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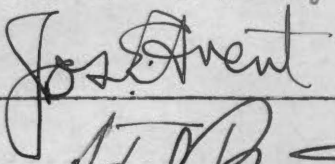
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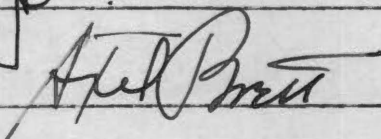
THE PSYCHOLOGY OF MEMORY

presented by

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THE PSYCHOLOGY OF MEMORY

BY

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Thesis submitted to the Department of Psychology of
the University of Tennessee in partial fulfillment of
the requirements for the degree of

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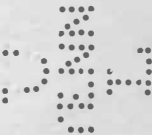


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PART I

THE IMPORTANCE OF MEMORY

Throughout all the ages man has had some faint realization of the tremendous importance of memory. Even today we realize its full importance only faintly. Memory is undoubtedly one of the most important functions of the mind. Without memory the mind is nothing. Memory is one of the basic and fundamental elements of the mind.

In recognition of the importance of memory, the most prominent educational systems of all times have placed a considerable amount of emphasis on the cultivation of the memory.

From time immemorial the Chinese system of education placed a great amount of emphasis upon the cultivation of the memory. In ancient China an education used to consist very largely of the memorization of the works of Confucius and Mencius. John McCook Roots tells us that the "Chinese scholar learned the classics by rote and then presented himself to be shut up in one of the...examination cells, of which there were some twenty thousand in Nanking alone."¹ From this examination cell he emerged a finished scholar, his education having consisted almost altogether of rote memory work.

1. ROOTS, JOHN McCook. Asia Magazine. July 1927, Page 547.
In an article entitled "Nationalism and Missions."

The ancient educational system of the Hebrews also placed a considerable amount of emphasis upon the cultivation of the memory of the students. Rev. B. Spiers said:

"The Talmud lays great stress upon the cultivation of memory, to which....thorough instruction seems to be a necessary complement." ²

It is not hard to understand why the ancient Jews attached so much importance to memory work. To the ancient Jew, the summum bonum of this earthly existence was for a person to have a thorough mastery of the Jewish Law. In a legal dispute the changing of a single word in a law might make a most profound difference. In order to argue intelligently about the Law the Hebrew scholar had to know enormous portions of the Law word-for-word.

The ancient Greeks also attached a great deal of importance to memory. It is significant to know that Mnemosyne, the Greek goddess of memory, was according to Greek Mythology the mother of the nine muses of Zeus, who according to mythology presided over all of the arts and sciences. This fact might be interpreted to mean that even the most ancient Greeks realized the great importance of memory.

2. SPIERS, Rev. B. The School System of the Talmud, London. Trubner & Co., 1882. Page 14.

Most authorities seem to agree that the Greeks were among the first to raise memorization to the status of an art. Every indication seems to show that we are indebted to the inventive genius of the ancient Greek mind for the system of memorizing known as Mnemonics. This system of memorizing is the basic element of the majority of those "startling" memory systems which are advertised so extensively at the present time.

The invention of the system of memory known as mnemonics is generally ascribed to the Greek poet Simonides, who lived almost five centuries before the Christian era began. Among the many authoritative quotations that might be given on this subject are to be found the following:

"Mnemonic devices were much cultivated by Greek sophists and philosophers, and are repeatedly referred to by Plato and Aristotle. In later times the invention was ascribed to the poet Simonides...³ Cicero attaches considerable importance to the art."

"There was however a special instrument for the cultivation of the memory, the use of which was advocated by the writers of the Talmud. This was the art of mnemonics, originated by the Greeks."⁴

"The systematic attempt to improve the efficiency of memory is known as the art of mnemonics, which is said to have originated with the Greek poet Simonides."⁵

3. Encyclopedia Britannica. Volume XVIII. Page 629.

4. SPIERS, Rev. B. The School System of the Talmud: Page 22.

5. The New International Encyclopedia, Vol. XV, Page 384.
Dodd, Mead & Co. New York. Second Edition. 1925.

Not only did the ancient Greeks give to the world the system of Mnemonics, but prominent Greek writers, such as Plato and Aristotle, made such valuable contributions to the literature of memory that W. H. Groves said:

"It would be folly to claim absolute originality for a work on memory. Loisetle did this and lost at it. The ancients stole his best ideas. His laws...stated in a different way [were] announced by Aristotle." ⁶

Not only during the times of remote antiquity but all through the Middle Ages and on to the present time we find some of the most prominent educational systems attaching a great deal of importance to the cultivation of the memory.

Among the more modern educational systems which placed a great deal of emphasis upon the cultivation of the memory is the Jesuitical system of education. Considered from the standpoint of the amount of verbal knowledge which the student acquired with thoroughness, this was perhaps one of the most efficient educational systems of early modern times. The Jesuits frequently claimed that "Memory is the mother of learning."

It is interesting to know that the Jesuits were among the pioneer educators in America. They were the founders of the first university in the Western

6. GROVES, W. H. The Rational Memory, Page 5. The Cosmopolitan Press, New York, Second Edition. 1912.

Hemisphere. The following quotation taken from the Mentor Magazine brings out this fact:

"The University of San Marcos in Lima, Peru, was founded in 1551 by the Jesuit priests who accompanied the Spanish conquerors to South America. It is the oldest seat of learning in the Americas, having been founded over a hundred years before Harvard University in Massachusetts." ⁷

The Jesuits attached, perhaps, too much importance to one of the least important forms of memory - verbal memory. An anonymous writer in the Atlantic Monthly describes the type of education that was characteristic of the Jesuits in the following terms:

"In all these studies they [the students] are simply supposed to memorize the ideas handed down by great minds which have gone before. In the whole course of this education no individual thought is required, nor for that matter permitted....It is a system little adapted to produce men of thought and individuality."⁸

Some authorities maintain that the reason which prompted the Jesuits to attach so much importance to memory work was not that they recognized the importance of cultivating the memory, but that they saw in such a practice a golden opportunity for imposing their authority and increasing their power over the mind of the student. I am of the opinion that, if the Jesuits did make mental slaves of their pupils, it was not

7. Mentor Magazine, December 1927. Page 57.

8. Anon. Atlantic Monthly, January 1928.

by emphasizing memory work but by repressing individuality and originality. I believe that it is quite possible for a person to have a well cultivated memory without the sacrifice of individuality and originality. A well cultivated memory is a great aid to original thought and not a hindrance to it.

We must recognize the fact that the Jesuits recognized the great importance of memory and placed a great deal of stress upon the cultivation of the memory, regardless of what their motives may have been for doing so.

The importance of memory is not only well attested by the amount of emphasis placed upon the cultivation of the memory in the majority of the most prominent educational systems of all times, but it is also universally recognized in the most authoritative artistic and scientific circles of today. In the musical world, for example, memory is recognized as one of the basic elements of musical skill. Not much over half a century ago the greatest musicians did much of their playing from the printed page rather than from memory. Picturing the conditions of days gone by, Francesco Berger, Professor of Piano at the Royal Academy of Music, London, England, said:

"I have not sat by Liszt when he played either in public or in private. But I think it highly probable, great virtuoso as he was, and gifted with an exceptional memory, that he did not trust himself to 'playing by heart' except in his own pieces. But I HAVE sat by most of the greatest pianists of the past (in many cases turned the pages for them), and I know that Moscheles, Mendelssohn, Sterndale Bennett, Rubinstein, Halle, Clara Schuman, Thalberg, Jaell, Pugno, Sophie Menter, Carreno and Essipoff did not play from memory, excepting their own music, or in a concerto. Bulow may have done so but his was an exceptional memory, and he was an eccentric man." 9

In contrast with this we find Josef Hoffman, the world renowned pianist, expressing the view of most modern musicians as follows:

"Playing from memory is indispensable to the freedom of rendition. You have to bear in your mind and memory the whole piece in order to attend properly to its details. Some renowned players who take the printed sheets before them on the stage, play, nevertheless, from memory. They take the music with them only to heighten their feeling of security and to counteract a lack of confidence in their memory." 10

MEMORY IS AN ESSENTIAL PART OF THE MIND

Memory is far more important than it appears to be from a superficial consideration of the subject. Few people realize how much they owe to their memory. Take memory away from the mind and you have little mind left. Kant considered memory as being "the most wonderful of the faculties." 11 W. H. Groves said:

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9. BERGER, FRANCESCO, The Academician, March 1924. Page 7.
 10. HOFFMAN, JOSEF. Piano Questions. Theodore Presser Co. 1920. Pages 112-113.
 11. KANT, IMMANUEL, quoted by William Walker Atkinson. Memory, How to Develop, Train and Use It. Page 9.

"Memory is the basis of the mind. Without it we could not perform any of the functions of the mind. If what we see, or hear, or experience were dropped immediately out of the mind there could be no comparison, no judgment, no reason, no imagination. We would be perpetual infants. All our knowledge consists in what we remember or can recall, and our wisdom in its rightful use." 12

Without memory we could have no knowledge.

Knowledge is but the memory of past experiences.

Francis Bacon said:

"All knowledge is but remembrance." 13

Dr. Isaac Watts said:

"There is neither knowledge nor arts, nor sciences without memory; nor can there be any improvement of mankind in virtue, or morals or the practice of religion without the assistance and influence of this power." 14

Without memory we could have no wisdom. Wisdom

consists of the intelligent use of knowledge. Tupper said:

"Memory is the teeming mother of wisdom." 15

Without memory we could have no ability to reason.

Without memory we could not have the ability to reason for we must depend upon our memories for the material with which to reason. It is the memory that furnishes the mind with the ideas, images, words, and other material of like nature which makes up the material employed in reasoning.

12. GROVES, W. H. The Rational Memory. Pages 7-8

13. BACON, FRANCIS. Advancement of Learning. I, 2.

14. WATTS, ISAAC. quoted by David Kay. Memory, What it is and How to Improve it.

15. TUPPER. Quoted by W. W. Atkinson. Memory. Page 58.

Without memory we could have no ability to pass judgment. Judgment is based on experience. We trust the judgment of those who are older than ourselves because they have had more experience than we have had. It has been recognized throughout the ages that old age has peculiar abilities in counsel for the simple reason that it represents a great back-ground of experience. Although the younger person may be far more intelligent than the older person he is handicapped in the matter of judgment by his lack of experience.

Experience is worthless unless it is remembered or unless it has made some lasting impression upon the mind. The old person who has no memory of his experiences or whose mind has not been permanently impressed by them in some way, is no better qualified to pass judgment wisely than the younger person who has not had the experience. Were it not for memory, experience would mean nothing to us in the future. We profit by experience only in-so-far as we are permanently changed by it, or retain and remember the lesson which we derived from it. Puttenham said:

"Yet experience is no more than a masse of memories assembled, that is, such trials as man hath made in time before." 16

Alexander Bain said:

"A full and accurate memory....is the intellectual basis of both prudence as regards to self, and sympathy as regards others." 17

16. PUTTEHAM. Arte of English Poesie, Page 31.

17. BAIN, ALEXANDER. Quoted by W. W. Atkinson. Memory. Page 11.

Without memory we could have no reproductive imagination, for memory is reproductive imagination.

Without memory we could have no creative imagination. Basile has said:

"Memory is the cabinet of imagination." 18

David Kay said:

"Not only the learning of the scholar, but the inspiration of the poet, the genius of the painter.... all depend on memory." 19

"The power of creating depends upon the power of remembering, and he who has most enriched his mind with the stores of nature and art will always have the most fertile and readiest invention." 20

David Kay quotes Dr. Thomas Brown as saying:

"The richer the memory, and consequently the greater the number of images that may arise to the philosopher, the more copious in both cases will be the suggestions of analogy which constitute poetic invention or philosophic discovery, and the more copious the suggestions of analogy may be, the richer and more diversified, it is evident, must be the inventive power of the mind." 21

Without memory there could be no language. A language consists in the conventionalized symbols for the expression of ideas, feelings, emotions and the like. How could there be any language if people could not remember the symbols nor what they stood for? Memory makes it possible for us to use and to understand language.

18. BASILE. quoted by W. W. Atkinson. Memory. Page 9.

19. KAY, DAVID. Memory - What it is and How to Improve it. 1901. Page 2.

20. Ibid. Page 16.

21. BROWN, THOMAS. Quoted by David Kay. Memory. Page 16.

Without memory there could be no skill. Skill is built up by the proper kind of practice and experience. Were it not for memory, the skill we might gain in one moment would be lost in the next moment. The skill which we have gained in the past is preserved by means of memory. Skill is based on habit. Habit is but a form of memory. Reuben Post Halleck said:

"Habit is, therefore, a bundle of memories or tendencies to act again in a way in which we have acted before." 22

"In the strictest truth all habit is memory." 23

Without memory we would have no fixed personality.

C. K. Ogden said:

"Memory might be the bond which united my experiences into one self and yours into a different self." 24

The present personality of any individual consists of the combined memories of the past experiences of that individual.

MEMORY IS ONE OF THE BASIC ELEMENTS OF OUR MORAL NATURES

Without memory we could have no character. Character consists of an aggregation of habits which govern all our actions. Habit is but a form of memory. Our characters

22. HALLECK, REUBEN POST. Education of the Nervous System, Page 228.

23. Ibid. Page 226

24. OGDEN, C. K. The Meaning of Psychology, Page 181.

are moulded out of our habits. Reuben Post Halleck said:

"Herein lies the tremendous importance of early actions. Their results do not end with the setting sun; they are as imperishable as ourselves....By repeated motor responses the boy moulds his nervous system so that it will continue to react in the same way. At the start he may be master; at the end he will be slave. It will be well if he is the slave of a sensible master." 25

Memory makes our actions and experiences almost as imperishable as our selves. As we have acted in the past so shall we be inclined to act in the future. Memory is without question one of the basic elements of character.

Without memory we would have no conscience. If we could not remember the precepts of morality we would not be able to distinguish between good and evil and between right and wrong. Conscience is largely the product of memory. Our consciences hurt us when we are about to do certain things because we remember our previous training which impressed upon our minds the fact that such things were evil or wrong. It is a well known fact that what will satisfy the conscience of one individual will hurt the conscience of another individual who has been trained differently.

Were it not for memory, the evil deeds we committed in the past could not live to torment us in the present and in the future. Man could commit the most atrocious, the most horrible and the most blood-stirring crimes, without the danger of having these to return to his

mind to trouble his spirit or to disturb the happiness, joy, serenity, peace or tranquillity of his mind.

Memory makes John the Baptist, whom Herod had put to death, live forever in Herod's mind to persecute him.

Memory makes Lady MacBeth rub her wicked hands and exclaim: "All the perfumes in Arabia will not sweeten this little hand."²⁶ Memory is that sting of conscience that MacBeth speaks of as "that suggestion whose horrid image doth unfix my hair and make my seated heart knock at my ribs against the use of nature."²⁷

Memory not only embitters the life of the evil-doer but it sweetens the life of the person who lives righteously. Memory rewards the person who wisely invests his life with joy, tranquillity, peace, and happiness. Solomon once said that "the memory of the just is blessed."²⁸

Memory may be said to be one of the essential elements of our moral natures. It persecutes us for our evil deeds and it rewards us for the noble things we do.

MEMORY AND EDUCATION

When we consider the tremendous importance of memory and when we consider the highest purposes of education we must admit that memory plays, and should play, a very important part in the education of every individual.

26. SHAKESPEARE, WILLIAM. MacBeth, Act V, Scene I.

27. Ibid.

28. Solomon. Proverbs 10:7.

We can hardly mention anything that is more important in education than the cultivation of the memory, since memory is one of the most important elements of the mind, the personality and the moral nature of every person. After a careful consideration of the part that memory should play in education David Kay said:

"It is impossible to over-estimate the importance of this subject [memory] as bearing upon education. The whole science of education may be embraced in the question of 'How to improve the memory?'....Every act in the training or cultivation of any power or faculty depends on memory; all the habits we form are built up through it." 29

"The great business of education should be the cultivation of the memory, for upon this everything else depends. By means of it we develop and instruct the intellect, build up the moral character, and even train the physical powers. 'The leading inquiry in the Art of Education' says Prof. Bain, 'is how to strengthen the memory.'" 30

MEMORY IS ESSENTIAL TO PROGRESS

Some people have the erroneous idea that to emphasize the cultivation of memory in our schools is to oppose progress. Many authorities claim that the emphasis placed upon the cultivation of the memory by the Chinese kept the Chinese mind at a standstill for thousand of years. The Chinese mind remained more or less at a standstill for thousands of years, not because the Chinese people attached so much importance to the cultivation of the memory,

29. KAY, DAVID. Memory, What it is and How to Improve it, Page 8.

30. Ibid. Page 312.

but because they attached so little importance to originality and individuality and ~~because~~ they were so well satisfied with the present and the past that they opposed every suggestion of change. It is quite evident that the Chinese people would have never reached the degree of civilization which was theirs in the most remote times of antiquity had they failed to attach the necessary importance to the cultivation of their memories. Memory is by no means opposed to progress; it is indispensable to progress. We make progress by proceeding from the known to the unknown. Knowledge of the past is the foundation upon which we must build in order to make any progress. We make no progress when we lose as much as we gain, or when we forget as much as we learn. We could make no progress without memory, for even though we were able to learn something new it would avail us nothing if we forgot it as soon as we learned it. Memory is indispensable to the march of progress. It is memory that keeps our minds furnished with knowledge, which consists of a mental representation of our past experiences and the past experiences of others who have lived in times past. In discussing the relation of memory to progress W. H. Groves said:

"Memory is the basis of all progress. Without it the past would be a blank, the relation of by-gone

ages an impossibility....Without it there could be no study and no advancement. There would be no arsenal for reason to forge her weapons, no arena for imagination to win her victories. There would be no consciousness of the past nor responsibility for the future. The human mind would be forever at a standstill....No vessel ever carried a cargo so precious. She memory preserves the past and makes civilization possible. She bundles up mountains and oceans and carries them whither she pleases. She is the treasury of knowledge, and garners up facts which the orator hurls as thunderbolts and the statesman pines over to find a safe passage for the ship of state." 31

MEMORY PRESERVES THE PAST

Without some form of memory we could have no knowledge of the past. It is by means of memory that we retain a mental hold on the past. What a blessing it is for us to be able to go into the treasure house of memory and revive from there the precious relics and remembrances of days gone by. What a blessing it is for us to be able to bring back to our minds the pleasant scenes of our childhood. When we become old and feeble our memories become a source of real comfort to us. When our bodies become stooped and worn with age, our limbs become so feeble that we can move about only with great difficulty and we can no longer enjoy the pleasures which life brings to the youth - what a blessing it is then to be able to look back mentally over the days when we had straight stalwart bodies filled with the energy of youth and retaste, one by one, the many joys which were ours when we were young, strong and gay.

