system of points. A mark in the P_3 (each response pleasant) column counted three points for P ; a mark in the P_2-U_1 column counted two points for P and one for U , since this meant that two of the three responses were pleasant and the other unpleasant. This was done separately for the marks 'above the line' and 'below the line' (stimulus word recalled, and stimulus word not recalled). Three columns of totals were the result, one each for P , U , and I responses. Three additional columns showed the ratio of the points above the line to the points below the line for each subject, and for the P , U , and I columns respectively. These ratios were used as a measure of the effect on recall of each of the three possible affective responses, although separate results will be given where the P_3 , U_3 , and I_3 columns only were considered.

It may be objected that the actual distribution of experiences recalled can not be accurately determined in the manner described above, and the justice of the criticism must be admitted. Yet the experimenter believes that, on the whole, the results are approximately correct. The errors which doubtless crept in would not be likely to produce fictitious correlations.

Another criticism may be that no consideration was given in the instructions to the subject to the rather important distinction to be made between the affective tone of the original experience which was recalled and the affective coloring of the recall. Nothing was said about this distinction to the subjects for fear that the net result would be to confuse more than anything else, since most of the subjects were just beginning the study of psychology. It is probable that

in the majority of cases the judgment was based more on the nature of the original experience than upon the feeling tone accompanying the recall. Yet in the majority of cases this affective tone was probably the same, though of less intensity, in the recall as in the original experience. For convenience, in the discussion to follow, I shall speak of the 'affective response' or the 'affective reaction' to the stimulus-word.

The pronounciation of three of the one-syllable words was misunderstood by several of the subjects and were eliminated in the tabulation of the results.

Experiment II.—This experiment was similar to the preceding, differing in that 100 words were used, in that the words were presented visually, and in that the list was given but once. The subjects were later asked to recall the stimulus-words, as in the first experiment. The tabulation of the results was the same except for the simplification arising from the fact that there was but one presentation.

Experiment III.—This was a duplication of Experiment II., save for the fact that a different list of words was used. There were only thirteen subjects in this group.

Experiment IV.—Continuous association test. The subjects were first given a free, continuous association test; then a three-minute test in which they were to write as many as possible of words with pleasant meanings or associations; and another similar period during which 'unpleasant' words were to be written. The number of words written in each of the three parts of the test were tabulated, and the different ratios between the scores computed for each subject.

V. Questionnaire.—The subjects were asked to rate themselves in cheerfulness, as Very Low, Low, Average, High, or Very High. The value of such estimates is obviously limited. Yet this method was used in the hope that any very close correlations would show up to a degree in such results. Most of the subjects were strangers to each other. This was a part only of a more extensive questionnaire, which included self-estimates in twenty-five traits. The rest of this questionnaire was given for other purposes and need not concern us here.

Experiments II. and IV. and the Questionnaire were given to the same group of sixty subjects, all beginning students in psychology. Coefficients of correlation were computed between the results of these tests.

RESULTS

The results will be presented and discussed by topics rather than by experiments, since this will save duplication which would otherwise arise from the similarity of most of the experiments. Those results for which we must look to the first experiment alone are discussed first.

1. The relation between the nature of the affective responses and the distribution of associations (Experiment I.). The score for each subject for the distribution of associations was the total number of different associations called out by the stimulus words. This was obtained by multiplying the number of the *D1* cases by one, the *D2* cases by 2, the *D3* cases by three, and by adding the three products. The total number of points for *P*, *U*, and *I* responses respectively, also the ratio of pleasant to unpleasant responses were then correlated with the scores for distribution of associations with the following results:¹

Distr. of Associations, and <i>P</i> responses	.20
Distr. of Associations, and <i>U</i> responses	.53
Distr. of Associations, and <i>I</i> responses	.17
Distr. of Associations and <i>U/P</i> responses	.39

These figures indicate a fairly close relationship between the number of unpleasant responses and the number of different associations. This is also clearly evident in the data in Table I.

