THE RELATIONSHIP OF AFFECTIVE TONE AND MEMORY OF 
CONTROLLED ASSOCIATIONS

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CHAPTER I

SOME THEORETICAL CONSIDERATIONS

As usually phrased, the problem of the present investigation may be stated as follows: what is the influence of emotional states upon memory? Stagner (59) follows Meltzer (38) in stating the problem: what is the relation of the feeling-tone aroused by an experience to the retention of the experience? The latter, as Stagner points out, is the better terminology, mainly because it avoids the implication of prejudgment of causal factors.

In the thinking of the present writer, there are two important concepts to be considered in dealing with the theoretical dynamics of memory for pleasant (P) and unpleasant (U) experiences. Evaluation of earlier work on the problem and a consideration of its present status should be deferred until the relationship of these concepts has been established.

Several writers (12, 25) have pointed out the pertinence of Thorndike's "Law of Effect", and others (21, 31) have recognized the importance of the psychoanalytic theories of repression and forgetting. At least one investigator (42) has realized that the two are by no means mutually incompatible—that both may be operative. Thorndike (64) states his "Law of Effect":

"To the situation, 'A modifiable connection between an S and an R and being accompanied or followed by a satisfying state of affairs,' man responds, other things being equal, by an increase
in the strength of that connection. To
a connection similar, save that an annoy-
ing state of affairs goes with or follows
it, man responds, other things being equal,
by a decrease in the strength of the con-
nection."

However true this may be, it does not offer an
explanation of the dynamics of the operations involved--
it is rather descriptive of the phenomena and their
concomitants. For an explanation of the dynamics it
is necessary to turn to psychoanalytic theories. While
there are undoubtedly those who would quarrel with such
a viewpoint, psychoanalysis offers the best explanation
extant for these particular circumstances, and hence
must serve for the time being. In his work, The Inter-
pretation of Dreams, and elsewhere, Freud postulates a
psychic censorship, operating at the margins of the Pcs.
(the preconscious) and the Ucs. (the unconscious) which
prevents unacceptable material in the Ucs. to be brought
into the Pcs., where it could rather easily be drawn in-
to consciousness. This dynamic force is bi-directional,
that is, conscious material which is repugnant or other-
wise unacceptable (usually by social or cultural criteria)
is repressed into the Ucs. by the censor. Conversely, Id
impulses of the same general unacceptable nature are
prevented from rising into the conscious. The reason for
this repression, Freud argues, is that either of these
types of material present in the conscious will be in
command of motility. This dominance of motor activity
is likely to result in behavior which would bring upon
the individual the disapproval of society. Therefore, it must be repressed into the Ucs.

Not only the physiological bases, but even the very nature of pleasantness and unpleasantness, are highly controversial. Herrick (27, p. 256) points out the extensiveness of the confusion:

"Many physiological theories of pleasure-pain have been elaborated, for the most part on very slender observational grounds. It has been suggested that the flexor movements of the body are associated with pain, the extensor movements with pleasure; that constructive metabolism is pleasurable, destructive metabolism disagreeable; that heighted nervous discharge is pleasurable, and the reverse (some form of inhibition or of antagonistic contraction) is unpleasant. Some hold that pain and unpleasantness or disagreeableness are different in degree only, not in kind. Others regard pain as a true sensation, but disagreeableness and pleasure (affective experience) as belonging to a different category which is non-sensory. In the latter case the affective experience may be neurologically related in some way with the various sensations (including pain) or the affective experiences and sensations may be independent variables with separate cerebral mechanisms. None of these hypotheses or many others which might be mentioned, are competent to explain satisfactorily all the known facts, though strong arguments can be adduced in support of each of them."

To operational theories such as those outlined by Herrick could be added descriptively categorical entities, such as the Wundtian tri-dimensional and the Tichnerian uni-dimensional theories. For the purposes of a study such as the present, it is relatively unimportant what the function itself consists of--the important fact for us is that a given experience by a given individual may subjectively be either pleasant or unpleasant. In other words, not WHY, but WHAT, is our concern. Keeping this fact in
mind, an explanation offered by Washburn (69) will suffice quite adequately under the mentioned limitations for the purposes of definitions of terms.

With some liberty of phrasing, but not of thought, it might be stated thus: the determinant of affective reactions is the lessening (satisfaction) or dissatisfaction, of physiological or psychological tensions. These reactions are classifiable into primary and secondary groups. Reactions connected directly with tension-satisfaction are primary; thus, the satisfaction of food or sex-hunger would bring about a pleasant affective tone. Failure of satisfaction, or factors hindering such satisfaction, perhaps without wholly blocking it, would be unpleasant. The explanation as applied to secondary tones is less satisfactory. Washburn believes that a foreknowledge of a future satisfaction is suggested by these and hence lends to them a pleasant affective tone. Pleasantness attached to colors or to certain odors are examples of such secondary tones. Although probably possessing flaws, such an explanation is at least a praiseworthy attempt at systematic treatment.