When we become old and feeble what a blessing it is for us to be able to enjoy in a mental way the activities and experiences which we enjoyed in a physical way during the days of our youth.

The subject of "Memories" is one of the favorite subjects of the poets. To the poet this subject seems to have a certain glamor, a certain fascination, a certain witchery which few other subjects have.

John Greenleaf Whittier once wrote a beautiful poem of which the following is a part:

"How thrills once more the lengthening chain
 Of memory, at the thought of thee!
 Old hopes which long in dust have lain,
 Old dreams, come thronging back again,
 And boyhood lives again in me;
 I feel its glow upon my cheek,
 Its fulness of the heart is mine,
 As when I leaned to hear thee speak,
 Or raised my doubtful eye to thine.

"I hear again thy low replies,
 I feel thy arm within my own,
 And timidly again arise
 The fringed lids of hazel eyes,
 With soft brown tresses overblown.
 Ah! memories of sweet summer eves,
 Of moonlit wave and willewy way,
 Of stars and flowers, and dewy leaves,
 And smiles and tones more dear than they!

"....I too can smile, when o'er that hour
 The lights of memory backward stream,
 Yet ~~feel the while that manhood's power~~
 Is vainer than my boyhood's dream." 32

Ellen C. Howarth once wrote a beautiful poem of which the following is a part:

32 WHITTIER, JOHN GREENLEAF. Poem: Memories. American Prose and Poetry, Edited by Norman Foerster. Houghton Mifflin Company, New York. Pages 604-605

"Where is the heart that doth not keep,
 Within its inmost core,
 Some fond remembrance hidden deep,
 Of days that are no more?" 33

The ability to remember is not only of great service and utility to mankind but it is a source of constant joy and happiness. The poetic literature of all nations is filled with frequent praises to this power we have of recalling to mind those scenes which are forever gone from our eyes, and those experiences which are forever gone from our lives.

MEMORY AND THE PRESENT

Not only does memory preserve the joys of the past for our enjoyment in the present and in the future but it makes the present intelligible to us. Were it not for memory we would have no powers of perception, understanding or comprehension of the present. From a superficial consideration of the relation of our memories to our present condition, we would imagine that memory has little or nothing to do with our present well-being and that even though we were deprived of memory we would feel perfectly comfortable and at ease in our present surroundings. When we stop to consider the subject seriously, however, we soon come to realize that memory has far more to do with our present well-being than we had ever dreamed of before. The present is all wrapped up in the past. Were it not for memory the present would be more

33. HOWARTH, ELLEN C. Poem: "Tis But a Little Faded Flower."

confusing, perplexing and meaningless to us than it is to a newly born babe.

Perception is based very largely on memory. Without some memory of the past the present would mean nothing to us. Were it not for memory we would be able to perceive nothing even though our sensory capacities may be normal in every respect. Though we had eyes we would be as if we saw not, though we had ears we would be as if we heard not, though we had hands we would be as if we felt not - were it not for memory. Whatever we might be able to experience in any way would be but a meaningless and uneventful occurrence in the course of our lives.

The fact that we can have vision without having visual perception is made remarkably plain to us by the many cases of mental-blindness which are on record. Following some injury to the brain the unfortunate individual may find that he is able to see but what he sees means nothing to him so that he does not know what he is really seeing. In other words, he finds that he has sight without perception. The unfortunate individual may see a man come into the room, yet he does not know that it is a man until he hears his voice. The same is true about mental deafness. The unfortunate individual who is afflicted with this ailment finds that he is able

to hear yet what he hears means nothing to him. In other words he finds that he has hearing without auditory perception. He can hear all kinds of sounds, but all of them are unintelligible noises to him. In describing a case of mental-deafness, Dr. William Hanna Thomson said:

"The unfortunate....cannot tell the sound of a locomotive from that of a church bell." ³⁴

There is ample evidence to support the belief that perception is based very largely on memory.

David Kay said:

"Without the past our present ideas would be devoid of all meaning, all intelligibility. It is only as our past ideas and sensations come to interpret and explain our present experiences that we can know or understand them. The sight of a stone, a tree or a book would convey little meaning to the mind did not memory serve to throw light upon it, as the words of a book would be unintelligible did not memory furnish us with the several meanings attached to them." ³⁵

"Nay, even consciousness itself could have no existence without memory, for every act of consciousness involves a change from a past state to a present; and did the past state vanish the moment it was past, there could be no consciousness of change. Memory, therefore may be said to be involved in all conscious existence, a property of every conscious being." ³⁶

In the New International Encyclopedia the following

³⁴. THOMSON, WILLIAM H. Brain and Personality. Page 188.

³⁵. KAY, DAVID. Memory, What it is and How to Improve it. Page 5.

³⁶. Ibid. Pages 2-3.

facts are reported:

"When we look at a stone, we seem to see a heavy, hard, rough, cold, resisting mass. What we actually see is, of course, only the 'look' of the stone; the shape, the color, and the brightness. We 'think in' the rest from what our past experience has told us of the 'properties' of the stone." 37

MEMORY AND THE FUTURE

Memory has a much greater relation to the future than we would be willing to admit after making a hasty consideration of this subject. Patrick Henry said: "I know of no way of judging the future but by the past." Wise men who are thoroughly familiar with the past are able to prophesy the future with remarkable accuracy. The future is moulded out of the past. Past and future are inextricably bound together. It is often memory that binds them thus. It is a fundamental law of nature that everything tends to act in the future as in the past. All nature is ruled by the law of inertia. The law of inertia might be stated as follows: Everything behaves in the future as in the past unless new forces are introduced to prevent or modify such behavior. As a man acts in the past so tends he to act in the present and throughout the future unless some new forces are introduced into his life to prevent or modify such action. This law of inertia applies to everything from an atom to a star.

This law of inertia applies to the mind of

man just as truly as it does to material things. We might even say that memory is a form of mental inertia. The behavior of man's mind is the most unpredictable thing on earth, but due to the influence of memory over his mental activities even the behavior of man's mind can be predicted to a certain extent.

Memory enables us to predict the future. If all things tend to behave in the future as in the past unless new forces are introduced to prevent or modify such behavior and if the ability to remember enables us to keep the past behavior of anything in mind we can say, then, that by so doing we are enabled to prophecy the future with a certain degree of accuracy. Memory has far more to do with phrophecy than the average person ever dreams of.

The fact that we are able to remember our past experiences enables us to act more wisely in the future than we have in the past. David Kay said:

"But it is as serving to guide and direct our future conduct, to give us judgment, accuracy, and skill in carrying out what we purpose or intend to do, that the value of a good memory is most seen. In regard to any line of conduct or course of action that may lie before us, it is evidently of the greatest importance that we should have present to us, in the mind, the memory of previous actions of the same or a similar kind, for our guidance and direction. If we have pursued one course of conduct and it has turned out wrong the remembrance of this should lead us to the adoption

of a different course the next time, which may, peradventure, turn out right; and on the other hand, if the course we have previously followed be the right one, the memory of this will not fail to strengthen and encourage us to continue in it, while the effect of each repetition, which is but another form of memory, will be to render each succeeding act more easy and natural than the preceding one." 38

SUMMARY

The importance of memory is well attested by the importance which many of the world's most prominent educational systems have attached to cultivation of the memory.

Memory is one of the basic elements of the mind. Without memory man's mind would be practically nothing. Without memory we could have no knowledge, we could have no wisdom, we could have no ability to reason, we could have no ability to pass judgment on anything, we could have no imagination, we could have no comprehension of language, we could have no ability to use language in any of its forms, we could have no skill of any kind, and we could have no fixed personality.

Memory is one of the basic elements of our moral natures. Without memory we would have no character and without memory we could have no conscience.

38. KAY, DAVID. Memory, What it is and How to Improve It. 1901. Page 6.

The cultivation of the memory is one of the most important phases of education. In fact, almost every activity pertaining to the education of any individual must involve some form of memory.

Memory is indispensable to progress. By means of memory, knowledge which has been gained in the past may be kept in mind to serve as the foundation for such new knowledge as we may acquire in the present and in the future.

Memory preserves the past for us in a mental way. It enables us to enjoy the present by looking back over the joyful experiences which were once ours, in the past.

Memory makes the present intelligible to us. It makes perception possible. Without memory we would not be able to perceive, understand, or comprehend the present. Were it not for memory our present experiences would be nothing more than meaningless and uneventful happenings in the course of our lives.

Memory enables us to predict the future with a certain degree of accuracy. Prophecy is possible very largely on account of the fact that we are able to remember the outcome of the operation of certain forces in the past which are operating anew in the present, the outcome of which, however, has not been reached.

The fact that we are able to remember our past

experiences enables us to act more wisely in the future than we have in the past.



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PART II

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WHAT IS MEMORY ?

When we take into consideration the fact that the average individual forgets far more than he remembers about his past experiences, we are tempted to agree with the school boy who defined memory as "the thing people forget with".

Before we can make a very profitable study of the phenomena of memory we must first establish in our minds some definite conception as to the meaning of the term "memory". Any discussion of the phenomena of memory will most likely lead us into greater and greater confusion, unless we have from the start some conception as to the meaning of the term "memory" firmly established in our minds. The only way to reduce to a minimum the chances for confusion which may come out of the discussion of this subject is for us to arrive at some clear and definite definition of the term "memory" at the very start of our discussion. A definition of this term, in order to convey any definite meaning to the mind of the average individual, must be in terms of experiences which are common to the average individual.

Many authorities define memory as being "a knowledge of the past." For example, Bertrand Russell defines memory in the following terms:

"True memory....consists of knowledge of past events." 1

This is a very simple definition, but it is entirely too abstract to suit our purposes. The use of the term "knowledge" makes it so abstract that it fails to convey any definite meaning to the mind of the average person. Assuming that the term "knowledge" had been previously defined in terms of the common experiences of the average individual, and that every person knew exactly what is meant by this term, we would certainly say that this is a very meritorious definition. The world, however, is not fully agreed upon what is meant by the term "knowledge" neither is the average individual able to interpret this word in terms of his own past experiences. The philosophical world is still speculating on the true nature of knowledge. Few people have more than the faintest idea as to what knowledge consists of in the final analysis.

A definition of the word "memory" in order to be comprehensible to the average individual must avoid the use of terms ~~that are liable to prove to be misleading~~ on account of their abstractness. There is but one way to make the average individual understand what is meant by the term "memory" and that is to define it in terms of experiences which are common to the average individual. I would

1. RUSSELL, BERTRAND. Analysis of the Mind.Page 172.

propose to define it by enumerating the mnemonic phenomena which constitute the common experience of every normal individual.

MEMORY IS THE ABILITY TO MENTALLY RECALL THE PAST

The ability to recall the past to mind is certainly one of the phenomena of memory. Most authorities mention this phenomenon in their definitions of memory. Dr. James Beattie has defined memory as being "the power to recall past sensations and thoughts."² John Locke has defined memory as being "the power the mind has to revive perceptions which it has once had with the additional perception annexed to them - that it has had them before."³ He also defines it as "the power to revive again those ideas which after imprinting have disappeared, or have been as it were laid aside out of sight."⁴ Fuller defines memory as being "the power of reproducing in the mind former impressions, or percepts."⁵ These definitions very clearly recognize mental recall as being one of the phenomena of memory. There are, however, several criticisms that might be made of these definitions.

2. BEATTIE, JAMES. Quoted by David Kay. Memory. Pg. 12.

3. LOCKE, JOHN. Essays. Book II, Chapter X, Paragraph 2.

4. Ibid.

5. FULLER. Quoted by W. W. Atkinson. Memory. Page 13.

We might notice, for example, that these definitions fail to recognize or even to imply that there is an essential difference between an experience and the memory of that experience. Notice that Dr. Beattie defines memory as "the power to recall past sensations and thoughts", Locke defines it as "the power to revive perceptions" and also as "the power to revive ideas". But is memory the power to recall past sensations, thoughts, ideas, perceptions and the like?

It seems that memory is the ability to recall certain mental images, or memory images, produced in the mind by sensations, thoughts, ideas, perceptions and the like and not the ability to recall the actual sensations, thoughts, ideas, perceptions and the like. If memory were the ability to recall past sensations, we should not be able to distinguish between an actual sensation and the memory of a sensation which we experienced in the past. In other words, we would be unable to tell whether we were actually experiencing something or merely remembering it. In actual reality the normal individual does not have the slightest difficulty in discriminating between a present experience and the memory of a past experience. There is so much difference between

the two that we do not have the slightest difficulty in distinguishing between them.

Many authorities recognize the fact that there is a considerable difference between an original mental experience and the memory of that experience.

C. K. Ogden said:

"There is every reason to suppose that images differ from the actual experiences by being aroused not through incoming impulses from the receptive centers, but through impulses of central origin." 6

"Sensations are happenings in the nervous system, due to stimuli from outside the body." 7

Theodule Ribot said:

The memory of an apple is necessarily a weakened form of the perception of an apple." 8

Bertrand Russell said:

"Hume...speaks of impressions as 'those perceptions which enter with most force and violence' while he defines ideas as 'the faint images of these in thinking and reasoning.' He says, 'Every one of himself will readily perceive the difference betwixt feeling and thinking.'" 9

That there is a vast difference between an original experience and the memory of that experience no one will deny. For example, almost everybody will agree that there is a considerable difference between a sensation and the memory of that sensation.

6. OGDEN, C. K. The Meaning of Psychology, Page 68.

7. Ibid. Pages 8-9

8. RIBOT, TH. Diseases of Memory. Page 42.

9. RUSSELL, BERTRAND. The Analysis of Mind. Page 146.

To be sure, sensory images are immediately metamorphosed into memory images, the moment the sensation is past. In other words, the moment the sensation is past the sensory image becomes a memory image. We can recall the memory image but we cannot recall the sensation itself, unless we provide the identical outward stimulation for the new sensation as there was for the old sensation. One essential difference between a sensory image and a memory image is that a memory image is much fainter and much vaguer than the sensory image that created it. The memory image is not near so perfect as the sensory image that produced it in the mind. In view of this fact Hobbes defined memory as "decaying sense". ¹⁰ In his definition of memory mentioned above, Hume speaks of memory images as "the faint images of these [perceptions] in thinking and reasoning". He also says that perceptions enter the mind with the most force and violence. Unless sensory images continuously come to the rescue of memory images, strengthening their hold on the mind, the memory images soon fade away. As time passes on, the imperfection of a memory image becomes greater and greater unless it is constantly revived in the mind.

10. HOBBS. Quoted in Baldwin's Dictionary of Philosophy and Psychology, Vol. II, Page 63.

In recognition of the fact that there is a considerable difference between an original experience and the memory of that experience we might define memory as the ability of recalling images once created in the mind by some conscious experience or experiences. It would also be correct to define memory as the ability to arouse in the mind the conscious representation of past impressions and experiences. By defining memory in this manner we would recognize, or imply, some difference between an original mental experience and the memory of that experience.

Some authorities limit the meaning of the term "memory" to be the ability to recall past experiences into consciousness. Recall, however, is but one of the phenomena of memory. We must not overlook the fact that there are other phenomena of memory which are just as important as this ability of the mind to recall past experiences into consciousness.

Memory images may be created in the mind by the various forms of thought such as reasons, fancies, notions, opinions and the like. They may be created in the mind by various sorts of feelings such as emotions, sentiments, desires, longings, wants, Volitions and the like. They may be created in the mind by

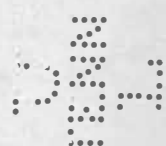
sensations, perceptions and the like. They may also be created in the mind by certain ideas, abstract qualities, quantities, symbols and the like.

MEMORY IS THE ABILITY TO RETAIN MENTAL IMAGES

Many authorities define memory as the ability to retain the mental images produced by conscious experiences. Retention is one of the phenomena of memory. I am inclined to believe that the ability to recall to mind the impressions which the mind has received in the past would naturally include and imply the ability of the mind to retain those impressions, for it seems that recall is impossible unless there is some form of retention.

The ancients used to define memory as the treasury of knowledge or as the storehouse of knowledge. In a figurative way these definitions define memory in terms of the mnemonic phenomenon of retention.

Some authorities limit the meaning of the term "memory" to be the ability of the mind to retain impressions. It seems that memory is far more than that. Memory not only includes the ability of the mind to retain impressions, but it includes the ability of the mind to recall impressions, the ability of the mind to recognize impressions, and so on. Nearly all psychologists



in discussing the topic of memory mention the ability which the mind has to retain impressions as being one of the phenomena of memory.

MEMORY INCLUDES THE CAPACITY FOR RECOGNITION

Almost all psychologists mention recognition in discussing the topic of memory. Recognition is truly one of the phenomena of memory. I prefer to think of recognition as being ~~a form of~~ recall rather than think of it as being a separate and distinct phenomenon of memory. In defining memory, however, it would certainly be wise to mention the capacity for recognition as being one of the phenomena of memory.