Yet if we turn to Table II., showing the tabulation of the *P*₃, *U*₃, and *I*₃ responses only, we find no evidence of any such relationship. If, in the '*P*₃' column, we multiply the number in the *D1* row by one, the number in the *D2* row by 2, and the number in the *D3* row by three, add the three products

¹ No attempt was made to correct for attenuation any of the coefficients presented in this report. The short-cut method proposed by Adams (*Psychol. Bull.*, 1918, 15, 456-460) was used. This makes use of a formula derived by Thurstone (*Psychol. Bull.*, 1917, 14, 28-32) from the familiar 'products-moments' formula.

and divide by the total number of P_3 responses, and then do the same with the U_3 and I_3 columns, we get the following values: P_3 , 1.85; U_3 , 1.86; I_3 , 1.73. This means that those words with three pleasant responses called up, on the average, 1.85 different associations, etc., there being no difference in the number of different associations called up by the P_3 and the U_3 stimulus-words. However, we should not expect to find the same difference in the results shown in Table II. that we find in the results shown in Table I. where there was a change in the nature of the affective responses to many of the stimulus words. In this connection it should be remembered that the data presented in Table I. include the data shown in Table II.

TABLE I
SUMMARY OF RESULTS OF EXPERIMENT I., BASED ON THE TOTAL
NUMBER OF POINTS IN EACH CASE

	<i>P</i>	<i>U</i>	<i>I</i>	Total
<i>D</i> ₁ , Number.....	511	371	489	1,371
% recalled.....	64.3	59.8	50.5	58.2
<i>D</i> ₂ , Number.....	735	638	655	2,028
% recalled.....	62.0	58.2	56.8	58.8
<i>D</i> ₃ , Number.....	593	506	578	1,677
% recalled.....	64.2	64.2	62.6	63.6
Total, Number.....	1,839	1,515	1,722	5,076
% recalled.....	63.3	60.5	56.6	60.2

TABLE II
SUMMARY OF RESULTS OF EXPERIMENT I., BASED ON TOTALS OF POINTS, BUT LIMITED
TO P_3 , U_3 , AND I_3 CASES

	P_3	U_3	I_3	Total
<i>D</i> ₁ , Number.....	142	104	126	372
% recalled.....	66.2	60.5	50.0	59.2
<i>D</i> ₂ , Number.....	146	121	111	378
% recalled.....	62.4	62.8	52.3	59.5
<i>D</i> ₃ , Number.....	86	63	49	198
% recalled.....	71.0	65.0	59.2	66.2
Total, Number.....	374	288	286	948
% recalled.....	65.7	62.5	52.4	60.8

2. The distribution of associations and the recall of the stimulus-word (Experiment I.). Direct evidence of a positive correlation may be found in Tables I. and II. The ' I ' column in Table I. and the ' I_3 ' column in Table II. contain

data which are not affected by the nature of the affective response to the stimulus-words, and in these columns there seems to be clear evidence of a direct positive relationship between the number of different associations called out by a stimulus-word and the probability that that word will later be recalled.

In addition, the results obtained by the use of adjectives and those obtained by using nouns were tabulated separately, to show the per cent. recalled for each of the three distributions (D_1 , D_2 , and D_3) with the following results:

Adjectives..... D_1 , 58.6; D_2 , 64.4; D_3 , 72.5.
Nouns..... D_1 , 56.7; D_2 , 53.4; D_3 , 56.5.

The coefficient of correlation between the number of different associations and the total number of all stimulus words recalled is only .18. The method of partial correlation, taking the affective response into account raises this to .38. Yet the small size of these coefficients is not to be regarded as evidence against the existence of a real correlation.

3. Distribution of affective responses. On this point the results are in accord with those reported by other investigators. In Experiments I., II., and III. (Tables I., II., and III.), the results agree in showing a greater proportion

TABLE III

DISTRIBUTION OF AFFECTIVE RESPONSES AND THE PER CENT. OF STIMULUS-WORDS
RECALLED IN EACH CASE. BASED ON 'POINTS' IN THE ORIGINAL
TABULATION OF DATA

Response	Experiment II		Experiment III	
	Av. Number	Per Cent. Recalled	Av. Number	Per Cent., Recalled
<i>P</i>	41.1	30.0	27.3	25.2
<i>U</i>	31.0	24.6	17.6	23.1
<i>I</i>	27.8	27.4	10.1	23.0
<i>U P</i>	78.8	84.6	57.5	71.0

of pleasant than of unpleasant associations. Since different sets of words were used in each of the three experiments I believe it improbable that the results are due to an unfortunate choice of words. Yet, as has been pointed out earlier in this report, such results offer no evidence that unpleasant experiences are repressed.

The results of Experiment IV., shown in Table IV., show that more 'pleasant' than 'unpleasant' words may be written in three minutes.