A quite logical explanation for many of the conflicts in theory is offered by Ruckmick (53) who suggests that, "opposition between pleasantness and unpleasantness is probably logical and not psychological." Nor is there, he continues, any opposition in movement (in terms of response) between P and U.

Keeping all the foregoing in mind, one might well
give some consideration to questions along the line of the following: (a) are P and U extremes of the same continuum, ranging from P, through indifference to U; or (b) may it not be that P and U are really rather two discrete and actually perhaps totally unrelated forms of affectiveness; or (c), might it not be possible that P is the absence of U or vice versa?

Another likely source of much of the confusion is the apparent loose-thinking centering about the comparability of P or U sensory experiences in different sense modalities. As will be more thoroughly discussed later, some investigators have experimentally studied the memory for the names of pleasantly or unpleasantly smelling essential oils, for example, and on the basis of these results have extended their conclusions to cover the realm of P and U interpersonal experiences! Unless a universal neural basis be demonstrated, such a conclusion is entirely unjustified. It is pleasant to smell a rose, some people find pleasure in such diverse activities as attendance at a church or a night-club. Some experiences are almost universally P or U-- others will affect one group one way and another quite the opposite manner. Can we, with any logic, say that the three experience cited above as illustrations, are equivalent in any way save that the subjective feeling of pleasantness is reported by the individual? Simple sensory experiences may quite well be universal in tone, but interpersonal relationships are obviously of a much more highly
complex order. Here the criteria of P and U must depend entirely upon the subjective reports of the individual, for simple sensory experiences play a relatively minor role in such relationships as these.

In general, however, we might categorize P experiences as possessing an adient tendency—that is, to get more of the stimulating factor(s), and conversely, U experiences as possessing an abient tendency—that is, to get less (or to avoid) the stimulating factor(s).

Tracing a complex experience of the sort with which we are dealing from the point of its recording, at the time of its occurrence, to the point where its memory trace is revived, we expect to find the law of effect operating. That is, if the circumstances of the total experiential processes are largely P we should expect to find the memory trace thereby strengthened. Or, in the other terminology, if the overt or covert motility to which the original S directed the individual was acceptable to the psychic censorship, it was not repressed, but remained in the Ps. or conscious, as the degree of trace remaining might determine. Consequently, revival of the memory trace would be facilitated.

On the other hand, if the reverse situation exist, that is, if the experience is U, the result will be that

* It is possible that in these last few words we have the clue to the real nature of pleasantness and unpleasantness.
the strength of the connection will be weakened and the memory revival therefore inhibited.

With these few fundamentals as theoretical background, let us orient ourselves with reference to work on this problem.
CHAPTER II

A HISTORY AND CRITICAL EVALUATION OF PREVIOUS INVESTIGATIONS

In considering much of the work that has been done on the problem, one is impressed by the fact that there is much more inconsistency than consistency in the experimental approaches and findings. There has been scant agreement as to what constitutes the real nature of the problem. Granted that the discussion in the preceding chapter is sound, let us examine some of the earlier work in the light of these principles.

Colegrove (13) is usually considered to be the first (1898) to put the question to investigation. Question #8 in his questionnaire was, "Do you recall pleasant or unpleasant experiences better?" For both sexes the reply was that P experiences were better recalled but with female subjects reporting relatively more U experiences than males.

The defects here are obvious—the results show the subjective belief of the subjects. The item measures not what they remember, but what they think they remember. Ruckmick (53) points out that P and U experiences occur with unequal frequency. Is it not possible that Colegrove's subjects might have mistaken frequency for readiness of memory?

In 1911, Henderson (26) reported on the results of an experiment in which 10 college students were the subjects. Each related 100 incidents in his life and rated them as P, U, or I. The number of cases is woefully in-
sufficient to be reliable and the approach is not one to favor any real bearing on the problem. If the experimenter had controlled the numbers of experiences, the method might hold some promise, but his results (showing 55.1% P experiences, 11.8% I, and 33.1% U) might as easily be interpreted as demonstrating a greater frequency of P experiences as they might in showing that we forget the disagreeable.