MEMORY IS THE ABILITY TO REPEAT CERTAIN MENTAL ACTIVITIES

Some authorities in discussing the topic of memory mention the fact that the mind shows a tendency to be influenced by its past experiences to a very large extent. The ability and the tendency which each individual has to repeat certain mental activities in a way or manner resembling, influenced and affected by past mental experiences of like nature is considered one of the phenomena of memory by many authorities. Reuben Post Halleck said that memory consists of "tendencies to act again in a way in which we have acted before." 11

11. HALLECK, R. P. Education of the Nervous System.
Page 1.

SUMMARIZING DEFINITION

Memory seems to consist of:

(I) The ability to retain certain mental images previously created in the mind of an individual by:

(1) Such sensations, perceptions and the like as have been brought into the consciousness of the individual;

(2) Such thoughts, ideas, fancies, notions, opinions and the like as have been entertained in his mind;

(3) Such emotions, sentiments, desires, longings, volitions, and the like as have been made conscious to his mind;

(4) Such ideas, abstract qualities, quantities, and the like as the mind has been made to comprehend, perceive or conceive;

(5) Such symbols representing any quantity, quality, thing, action or experience of any kind as have been impressed upon the mind; and by

(6) Any conscious experience of the individual.

(II) The ability to reproduce, repeat, or recall such mental or nervous functions as have been previously performed by the individual.

(III) The ability to recognize or identify certain sensations, thoughts, acts, experiences and the like as being similar or identical to other sensations, thoughts, acts, experience and the like

as have been brought into the consciousness of the same individual.

(IV) The disposition or tendency which each individual has to think, act, and to do everything he does in a way or manner resembling, influenced and affected by his previous thoughts, acts and experiences.

(V) Usually, though not necessarily, any of the above mentioned phenomena of memory may be accompanied by the consciousness that the experience which is being recalled to the mind had been impressed upon the mind in the past; and the individual oftentimes is able to recall the time, the place and the conditions by which it was originally impressed upon the mind.

PART III

Modern authorities have divided memory into many different types or kinds of memory, according to the various kinds of mental images which are involved in each of the different types of memory.

Theodule Ribot, a prominent authority on memory, said:

"Memory may be resolved into memories, just as the life of an organism may be resolved into the lives of organs, the tissues, the anatomical elements which compose it." 1

George Trumbull Ladd said:

"What Cardinal Newman said of the psychical faculty is true of the organic basis: 'There are a hundred memories as there are a hundred virtues.'There is sound reason, then for speaking of a 'memory of the ear', 'memory of the eye', etc.... the memory of any perception of the senses, any complex state of feeling, or of ideation." 2

The International Encyclopedia says:

"There are, in strictness, numerous partial 'memories', - auditory, visual, kinaesthetic, etc. and not one single 'memory'. 3

Smith Ely Jelliffe said:

"It will be necessary to speak not merely of memory, but of memories....There are thus not only a visual memory, but an auditory memory or memory for sounds, a gustatory memory or memory for tastes, an olfactory memory for smells, and special memories for the other special classes of sensations." 4

Practically every modern authority on memory recognizes the fact that memory may be divided into

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1. RIBOT, THEODULE. Diseases of Memory. Page x.
 2. LADD, GEORGE TRUMBULL. Outlines of Physiological Psychology. Page 426.
 3. The New International Encyclopedia. Vol XV, Page 383.
 4. JELIFFE, SMITH ELY. The Americana. Vol. XVIII, Pg.614.

many different types or kinds of memory. No authority, as yet, has claimed that his list of the different types of memory is a complete list. There are so many different types of memory that it is extremely difficult, if not altogether impossible, to tabulate them all. I have endeavored to make as complete a list of the most important kinds of memory as I am able to make at the present time, yet I feel quite sure that it is far from being a complete list.

For the sake of convenience in handling this subject, I shall consider the functions of the mind as being of at least four different types; namely:

(1) Passive, (2) Active, (3) Responsive and (4) Associative. With such a division of mental functions in mind we can classify the various types of memory more intelligently than otherwise. By such a division of mental functions into their various types, I do not wish to imply that certain functions are purely Passive, others are purely active, others are purely responsive and still others are purely associative. The truth of the matter seems to be that certain mental functions are predominantly active, others are predominantly passive, others are predominantly responsive and still others are predominantly associative. In a mental function which is predominantly passive in nature some mental activity, some association and some response is involved but not to the extent that the passive element is involved.

Using this classification of mental functions as a basis for the classification of the various kinds of memory we might say that there are at least four main types of memory, namely: (1) Memory of impressions received through a passive mental function, (2) Memory of impressions received through an active mental function, (3) Memory of impressions received through a responsive mental function, and (4) Memory of impressions received through an associative mental function.

MEMORY OF IMPRESSIONS RECEIVED THROUGH A PASSIVE MENTAL FUNCTION

We are indebted to the passive functions of the mind for the great bulk of all our knowledge. In a mental function of the passive type, the mind is, to a predominant extent, acted upon by external stimuli. In the case of sensation, for example, the mind is, to a predominant extent, passive.

MEMORY OF IMPRESSIONS RECEIVED THROUGH AN ACTIVE MENTAL FUNCTION

This type of memory involves a much higher type of mental operation than does any of the other types of memory. It is also less essential to the life of the organism than any of the other types. In this type of mental functions, the mind is an active agent, to a predominant extent. This type of mental

functions includes such mental operations as thinking,⁴⁰ willing, striving, imagining, longing and the like. All creative imagination belongs particularly to this class of mental functions. This type of memory enables the composer, the poet, the inventor, the artist and any individual gifted with creative imagination to retain within mental reach the images, ideas, conceptions and the like which have been created by his mind. We must include in this class of mental activity an inferior type of imagination - that one which is responsible to a considerable extent for superstitions, fancies, notions, opinions, and the like. Many of the mystic ideas of the orient, such as dragons, demons, evil spirits and the like owe their origin very largely to the operations of the active functions of the mind. There is a type of memory related to each and every type of mental function and we can truly say that there is a type of memory related to the active functions of the mind.

MEMORY OF IMPRESSIONS RECEIVED

THROUGH A RESPONSIVE MENTAL FUNCTION

Certain functions of the mind are of a predominantly responsive nature. Mental operations consist largely of certain well established responses which we make to certain situations. As a general rule, the making of any response involves both the passive and the

active functions of the mind and oftentimes certain associative mental functions are involved as well. A great deal of our knowledge consists of established responses to certain external situations. We might say that there is a type of memory related to this type of mental functions.

MEMORY OF IMPRESSIONS RECEIVED THROUGH AN ASSOCIATIVE MENTAL FUNCTION

The associative function of the mind has to do with the organization of our knowledge into a form which is easy to deal with. By means of association order is kept in the mind. Our mind is able to retain knowledge in an orderly fashion due to the operation of this type of mental functions. Association enables our mind to retain knowledge in an orderly fashion resembling that of a well kept filing system. Unless our ideas are properly associated they can be of little value to us. By means of association, our ideas may be so organized as to form logical and coherent chains of thought. Related to this type of mental functions there is also a related type of memory.

Throughout the following pages we shall deal with these four outstanding types of memory more in detail.

MEMORY OF IMPRESSIONS RECEIVED THROUGH A PASSIVE MENTAL FUNCTION

For the sake of convenience in dealing with this subject I shall divide this type of memory into two divisions, namely: (1) Sensory Memory, or Memory of Sensory Impressions, and (2) Representative Memory or Memory of Symbolical Impressions.

MEMORY OF SENSORY IMPRESSIONS

Without any doubt the greatest and the most valuable part of all our knowledge comes either directly through the senses. The great majority of all the mental impressions we receive come directly through the senses. Those impressions which do not come directly through the senses, either come indirectly through the senses or owe their existence very largely to those impressions that have come through the senses. Sensation is a basic element of what we call "mind". Without sensation there could not be what we might call "mind" in the generally accepted sense of the term. David Kay said:

"The senses directly or indirectly furnish all the materials of thought and of knowledge, for there is nothing in the mind that has not entered it through the senses. They also supply the stimulus necessary to develop every inborn faculty, for without their aid, too, without their guidance and direction, voluntary action would be impossible....Knowledge comes to us solely through our senses." 5

5. KAY, DAVID. Memory, What it is and How to Improve it.
Page 124.

Helmholtz said:

"Apprehension by the senses supplies directly or indirectly the material of all human knowledge, or at least the stimulus necessary to develop every inborn faculty of the mind." ⁶

Dr. Carpenter said:

"If it were possible for a human being to come into the world with a brain perfectly prepared to be the instrument of psychical operation, but with all the inlets to sensations closed, we have every reason to believe that the mind would remain dormant like a seed buried in the earth." ⁷

Dugald Stewart said:

"That the powers of the understanding would forever continue dormant, were it not for the actions of things external on the bodily frame, is a proposition now universally admitted by philosophers." ⁸

It can be clearly seen that the great bulk of all our knowledge comes directly through the senses. This being true, we can say that the type of memory which is related to this type of mental functions, the memory of sensory impressions, is the most important of all of the various types of memory. The great bulk of all our knowledge consists of the memory of sensory impressions.

6. HELMHOLTZ. Quoted by David Kay. Memory. What it is and How to Improve it. Page 124.

7. DR. CARPENTER. Quoted by David Kay. Memory. What it is and How to Improve it. Page 124.

8. STEWART, DUGALD. Quoted by David Kay. Ibid. Page 124.

SUBDIVISIONS OF THE MEMORY OF SENSORY IMPRESSIONS

The memory of sensory impressions may be subdivided into many different types of memory according to the type of sensation that is involved in each. Halleck once said:

"Many persons think that memory is mainly of sight; but we have as many different kinds of memory as we have senses." 9

There is still some disagreement among modern authorities as to the number of the types of sensation that may be experienced by the normal man. Some modern authorities still cling to the old view which regards man as having five senses. For example, William Walker Atkinson said:

"Memory of Sense Impressions of course includes the impressions received from all of the five senses: sight; hearing; taste; touch; and smell." 10

Many modern psychologists have come to the conclusion that man is capable of experiencing at least eleven different kinds of sensations. This number may be increased to twelve by dividing the thermic sense into two types of thermic sensations, namely: heat sensations and cold sensations. There are excellent reasons for doing this, but it suits the purposes of this work better to consider these

9. HALLECK. Quoted by W. W. Atkinson. Memory, How to Develop Train and Use it. Page 88.

10. ATKINSON, WILLIAM WALKER. Memory, How to Develop Train and Use it. Page 82.

together rather than apart. The eleven senses may then said to be as follows:

1. Visual (sight).
2. Auditory (hearing).
3. Olfactory (smell).
4. Gustatory (taste).
5. Tactile (touch).
6. Thermic (temperature).
 - a. Sense of heat.
 - b. Sense of cold.
7. Electro-kinetic (electrical shocks).
8. Kinaesthetic (muscular, motor, weight).
9. Static (bodily position).
10. Internal or Organic (bodily conditions).
11. Algesic (pain).

Related to each of these different forms of sensations is a type of memory which involves the types of sensory impressions made on the mind by each of these types of sensation. We may therefore speak of a visual memory, (or a memory of visual impressions); an auditory memory (or a memory of auditory impressions); an olfactory memory (or a memory of olfactory impressions); a gustatory memory (or a memory of gustatory impressions); etc.

Some authorities carry this subdivision of memory still further. The New International Encyclopedia holds that "these type differences are, however, gross differences; subclasses within type may be distinguished."¹¹ For example, we might subdivide visual memory, or memory of visual impressions, into a number of classes including the following: (1) Memory of visual impressions of luminosity, (2) Memory of color impressions, (3) Memory of spatial impressions as to the form, shape, size, distance, contour, design, configurations and similar qualities of things, (4) Memory of textural visual impressions as to the roughness, smoothness, sliminess, solidity, and similar qualities of things, (5) Memory of the visual impressions as to the motions of things.

That such a subdivision of the various types of memory may be carried on ad infinitum there is no doubt. In the original manuscript of this work the author made such a subdivision of each of the types of memory related to the various types of sensations, but in rewriting this work the author abandoned these subdivisions in order to devote the space which they occupied to matters of a more vital relation to the topic of memory.

¹¹. The New International Encyclopedia, Vol XV, Page 383.

MEMORY OF VISUAL IMPRESSIONS

The memory of visual impressions is perhaps the most important type of memory which man has. The sense of sight is without any question one of the most valuable of all our senses. The sense of sight deals with a greater number of objects than any other sense. Unlike other forms of sensation the sense of sight deals not only with the things of this world but it enables man to obtain information about worlds which are at a tremendous distance from this world. When a man gazes into the heavens and looks at the stars, his vision is reaching for thousands and thousands of miles into space. We cannot say that this is true of any other sense with which man is gifted.

The sense of sight not only deals with a greater number of objects than any other sense but it furnishes man with the most varied information respecting the objects with which it is able to deal. Through the sense of sight man is informed about the luminosity of the various portions of things. By means of the sense of sight man is informed about the color of things. By means of the sense of sight man is informed about the spatial qualities of things, in other words, man is informed about the shape, form, size, distance, contour design, configurations and other similar

qualities about things. By means of sight man is informed about the texture of things. He is informed as to whether or not the thing under consideration is a liquid, or a solid, and in some cases certain gases may be perceived by the means of sight. By means of sight man is informed about the roughness, smoothness, sliminess, and other textural qualities of things. By means of sight man is informed about the motions of things.

By guiding and directing our physical activities the sense of sight renders a most vital and important service to man. It makes it possible for him to make his way through the world in safety amid the most dangerous environments. The sense of sight enables us to perform an enormous number of activities with relative ease such as threading a needle, striking a ball, and the like.

The sense of sight not only renders a most vital service to man but it contributes very largely to his pleasure. The sense of sight contributes more to the pleasure of man than perhaps any other sense. It is sufficient to notice the delight that people take in watching a foot-ball game, or in attending the "movies" in order to realize how much the sense of sight does contribute to the pleasure of man.

The great bulk of our knowledge consists of the memory of visual impressions.

MEMORY OF AUDITORY IMPRESSIONS

Next to the memory of visual impressions, the memory of auditory impressions is the most important type of memory that man has. In some respects the memory of auditory impressions is even more valuable than the memory of visual impressions.

Next to the sense of sight, the sense of hearing is perhaps the most valuable of man's senses. The sense of hearing renders a most valuable service to man. The value of the sense of hearing lies largely in the fact that it enables man to use vocal sounds as a means of conveying thought. The sense of hearing makes oral communication possible. A large percentage of man's knowledge comes to him through his sense of hearing by means of oral expressions of the thoughts of other people in the form of spoken words. In a later portion of this work dealing with the topic of verbal memory greater attention shall be given to this topic.

The sense of hearing not only renders a great service to man by making oral communication possible but it contributes very largely to his pleasure. Music, that art which stirs the inmost souls of so many people and which is the source of such undefinable and indiscribable joy to them,

reaches their minds through the sense of hearing. The memory of auditory impressions preserves for us the joy which comes from listening to beautiful music, and years after listening to a beautiful piece of music well rendered we can recall to our minds those strains which appealed so forcibly to us at that time.

The sense of hearing informs us about the various qualities of sounds such as their tone-color, their timbre, their pitch if they are musical, their loudness, the harmony or disharmony of the various combinations of tones of different pitch, the dissonance or consonance of the various combinations of tones of different timbre, the rhythmic succession of tones, the tempo in which tones succeed each other and many similar ideas pertaining to sound. By means of the sense of hearing man is made aware of many noises, such as detonations, buzzes, squeaks, screeches, shrieks, roars, honks, toots and the like. Noises oftentimes warn man of approaching danger although at times they are the source of considerable annoyance. At times, however, they seem to be a source of real pleasure as in the case of Fourth of July celebrations in which people try to see how much noise they can really make.

Related to the sense of hearing is a type of memory - the memory of auditory impressions - which is of considerable importance. A large percentage of

man's knowledge consists of the memory of auditory impressions or of ideas established in the mind through auditory impressions in the form of the spoken word.

MEMORY OF OLFACTORY IMPRESSIONS

The memory of olfactory impressions is not of any vital importance to man. It is sometimes a source of delight and in some rare cases it may be of real service to him, but ordinarily the memory of olfactory impressions is of no great value to man.

The sense of smell oftentimes contributes greatly to man's delight. Hervey once said:

"How 'passing wonderful' are the various scents.... that fill the air, yet when they fall upon the fine membrane of the nose they are inhaled distinguished, and called by name! They sail in numerous squadrons, close to our eyes, and close by our ears, yet are so amazingly attenuated that they elude the search of both! Nevertheless, so judiciously are the olfactory nets laid, and so artfully their meshes sized, that they catch these vanishing fugitives. They catch the roaming perfumes which fly off from the opening honeysuckle, and take in the stationed sweets which hover round the expanded rose. They imbibe all the balmy fragrance of spring, all the aromatic exhalations of autumn, and enable us to banquet even on the invisible dainties of nature." 12

The sense of smell is perhaps not of great use to modern man but it is still a source of great delight to him. There is great delight in roaming through sweet scented flower gardens and inhaling the delicate perfumes which are wafted from the flowers by the breeze.

12. HERVEY, J. Quoted by David Kay. Memory. Page 171.

The olfactory sense and the memory of olfactory impressions which is related to it may be developed to a considerable degree. David Kay said:

"The sense of smell, like the other senses, may be brought to a very high degree of perfection by cultivation. In blind persons this sense is sometimes so acute that they are able to distinguish individuals by it. In the well-known case of James Mitchell, who was blind from his birth, it was his principal means of distinguishing persons, and enabled him at once to perceive the entrance of a stranger. Among the savage tribes, too, who depend much on this sense, it is very acute." 13

D. E. Phillips said:

"Many animals far surpass man in the power of smell. The range is widened in man, but the power is diminished. The dog tracks the wild animal many hours after its passing by, and scents his master's trail on the pavement amidst thousands of others.... Tobacco buyers cultivate a keen sense of smell. The blind exhibit marvellous power in this line. A girl in Massachusetts was able to recognize persons she had met by the smell of their gloves.... Helen Keller detects an approaching storm, tells the time of day, knows the nature of the house she enters, recognizes individuals, all by the sense of smell." 14

Since the memory depends upon the senses for its impressions, a keen olfactory sense is an essential prerequisite to a well-developed memory of olfactory impressions. In the case of the blind the sense of smell and the memory of olfactory impressions may be of considerable importance, although they seem to be of no great importance in the case of the average person.