TABLE IV
(EXPERIMENT IV)

Average Number of Words per Subject Written in Three Minutes

	Free	P	U	U/P
Mean.....	62.8	36.5	31.7	.88
S.D.....	14.7	12.6	11.8	.23

4. The effect of the affective response upon the recall of the stimulus-word. The most direct evidence on this point is to be found in Tables I., II., and III., showing the per cent. recalled under different conditions. In every case a greater per cent. of *P* than of *U* stimulus-words were recalled, and, generally, a greater per cent. of *U* than of *I* words. However, these results are not necessarily to be regarded as evidence that unpleasant experiences and the things associated with unpleasant experiences are repressed. They indicate rather that an affective reaction of any kind is favorable to the recall of the stimulus-word. The fact that a greater per cent. of words calling up pleasant associations than of those calling up unpleasant associations were recalled may indicate either that a pleasant reaction is more favorable to recall than an unpleasant reaction, or else, that the responses designated as pleasant were, on the whole, stronger than those designated as unpleasant.

For some reason the nature of the affective response seems to be more effective upon recall when adjectives are used as stimulus-words than when nouns are used (Experiment I.). The per cents. of *P*, *U*, and *I* stimulus-words respectively, which were recalled in each case were as follows: For adjectives, 74, 64, and 54; for nouns, 55, 56, 54.

Coefficients of correlation were computed between the numbers of *P*, *U*, and *I* responses, respectively, and the number (not per cent.) of *P*, *U*, and *I* stimulus-words recalled. The resulting coefficients were; *P*, .68; *U*, .83; *I*, .86. These would be quite as large if not larger in the absence of any

effect upon the recall of the stimulus-word by the affective reaction.

I have assumed that ordinarily there was some affective reaction accompanying those associations designated by the subjects as '*P*' or '*U*.' Physiological reactions observed during similar experiments make such an assumption reasonably safe. If one should make the opposite assumption, the results would indicate at least that those words which call up experiences which were affectively toned are more likely to be recalled than other words.

5. Another question of considerable practical importance in the devising of tests of temperament has to do with the relation of the percentage of *P*, *U*, or *I* responses and the percentages of the stimulus-words recalled for each of the three kinds of response. For example, will the factors which cause one person to have more pleasant reactions than the average of the group, also cause him to rank high in the group with regard to the ratio of the percentage of *P* stimulus-

TABLE V¹
INTRA-TEST CORRELATIONS

Association	Per Cent. Recalled	Experiments		
		I	II	III
<i>P</i>	<i>P</i>	.06	.08	-.10
<i>U</i>	<i>U</i>	-.19	.14	.30
<i>I</i>	<i>I</i>	.30	-.13	.00
<i>U/P</i>	<i>U/P</i>	-.16	-.18	-.32
<i>U/I</i>	<i>U/I</i>	.39	.26	.20
<i>P/I</i>	<i>P/I</i>	.07	.10	.13

words recalled to the percentage of *U* stimulus-words recalled? If the kind of affective reaction is affected by the mood of the subject (association by congruity of emotional tone), or by a greater number of pleasant or of unpleasant experiences, or by a repression of the unpleasant, it would seem reasonable

¹ The method of tabulation 'by points' has been explained under 'Method.' In tabulation the results from each stimulus-word for each subject, the mark in the table representing the particular combination of affective responses and 'distribution of associations' was placed above a line if the word were later recalled, below the line if it were not recalled. The 'Per Cent. Recalled' represents the ratio of the number above the line to the whole number.

that the same factors would affect the memorability of the stimulus-words for the different kinds of affective response. Yet the coefficients of correlation shown in Table V. offer little positive evidence either way.

When there were a very few affective reactions of a certain kind, ordinarily a greater percentage of these than of the other stimulus-words were recalled. This may be because they were something of a novelty. If so, this novelty would be a factor operating against any effect of the mood of the subject in determining recall. It may also be true that there is something of a negative reaction away from those words calling up unpleasant memories. But if so why should there not be more evidence of a repression of the stimulus-words evoking unpleasant responses? The answer may be that this tendency, if it exists, is overcome by the operation of other factors, particularly the favorable effect upon recall of any affective response. The fact that the recall value of the *P* stimulus-words is higher than that of the *U* stimulus-words, and that it seems to be higher for both than for the *I* stimulus-words would fit in with this explanation. It remains for further work to isolate these factors more completely and determine which are operative and when.