Tait (62) in 1913, studied what he termed the "effect of psycho-physical attitudes on memory" and found for 9 subjects that P words were better remembered than U words and that memory for both exceeded that of indifferently-toned words. For colors, he found that 63+ % of P colors were recalled compared to 47+ % of U and 27+ % of I. In all cases the basis of judgment of affective quality was the subject's report. He concluded that in addition to the positive effect of pleasantness, U impressions exert a repressing influence. Here again the number of subjects is far too small to be statistically reliable.

Two other studies, one by Tolman (66) (based on 6 subjects) the other by Tolman and Johnson (67) manifest another common error of method. In the latter study the problem was approached both by memorability and association times for lists of 20 each of P, U, and I words. The findings were that the average association times were longer for U words than for P and that in order of memorability, they ranked P, U, I. In both cases the words
were selected on their affective basis by the investigators, and not by the subjects. (Thompson (63) includes in her list of criteria for good tests of affection and memory the dictum that the subject should determine the feeling tone of the experience.) How is one to be sure of a universal feeling-tone for a word without knowing the individual association evoked?

Fox (18) in an ingenious method of approach took cognizance of the possibility that P or U may be a matter of complexly caused preference in some cases rather than a genuine affective state. He had 24 subjects each learn several sonnets, report which was more easily learned, and which were preferred. As might be expected, preferred sonnets were more easily learned and were better remembered. Of course, it is a moot point whether ease of learning or subjective preference is the causal factor, but in either event this study seems to support the belief that the attitude of the learner may be of greater influence than the feelings aroused by the material itself.

White (77) and Young (80) concur in general with this view—the former pointing out the uncertainty of absolute determination of affective tone and the individual experience with P and U stimuli; and the latter the frequently ignored likelihood that a P word does not necessarily evoke a genuine affective reaction. A word like "happy", for instance would probably be rated P by most individuals, yet the affective tone produced is certainly not terribly strong, on the other hand, "vomit" would probably be rated
U, and yet, at least in non-neurotic persons, the feeling tone aroused would not likely be very strong.

Somewhat along this line of thought, Chaney and Lauer (12) studied differences in learning rates for P and U words and nonsense syllables (thus adding another variable.) The value of this addition is shown in their findings that 16% more meaningful material was learned than nonsense. They concluded that affective tone (at least, that of the type produced by words) had no effect on learning, and that the "law" of effect was really an attitude on the part of the learner. Learning is thus apparently facilitated by associations and it is therefore possible to conclude (following White (75) that the affective tone as such is not the primary factor in word-learning, but that it is rather the greater richness of the associations formed with P words which is responsible.

One more conclusion from a study employing this general method (i.e., simple verbal material) should be mentioned at this point, before considering another methodology. Harden (25) found that blocking seemed to be present during the learning of syllables under emotional influences and raised the very pertinent question whether all emotion might likely be unpleasant.

Several other investigations have used similar methods

*Barrett (3), Bunch & Wientge (6), Carter (7,8), Cason & Lungre (11), Griffiths (24), Koch (34), Lynch (37), Sharp (54), Silverman & Cason (55), Smith (58), White, et al. (75, 76, 77), and Young (60, 81).
and some have erred in the manner already mentioned--the feeling tone has been determined by the experimenter rather than by the subject.

Memory for P and U odors have also been studied, although not as extensively as memories of the types just discussed.

The nature of the affective tones and of the associations with various odors was studied by Kenneth (33) who, however, gave no attention to the relation of these to memory. He employed essential oils, and other strongly odorous substances such as oil of lavender, oil of cedarwood, valerian, asfoedita, musk, citronella, etc. Subjects were then asked to report on whether the odors were P or U and to report on associations. No analysis was made of the total associations, but judging by the examples cited it seems that no more associations are formed with P than U odors. This is in direct contradiction, of course to the conclusions of Chaney and Lauer (12) and White (75).

Studying the relation of affection to memory for odors, Gordon (22) found that of a total of 1020 P impressions, 49% were recalled, of 882 U impressions, 50% were recalled and of 96 I impressions 56% were recalled. It was concluded that although odor seemed to exert a positive influence in recall of name, there was no significant relationship between the memory value of odors and the affective tone.

Frank and Ludvigh (19) from a study of memory for odors concluded that P odors have retroactive facilitative
effect and that U odors have a retroactive inhibitory effect.

Much use has been made of what might be called the anecdotal method, in which various techniques are employed, but which typically consists of requesting the subjects to record affectively toned experiences occurring during some fixed period of time preceding the test.

Jersild (24) in his discussion of a study of this type conducted by him, points out that while "classification... may yield a preponderance of pleasant items... there may have been a preponderance (of such items) in past experience."

Studies have been made on this point with no clear-cut evidence (partly, perhaps, because memories were recorded as the original data rather than the actual occurrences).