13. KAY, DAVID. Memory. Page 174

14. PHILLIPS, D. E. An Elementary Psychology, Page 145.

MEMORY OF GUSTATORY IMPRESSIONS

The memory of gustatory impressions is not of any great importance to man. The memory of gustatory impressions is sometimes a source of enjoyment to man and in some rare cases it may be of real service to him, but ordinarily the memory of gustatory impressions is of no vital importance to man.

The sense of taste is oftentimes a source of considerable delight. The sense of taste makes a considerable contribution to the enjoyment of our meals. We can easily imagine that our appetites would suffer considerably were it not for the taste-appeal which well prepared foods make on our gustatory sense organs. The All Wise Creator by giving us a sense of taste made the nutrition of our bodies an attractive feature of our lives. The boy who is away from home often thinks of home in terms of gustatory sensations. Thoughts about tasty meals throng to his mind as it were in battalions whenever the word "home" is mentioned.

The memory of gustatory impressions is oftentimes of some service to man. For example, it enables the tea-taster to recognize the various grades of tea by their tastes, it enables the wine taster to recognize the various kinds of wines, it enables the experienced cook to recognize the ingredients that go to make up

a certain dish. To the average person, however, the memory of gustatory impressions is of no great importance.

MEMORY OF TACTILE IMPRESSIONS

In some cases the memory of tactile impressions may be highly developed and may be the source of a large proportion of the knowledge which belongs to some people. D. E. Phillips said:

"The blind may be educated to read with ease, rapidity, and accuracy, either through the fingers, or in case the hands are wanting, through the lips or toes. The blind learn to distinguish color, and develop a marvellous sense of direction and of the nearness of objects. Helen Keller received an all-round college education through the sense of touch. But the education of touch, while most manifest in the blind, is not limited to them. Many men develop the ability to shave without a mirror and with a common razor, even on a moving train.... Instrumental musicians have a highly developed sense of touch and muscular movement in the hands and arms." ¹⁵

Locke points out the fact that all men must receive the idea of solidity largely from touch. He said:

"We receive this idea [of solidity] from touch. The idea of solidity we receive by our touch; and it arises from the resistance which we find in a body to the entrance of any other body into the place it possesses, till it has left it.... That which thus hinders the approach of two bodies, when they are moving one towards another, I call solidity....but if any one think it better to call it impenetrability, he has my consent." ¹⁶

¹⁵. PHILLIPS, D. E. An Elementary Psychology. Page 143.

¹⁶. LOCKE, JOHN. Human Understanding. Book II, Chapter IV, Paragraph 2.

The average person derives a considerable amount of knowledge from his, or her, sense of touch. Babies are quite fond of handling things and some authorities interpret this fondness for handling things as being an instinctive impulse which young children have to gain knowledge about things by obtaining tactile impressions about them.

Blind people have to depend upon their sense of touch for the knowledge they acquire far more than do people who are able to see. Even the person who is gifted with good eye-sight must depend upon his sense of touch for certain ideas. Certain textural ideas, such as those of roughness, smoothness, sliminess, solidity, stickiness, plasticity, and the like are acquired very largely through the sense of touch. Certain spatial ideas such as those of form, size, shape, distance, design and the like are at least partly acquired through the sense of touch.

Some authorities are of the opinion that all sensations are but different forms of touch sensations. D. E. Phillips said:

"Touch is the oldest of all the senses; all others appear to be modifications of it." 17

The popular notion of touch includes, or used to include, pain, temperature, pressure and the like. Modern psychologists no longer regard touch in this sense.

17. PHILLIPS, D. E. An Elementary Psychology. Page 138.

D. E. Phillips said:

"The popular notion of touch also includes pain, temperature, pressure, and even the muscular sense. These have lately been differentiated. Specialists claim that pain may be destroyed in any given part of the body by disease or application of drugs, while susceptibility to sensations of heat and cold remain. Sensations of pain may be destroyed while those of touch remain intact. At least two normal examples showing the independence of touch and pain may be mentioned. Contact with the cornea of the eye gives no touch sensation, but pain. Piercing odors produce pain without touch. The areas of greatest sensitiveness to touch are not identical with those of greatest sensitiveness to temperature." 18

In the strict sense of the term, the word "touch" cannot be taken to include pain, temperature, pressure and the like. Even when we consider the sense of touch in this restricted sense of the word we cannot fail to recognize its importance. Much of our knowledge is either partly or wholly acquired through the sense of touch, in other words, a considerable portion of our knowledge consists of the memory of tactile impressions. Blind people depend upon their sense of touch for the knowledge they acquire, far more than do people who are gifted with good eye-sight. The knowledge of a blind person consists to a very considerable extent of the memory of tactile impressions. We can truly say that the memory of tactile impressions is one of considerable importance.

18. PHILLIPS, D. E. An Elementary Psychology. Page 142.

THE MEMORY OF THERMIC IMPRESSIONS

The memory of thermic impressions in some cases may be one of considerable importance. We have oftentimes heard the old saying: "A burnt child fears the fire." In this case, the memory of thermic impressions and the memory of pain impressions make the child more prudent and cautious in his dealings with fire.

The thermic sense, or sense of temperature, has been considered as a part of the sense of touch by most of the ancient writers on sensation. Modern authorities consider the sense of touch and the thermic sense as being two separate and distinct types of sensation. Modern authorities not only consider the sense of touch and the thermic sense as being two distinct types of sensation, but they go still a step further and consider the sense of heat and the sense of cold as being two separate and distinct types of sensations. The reason why the sense of heat and the sense of cold are considered as being separate and distinct is that certain spots of the skin are sensitive to heat and other spots are sensitive to cold. Robert S. Woodworth reports an interesting experiment which brings out this fact. He says:

"The most successful way of isolating the elements out of these compounds is to explore the skin, point by point, with weak stimuli of different

kinds. If a blunt metal point, or the point of a lead pencil, a few degrees cooler than the skin, is passed slowly over the skin, at most points no sensation except that of contact arises, but at certain points there is a clear sensation of cold. Within an area an inch square on the back of the hand, several of these cold spots can be found; and when the exploration is carefully made, and the cold spots marked, they will be found to give the same sensation every time. Substitute a metal point a few degrees warmer than the skin, and a few spots will be found that give the sensation of warmth, these being the warmth spots. " 19

I know of no reason for objecting to the division of the thermic sense into two separate senses instead of one. It is for the sake of convenience in discussing this topic, that I speak of the memory of thermic impressions instead of the memory of sensations of cold and the memory of sensations of warmth. Assuming that sensations of heat and sensations of cold are two separate and distinct classes of sensations instead of being merely one we have a perfect right to speak of two types of memory of thermic impressions, namely: (1) Memory of impressions of heat sensations and (2) Memory of impressions of cold sensations.

MEMORY OF ELECTRO-KINETIC IMPRESSIONS

No authority which I have consulted has made any mention of this distinct type of sensation - the sensation of an electric shock. So far as I am able to tell we have no name for this type of sensation. I have adopted the term "electro-kinetic" because I considered it as being the term which best applied to this type of sensation. The term "electro-kinetic" means "pertaining to electricity in motion" or "pertaining to an electric current". It is a well known fact that electricity is altogether powerless unless it is in motion. We can come into contact with a powerful electrical current without experiencing any sensation at all, so long as we do not allow the current to pass through our bodies. But when we allow a small electrical current to course through our body, or through a certain portion of our bodies, we experience a type of sensation which I have chosen to call an "electro-kinetic sensation". To illustrate my point, let us suppose that having isolated our bodies from all possible outlets for the electrical current, we touch a wire which is charged with electricity. We would experience

no sensation because we have provided no outlet for the current which we have allowed to come into contact with our bodies. Now let us suppose that we allow some part of our body to come into contact with a wire which would serve as an outlet for the current. By touching the wire that is charged with electricity we would immediately experience a sensation, varying in intensity in ratio to the amount of electricity that passes through our bodies per unit of time. It is in view of the fact that an electrical current must flow through our bodies, or at least through a portion of our bodies, in order for us to feel it that I have chosen the term "electro-kinetic" in preference to the term "electrical sensation".

Our knowledge of electricity is quite meagre at present in spite of the many marvels which have been accomplished by means of electricity. Personally I am inclined to believe that all sensations are but different types of electrically activities taking place in certain portions of our bodies. The view that sensations have a certain physio-chemical, or bio-chemical substratum is a quite commonly accepted hypothesis. Some things have already been written about certain phases of the electrical theory of sensation. An extensive

investigation of this theory of sensation may some day prove of value to the scientific world. Such an investigation of sensation may some day reveal certain facts about sensations which have been hitherto altogether overlooked.

THE KINESTHETIC MEMORY

There is an almost inexhaustible amount of literature on the subject of kinesthetic memory. Entire books have been written about certain phases of this subject. For example, a number of books have been written on the subject of handwriting; speech; muscular control in music, drawing, in the various arts, industries and the like. A great portion of the things we do in every day life involves some form of kinesthetic memory. Among the many things that may be mentioned are: walking, running, swimming, dancing, playing musical instruments, writing (with pen, pencil, typewriter, etc) playing athletic games (such as foot-ball, base-ball, tennis, billiards, etc.), drawing, painting, sewing, embroidering, all manual activities and the like.

That the kinesthetic memory is of great importance to every individual, no one can deny.

Theodule Ribot, a prominent authority on memory, says with reference to the kinesthetic memory:

"These secondary automatic actions, or acquired movements, are the very basis of our every-day existence. Thus locomotion....must be acquired by man, particularly the power of co-ordination which maintains the equilibrium of the body in any position....In a general way, it may be said that the limbs and other sensorial organs of the adult act with facility only because of the sum of acquired and co-ordinate movements which forms for each part of the body its special memory, the accumulated capital upon which it lives, and through which it acts - just as the mind lives and acts in the medium of past experience. To the same category belong those groups of movements of a more artificial character which constitute the apprenticeship of the manual laborer, and are called into action in games of skill, bodily exercises, etc.....Without seeking extraordinary illustrations, we find in every day life series of organic, complex and carefully determined acts, with fixed limits, whose terms, all differing from one another, follow in constant order; for example, the ascent and descent of a staircase with which we are familiar. Our psychological memory is ignorant of the number of steps; but the organic memory [rather than the kinesthetic memory] knows this, as well as the number of flights, the arrangement of the landings, and other details; it is never deceived.....The secondary automatic movements employed in swimming or dancing require certain modifications of the muscles and articulations already used in locomotion, already registered in certain nervous elements: they find, in fact, a memory already organized, many of whose elements are turned to their own use, causing them to enter into new combinations and concur in the formation of another memory." 20

When we consider the fact that all of our physical activities physical activities with the exception of a few simple one which are characteristic of the

20. RIBOT, THEODULE. Diseases of Memory. Pages 27-28.

earliest days of babyhood involve some form of kinesthetic memory, we cannot fail to realize the importance of this form of memory.

An indefinite number of subdivisions might be made of the kinesthetic memory. The following are some of the outstanding ones, but this is only a relatively small number of them: (1) Memory of the kinesthetic impressions of speech and song, which is called "voco-kinesthetic memory," or "voco-motor memory" by some authorities; (2) Memory of the kinesthetic impressions of handwriting, which we might call "grapho-kinesthetic memory"; (3) Memory of the kinesthetic impressions of drawing; (4) Memory of general kinesthetic impressions such as those involved in the various forms of locomotion which the normal individual is able to indulge in, such as walking, swimming, running, playing athletic games, doing slight of hand tricks, and the like.

There is an intimate correlation between the kinesthetic memory and the various senses. A few examples of cases in which this correlation is specially noticeable are: (1) In the case of writing and drawing, in which the sense of sight

is correlated with the kinesthetic memory. Milton went blind after he had learned to write. Yet he had to get his daughters and friends to do his writing for him. He had to do this, not because he had forgotten how to write, but because his hands had lost the guiding influence of his sight. (2) In the case of music, in which the sense of hearing is co-ordinated with the kinesthetic memory. Beethoven, a pianist who had become world famous, after losing his hearing could scarcely play anything correctly. It was not that he had forgotten to play, that caused his playing to suffer so, but it was because his hands had lost the guiding influence of his hearing.

Even in the cases mentioned above, certain individuals have been trained in such a manner as to enable them to do without the guidance and direction of certain senses which are considered essential in the performance of certain acts involving the kinesthetic memory. Certain blind people, for example, have been taught to earn a living by painting toys. In a certain school there is a band of music in which the performers are all deaf-mutes. In this case, the individual has been so trained as to be able to do without the guidance and the direction of a form of sensation which is generally regarded as being essential

in the performance of the activity in which he is engaged.

MEMORY OF STATIC IMPRESSIONS

The term "static" applies to position. The static sense is the sense that tells us the position of our bodies. Related to the static sense is a type of memory which we may call the memory of static impressions.

The static sense is one of the most delicate senses of man. It is by means of the static sense that we are enabled to keep our bodies in a perfect state of equilibrium. The static sense enables us to walk on two legs without falling over. It also enables us to bend our bodies into all kinds of positions without losing our equilibrium.

Although the static sense is quite an important one, the type of memory that is related to it is perhaps of no great importance. It is only on rare occasions that we recall static images to mind.

It is mainly from the semicircular canals in the ear that we get our ideas concerning the position of our bodies. These semi-circular canals are three in number and are arranged in three planes which are almost perpendicular to one another.

Many of our ideas concerning the position of our bodies were obtained through certain forms of sensation other than the static ones. For example,

the sense of sight may be used to verify the position of our bodies. P. G. Stiles says, however:

"One need not look at the extremities to see how they are disposed; there is sensory evidence of one's position at all times." 21

The kinesthetic sense may be used to verify the position of our bodies. We might be able to tell whether we are standing or lying down by noticing the muscles which are strained and those which are relaxed.

The sense of touch may be used to verify the position of our bodies. When we are standing up the pressure is largely on our feet. When we are lying down, the pressure is distributed along one side of our bodies.

The organic sense may also be used to verify the position of our bodies in some cases. For example, we can tell whether we are in a "heels-over-head" position or whether we are in an upright position by the amount of blood pressure in the head, since our blood rushes to our head when we are in a heels-over-head position.

Though we may get some idea of bodily position from these sources they do not tell us

21. STILES, P. G. Human Physiology. Page 145.

whether our bodies are in a state of equilibrium or not although they do inform us about certain things which might be taken to imply that our bodies are or are not in a state of equilibrium. There are certain ideas of position which come to our minds very largely through this static sense.

MEMORY OF INTERNAL SENSATIONS

By means of the various forms of internal sensations the individual is informed about the condition, the needs, the wants, the functions, etc., of the various organs that compose his body. The following list is about as complete a list of the most important types of organic or internal sensations as I have been able to compile up until the present time: hunger, thirst, asphyxia, nausea, debility or weakness, strength or vigor, fatigue, sleepiness, drowsiness, sexual excitation, coenaesthesia (which is also spelled "caenaesthesia" and "cenaesthesia"). I have no reason to believe that this is a complete list and I hope to increase it through my research in the future.

The term "coenaesthesia" is a term which modern psychologists apply to a feeling of general physical well-being or its opposite. It is derived from two Greek words which combined mean "common perception".

Modern psychologists use this term to designate a feeling of general physical well-being or comfort or a feeling of general discomfort.

David Kay speaks of the coenaesthesia as follows:

"The undefined consciousness, the product of all vital processes, constituting bodily perception, and, which is expressed in one word - the caenaesthesia. Our conception of this organic consciousness is so vague that it is difficult to speak of it in precise terms. It is a bodily condition which perpetually renewed, is no more recognized than a habit....It passes through instantaneous or rapid modifications that produce radical changes in personality." 21

MEMORY OF ALGESIC IMPRESSIONS

The word "algesic" is derived directly from the Greek word ἀλγος which translated means: "sense of pain". The memory of algesic impressions is, then, the memory of pain sensations.

The memory of algesic impressions played at one time quite a respectable role in the schooling of every student. In some places today, it still plays a very important role in the education of the child. One of the great contributions of Rousseau and Pestalozzi to the science of education was the idea that inhumane punishments are not an essential feature of education. In the early history of modern education the fighting teachers were considered the best. If a teacher could not whip anybody in his classes he was considered as

being unfit for the vocation of teaching. It is interesting to note that in pictures of ancient school rooms, the teacher was almost invariably represented with a bundle of switches in his hand. In a picture of Pestalozzi's school room we observe for the first time the absence of the rod in the hand of the teacher.

Ellwood P. Cubberley says with reference to school discipline up until about 1750:

"The discipline everywhere was severe. 'A boy has a back; when you hit it he understands', was a favorite pedagogical maxim of the time. Whipping-posts were sometimes set up in the schoolroom, and practically all pictures of schoolmasters of the time show a bundle of switches near at hand. Boys in the Latin grammar school were flogged for petty offenses. The ability to impose order on a poorly taught and, in consequence, an unruly school was always an important requisite of the schoolmaster. A Swabian schoolmaster, Hauberle by name, with characteristic Teutonic attention to details, has left on record that, in the course of his fifty-one years and seven months as a teacher he had, by a moderate computation, given 911,527 blows with a cane, 124,010 blows with a rod, 20,989 blows and raps with a ruler, 136,715 blows with the hand, 10,235 blows over the mouth, 7,905 boxes on the ear, 1,115,800 raps on the head, and 22,763 notabenes with the Bible, Catechism, singing book, and grammar. He had 777 times made boys kneel on peas, 613 times on a triangular piece of wood, had made 3001 wear the jackass, and 1707 hold the rod up, not to mention various more unusual punishments he had contrived on the spur of the occasion. Of the blows with the cane, 800,000 were for Latin words; of the rod 76,000 were for texts from the Bible or verses from the singing book. He also had about 3,000 expressions to scold with, two thirds of which were native to the German tongue and the remainder his invention." 22

Many similar quotations might be given to show the importance that was attached to the algesic memory in Medieval education, but for lack of space I shall not attempt to do this.