6. Is there a general affective sensitivity? Is a high threshold for one kind of affective reaction associated with a high or low threshold for the other kind of reaction? Some writers seem to assume an affirmative answer, others a negative. While the question is fundamental, it is one which is rather difficult to answer.

If, in association experiments, there were always some affective reaction, it is evident that the coefficient of correlation of the number of pleasant responses with the number of unpleasant responses would be minus one. Yet if we could measure the strength of the reactions we might find a fairly large positive correlation. In any event, the negative correlation between the numbers of the different reactions could not be regarded as evidence against the existence of a general affective sensitivity. In my experiments, however, there were many cases regarded as 'indifferent' by the subjects.

This makes it possible to obtain some information on this point by correlating the scores (frequency) for the different affective reactions with each other, and each with the number of 'I' responses. This was done with the data from Experiments I. and II. It should be remembered that there were twice as many subjects and twice as many words used in the second experiment, and that each word was given but once instead of three times as in the first.

TABLE VI
INTRA-TEST CORRELATIONS

	A. Experiment I				B. Experiment II		
	<i>P</i>	<i>U</i>	<i>I</i>		<i>P</i>	<i>U</i>	<i>I</i>
<i>P</i>	—	-.02	-.66	<i>P</i>	—	.26	-.75
<i>U</i>		—	-.75	<i>U</i>		—	-.78
<i>I</i>			—	<i>I</i>			—

C. Experiment I			
<i>U/I</i> and <i>P/I</i>	.76	<i>U/P</i> and <i>I</i>	-.09
<i>U/I</i> and <i>U/P</i>	.49	<i>U/I</i> and <i>P</i>	.39
<i>P/I</i> and <i>P/U</i>	.14	<i>P/I</i> and <i>U</i>	.45

In considering these correlations, shown in Table VI., it must also be remembered that we are still moving in a closed circle, so to speak, since the sum of the reactions is always the same. This being true, an increase in the number of *P* responses must be associated with a decrease in the sum of the *U* and *I* responses. If, therefore, the number of *U* responses should remain the same under such conditions, it would indicate an actual lowering of the threshold for these reactions. Therefore, even a zero correlation between the frequencies of *P* and *U* responses, with a large negative correlation between the *P* and *I*, and between the *U* and *I* responses, would point to an actual positive correlation between the positions of the two thresholds. The writer therefore believes that the coefficients given in Parts *A* and *B* of Table VI. may be regarded as evidence of the existence of a general affective sensitivity.

The coefficients shown in Part *C* probably furnish further evidence along the same line. One reason for showing these

coefficients is their significance with regard to methods of scoring the results of such experiments. Tolman and Johnson used the ratios P/I and U/I in working up their results. But since the results may be affected by the mood of the subject (association by congruity of emotional tone), by a general affective sensitivity, and possibly by a repression of the unpleasant, care must be taken in the selection of the ratios to be used. To bring out the relative positions of the P and U thresholds the ratios P/U or U/P will be found valuable. The use of any such ratios will be made safer by reducing them to logarithms.

I have been speaking of two thresholds, one for P and one for U reactions. It may be that there is but one.

I had hoped that further information might be secured by correlating the results of the three parts of Experiment IV. (continuous association tests, three minutes for each part). The following coefficients were obtained: Between the Free and the 'Pleasant' tests, .59; between the Free and the 'Unpleasant' tests, .42; between the 'Pleasant' and the 'Unpleasant' tests, .61. Since the last one mentioned is so nearly the same as the other two the only safe conclusion is merely that some constant factor or group of factors was operating.

Other evidence of the existence of a general affective sensitivity is to be found in the data presented in Table VII., showing the distribution of affective responses for each of the three presentations of the stimulus-words in Experiment I.

On the whole, the writer believes that the data just discussed indicates the existence of a general affective sensitivity. In other words, there seems to be a positive and not a negative relation between the positions of the two thresholds, the one for pleasant reactions, the other for unpleasant reactions. Common experience tells us that the person who is most likely to show pleasure in one situation is most likely to show displeasure in another situation; the stolid, phlegmatic person is not so likely to show any evidence of an affective reaction in either. Yet, on the other hand, the mood of the individual does play a part, and the same thing may at one time cause pleasure and at another displeasure. In one mood

one threshold seems to be much higher than the other; in the opposite mood, the other threshold seems to be the higher. In abnormal cases the apparent opposition between mania and melancholia would seem to point to a negative relation.

7. The effect of repetition upon affective sensitivity.¹ The number of *P*, *U*, and *I* responses for each of the three presentations in Experiment I. is shown in Part *A* of Table VII.