In a study mentioned earlier in another connection, Henderson (21) found that of 1000 experiences, 55.1% were P, 11.8% were I, and 33.1% were U. Not widely variant results were obtained by Flügel who had 9 subjects record all affective states at hourly (or less) intervals for 30 days. 50.1% of these experiences were P, 27.8% I, and 22.1% U. However, Gordon (23) in a study of early memories found for 750 subjects that there were 25% P memories, and 53.2% U memories reported by males, and 35.2% P and 46% U memories by females. Presumably the balance of the memories were I, although the report does not so state.

In the study of Jersild's (24) quoted before, 51 sub-
jects recorded their experiences of the three weeks preceding. 834 P items and 698 U items were reported. Later 355 P (or 46%) items, and 197 U (or 32%) items were recalled. The critical ratio of this difference was reported greater than 3.

Several investigators had subjects list the pleasant and unpleasant experiences of a holiday period immediately after the period and then recall at periods varying from 2 days to 20 weeks. Wohlgemuth (78) employed 687 subjects from 11 to 16 years old and found that 40.1% of P experiences and 39.8% of U experiences were forgotten—an insignificant difference.

A similar study reported by Meltzer (38) used 132 subjects, 62% of the experiences reported were pleasant and 37% were unpleasant. Despite this disparity, 59.7% of the U and 42.6% of the P experiences could not be recalled. This study, therefore, shows a significant difference favoring the forgetting of U material.

Waters and Leeper (74) had subjects grade the intensity of the experience and found that there was a general tendency toward more moderate categories upon recall, that the degree of affective value is related to retention, but that there is no clear-cut relationship between retention and the nature of the affective tone.

In general, holiday period are not desirable as the media of experiences, for they are very apt to be atypical in that an over-preponderance of P experiences is likely
to occur during a holiday or vacation period.

Of 1179 experiences reported by 96 subjects in a study by O'Kelly and Steckle (47), 52% of the P experiences and 60% of the U experiences were forgotten. The original body of data contained 62% P and 37% U items.

In many studies of the anecdotal type a fact which seems highly significant to the writer seems to be largely ignored. Namely that a preponderance of forgetting U items is the reverse of what might be expected. Thus if the percentage of each forgotten were the same, (e.g., 40%) this would still be an advantage for the P material simply because there was more of it in the first place. Hence, if one remembered 50% of a list of 100 words and 50% of a list of 1000 words, one would be justified in saying that the latter was better remembered because the actual amount was greater.

Another major complication of the anecdotal type of study as a whole is that the units of response are too highly variable. This objection applies more especially to the recall—what constitutes an adequate reproduction of an anecdote as written by the subject? Some have taken as their criterion the reproduction of "logical units", these, however, are subjectively determined by the investigator, who is naturally unable to discern for certain whether units apparently irrelevant in the original are perhaps pertinent to the experience by virtue of the associations which they might call up. Conversely, what may seem a "logical unit" in the original, may be an
irrelevant detail to the subject.

To the writer, however, the most valid objection to the recording of experiences in detail is the fact that the precise effect that one is trying to study may have taken place in the act of writing—that is, there may be considerable emotional blocking brought about by a revival of the tone of the experience itself by the act of writing it down. Then, too, the subject is rather likely to gloss the account up, to place himself in a more favorable light, etc.

Laird (35) introduced a new technique as well as a new variable into the problem. He had 62 subjects each write the names of 10 people arranged as to likableness or dislikableness. The subjects were then rated as optimistic, mixed or pessimistic on the basis of self-judgments and the judgments of other students. His findings were that those rated as optimists tended to remember the persons liked, and pessimists the persons disliked, and concluded that recall of pleasantness and unpleasantness was governed more by temperament than by the nature of the affective state.

Noch (34) determined students' memory for grades, and found that pleasing grades were better remembered than unpleasing ones. The defect here seems to be that he restricts the field to a narrow area, and one which is rarely met with in the world outside the class-room. Within these limits it appears to be a very careful study.
Stagner (59) found a reliable difference between the redintegration of P and U experiences and went on to suggest an active process of forgetting which might be due to a principle much like retroactive inhibition.

Rosenzweig and Mason (52) evolved an ingenious technique, used however on children and based on a limited number of cases (40). The method, however, is one suggestive of further investigation. The children were set to work solving puzzles and allowed to finish only half of them and were then asked for the names of all—the supposition being that the frustration caused by the unfinished work would produce a U tone. This would probably be true only if the original motivation were strong enough to cause the children to want to finish the puzzles. Then, too, it is likely that the longer period of time allowed for the completed puzzles would result in a greater familiarity with them and a consequent greater memory value for the particular item.