Even today a teacher is occasionally admonished by a loving parent of the old school as follows: "If my son dont 'larn' jist beat the 'larning' in him." Many parents today also swear by the old maxim: "Spare the rod and spoil the child."

Modern authorities recognize the fact that a certain amount of punishment, properly administered, may be very valuable in dealing with young people; but the tendency among modern teachers is to refrain from any form of inhumane punishments as might permanently scar or injure the body of the student. The number of children who are branded for life with the scars inflicted upon them by an angry teacher is smaller today than ever before. The algesic memory is largely losing its place of importance in the modern school, now that better and more interesting methods of teaching are making punishments less and less necessary. It is really remarkable how much corporal punishment can be done away with by a wise and well-prepared teacher.

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THE REPRESENTATIVE MEMORY

OR

THE MEMORY OF SYMBOLICAL IMPRESSIONS

There are many types of symbols which are in almost constant use by the average person. I shall discuss the memory of three types of symbols, namely: words, numbers, and special symbols. Modern authorities speak quite frequently of verbal memory and numerical memory and occasionally of the memory of special symbols.

THE VERBAL MEMORY

The verbal memory consists of the memory of words. Words are arbitrary signs for things, experiences, qualities, actions, and the like. We might say that words are the cloaks of ideas. It is quite possible to get the cloak without getting the idea that supposedly is in it. We might divide the verbal memory into two general groups, according to whether or not the words convey their real meaning to the mind.

I know of no words which have been arbitrarily adopted to designate these two types of memory, so in the absence of this knowledge I have adopted for my own use the two words as follows: "noetic" and "anoetic".

The word "noetic" is derived from a Greek word which means "with understanding". The word anoetic is derived from the same Greek word with the alpha privative prefix which makes it mean "without understanding". Noetic verbal memory is then verbal memory in which the words are properly understood and anoetic verbal memory is that type of verbal memory in which the words are not properly understood or convey no real and accurate meaning to the mind.

The verbal memory may be of the auditory word, or the sounds of words; it may be of the written word, or the looks of words; it may be of the spoken or the written word in which the individual himself does the writing or speaking; and it may be of the feel of words as in the case of the blind. We might speak then of an auditory-verbal memory in which the individual remembers the sounds of words; the visual verbal memory in which the individual remembers the looks of words; the kinesthetic-verbal memory in which the individual remembers the muscular activities involved in the writing, speaking or singing of words; and a tactile-verbal memory in which the individual remembers the touch or feeling of words, as in the case of the blind.

THE IMPORTANCE OF THE VERBAL MEMORY

The verbal memory is losing its importance in our schools. There was a time when education meant verbal education, but the day in which verbal learning reigned supreme is fortunately coming to a close.

Two figures stand out in the history of education for bringing about the downfall of verbalism in education. These are Rousseau and Pestalozzi. A number of philosophers who lived prior to the time of these two men, had realized the error of making out of education an affair of learning "words, words, words" and had advocated changes to a more practical type of education, but they attracted little attention and consequently exerted little influence upon the educational systems of their times.

Rousseau attracted a great deal of attention to this question of verbal learning when his book Emile left the press. This book was denounced and condemned in the most vehement terms. The executioner was ordered to burn all the copies he could find. It was in this way that Rousseau's Emile made its debut into the world, but it accomplished what other books

had failed to do. It had attracted the attention of the public to some of the outstanding evils of the educational practices of the time. To be sure, Rousseau's Emile had engendered the antagonism of the authorities of his time, but antagonism is oftentimes a better form of advertisement than universal recognition and without any doubt it is a much better form of advertisement than mere indifference. Although other progressive educational writings had met with indifference leaving no impress on the school systems of their times, Rousseau's Emile met with the most vehement sort of antagonism, but, by bringing the attention of the public to bear upon the subject with which it dealt, it came to have a tremendous influence on education.

The following quotations from Rousseau's Emile show Rousseau's disapproval to parrot-learning or mere word-learning:

"Do not give your pupil any sort of lesson verbally: he ought to receive none except from experience." 23

"There is no science in words....Of what use is it to write on their minds [on the minds of the students] a catalogue of signs that represent nothing to them? In learning the things represented

23. ROUSSEAU, JEAN JACQUES. Emile. Translated by Eleanor Worthington. Page 56.

would they not also learn the signs? Why do you give them the useless trouble of learning them twice? Besides, you create dangerous prejudices by making them suppose that science consists of words meaningless to them." 24

"Let the child take nothing for granted because some one says it is so." 25

"He [the ideal pupil] is not to be ruled by opinion, he must receive nothing upon authority." 26

"Pedagogues, who make such an imposing display of what they teach, are paid to talk in another strain than mine....For after all, what do they teach their pupils? Words, words, words." 27

Jules Steeg, in commenting upon Rousseau's views regarding mere verbal learning said of him:

"One cannot but admire this aversion of Rousseau's for parrot-learning, word-worship, and exclusive cultivation of the memory." 28

Rousseau found a staunch disciple in Pestalozzi. Pestalozzi was as strongly opposed to that type of education which consists of mere words as was Rousseau. The following quotations by Pestalozzi clearly show his aversion to educational verbalism:

"Intellectual training must be based upon an alphabet of sensory experience." 29

24. Ibid. Pages 83-84.

25. Ibid. Page 142.

26. Ibid. Page 155.

27. Ibid. Page 80.

28. Ibid. Page 85.

29. PESTALOZZI, JOHANN HEINRICH. Pestalozzi's Educational Writings. Page 141.

"I rejected the verbalism of the schools of our time, and, as Nature does to the savage, I placed before the eyes of my children one picture at a time, and then sought for a word to describe it. This simplicity of presentation required from them no judgment and no inference, since it was not offered as a dogma, or as in any way dealing with truth and error, but only as material for observation and as a basis for future judgment and inference." 30

"Whenever we put empty words into a child's mind, and impress them upon his memory, as if they were real knowledge, or genuine means of acquiring it, even when neither his feeling nor his experience of things are in a position to furnish clues to their meaning, we are obviously deviating from the principle 'Life teaches'. We are sowing the seeds of an artificial use of the Divine gift of speech. We are sowing seeds of callous insincerity and shallowness to which is due so much of the blundering arrogance which is characteristic of our time." 31

Pestalozzi maintained that verbal learning of the proper kind has a legitimate place in education. He insisted however that words cannot take the place of experiences. Words are the arbitrary signs for conscious experiences. They mean something to a person who has had the experiences for which they stand, but they can mean nothing to the person who has not had those experiences. Pestalozzi maintained that experience should come first, then words.

30. Ibid. Page 99.

31. Ibid. Page 293.

Pestalozzi insisted that object teaching should precede and accompany verbal teaching. The way to build a vocabulary is for us to familiarize ourselves with many objects and many types of experience and then to learn the words which represents these objects and these types of experiences.

The following quotations from the writings of Pestalozzi show his views regarding the relation of object teaching to verbal learning:

"Accordingly, the faculty of speech in every child depends upon the extent and accuracy of his sensory acquaintance with things, and if these are wanting, the teacher must first fill up the gaps." 32

"The outward manifestations of speech, the sounds themselves, unless intimately associated with the experiences which give them significance, are empty and idle. Only by the consciousness of this relation to experience do they become true human sounds." 33

"Knowledge begins in experience and not in words....Careful attention to sensory experience is the foundation of the whole matter." 34

"The more extensive and definite our sensory acquaintance with objects and their qualities, the more extensive and definite are the natural foundations of the faculty of speech." 35

32. Ibid. Page 293.

33. Ibid. Page 293.

34. Ibid. Page 98.

35. Ibid. Page 293.

"Sensory impressions should, however, be distinctly apprehended before the child learns the arbitrary catch-words which express them." 36

"We ought not to reason with very young children, but should pursue the following course for the development of their intellect: (1) Steadily increase the range of their practical experience with things. (2) Do all that is possible to clear this experience from confusion and indefiniteness. (3) Supply them with words sufficient for dealing with these experiences, going, indeed, a little farther in preparation for the future." 37

Pestalozzi believed that one of the prime duties of a teacher was that of building up the vocabulary of his pupils. As the quotations above indicate, he believed in building up the vocabulary of the pupils by means of object teaching. Pestalozzi attached a great deal of importance to the building up of the vocabulary of the child. He said:

"An extensive vocabulary is an inestimable advantage to children. Familiarity with the name enables them to fix the object whenever it enters their consciousness, and a logically correct series of names develops and maintains in them a consciousness of the vital relation of things to each other." 38

Personally I am of the opinion that we can greatly improve our modern educational scheme by giving greater attention to the etymology of words.

36. Ibid. Page 292.

37. Ibid. Page 93.

38. Ibid. Page 93.

Words mean so much more to us when we know their etymological history. I count among the most valuable hours of my education, those hours I spent in the libraries of the schools I have attended perusing the dictionaries which trace out the etymological significance and history of words. My observation is that few people study the dictionary as much as they should. Dictionary-study can do much to make words meaningful but even the dictionary cannot take the place of a certain amount of sensory experience with the objects for which the words we are studying stand. Some teachers take too much for granted and think that their students are perfectly familiar with the meaning of the words they use. Sometimes they are, but oftentimes they are not. This has done a great deal to cause verbal learning to fall into disrepute. Verbal learning fails to be effective when the student does not understand the words which are being used by the teacher.

The educational systems of the middle ages and many oriental educational systems have been criticized for giving too much attention to the cultivation of the memory of the students. The criticism which I make of these educational

systems is not that they attached too much importance to the cultivation of the memory, nor even that they attached too much importance to verbal learning; but that the teachers did not attempt to make significant to the student those words which they required the student to learn. The trouble with these educational systems was that they stuffed the mind with words and, not with ideas. Teachers in these schools took it for granted that if the student got the word he got the idea, but nothing is further from the truth. Southey uses a phrase which I think describes what was taught in these schools better than any other phrase which I ever heard. This phrase is "the arts Babblative and Scriblative".³⁹

In these schools too much attention was given to the teaching of the students to talk and to write and too little attention was given to the teaching of the students to live, to enjoy life and to make a serviceable investment of their lives.

In this discussion of verbal memory I have aimed not at condemning it nor at praising it, but I have aimed at getting the proper perspective towards verbal learning and to arrive at a just estimate of its true value. There is much that

can be said against verbal memory and much that can be said in favor of it; but we must admit that the thinker who is truly scientific in his methods cannot afford to take the position of either the scoffer or the zealot in relation to this topic. Verbal learning of the proper kind has its place in education, and it is the business of the educator to find that place and to keep it in its place. We may speak derogatively of words, words, words, but they have their place in education. We might agree with the many poets who have claimed the honor of saying that "words are but "wind", but even though at times words are no more than so much wind, at other times they are the only legitimate means for the commerce of ideas. We must not forget that the use of words makes it possible for us to make the wisdom of Solomon or the eloquence of Demosthenes our own. By means of words we can live, as it were, in times remotely past. Words make it possible for us to get some idea of "the grandeur that was Greece and the glory that was Rome". By means of words we can travel, as it were, all over the world without leaving our homes. Words can make the experiences of others our own.

Words, when understood, are the symbols for ideas. When they are understood they become marvellous vehicles for thought, but when they are not understood they are altogether worthless.

John Dewey said:

"They [words] are symbols only by virtue of what they represent, i. e. meanings. They stand for these meanings to any individual only when he has had experience of some situation to which these meanings are actually relevant. Words can detach and preserve a meaning only when the meaning has been first involved in our own direct intercourse with things. To attempt to give a meaning through a word alone without any dealings with a thing is to deprive the word of intelligible signification; against this attempt, a tendency only too prevalent in education, reformers have protested. Moreover, there is a tendency to assume that whenever there is a definite word or form of speech there is also a definite idea; while, as a matter of fact, adults and children alike are capable of using even precise verbal formulae with only the vaguest and most confused sense of what they mean. Genuine ignorance is more profitable because likely to be accompanied by humility, curiosity, and open-mindedness; while ability to repeat catch-phrases, cant terms, familiar propositions, gives the conceit of learning and coats the mind with a varnish waterproof to new ideas." 40

Verbal memory is certainly a very valuable form of memory when the words remembered are properly understood. When the individual does not understand the words he remembers he is worse off than he would be if he had never memorized them.

40. DEWEY, JOHN. How We Think. Pages 176-177.

NUMERICAL MEMORY

The second type of symbolical memory which I shall attempt to discuss in this work is numerical memory. We might say that we have a memory for numbers as well as for words. Like words, numbers are the symbols which stand for certain ideas. Unless the idea which the number represents is associated with the number itself it can be of little value in the commerce of ideas.

Modern statistics have carried the number idea hopelessly beyond the grasp of our minds. Personally, big numbers such as those involving millions mean very little to me. I have no accurate means of conceiving a million. I am not criticizing modern statistics, but only too frequently they involve numbers which are hopelessly beyond the ken of the human mind. Only too often, the figures used in modern statistics involve numbers which are hopelessly beyond the conception of the average person.

As in the case of verbal memory, we might divide numerical memory into noetic-numerical memory, and anoetic-numerical memory. Noetic numerical memory applies to the type of numerical memory in which the individual actually

has some conception of the abstract idea which the number is supposed to represent. Anoetic-numerical memory applies to the type of numerical memory in which the individual has no conception of the idea which the number is supposed to represent. In the case of anoetic-numerical memory the individual calls to mind the number only and not the number concept; whereas in the case of noetic-numerical memory the individual calls to mind both the number and the number concept.

The teacher of beginners in arithmetic has a considerable difficulty in getting the young child to get the number concepts which are represented by the various numerical figures or numbers. Pestalozzi employed a number of valuable methods for getting the child to get this number concept. One of the most noteworthy of these was his number chart. With regards to the Pestalozzian number chart Cubberley said:

"The Pestalozzian number chart....was for long a prominent feature in all Pestalozzian schools, the purpose being to keep before the pupil's perception the number combinations from one to ten. Concrete number ideas, and not words about numbers, were what Pestalozzi was trying to teach." 41

41. CUBBERLEY, ELLWOOD P. Public Education in the United States. Pages 302-303.

The teacher of young pupils who are beginning the study of arithmetic must spend a considerable amount of time in getting the children to get the various number concepts which are represented by each number. This step in the study of mathematics is one of considerable importance and must receive the most careful attention of the teacher who is responsible for this phase of the mathematical education of the child.

Numerical memory is involved in all forms of mathematical work. Numerical memory is of great importance to almost every individual. Certain forms of it are involved in the simplest forms of mathematical computations. We would be unable to figure the costs of our purchases, to make change and to do anything involving mathematical computation without the use of some form of numerical memory.

THE MEMORY OF SPECIAL SYMBOLS

There are many types of symbols that enter into the life of the average person of today. Practically every branch of modern science has a special number of symbols to represent the various ideas and processes with which it deals. For example: Chemistry has a special symbol for each chemical element. The most complicated chemical compositions may be represented some simple formula composed of the symbols used in chemistry. Arithmetic has its plus and minus marks, its symbols to designate division, square root, cube root, multiplication, and the like. The science of education has its symbols such as the I. Q., the A. Q., the E. A., the C. A., etc. Only a person who is conversant with the terminology and symbology of modern educational science has the slightest ~~ideas~~ to what is meant by these symbols. Music has, what is perhaps the most elaborate set of symbols belonging to any art or science. It is simply astounding the number of ideas pertaining to the performance of music that may be expressed by means of notes, rests, measures, sharps, flats, key-signatures, etc. ~~Many~~ musicians in memorizing a musical composition actually memorize these symbols as well as the ideas which they represent.

In practically every vocation of life some form of the memory of special symbols is involved to a considerable extent. Mental processes may be greatly abbreviated by the use of the special symbols which stand for rather complicated ideas. The use of symbols abbreviate the thinking process to such an extent that practically all of our thinking is done in terms of symbols. It is only natural for us to do our thinking in terms of symbols since we give expression to all of our thoughts by means of some form of symbols.

The memory of symbols is a type of memory which is of greatest importance in every walk of life. When the symbols stand for something in the mind of the person who has memorized them they are of great value since they greatly abbreviate the thinking process and furnish us with the means of expressing our ideas. The symbolical memory is, then, one of great importance.

MEMORY OF IMPRESSIONS RECEIVED
THROUGH AN ACTIVE MENTAL FUNCTION

This type of memory involves what is perhaps a higher type of mental operation than those types involved in the other forms of memory. By an active mental function is meant a mental function which is of a predominantly active nature. Those mental functions as thinking, willing, striving, reasoning, imagining, and the like would come under this classification. When these operations are taking place the mind is active to a predominant degree. The type of memory that is related to these mental operations makes it possible for the composer, the creative artist, the poet and any individual gifted with creative imagination to keep within mental reach those things that have been created by his mind. This type of memory has made it possible for civilization to reach the stage of development that it has reached today. If the human mind could not retain and recall thoughts, reasons and the like as well as it does sensations, civilization would have been an impossibility.

IMAGINATIONAL MEMORY

Imagination is based primarily on sensory perception. We know far less today about imagination than we know about sensation, but we have every reason to believe that imagination is based primarily on sensory perception. In other words, we think in terms of sense images, or to be more accurate I would have to say that we think in terms of images of sensory perceptions, for our minds do not always see exactly what our eyes see.