Part *B* of this same table shows the results of treating the data in another way. For each subject the order-of-merit method was used in ranking each of the three presentations with regard to the number, first of *P*, then of *U*, and finally of *I*, responses. These were then totalled, with the results shown in the table (the larger the number the lower the score).

TABLE VII

A. DISTRIBUTION OF AFFECTIVE RESPONSES
(1,692 Cases, Each Presentation)

	First Presentation	Second Presentation	Third Presentation
	%	%	%
<i>P</i>	35.9	37.6	36.4
<i>U</i>	29.4	29.9	30.1
<i>I</i>	35.4	33.0	33.4

B. SAME; ORDER-OF-MERIT METHOD

<i>P</i>	79.0	70.0	67.0
<i>U</i>	75.5	75.0	65.5
<i>I</i>	63.5	80.0	72.5

These results are not very conclusive, but suggest a greater affective sensitivity for the second presentation, while that for the third is less than that for the second but more than that for the first. It may be noticed that the number of *P* responses is greater the second presentation, but that there is a steady increase in the number of *U* associations. The experimenter felt that some of the subjects were becoming 'bored' toward the close of the experiment.

8. As stated earlier in the paper, the purpose in giving Experiment IV. was to determine the correlation, if any, between the results of this test and the results of Experiment II.

¹ Professor H. F. Adams first suggested to the writer the desirability of re-tabulating the data to obtain information on this point, because of its importance in the psychology of advertising.

The value of this correlation is affected by the fact that it was not possible to give the two experiments the same day but on days a week apart. The following coefficients were obtained between the results of the two tests: for P , .18; for U , .09, for U/P , .30. The last may be of some significance. These results are not very encouraging, although the writer intends to include this in a new series of experiments along the same line the coming school year.

9. Questionnaire. Correlations were computed between the self-estimates in cheerfulness and the different scores in Experiments II. and IV., the only experiments in which the subjects were asked to rate themselves. The correlations were generally positive with the scores based on the number of pleasant associations or on the number of 'pleasant' words written in three minutes, and ordinarily negative with the scores based on the number of unpleasant associations or on the number of 'unpleasant' words written in three minutes. However, the only correlation large enough to be of much significance was one of .47, P.E., .06, between self-estimates in cheerfulness and the ratio of pleasant to unpleasant responses in the discrete association test (Experiment II.).

SUMMARY OF RESULTS

1. When the same stimulus-words are presented three times in a free, discrete association test there is a correlation of .41 between the number of unpleasant associations and the distribution of associations (number of different associations).

2. There seems to be a correlation between the number of different associations, when the stimulus words are given three times each, and the probability that the stimulus-word will later be recalled. This correlation is fairly large when adjectives are used as stimulus-words, but is practically zero when nouns are used.

3. In every experiment there were more pleasant than unpleasant associations.

4. There is but little, if any evidence that stimulus-words calling up unpleasant associations are repressed. To the contrary, the evidence indicates that an affective reaction of

any kind is favorable to the recall of the stimulus. A greater per cent. of the words arousing pleasant associations are recalled than of those arousing unpleasant associations. The memorability is least for those with indifferent associations.

5. The coefficients show very little, if any correlation between the numbers of *P*, *U*, and *I* responses and the percentages of the corresponding stimulus-words which were recalled. A subject with more pleasant than unpleasant responses may or may not recall a greater per cent. of the stimulus-words for the pleasant associations than of the stimulus-words with unpleasant associations.

6. There is evidence of the existence of a general affective sensitivity. In other words, that there is a positive and not a negative correlation between the threshold for pleasant reactions and the threshold for unpleasant reactions.

7. In the first experiment the stimulus-words were presented three times. The affective sensitivity, in so far as it is measured by the sum of the pleasant and unpleasant associations, was greatest for the second presentation, and was higher for the third than for the first.

8. Three minutes were devoted to the writing of as many 'pleasant' words (names of pleasant objects, etc.) as possible, and another three minutes to the writing of 'unpleasant' words. There is some correlation, .31, P.E., .06, between the ratio of the number of words in the 'pleasant' list to the number in the 'unpleasant' list, and the ratio of pleasant to unpleasant associations in a free discrete association test taken by the same group of subjects.

9. The ratio of pleasant to unpleasant associations in a free discrete association test showed a correlation of .47, P.E., .06 with self-estimates of cheerfulness.