Washburn, and others (2 and 71) using a method different from all those mentioned before, had 90 female subjects remember experiences and try to revive the emotions connected with them. The subjects themselves introspectively decided the relative intensity of the original experience and that of the revived emotion. The findings were that the U experiences took longer to recall but that physical

*Meltzer (38) points out that the problem is probably better investigated in adults than in children.
U was more readily recalled than mental U. Further, it was found that revived anger fell away in intensity more rapidly than revived joy or fear, and that joy was more intensely and more quickly revived than either anger or fear.

The net conclusions from the foregoing studies appear to be: (a) Pleasant material is better remembered than unpleasant, although, (b) temperament seems to play a role, as does, (c) the strength of the affective tone; (d) attitude on the part of the learner may also have considerable bearing and, (e) it is even possible that these last three may be the sole determinants and that the effect of emotional tone, per se, is negligible.

At this point we have outlined the methods and findings of the more important studies and have given examples of each of the techniques employed. Let us now turn to a consideration of the present study. It is by no means claimed that we have avoided all of the pitfalls (in fact some will be later pointed out) but these were unforeseen in planning the experiment and it is felt that a path for future investigations is thereby pointed out.
CHAPTER III

THE METHODOLOGY AND RATIONALE OF THE PRESENT INVESTIGATION

The data for the experiment were gathered on forms (see Appendix A for sample) which did not mention the purpose of the experiment. Page one of the form contained the following material: the subjects were asked to "co-operate in a study dealing with certain aspects of personality", and were given information as to the preservation of anonymity, etc., and specific instructions as to the method of filling out the pages which comprised pages two and three of the form. These instructions were:

"1.) In the first column write the name (first name in full, initial of the last name, as, John D. or Mary R., etc.) of 10 persons, male or female, aside from your immediate family, with whom you associate pleasant incidents or experiences.

2.) In the second column give the approximate time in months, since the occurrence of the incident of which you are reminded by that person.

3.) In the next series of columns estimate the degree of pleasantness of each incident. Make your judgments on a scale of 5, 5 being extremely pleasant, 4 somewhat less so, down to 1, mildly pleasant. Indicate your judgment by an X in the proper column."

Pages two and three contained three main headings with five sub-groupings for the last, making seven columns in all. The first column was for the name, the second for the time in months, and the third, sub-divided as mentioned above was for the degree of emotional tone felt for the experience.
At the bottom of page two, instructions were given to list 10 names associated with U experiences on the following page (three).

In a study of this type especially, it appears to be better experimental strategy that the subjects remain un-enlightened as to the purpose of the experiment, consequently the title for the blanks ("The Organization of Personality") was selected as satisfying to the curiosity and yet completely ambiguous. The expression "certain aspects of personality" was selected on the same basis.

In an investigation preliminary to the present one, conducted some time previously, data were collected in a similar manner except that all the associations were given on a single page with individual ratings as to P and U. In other words, there was no attempt to control the numbers of either P or U experience-associations. It was found then that the number of P experience far over-balanced the number of U experiences, being of a ratio of the order of 10 or 15 to 1. This was deemed unsatisfactory since it was felt that the number of U experiences listed was too small to be statistically significant, furthermore, it was felt that a somewhat smaller number of desired P experiences would make the individual scorings more comparable. The length of time since the occurrence was felt to be desirable information, both as a double check on the identification, and (more significantly) as furnishing further, although indirect, evidence on the problem in hand.

Several studies have tended to show the difference
in memory value according to the strength of the emotional tone, and it was deemed worth-while to include this information. Definition of the criteria of "extremely" pleasant and other criteria was purposely omitted, since the individual's subjective interpretation was desired.

Blanks for the retest were practically identical, differing only in the introductory remarks.

The subjects were approximately 150 students in an introductory course in psychology, with about \( \frac{1}{2} \) the group enrolled in the College of Education. There is such a preponderance (unavoidable-- c'est la guerre) of female subjects that any sex-difference will not be brought out in this study. Naturally the number of cases in the study is less than the figure stated above since some of the subjects were not available for the retest.

The retest was given at expiration of a two-week period.

It is the contention of the present writer that if the phenomenon under question has a practical application, it is in the field of clinical psychology, for it is directly implicated in such matters as the recognition of the individual's own adjustment problems, repression, and other reaction mechanism, etc. Although to perhaps a somewhat smaller extent than in therapy, the question is still entirely pertinent to the educator, for obvious reasons. In either event, however, the pleasantness or unpleasantness of the experiences involved are those of
a total situation and almost uniformly arise from interpersonal relationships. If, as is contended in Chapter I of the present study, one may not justifiably equate P and U experiences in different sense-modalities, there is still less justification for one doing so in comparing the results of studies involving sense-modalities and these inter-personal relationships. At any rate there is no necessity for so doing when one may study the nature of the relationship in this category of association directly.