Before proceeding into the discussion of the memory of imaginal impressions it might be wise for us to consider the differences, if any, between thinking and imagination. We might say that these two terms are practically synonymous. They are used today almost interchangeably. Perhaps the greatest distinction which might be made between the two is that most people are inclined to think of imagination as being carried on in terms of actual sensory images, whereas the thinking process is usually done in terms of words, or in other words, in terms of representative signs. We would say that we can imagine what we would look like in a foreign costume, but we would say that we can think of the things

people would say about the costume we are wearing. In some cases, however, we conceive of imagination as being in terms of words. For example, we speak of the creative imagination of the poet or of the writer. This type of imagination is oftentimes of actual sensory perceptions, but more commonly the imagination of the poet, or of the dramatist consists of new combinations of words rather than new sensory perceptions. We can say, then, that no sharp distinction between thinking and imagination has been universally recognized. The distinctions which we might make between the two do not hold true in every case. If any real distinction has been made between the meaning of these two terms they have not become crystalized in the mind of the average person. Thinking, seems to be the most flexible of these two terms since it is used synonymously with reasoning as well as with imagination. In fact, people commonly think of thinking as being the equivalent of reasoning.

We can truthfully say that very few people are gifted with creative imagination to any marked degree. Creative imagination is usually considered to be a high type of mental activity.

As a general rule, creative imagination is of a highly specialized nature. Among the classes of individuals who are gifted with this high type of mental activity might be mentioned the poet, the inventor, the musical composer, the creative artist who is gifted in any of the arts such as in music, sculpture, painting, architecture and the like.

By means of the imaginal memory these creative artists are enabled to retain within mental reach the things which their minds have created. The musical composer oftentimes meets with a tremendous difficulty and that is that he is able to compose beautiful musical creations which escape his mind before he is able to record their symbolical representation on paper. Many composers, though gifted with marvellous creative abilities fail to become distinguished composers for the simple reason that their compositions vanish from their minds before they have a chance to record them on paper.

Many individuals who are not gifted with the higher form of creative imagination are gifted with a lower type of the same. The higher form of imagination is carried on in terms of

accurate perceptions of things, but the lower type of imagination is carried on in terms of inaccurate perceptions of things or no perceptions at all. We might call this lower type of imagination by the name of "fantastic imagination". The individual merely fancies things, rather than construct them out of elements which have been accurately perceived in the past. The superstitions of the world present a most pitiful proof of what an over-worked imagination can do. When we lack any accurate knowledge about something we immediately begin to imagine or fancy all kinds of fantastic things about it. There is no harm in fancying things so long as we make it clear to others that those things which we fancy are but the fantastical creations of our minds which may or may not have some foundation in reality. To mention a few of the things which have gained general acceptance although there seems to be no sensory evidence for them are: the mystic ideas of the orient as pertaining to the existence of a spirit world which controls the physical world in which we live, dragons, demons, evil-spirits, witches, and the like. The scientist argues that there is no

evidence for the existence of these things, but the serenity of the oriental mind is not disturbed in the least since the oriental believer in these things can reply with an argument which is almost as irrefutable as the first one - there is no evidence against their existence. Although the scientific thinker rejects the existence of these things almost invariably, the oriental mind accepts them with the utmost sincerity.

The memory of phantastical images is usually based on inaccurate perceptions of things or on not perception at all, whereas the memory of true imaginal images is based actual perceptions of conscious physical experiences. The fantastic conceptions of the oriental mind usually show some resemblance to earthly things, yet the resemblance is not an accurate one. I would attribute the origin of superstitions, fancies, notions, and the like to inaccurate perception of realities, rather than to the idle working of man's mind. I am inclined to believe that superstitions, fancies, notions, and the like are as much the result of poor observation as they are of poor thinking.

If imagination is based primarily on sensation we might divide imagination into many types of imagination according to the type of sensory images that is involved in the various types of imagination. We might then speak of the memory of visual imaginative images, or the memory of auditory imaginative images and the like.

We might say that the artist who creates mentally a scene which he portrays on canvas employs visual-imaginative images. The musician who composes a musical composition employs auditory-imaginative images. The poet who composes beautiful combinations of words, or word-compositions, employs verbal imaginative images.

THE RATIONAL MEMORY

Reasoning might be defined as mental problem-solving. Reasoning is based primarily on memory. We might define reasoning as a mental trial-and-error activity employed in the solution of a problem. Reasoning is motivated primarily by the consciousness of a problem which demands solution. When we reason we carry on in our minds a process of mental trial-and-error. We face a problem that demands solution. We think of a number of facts that may enable us to solve our problem. In a mental way we test each of these facts out by means of a mental trial-and-error process. Mental trial-and-error is based primarily upon a physical sort of trial and error in which the individual comes into actual contact with the elements giving rise to the problem. For example: A man finds himself locked out of his room. He immediately becomes conscious of a problem that demands solution. He considers several possible solutions. He thinks of the bunch of keys that is in his pocket. He remembers that the key to his room is not on that bunch of keys. He does not have to remove the bunch of keys from his pocket and search for the right key on the bunch if he knows that it is not there.

So he eliminates his bunch of keys from the list of possible solutions to his problem. It might then occur to him that there might be some other key on the bunch that might open the door. If he has not tried the keys before he will remove the keys from his pocket and try them one by one. But if he has tried the keys before he grows through the trial-and-error process mentally rather than physically. He remembers that he had tried the keys before and they had failed to open the door. So without trying the keys in the door he eliminates them from the list of possible solutions to his problem. He then thinks of the ladder in the wood-shed or in the garage. If he has tried the ladder before he will know exactly whether or not it will serve as the solution to his problem. If he has not tried the ladder before he will go and place it under his window and actually try it out. But if he has tried the ladder before and he found it to be too short to enable him to reach the window to his room, he immediately eliminates the ladder from the list of possible solutions to his problem. To bring our story to an end, I might say that just then his room-mate comes along with the right key

in his hand. The solution of the problem is apparent.

Reasoning differs from physical trial-and-error in that in the former the individual goes through mentally what he would go through physically in the latter. In the reasoning process the individual does not employ things to solve his problem. Rather he employs certain facts or ideas about things. Any fact or idea, when considered as a possible solution for a problem, is a reason.

It is by means of sensations primarily that our minds are made conscious of facts. We can say then that without sensation there can be no reasoning. It is by means of memory that our minds are able to retain and recall facts and ideas, so without memory there can be no reasoning. If we cannot call to mind certain experiences which we have had with things in the past in order to consider these things as offering the solution to our problem we cannot reason, or in other words, go through a mental trial-and-error of these things as being the possible solution for our problem. When our back ground of experiences fails to offer us any knowledge as to the usefulness of a certain type of procedure in the solution of our problem

we must actually go through the procedure physically in order to test out its utility or futility in the solution of our problem.

Memory has a great deal to do with our abilities to reason. The ability to reason is the outcome of the memory of our previous experiences, or of the experiences of others which have been presented to us in a conscious way, applied to the solution of our problems. Psychologists belonging to the old school of faculty-psychology were of the opinion that if the individual showed abilities to reason about some things he would show equal ability in reasoning about other things or about other problems. This would be quite true in case the individual had had equal experience with all the things about which he might reason, but this is rarely the case. If the individual displays marvellous rational abilities in the religious world it is largely because he has had a welath of religious experiences. We cannot take this fact to indicate that the same individual could distinguish himself for his rational abilities in solving mathematical problems to the extent that he distinguishes himself in solving religious problems.

Some authorities attach a great deal of importance to the rational memory, or the memory for reasons. That our rational capacities depend to a very great extent upon rational memory no careful investigator of the subject can deny. Rational memory is involved in all of our rational activities. Rational activities would be impossible without rational memory. Much of our knowledge consists of the memory of reasons. In this age of intense rationalism the memory of reasons is more important than ever before. That little word - why - is used more today than ever before. In every walk of life people are being asked the "why's and wherefore's of things". The Latin teacher is being asked why Latin should be taught in our schools, the teacher of mathematics is being asked why mathematics should be taught in our schools, the school authorities are being asked why music and art is not taught in our schools, etc. Formerly all of these things were taken pretty much for granted. Never before in the history of the world have such rigid demands been made on the rational memory of every individual. Never before in the history of the world has the rational memory been of so tremendously important as it is today.

VOLITIONAL MEMORY

The term "volitional" means "pertaining to the will". We can remember that we wanted something or that we wanted to do something, so we can say that we have a volitional memory. Great achievements are made possible by the memory of the will to accomplish certain things. We could never accomplish anything of great and lasting value if we were unable to remember our will to accomplish that thing.

As a general rule we can say that our will is ruled by our needs. Great will-power is often the outcome of great needs. Some authorities are of the opinion that man has no will, but that he does what he does not through any choice on his part but in response to the external conditions under which he lives. To a certain extent this may be true. I would be slow to say that man has absolute freedom of choice in all that he does, but I would be still slower to say that man has absolutely no choice in whatever he does. I am of the opinion that the element of will, or choice, enters into everything we do. Others believe differently. They have perhaps as much right to their beliefs as I have to mine.

To a certain extent our will is ruled by our instinct for self-preservation and our love for those things which bring us pleasure. We want some things because our lives actually depend upon them. Unless our nervous system has become disorganized in some way we usually desire to have those things which are essential to the maintenance of a healthful condition of our bodies. Hunger and thirst are some examples of the various organic needs that give rise to wants. We become hungry and thirsty because food and water are essential to the preservation of a healthful condition of our bodies. The all-wise Creator of Life saw that, unless the individual's will could be controlled to a certain extent by the organic needs of his body he would not give his body the attention it deserves. For this reason we are able to experience certain organic sensations that control our wills to a certain extent. This type of volition is altogether natural.

There is a type of volition which we can scarcely describe as natural. The gormand who eats far more than is good for him, the drunkard who wills to drink far more than is good for him is not obeying his inborn instinct for self-preservation.

We cannot say that our wills are controlled altogether by our physical necessities. To a certain extent they are. It is my opinion that man has some freedom of choice in the things he does. This being true we can say that he has a volitional memory.

The memory of the will to accomplish some specific thing made it possible for Napoleon to accomplish some of the most marvellous military and diplomatic feats of all times. The memory of the will to accomplish something in the musical world made it possible for Franz Liszt to compose those marvellous musical creations - the Hungarian Rhapsodies. The memory of the will to accomplish something in the world of spatial arts made it possible for Michelangelo to paint those marvellous paintings which left his brush and to carve those marvellous statues that resulted from his sculptural activities.

The volitional memory is certainly one of great importance. The realization of our ambitions, which are the results of our wills, would be an impossibility were it not for the fact that we can remember our volitions as well as other mental activities.

THE CONATIVE MEMORY

The term "conation" applies to the activity of the mind which is commonly known as "striving" or "trying". A consciousness of striving results from the consciousness of willing something and the consciousness of the expenditure of effort applied to the realization of our wills. A little ragamuffin may remember how much he or she wanted a certain toy which was seen in the window of a certain store. This child has a volitional memory about that toy. But when he remembers how much he tried to earn and to save the number of pennies that would make possible the purchase of that toy he or she recalls a conative memory about that toy. If we can become conscious of the fact that we are striving for something, we can recall this consciousness to mind. In other words, we can say that we have a conative memory as well as a memory for other types of mental experiences.

The conative memory may not be of any great importance, but sometimes when we meet up with failure it consoles us to think that the failure was not due to our fault because we remember how much we tried to succeed, in spite of the many odds that may have presented themselves.

EMOTIONAL MEMORY

Modern psychologists agree that we know less about the emotions than we do about perhaps any other type of psychic phenomena. To discuss the emotions, means to the modern psychologists, to grope about in mental darkness. The emotions constitute one of the most potent means of controlling the conduct of the individual of which there is any definite knowledge. Emotion is the essential element of mob-psychology, it is one of the essential elements in patriotism, it is indeed one of the outstanding elements in any true religious experience. We know that emotions exist, we are moved by them, but the operation of the emotions in our lives is so elusive that we have little knowledge about them.

Emotion is one of those mental operations that are predominantly responsive in nature. An emotion, may be said to be a mental response to certain things made conscious to the mind. The memory of a mental response is quite different from the memory of a physical response. When we recall to mind the conscious representation of a physical response to certain stimulation we recall a composite group of sensations, such as

muscular sensations, touch sensations, visual sensations, and the like. When we recall a mental response we recall a composite group of imaginative, rational, volitional, or conative experiences. I would class the emotions under this class of mental activities - the mental responses. As a rule emotions are mental responses to certain stimulations. My experience leads me to believe that we cannot assume an emotion at will. There must be some form of stimulation that arouses the emotions before we have an emotional experience. I therefore consider an emotion as being a responsive mental activity.

Emotions usually result from the experience or the anticipation of some experience which will either interfere with or contribute to our physical and mental well-being, or they may result from imagining ourselves as being in the place of some other person who is experiencing, or was experiencing, some emotionally stirring experience.

We might speak of two types of emotions, namely (1) the personal emotions, and (2) the sympathetic or imaginative emotions.

We feel the emotion of fear in the presence of a ferocious wild animal either because he has done something to interfere with our physical well-being

or because we anticipate his doing something that will interfere with our physical well-being. We fear a ferocious wild animal because we anticipate his pouncing on us and injuring our bodies or even taking our lives from us. We feel fear when we walk in the dark over unfamiliar ground because we are in the constant anticipation of stepping off into a hole and breaking our bones and bruising our bodies, or even losing our lives.

When somebody says something unkind to us we feel anger because we feel that that person has done something to us which interferes with our mental well-being or happiness.

We may feel an emotion by imagining ourselves as being in the place of some other person experiencing an emotion-stirring experience. We might call this type of emotion a sympathetic emotion or an imaginative emotion. To experience an imaginative emotion means that the individual actually experiences the emotion, although he does not physically go through the emotion-stirring stimulation. The stimulation is made conscious to the individual through the imagination rather than through his senses, but the emotion is just as truly an emotion as it would be in the case

in which the individual goes through the emotion-stirring physical experience. In the case of imaginative or sympathetic emotions the individual goes through the emotion-stirring experiences in an imaginative way. Sympathy consists of imagining ourselves as being "in the other person's boots". Since the term "sympathy" involves imagination we might use either term in this case to designate this type of emotion.

The emotional memory makes it possible for an individual to remember the emotions he felt in the past. We can say that we have a memory for the emotions just as truly as we can say that we have a memory for any other type of mental experiences. We sometimes hear people say that they remember how happy they were when some great event happened in their lives, or how angry they were when somebody did something to hurt their feelings. These are just a few cases in which the emotional memory are made use of by the individual. The emotional memory is certainly an important one if it enables us in any way to retaste the emotional joys that were our in the past.

THE ASSOCIATIVE MEMORY

Association enables us to organize our knowledge into a form which is easy for us to use. It is by means of association that we keep order in our minds. When we make the proper use of association our minds become, as it were, marvellous files of knowledge. Unless our ideas are properly associated with each other they are of little value to us. It is by means of association that we group our ideas in homogeneous groups. Association makes it possible for us to keep our ideas so organized that instead of thinking in terms of unrelated ideas we think in terms of related ideas which present a homogeneous, logical and continuous chain of thought.

Associative mental activities are of tremendous importance in all thinking processes. We must remember that words are meaningless unless they are associated with what they represent. The individual may know a word and he may have had some experience with what the word represents, but the word will continue to be meaningless to him so long as that word and that experience are not definitely associated with each other. Words mean nothing to us unless they are definitely associated in our minds with what they represent. It is by means of association that all meaningful things

acquire the meaning that is theirs.

All learning does not consist of the association of ideas as some people believe. Learning involves so much association forming that it seems to consist almost altogether of that type of mental activity. We should not be misled by appearances, however. It would be absurd to think that we could form associations without having anything to associate. The chief value of association forming is to preserve order in the mind. To be sure, knowledge is almost altogether useless unless it is orderly arranged.

Association has a great deal to do with memory. Theodule Ribot once said:

"A rich and extensive memory is not a collection of impressions, but an accumulation of dynamical associations, very stable and very responsive to proper stimuli." 42

Associations are of no value to us unless we can remember them. The associative memory, or the memory of associations, makes it possible for us to remember and to recall associations. Association enables us to attain order in the mind, the associative memory enables us to preserve order in the mind. The associative memory is certainly a very important type of memory.

SUMMARY

In dealing with the topic of memory, modern authorities have found it convenient to divide memory into various types of memory. There is a type of memory related to each and every type of mental function. Memory is characteristic of all mental functions. This makes it possible for the normal individual to recall any type of conscious experiences to mind.

There is a type of memory related to each and every type of sensations. We might speak of a visual memory, or an auditory memory, or a kinesthetic memory and the like.

There is a type of memory related to each and every other type of mental functions. We might speak of imaginative memory, rational memory, volitional memory, conative memory, responsive memory, associative memory, etc.

Memory has an important relation to every type of mental activity. Memory is involved in all mental activities. Deficiencies in the memory capacities of the individual will result in deficiencies in the other capacities of his mind, and inversely deficiencies in any capacity of the mind will result in a deficiency in the memory-capacities of the mind.



PART IV

PTANCE BOND

MADE IN U.S.A.

THE THREE FORMAL STEPS OF MEMORY

Modern psychologists recognize three formal steps or phases of memory:

1. Memorizing.
2. Retention.
3. Recall.

A number of authorities mention a fourth phase of memory, adding recognition to the list above. For example Robert S. Woodworth said:

"The four problems may be named those of
 {1} Memorizing, or learning,
 {2} Retention
 {3} Recall
 {4} Recognition." ¹

I consider the process of recognition as being a form of recall and I therefore use the term recall as being a broad term that includes recognition. In discussing the step of recall I shall mention several of the most important types of recall.

Various terms have been used with reference to these three formal steps of memory.

For memorizing, the terms "impression", "registration", "learning", "Building up of a response mechanism", and other similar terms have been used.

1: WOODWORTH, ROBERT S. Psychology. Page 332.

For retention some authorities use such terms as "conservation", "remembering", and the like. Most authorities seem to prefer the term "retention" to all others. Of the terms in use today this one seems to be the best one by far.