It seems patently absurd to make the broad leap from assuming, for example, that since one remembers the name of a pleasantly smelling oil with greater facility than the name of an unpleasant oil, to the position of contending that one will remember some pleasant personal experience with greater facility than an unpleasant one, when it is not necessary. The anecdotal method seems undesirable not only for the reason before cited (the difficulty of determining how well the incident is remembered—the original data and the retest may be identical and both accounts be inaccurate) but another mechanism may quite well enter in—the subject may remember the incident very well, but be reluctant for a variety of reasons, to recount it. Incidents of the sort likely to be rated unpleasant are quite likely not to be creditable and a considerable amount of blocking might well take place. Which, naturally, introduces another and undesirable variable into the situation. Therefore, it was felt that for all practical purposes, the name of the individual with whom the incident
was associated would serve very well as an indicator of the memory for the incident. A further and possibly more important value of the name-association versus the entire anecdote is that it furnishes a stable unit of response. It will be remembered in this connection that in the previous chapter in the course of discussion of the anecdotal method that the question was raised as to what were the criteria of adequate reproduction and "logical units." If some such function as retroactive inhibition of the memory were to operate, it should do so here as much as in any other detail of the particular incident in question. Complete anonymity, both for the subject and for the material which he presents having been assured, it seems likely that this tendency has been largely eliminated.
CHAPTER IV

STATISTICAL RESULTS

Of the approximately 150 initial cases, 111 were available for retest, and all statistics were computed from these cases. The maximum number of P and U associations possible was, therefore, 1110 each. Actually recorded were 1104 P associations, and 807 U associations (mean number of P associations, 9.95 ± 0.15, SD ± 1.16; mean number of U associations, 7.27 ± 2.28, SD ± 2.95).

In order to find the significance of this, and following differences, the formula, \( CR = \frac{\text{Diff.}}{\text{SD of diff.}} \) was employed. (SD of diff. = \( \sqrt{SD^2_{(A \times 1)} + SD^2_{(A \times 2)}} \). The critical ratio thus found for this difference was 9.57. (A critical ratio of 3 means that the chances are 9986.5 out of 10,000 that the difference between the true measures is less than zero). The difference, therefore, is highly reliable.

P and U scores were computed, based on the total of the subject's ratings of incidents (from 1, mildly toned, to 5, extremely toned). The mean P score was 41.43 ± 5.54, SD ± 5.66; the mean U score, 24.01, but when the difference of the number of total incidents in each category was taken into account and the scores adjusted accordingly, the mean U score was found to be 33.02 ± 5.53, SD ± 5.54. In other words, the assumption was made that if the number of U experiences recorded were the same as the number of
P experiences, the mean would not thus be changed. It was felt that adjusting the scores in this manner would give a truer picture of the comparison than if the true strength of tone as rated were used. The CR of this difference was in excess of 4.

The length of time since the occurrence of each incident shows a decidedly skewed distribution (see Table I, Appendix B) both for P and U times.

The mean time per incident (i.e., N = 1104) for P associations was 6.87 months, for U associations, the mean time per incident (N = 807) was 11.79 months. The means per case (i.e., N = 111) were 68.7 ± 2.24, SD ± 23.64 for P times; and 85.8 ± 2.78 SD ± 29.29 for U times. The critical ratio of the difference between the two means is 4.79.

Using the formula, Skewness = \(3(\text{mean} - \text{median})/\text{SD}\), as a measure, the skewness of P scores was found to be +2.92, for U scores, +2.64.

Of the 1104 original P associations, 689 or 62.4% were remembered; of 807 U associations, 365 or 45.2% were remembered.

Applying the formula, SD \% diff. = \(\sqrt{\left(\frac{p'q}{N}\right)^2 + \left(\frac{p''q''}{N}\right)^2}\) (p = "gain" percentage, e.g., 62.4; q = "loss" percentage, e.g. 100-62.4) and the same formula as before for critical ratio, a CR of 7.42 was found for the difference between these two percentages.

One may, however, analyze this statistic in another,
and probably more meaningful manner. If the mean number of items remembered per case is computed, the mean for P items is $6.21 \pm 1.16$, SD $\pm 1.65$. The mean for U items may not be directly compared since the number of each type of items in the initial series is not the same. However, these may also be adjusted by assuming that if more U items had been listed initially they would be remembered in the same proportion. Therefore we multiply 365 (the number of U items recalled) by 1.368 (the ratio of P to U items) and divide the product by 111 and obtain an adjusted mean number of items remembered per case. The mean thus obtained is $5.13 \pm 1.19$, SD $\pm 2.01$. By this method the CR is considerably smaller than that obtained from the percentage difference, being 4.34, but is still a highly significant difference.

An analysis of the changes of ratings from initial test to retest showed no significant difference for P and U items. For summary of statistical findings, see Table II, Appendix B.
CHAPTER V

NEUT CONCLUSIONS FROM DATA AND CRITICAL COMMENTS

From the data given in the preceding chapter, we may conclude, at least for college students, that the following are the facts of the relative memory for P and U experiences:

(a). Pleasant incidents come more readily to mind—since when an equal number of each are requested, more P items are listed.

(b). Pleasant incidents are stronger in emotional tone.

(c). Pleasant incidents recalled have a tendency to be more recent.

(d). Associations with pleasant experiences are more readily remembered.

(e). While strength of emotional tone for both P and U incidents will vary over as short a period of time as two weeks, there is no significant difference in these changes for P and U experiences.

The fact that U items are less recent than P appears at first glance to be contradictory to the conclusion that P experiences are better remembered, since they would seem to be more persistent, but this does not necessarily follow. In Chapter I, it was pointed out that the two factors which might be accountable for such differences in memory were the "Law of Effect" and the psychoanalytic
theory of repression. If the latter is indeed an influential factor, then one may hold that recent U experiences are so strongly toned (and hence repressed) that the subject is unable (or at least unwilling) to recall them. Not until the strength of the emotional tone is diminished, or diluted, by the accretion of more recent experiences is the memory allowed to "come to the surface". Since P experience is not subject to this influence, the individual does not have to go so far back to find acceptable memories. Hence these are more recent.

In considering this study retrospectively, the writer feels that the technique employed enjoys a certain merit, but that it shares a common defect with many other studies of the same general type, but of different methods of experimental approach. What is compared is not an objective event and the subsequent memory trace, but rather changes temporally of the same subjective memory trace. It is the present view of the writer that some method whereby the subjects are presented with a controlled and artificial, but apparently natural situation, recorded by some completely objective method (for example, a sound motion-picture), then asked to rate the nature and strength of the feeling-tone evoked immediately after the incident, and finally, after the expiration of a given period of time requested to recount the incident, would furnish a more sound body of data for conclusions. It is
his opinion that only by some such method may the true nature of the relationship of emotional tone and memory be established.
APPENDIX A

Samples of Data Collection Forms
THE ORGANIZATION OF PERSONALITY
Form A-4

Number 46

You are requested to cooperate in a study dealing with certain aspects of personality. The information which you submit will be material from your personal experiences. Such information will be treated in a confidential manner, and will in no way be identified with you by name. Each of these blanks is numbered and has been distributed in random order. This number will be used to complete a later phase of the study, so record it in some convenient place (the back of your face-card, or the inside cover of your note-book are suggested places) for future reference.

WRITE IT NOW! -- DO NOT TRUST YOUR MEMORY. At no time will you be asked to divulge this number, which is for purposes of comparison only.

Adhere closely to the following instructions!
On the next page you are to do the following:

1.) In the first column write the name (first name in full, initial of the last name, as, John D. or Mary R., etc.) of 10 persons, male or female, aside from your immediate family, with whom you associate pleasant incidents or experiences.

2.) In the second column give the approximate time in months, since the occurrence of the incident of which you are reminded by that person.

3.) In the next series of columns estimate the degree of pleasantness of each incident. Make your judgments on a scale of 5, 5 being extremely pleasant, 4 somewhat less so, down to 1, mildly pleasant. Indicate your judgement by an X in the proper column.
On the following page list the names, etc., of 10 persons with whom you associate unpleasant incidents. Again, do not list members of your immediate family, but just as before, make your judgements on a scale of 5, 5 being extremely unpleasant, 4 somewhat less so, and so on, down to 1, mildly unpleasant.
<table>
<thead>
<tr>
<th>NAME (First name in full initial of last)</th>
<th>How long ago? Mos.?</th>
<th>Degree of Unpleasantness</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>5</td>
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<td></td>
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</tbody>
</table>
THE ORGANIZATION OF PERSONALITY
Form B-2

Number __________

You have previously cooperated in the initial phase of a study of certain aspects of personality. You are now requested to complete a later portion of the study.

In the space provided at the top of this page, record the number which was on the first page of your first blank (it was suggested to write it on the back of your fee-card, or on the inside cover of your note-book).

You are asked to list the names of persons with whom you associate experiences, just as you did before. Please make an effort to recall as much of the previous list as you can, but if you do not recall all of it, fill out the list with other names.