For recall some authorities use such terms as "revival", "recollection", "recitation", and the like. The term "recall" is by far the best of the terms commonly used today to designate this phase of memory.

We have all heard the expression "the three R's of education". Some one has said that the three R's of education are 'Reading, 'Riting and 'Rithmetic. Some one else has said that the three R's of learning are rod, rule, and remembering. We might say that memory also has its three R's. We might speak of the three R's (or the three formal steps) of memory as being: registration, retention and recall.

MEMORIZING

OR

LEARNING

The first formal step of memory is learning or memorizing. A number of terms are used by various authorities to designate this first formal step of memory, such as: "impression", "learning", "memorizing", "registration", "recording", "connection-forming", "building up of a response mechanism" and the like.

FACTORS WHICH AFFECT LEARNING

There are many factors that affect learning. To the best of my knowledge no exhaustive tabulation has ever been made of all the factors that affect learning. I shall discuss four factors which I believe to be the most important:

- (1) the individual
- (2) the matter to be learned
- (3) the conditions under which the learning takes place
- (4) the method by which the learning takes place.

THE INDIVIDUAL

One of the most important factors which affect learning is the nature of the individual. Some individuals are just naturally quicker and more accurate learners than others. Modern psychologists have come to recognize the factor of individual differences in learning ability as being one of supreme importance. Our modern psychology books are full of discussions of individual differences. Entire books have been written on this subject. Books of pedagogy are full of discussions of the ways and means by which a teacher should suit the instruction to the particular individual which is being dealt with. For a long time individual differences have been recognized by various authorities, but at no time in the history of the world have such exhaustive investigations of individual differences been made as are being made today. Individual differences seem to be so patent, so apparent and so self-evident that even the most superficial observer could scarcely fail to observe them. In quite ancient times individual differences in learning abilities were recognized

by educators. For example, in the Jewish Talmud we find the following statements:

"Four dispositions are found among those who sit for instruction before the wise; they correspond respectively to a sponge, a funnel, a strainer, and a sieve; the sponge imbibes all, the funnel receives at one end and discharges at the other, the strainer suffers the wine to pass through but retains the dregs, and the sieve removes the bran but retains the fine flour." 2

"Four dispositions are found among the disciples, he who quickly comprehends and quickly forgets, such an one loses more than he gains; he who with difficulty comprehends but does not readily forget, gains more than he loses; he who comprehends quickly but does not easily forget, has a good portion; he who slowly comprehends and forgets quickly has an evil portion." 3

Although many ancient authorities recognized the existence of individual differences in mental ability, they lacked any form of objective standards by which these differences could be measured. The outstanding contribution of modern psychologists to the study of individual differences is the creation of objective standards for the measurement of differences in mental ability. Today we have intelligence tests, achievement tests for practically every school subject, and many other types of tests for the measurement of individual differences in

2. SPIERS, Rev. B. The School System of the Talmud.

Page 20.

3. Ibid. Page 21.

mental ability and education. These tests have been carefully standardized and any person who is competent in giving and scoring these tests can easily ascertain whether the individual tested is above or below normal in the items tested, and if he is above or below normal the person giving the tests can easily ascertain the extent to which the individual tested is above or below normal, as the case may be.

We might say that individual differences might be classed under two main types:

- (1) General or gross differences, and
- (2) Specific differences.

Some individuals seem to be just naturally better endowed in every respect than other individuals. Some individuals are highly endowed along some specific line but are very poorly endowed along other lines. Blind Tom, the pianist, startled the world by his pianistic genius. He is a notable example of an individual gifted with high specific intelligence, but with low general intelligence. Although he could perform remarkable feats on the piano, there was little else that he could do.

In contrast with Blind Tom, we might mention Ignace Jean Paderewski, the celebrated pianist of today, who is not only one of the outstanding if not the most outstanding pianists of modern times, but also a statesman, an orator, a billiard player, and a philosopher of repute. Even if Blind Tom were able to compare with Paderewski in pianism, Paderewski would surpass him so considerably in all other points that Paderewski would still become the most famous of the two. A generation ago the name of "Blind Tom" was known everywhere. Today it is practically unheard of except in psychological and musical circles.

Another example of high general ability that might be mentioned is the case of Buonarrotti Michelangelo who stood almost unrivaled as a painter, sculptor, and architect, besides being a poet, inventor, and mathematician worthy of note.

In studying differences in specific types of mental ability it is apparent that high mental ability for one type of mental work cannot be taken to imply either high or low mental ability for other types of mental achievement. William

T. Harris said:

"The cases are rare in which a person has a weak memory in all directions." 4

Both kinds of individual differences are found in the memory capacities of various individuals. Some individuals display high general memory capacities and others display high specific memory capacities, others display low memory capacities in all lines etc.

Theodule Ribot said:

"It is even probable that inequality of memories in the same person is the rule rather than the exception....The antagonism existing between different forms of memory might further provide us with indirect proof of our hypothesis." 5

The differences between the various types of memory capacities in the same individual is almost astounding. A foot-ball or baseball player is able to keep in mind the scores of all the important games of the season as well as many points of interest about each game, yet the same individual may have what seems to be extremely weak memory capacities for his school subjects. The person who calls the trains in a railroad station may display marvellous

3. HARRIS, WILLIAM T. Editor's preface to Memory, What it is and How to Improve it, by David Kay. Page vii.

4. RIBOT, THEODULE. Diseases of Memory. Page 140

memory capacities for railroad matters but the meagerest memory capacities for things of literary nature. The merchant may display marvellous memory capacities for prices and matters pertaining to his business yet he may have what seems to be an extremely weak memory for those things which the student in the elementary school learns with ease. An expert card player may display marvellous memory capacities for matters pertaining to the playing of card games (for example he might be able to remember every card that is played during the game, the person who played the card, and the time in which the player did this) yet he may display the weakest form of memory capacities for religious matters (for example he might be altogether unable to recall a single thing from the sermon he heard the preacher deliver on the Sunday before.

THE CAUSES OF INDIVIDUAL DIFFERENCES

In studying the question of individual differences it is wise to investigate some of the most important causes of individual differences. There are four outstanding causes of individual differences:

- (1) Heredity
- (2) Environment
- (3) Maturity
- (4) Personal traits of the individual.

HEREDITY

Heredity is certainly a powerful influence in the life of any individual. Heredity is the capital with which the individual starts out in life. Modern psychologists use the terms original nature, native ability, talent, genius, and the like to designate the hereditary part of the individual's make-up. By the type of original nature which affects learning is usually meant the individual's capacity to learn or to profit by experience, by practice, by drill, by instruction and the like. Some people are able to achieve far more than others. Achievement, however, is not always in proportion to the ability to achieve. Some poorly endowed individuals by

dint of toilsome labor achieve what those who are more highly gifted but less industrious never dream of achieving. Although heredity is a potent factor, it is not the only factor, nor even the most important factor in life or learning.

The unchangeableness of some things that go to make up original nature has long been recognized by intelligent thinkers. In the book of Jeremiah we find the following passage:

"Can the Ethiopian change his skin, or the leopard his spots? Then may ye also do good, that are accustomed to do evil." 5

Thorndike gives four main factors that determine the original (or hereditary) nature of an individual. He said:

"His original nature is determined partly by sex, partly by his remote ancestry or race, partly by his near ancestry or family, and partly by unknown causes of variation whereby children of the same parents receive different inheritances." 6

There are some differences between the original nature of two individuals of different races. Differences between the races, as to mental ability, are not near as great as was at one time commonly supposed. In fact differences between the races are not near so great as those within the races.

5. JEREMIAH, Chapter 13, verse 23.

6. THORNDIKE, E. L. Educational Psychology. Page 340

Mental differences between the sexes have been found to be not nearly so great as was at one time commonly supposed. There was a time when the majority of psychologists seemed to be "misogynists" or "woman-haters". For a long time women were declared to be far inferior to men in general intelligence and altogether unfit for any of the professions in which men were engaged. During the middle ages some authorities would debate as to whether or not a woman has a soul. During the middle ages women had practically no educational opportunities. Today the pendulum seems to have swung to the opposite extreme. The majority of the psychologists of today seem to be "philogynists" or "woman-loving". Some psychologists declared that women are equal to man in mentality in every respect. Others maintain that women are superior to men in some respects. There are some who go so far as to maintain that women are superior to men in every respect. Today we find women engaged in practically all of the professions. We find women competing and even excelling some men in professions for which only men were considered as being intelligent enough to qualify in times past. Although we occasionally find people

who are fanatical about the differences between the sexes, the majority of psychologists today conclude that the differences between the sexes are not nearly so great as was at one time commonly supposed. There is some difference, however. There were great differences between the sexes during the past, but these differences were the result of opportunity or the lack of opportunity rather than differences in native ability.

Differences due to near ancestry or family are in many cases quite considerable. It is certainly a good thing for an individual to be well-born, but we must remember that the individual from a highly gifted ancestry is not invariably a highly gifted individual himself. Oftentimes we find individuals from poorly gifted ancestry who startle the world with their genius. We might mention the case of Jenny Lind as being an example of this. She was the daughter of a shiftless father and of a mother of no conspicuous gifts. Though she came from a poverty stricken family she became the greatest singer of her day and in the opinion of many musical authorities the greatest soprano of all times.

Besides the causes of individual differences due to heredity which I have mentioned there are

a number of hereditary causes about which we have been unable to get any scientific information, although we know for certain that other causes must exist. Oftentimes two children of practically the same hereditary influences are so radically different that we can scarcely recognize any similarity in them. We know that there must be some cause for this difference but we have been unable to trace it out.

The differences in the original nature of individuals are transmitted from parent to child through the constitution or make-up of the child's body. The parent having a brilliant mind does not transmit a brilliant mind to his child, but merely transmits the physiological conditions that enable the child to develop a brilliant mind. Hereditary differences appear to be solely physical, but in-so-far as the physical differences serve as bases for mental differences we might say that certain mental differences are also transmitted, although in reality it is only the physical elements which are responsible for mental ones that are transmitted.

The person who has few native abilities has one consolation, and that is that he can

surpass those of high native capacities who fail to live up to their capacities, if he works hard enough. The individual who has determination to make the most of his abilities can usually surpass those who are more highly endowed, but lack this determination. The story of the tortoise and the hare illustrates the fact that it is not always the quickest runner that wins the race.

The person who is poorly gifted with native capacities may sometimes learn more than those who are more highly gifted, because the former has better opportunities for learning. This brings us to the second factor which is responsible for individual differences in learning or memorizing abilities, that is, the environmental conditions that enter into the life of the individual.

ENVIRONMENT

The person's ability to learn depends very largely upon the nature of the environment in which he has lived in the past and is living in in the present. Many types of environments might be mentioned. For example, there is an educational environment or school environment, there is a

literary or book environment, there is a religious or church environment, there is a civil or political environment, there is a social environment, there is an artistic environment, there is an economic environment, there is a climatical environment, there is a geographical environment, etc. All of these types of environments exert some influence on the individual. Everything which enters the life of an individual becomes a part of his being. Everything in his environment has some effect on his spiritual or mental nature. The environment in which an individual lives is such a potent factor in his life that we can say that the environment is a part of the man and the man is a part of his environment. The environment changes the man and the man changes his environment.

How easily a person learns depends upon what and how much he already knows. The knowledge a person will acquire at school depends very largely upon the amount and the kind of knowledge he carries to school with him when he goes. One of the main ways in which the environment affects the learning capacities of an individual is by furnishing him with the proper kind, or the wrong kind, of apperception. What an individual perceives or learns in the present depends very largely upon what he has learned or perceived in the past.

All learning is based on some form of perception. Since perception is based on apperception, or the influence of past experiences as affecting the interpretation of present experiences, we can truly say that the individual's apperceptive mass is a tremendous factor in learning. The apperceptive mass is the sum total of the experiences which have entered into the past life of the individual. The apperceptive mass of an individual consists of the influence of his previous experiences, observations, training, education, and the like upon his present mental make-up. We can say that the apperceptive mass of an individual is largely the result of environmental conditions in the past life of the individual. To illustrate the extent to which perception or understanding is recognized to be based on apperception, it is sufficient to say that no one will deny that it is foolish to attempt to teach trigonometry to an individual who has not learned the rudiments of arithmetic. The reason that it is foolish to teach trigonometry to the individual who has not mastered the rudiments of arithmetic is that the individual cannot be made to understand trigonometry without some knowledge of the rudiments of arithmetic.

The knowledge of arithmetic is an essential part of the apperceptive mass of the student who would master trigonometry. The individual may have the highest sort of mental capacities, but unless he has also the essential apperceptive mass he will be unable to learn or master trigonometry.

Differences in the apperceptive mass of two individuals will make a most profound difference in the perception of the same individuals. Dr.

Karl Lange said:

"It is a well-known experience that one and the same object seldom occasions precisely similar perceptions in the minds of different people. Of the same landscape the poet's image would differ greatly from that of the botanist, the painter's from that of the geologist or the farmer, the stranger from that of him who calls it home. In the same way, one and the same speech is often understood in as many different ways as there are hearers."

"To the lad who, with ghost-stories in his head and fear in his heart, hastens homeward over the barren moorland at night, the harmless occurrences about him become in a trice the most terrifying specters. (This suggests the story of Ichabod Crane, by Irving.) In the rustling leaves he hears the 'graveyard ghost'; the rattling of the reeds is the 'unholy spinner'; in the gurgle of the water at his feet he hears the melody of the 'false fiddler'; before him he sees clearly 'the unhappy woman', lamenting over her poor lost soul; and shuddering he hurries homeward."

These cases just mentioned illustrate the fact that differences in the individual's mental environment have as much influence upon his

7. LANGE, Dr. KARL. Apperception. Page 3.
8. Ibid. Page 14.

perception as differences in his physical environment. In the latter case mentioned above we might say that the factors from the individual's mental environment prevailed over the factors in his physical environment. The ghost stories had brought the individual into a mental set which was not overruled even by his previous sensory experiences. Of course, the individual knew the nature of the noises, yet he was frightened considerably by them merely because of his mental attitude towards them. A noise in a cemetery in the middle of a dark night is just a noise similar to noises which we have heard oftentimes before; yet such a noise would frighten us far more than it would had we heard it during the noon hour in the front yard of our home. The noise is similar in both cases, but the mental set is different.

Transfer of training is quite an important factor to be considered in the discussion of the influence of environment on the ability to learn. Recently I had a lesson assigned to me in a certain course in the university, the topic of which was food. I had previously studied the same topic in a course in hygiene and in a course in chemistry.

Consequently, I had to read the lesson over only once in order to stand an examination on it. On the examination on that lesson I made the highest possible score, yet I had read the lesson over only once. In other chapters of the same book I had read the material over for three or four times, outlined it, and attempted to memorize the outline. In those chapters my grade was oftentimes considerably less than the highest possible grade. In the first case there was a high amount of transferred training, whereas in the second case the amount of transfer training was negligible. That made all the difference in the world. The amount of transfer training, then, is a factor of real importance and has a great deal to do with the individual's ability to learn a particular type and amount of material.

In discussing the effect of transferred training Edward Stevens Robinson said:

"The rate at which we learn depends upon what habits we already possess. In the first place, the fixation of a habit is affected by what other habits have been previously acquired.... Certain acts of manual and intellectual skill cannot be acquired at all unless the learner has previously developed habits which are capable of forming a foundation for these later ones." 7

"Adding is learned more quickly if the child already knows how to count, and multiplying is learned more quickly if he already knows how to add." 8

"It is, of course, important to know where we can expect positive transfer and where we can not."9

"The more alike two habits are the more positive transfer there will be from one to the other. Both counting and adding involve an elementary understanding of the meaning of numbers. Therefore there is a marked transfer between them." 10

"Old habits, and reflexes too, occasionally interfere with the rapid fixation of a new habit.... When a habit already formed interferes with the fixation of a new habit, this effect is called negative transfer." 11

The individual's ability to learn a certain amount of a given type of matter depends on the amount of positive or negative transfer of training between the matter already learned and the matter which is being learned. The greater the positive transfer between the two, the greater the facility with which the individual learns; and the greater the negative transfer, the greater the difficulty with which the individual learns.

Environment can affect the individual's ability to learn not only by affecting his perception through apperception, and by furnishing him with knowledge and skill that can be transferred to

8. Ibid. Page 91.

9. Ibid. Page 91.

10. Ibid. Pages 91-92.

11. Ibid. Page 93.

the learning of the matter being learned, but it can affect the individual's ability to learn by affecting the condition of his body, the conditions of his nervous system and the like. Original nature largely determines the constitution of the individual's body, but environment determines the condition of the body. An individual may be unable to see because he was born blind. In other words, he is unable to see because heredity gave him an imperfect constitution. Another individual may be unable to see because he neglected to give the proper care to his organs of sight and such other parts of the body that can affect the condition of the eyes. The case of Milton might be mentioned as a classical example of this. Milton was gifted by birth with good organs of sight, but because he failed to give his eyes the proper care they lost their power of sight.

It is of utmost importance to see that the sense organs to be used in learning the matter in hand are in good condition. When sight is involved in learning a certain type of matter it is important to have the organs of sight in good condition. The individual's ability to

learn is affected tremendously by the condition of the sense organs involved in learning. Some children fail to make a success in school for no other reason than poor eyesight, or poor hearing. It is of tremendous importance for the school authorities to see that those children who fall behind in their work are not made to fall behind in their work are not thus retarded by some physical defect that can be remedied such as poor eyesight and poor hearing. Children who fall behind in their work should have their eyes examined and their hearing tested. Oftentimes such an examination reveals the real cause underlying their failure to do successful work. Another factor in eyesight to be remembered is that although some people see well, they may be suffering from Daltonism, or in other words, color blindness. It is futile to attempt to teach color discrimination to people who are blind to the colors involved. Color blind people are simply not endowed with the essential visual capacities for developing a keen sense of color discrimination. In deciding as to whether certain students should study art or painting the factor of color blindness should

should be considered carefully. There are many types of color blindness, but the majority of them would incapacitate the individual suffering from any one of them to learn to become a skillful painter.