To refresh your memory, the previous instructions were:

1. In the first column write the name (first name in full, initial of the last name, as, John D. or Mary R., etc.,) of 10 persons, male or female, aside from members of your immediate family, with whom you associate pleasant incidents or experiences.

2. In the second column give the approximate time in months, since the occurrence of the incident of which you are reminded by that person.

3. In the next series of columns estimate the degree of pleasantness of each incident. Make your judgements on a scale of 5, 5 being extremely pleasant, 4 somewhat less so, down to 1, mildly pleasant.

Indicate your judgement by an X in the proper column.
<table>
<thead>
<tr>
<th>NAME (First name in full initial of last)</th>
<th>How long ago? Mos?</th>
<th>Degree of Pleasantness</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>5 4 3 2 1</td>
</tr>
</tbody>
</table>

On the following page list the names, etc., of 10 persons with whom you associate unpleasant incidents. Again, do not list members of your immediate family, but just as before, make your judgements on a scale of 5, 5 being extremely unpleasant, 4 somewhat less so, and so on, down to 1, mildly unpleasant.
<table>
<thead>
<tr>
<th>NAME (First name in full initial of last)</th>
<th>How long ago?</th>
<th>Degree of Unpleasantness</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Yes?</td>
<td>5 4 3 2 1</td>
</tr>
<tr>
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<td></td>
</tr>
</tbody>
</table>
APPENDIX B
<table>
<thead>
<tr>
<th>Distribution of Times since occurrence of $P$ items.</th>
<th>Distribution of Times since occurrence of $U$ items.</th>
</tr>
</thead>
<tbody>
<tr>
<td>460-89...1</td>
<td>500-09...1</td>
</tr>
<tr>
<td>410-19...1</td>
<td>420-29...1</td>
</tr>
<tr>
<td>280-89...1</td>
<td>410-19...1</td>
</tr>
<tr>
<td>260-69...1</td>
<td>280-89...2</td>
</tr>
<tr>
<td>220-29...1</td>
<td>270-79...2</td>
</tr>
<tr>
<td>210-19...2</td>
<td>260-69...1</td>
</tr>
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<td>180-39...3</td>
<td>240-49...1</td>
</tr>
<tr>
<td>130-39...1</td>
<td>220-29...1</td>
</tr>
<tr>
<td>120-29...3</td>
<td>210-19...1</td>
</tr>
<tr>
<td>110-19...3</td>
<td>200-09...2</td>
</tr>
<tr>
<td>100-09...3</td>
<td>190-99...1</td>
</tr>
<tr>
<td>90-99...3</td>
<td>170-79...2</td>
</tr>
<tr>
<td>80-89...5</td>
<td>160-69...3</td>
</tr>
<tr>
<td>70-79...5</td>
<td>140-49...2</td>
</tr>
<tr>
<td>60-69...5</td>
<td>120-29...2</td>
</tr>
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<td>50-59...11</td>
<td>110-19...5</td>
</tr>
<tr>
<td>40-49...13</td>
<td>100-09...3</td>
</tr>
<tr>
<td>30-39...21</td>
<td>90-99...4</td>
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<td>20-29...12</td>
<td>80-89...5</td>
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<tr>
<td>10-19...8</td>
<td>70-79...6</td>
</tr>
<tr>
<td>0-9...8</td>
<td>60-69...9</td>
</tr>
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<td>50-59...8</td>
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<td>40-49...4</td>
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<td>30-39...12</td>
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<td>20-29...10</td>
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<tr>
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<td>10-19...12</td>
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<tr>
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<td>0-9...10</td>
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<tr>
<td></td>
<td>Mean</td>
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<tr>
<td>----</td>
<td>------</td>
</tr>
<tr>
<td>I</td>
<td>41.43</td>
</tr>
<tr>
<td>II</td>
<td>33.02</td>
</tr>
<tr>
<td>III</td>
<td>66.7</td>
</tr>
<tr>
<td>IV</td>
<td>85.8</td>
</tr>
<tr>
<td>V</td>
<td>62.4%</td>
</tr>
<tr>
<td>VI</td>
<td>45.2%</td>
</tr>
<tr>
<td>VII</td>
<td>6.21</td>
</tr>
<tr>
<td>VIII</td>
<td>5.13</td>
</tr>
</tbody>
</table>

I P score.
II U score.
III Time per case, P incidents.
IV Time per case, U incidents.
V Percentage of P incidents remembered.
VI Percentage of U incidents remembered.
VII Number of P incidents remembered per case.
VIII Number of U incidents remembered per case.
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