Deaf people can be taught to play musical instruments but I believe that the amount of time spent in teaching them to do this could be more profitably spent in perhaps some other type of learning. Even in the case of Beethoven, the great pianist and composer, deafness was a tremendous handicap. When his deafness began to grow upon him his playing began to deteriorate to such an extent that it caused him to feel the most intense mental discomfort. Many people are incapacitated for learning certain things because their sense organs are defective.

Environmental influences can also affect the general physical condition of the individual which in turn may affect his learning abilities. Malnutrition can cause a serious deterioration in mental ability. The quality and the amount of blood that courses through the veins of the individual has a great deal to do with his mental

capacities and abilities. The talented child is usually vivacious and full of vitality. Vivacity or vitality cannot always be taken as a sign of genius but a certain amount of vitality is essential to genius. A genius is usually noted for the amount of work he can do as well as how well he can do it. When we study about the outstanding geniuses of history we wonder how they could actually accomplish so much in the time they live, and at the same time do it so well. Many people are considered geniuses simply because of the amount of good work they can do. They are not only mentally able to do it, but they have the physical ability which underlies the mental ability. Mental ability without physical ability is worthless. Mental ability depends very largely upon physical ability. Unless the individual enjoys the degree of health that will enable him to put his mental powers into operation they will scarcely be of any value to him. Health has a considerable effect upon the learning ability of an individual. If an individual wishes to keep his mental ability at the maximum degree of efficiency he must

guard his health with the greatest caution and care. Some authorities make considerable mention of the effect of sleep, nutrition, exercise, rest, recreation, auto-intoxication, infection, disease and other factors that influence the health of an individual upon his mental ability. This work would be entirely too voluminous should I undertake to discuss these factors as they should be discussed. I must say that they have a most potent effect upon the mental powers of an individual. I shall not discuss the extent to which each of these affect the mental abilities of the individual, but shall say only that they have a most considerable effect upon the mental abilities of any individual.

MATURITY

Maturity seems to be one of the outstanding factors that affect the individual's learning ability. Dr. Carpenter said:

"It is a matter of universal experience that every kind of training for special aptitudes is both far more effective, and leaves a more permanent impress when exerted on a growing organism than when brought to bear on the adult. The effect of such training is shown in the tendency of the

organ to 'grow to' the mode in which it is habitually exercised; as is evidenced by the increased size and power of particular sets of muscles, and the extraordinary flexibility of joints, which are acquired by such as have been early exercised in gymnastic performances."¹²

It is a matter of general opinion that maturity, as a factor apart from the other factors, has a great deal to do with the individual's ability to learn. We have scarcely any scientific material which might be used in determining the extent to which maturity affects the individual's ability to learn. We know that maturity is indeed a factor that affects learning, but we know little about the extent to which maturity affects learning.

Edward L. Thorndike said:

"No competent student doubt that in certain mental traits maturity or inner growth causes one individual to differ year by year from his former self, irrespective of all training....About the magnitude of the influence of maturity there is, however, a wide range of opinion....The study of the facts is made difficult by the absence of any exact measure of maturity, that is, of the extent to which the original impetus to mental development has run its course. Length of life is the measure which has been used, but chronological age is not identical with mental maturity. An individual's degree of mental maturity cannot be inferred from his age....If we could separate out the effect of mere growth from within from the effect of training that accompanies it, we

¹². Dr. CARPENTER. Quoted by James, William.
Psychology. Vol. I, Page 110.

would measure each of the two. Such separation is well-nigh impossible with present knowledge.... Mere inner growth, no matter how potent, requires usually some stimulation from without." 13

Many authorities are of the opinion that young children are unable to reason. Rousseau seems to have had this conception. He said:

"Reason, apparently a compound of all other faculties, the one latest developed, and with most difficulty....The noblest work of education is to make a reasoning man, and we expect to train a young child by making him reason! This is beginning at the end; this is making an instrument of a result. If children understood how to reason they would not need to be educated....I would rather require a child ten years old to be five feet tall than to be judicious." 14

I am of the opinion that children at the ages which are commonly found in our elementary schools are able to reason. The difference between the rational abilities of the child and those of the adult is a relative one. It is not that the child cannot reason, but that he cannot reason as well as the adult that makes the difference. Although the child is not able to reason as surely as an adult he is nevertheless able to reason in his own small way. We oftentimes hear children at play arguing over whether a thing

13. THORNDIKE, EDWARD L. Educational Psychology. (Briefer Course) Pages 369-370

14. ROUSSEAU, JEAN JACQUES. Emile. Page 32.

was fair or not. The expression "That's not fair" enters the child's vocabulary at quite an early age, specially if he plays games with other children at such an age. Of course the reasons and the arguments of a child appear ridiculous to an adult, but they are nevertheless reasons. The main reason for the weakness of the reasoning capacities of a child, I am inclined to believe, is that the child does not have a background of knowledge which is sufficiently great to furnish him with the most important facts which enter into the consideration of a question under discussion. The child cannot reason as well as the adult, because he has less knowledge than the adult rather than because his rational capacities are undeveloped. Reasoning depends on knowledge to a very great extent. The best informed man is usually the most rational man, although in some cases the opposite seems to be the case. The most rational men are usually among the best informed men of their time. Information is essential to logical reasoning. The person who has no information about a

topic under consideration is powerless when it comes to reasoning intelligently about it. The reason children are inferior to adults in rational abilities is that the child has less knowledge and has had less experience than the adult.

Some authorities are of the opinion that the child surpasses the adult in ability to learn or to memorize. Books on pedagogy, especially those of the middle ages, are full of admonitions to teachers exhorting them to place a great deal of stress on memory work in teaching young children. A fact that seems to show that children surpass adults in ability to learn or memorize is that children as a rule seem to learn a new language with far greater facility than adults. David Kay quotes Dr. J. Beattie as saying:

"At the age of six years a child will learn the common words of a language in less than twelve months if he hears it continually spoken; which, as he acquires the pronunciation and accent as well as the meaning, is a proof not only of quick memory, but also of an exact ear and of great flexibility in the organs of articulation.... As we advance in life the acquisition of languages becomes more and more difficult; the talent of remembering new words decays gradually, nor is the ear so quick in catching a foreign accent, or the organs of speech so pliable in articulating unusual sounds." 15

15. BEATTIE, Dr. J. Quoted by David Kay. Memory. What It is and How to Improve it. Page 312

I have had several bitter experiences with this question of learning languages. Although young children seem to learn a language in a relatively short time, it seems that they forget it as quickly as they learn it. Specially is this true when they discover that they will have no more urgent use for it. When I was a young child, I would completely learn the Portuguese language and forget the English language, or vice versa, all in the course of a year. On coming to the United States for a year I would completely forget the Portuguese language and learn the English language during that time; and on returning to Brazil, I would soon find myself reversing the process, by forgetting the English language and learning the Portuguese - all in quite a short time. Disuse of what is memorized plays havoc with the child's memory of it. It seems, however, that this is not true in case of adults to the extent that it is true in the case of children. I am of the opinion that it is by forgetting the old that the child learns the new more quickly, whereas the adult holds on to the old and tries to acquire the new at the same time. The mind of

the child seems to be far more plastic than that of the adult. The child learns quickly and forgets equally as fast. I think that this is a real fact that may be presented as an argument in favor of considering maturity as being a real factor in learning.

Some authorities maintain that the child does not surpass the adult in ability to learn. They maintain that the old saying: "You can't teach an old dog new tricks" is fallacious. For example Henry J. Watt said:

"Has the child a better memory than the adult? There is a very widespread popular opinion which says that the memory of the child is stronger than that of the adult. Evidence of this is the fact that the child learns a language in a few years - a feat which a large number of adults feel to be beyond their power - not to speak of acquiring the accent properly. See how quickly the child retains small verses and fairy stories, and how ineradicable the memories of childhood are, even in the last years of the longest life. Our memories must have been stronger when we were young we think. We rarely learn a verse of poetry now. We forget the contents of a novel in a month or two, if not in a day or two, after we have read it; and as for remembering the past, why it is often hard enough to remember what we did yesterday. Against all this, however, one may put the fact that we remember far more of the scenes of the year just gone than the child does. Moreover, the child learns very little of his language in the first few years, and any adult of average intelligence who might be

surrounded by as much careful attention, and taught so persistently and carefully as the child, would learn in the same time far more than the child does. The child, however, has in so far the advantage, as his mind is unoccupied. It is to his ever-increasing advantage to learn continually, and he has little to forget while doing so. On the other hand, the adult is settled in life; he has adapted himself to his surroundings, and usually does not want to learn anything new. As a matter of fact, it is not true that our memory is strongest from the first few years of life up to about the tenth or thirteenth year, and then begins to weaken. This has been proved by experiment. The same tests have been put to young children, school-children, and boys and girls up to the age of twenty, and these show that the older the learner, up to these limits, at least, the quicker he learns, and the better he remembers. It may, of course, be that the child does not know how to learn to advantage....Yet, even if he did, he would certainly not learn so quickly or so well as the adult. He cannot concentrate his attention so closely nor for so long a time upon one object, and he has not the experience in thought to work upon which the adult is generally supposed to have. The will to learn and to remember is doubtless the most important of all influences in this regard. Every grown adult who keeps his mind mobile and is not suffering from weakness or disease, has as good a memory as he ever had. The trouble usually is, that we are either hypnotised into inactivity and lack of enterprise by our own poor ideas of our powers, or by such ideas instilled into us by the countless thieves of souls, who go about the world telling people what they are at least not good for, helping them to overcome the difficulties of choosing a career in life by cutting off the possibilities."16

Although maturity seems to be one of the important factors which affect the individual's ability to learn we have little definite

16. WATT, HENRY J. The Economy and Training of Memory. Pages 28-30.

scientific data as to the nature of the effect of maturity upon the mental abilities of the individual and the extent to which maturity affects the mental abilities of the individual.

We have considered heredity, environment, and maturity as they affect learning. There is still another factor that is of tremendous importance. We might call it personality.

There are certain personal elements that affect the individual's ability to learn to a considerable extent. Some authorities maintain that the personal elements are the elements which are most important. We have all heard the expression: "He can who thinks he can." Another expression which is quite popular is: "Where there is a will, there is a way." Other things being equal the personal factor may make a considerable difference in the learning ability of the individual. But, unless the individual has the essential type of original nature, unless he has had the essential environmental stimulation to develop his abilities, and unless his mind has arrived at the essential stage of maturity, the personal elements can amount to little. The personal element is certainly important, but it is not all.

PERSONAL FACTORS THAT AFFECT LEARNING

WILL

Will is one of the most important of the personal factors that affect learning. Many people never learn much for the simple reason that they have had no desire to learn. Will implies choice. Whether an individual will learn or will fail to learn depends very largely upon whether he chooses to learn or not to learn.

Learning may be of three kinds, as far as the will is concerned:

- (1) Voluntary
- (2) Involuntary
- (3) Unvoluntary or non-voluntary.

In voluntary learning the individual learns because he wants to learn, in involuntary learning the individual learns because he cannot escape from learning, and in unvoluntary or non-voluntary learning the individual neither tries to learn or to keep from learning. Voluntary learning might be called active learning. In this type of learning the individual "goes out after" learning. Involuntary learning might be called passive learning. The agent that stimulates learning goes out after the individual and he learns because he

cannot avoid learning. We learn a whole lot of things in this world that we do not want to learn, simply because we cannot avoid it. If a criminal could commit a crime without impressing his mind with the fact that he had committed the crime, it would not remain in his mind to hurt his conscience. It is not only the criminal that wishes that learning depended altogether of the will, so that his mind would receive none of the impressions which he did not want for it to receive. The person who lives in an environment in which improper English is spoken would wish that he could keep from learning that type of language. Yet, if he is kept in an environment in which that type of language is spoken altogether he will soon catch himself making the same mistakes that his associates make, in spite of his will not to acquire these improper language habits. I would say that most of the learning that takes place in school might be thought of as being involuntary or non-voluntary. The individual learns as a matter of course. Neither does he will to learn what he learns or not to learn it. Voluntary learning is the most efficient of these three types of learning.

The individual who wants to learn usually learns far more than the individual who takes learning as a matter of course, and the individual who takes learning as a matter of course learns more than the individual who actually tries to learn.

The desire or the will to learn can be considered as one of the important factors that affect learning.

TRAITS OF CHARACTER THAT AFFECT LEARNING

The will to learn is not the only personal factor that affects the facility with which the individual learns. There are certain traits of character that affect learning to a considerable extent. Character consists of habits crystalized into the temperament of the individual. Among the traits of character that might be mentioned as affecting learning are the following: ambition, cheerfulness, concentration, conscientiousness, contentment, mental courage, decision, diligence, enthusiasm, mental fortitude, hopefulness, industry or industriousness, judiciousness, optimism, patience, perseverance, purpose, self-confidence, self-control, self-denial, assertiveness, general attentiveness, curiosity,

fearlessness, constancy, carefulness, foresightedness, versatility, adaptability, open-mindedness and broad-mindedness. Some people learn more than others for the simple reason that they have these traits of character in a higher degree than others have. Procrastination can play more havoc with the student's success in his studies than perhaps any other single factor that we know of. The person who puts off his learning for some other time will never become a learned individual.

I consider cheerfulness and optimism as being two of the most important factors in learning. The grouch is rarely a well-informed individual. I have always endeavored to cultivate a cheerful and optimistic disposition, realizing that such a disposition is a tremendous aid in anything I undertake to do.

Enthusiasm is also a factor of tremendous importance. I have found that the more enthusiastic one becomes about something the more he learns about it. Inversely, the more one learns about something, the more enthusiastic he becomes about it. In order to acquire a proper balance in my mental attitude towards the various things of life I attempt to avoid becoming so enthusiastic about

any one thing that I fail to attach the relative importance to other things. A proper distribution of enthusiasm is essential to the attainment of a well-developed and a well-balanced mind.

THE EFFECT OF THE MATTER TO BE MEMORIZED UPON
THE FACILITY WITH WHICH IT IS LEARNED

The second one of the main factors that affect learning which I shall consider in this work is the nature of the matter being learned as it affects learning. The individual may be endowed with the various mental capacities and abilities essential to the learning of some things, yet in spite of this fact there are other things which he cannot learn with facility. A Chinese student may be able to learn a lesson in Chinese with great facility, but an American student would be able to learn only with great difficulty, if he is able to learn it at all. This illustrates the effect of differences between individuals in the learning of a certain lesson. Now the American student may be able to learn a lesson in English with great facility, but he would be able to learn the same lesson in Chinese only with great

difficulty. In this last case, the subject matter is different but the individual is the same. The change in subject matter has made all the difference in the world. The facility with which the individual learns depends upon the matter which is being learned.

The facility with which an individual learns a certain lesson depends first upon the individual and second upon the lesson. I shall use the term "style" to refer to those qualities of the matter to be learned that affects its impressiveness or the facility with which the said matter is learned. This term is used quite frequently in artistic and literary circles. It seems however that its debut into psychological circles has been greatly delayed.

STYLE AS IT AFFECTS LEARNING

There are three elements which I consider to be the fundamental elements of style. They might be called:

- (1) Clearness
- (2) Pleasingness
- (3) Forcefulness.

CLEARNESS

The facility with which a lesson is learned depends to a certain extent upon how clear it is to the given individual. In speaking of clearness we must remember that what is perfectly clear to one individual is not clear at all to another one. It is not how clear the lesson is to the teacher that counts in the final analysis, but how clear it is to the pupil. The teacher should constantly bring the pupil into action, by asking him questions, getting him to discuss certain topics and the like in order to ascertain whether or not what the teacher says is clear to the pupil.

Clearness depends upon many things. First of all it depends upon the familiarity of the learner with the elements that compose the matter to be learned. If everything is interpreted by the teacher in terms of the experiences which are common to all the pupils, then we might say that the lesson has been made clear to the pupil. When the pupil has not had the necessary experience upon which to base the instruction the teacher should make the experience available to the student. This is the reason that certain courses in our curriculum have certain hours devoted to laboratory work.

These courses involve experiences which are not common to the average student, and since the discussion should be in terms of the experience of the pupils it becomes necessary to bring the experiences into the life of the pupil by some means. Instruction should consist primarily of the reorganization of familiar elements, inductions of principles from such a reorganization of the familiar elements, the bringing of certain experiences into the lives of the students, the use of these experiences as a foundation for the acquisition of new knowledge and the like. The elements employed in a lesson should be familiar to the student. If they are not familiar, the formal lesson should be brought to a standstill until they are made familiar.

Clearness not only depends upon the use of familiar elements, but it depends also to a very considerable extent upon the concreteness of the matter being learned. Abstractness plays havoc with the effectiveness of instruction. The use of abstract terms should be avoided as much as possible. By an abstract term I mean a term that conveys no definite meaning to the mind of the student, or to the mind of the average person. It is a wise plan for an instructor

to define his terms and to interpret the terms he uses into experiences that are common to the students before whom he uses these terms. Certain words have such different meanings for different people that it is wise for any writer, lecturer, teacher, speaker and the like to define the terms before using them or immediately after using them. Of course, the matter of definition of terms can be carried too far. If the person feels sure that all the terms he is to use will be clearly understood there would be no necessity for his defining the terms used.

Clearness also depends upon the unity of the matter which is to be learned. Unity depends upon the proper organization of the subject-matter presented. The subject-matter should be organized by topics, each topic being presented separately, instead of being presented all mixed up with the other topics being discussed.

Clearness also depends upon sequence and coherence. Each topic should not only be presented separately, but the topics should follow one another according to some logical arrangement. Each topic should form a clear transition from the topic preceding it to the topic following it.

Clearness also depends upon simplicity. The greatest things after all are usually simple. The essential parts of the study of psychology are so simple that it seems almost ridiculous to talk about them. In discussing some of the basic elements of psychology we find ourselves saying, "What is the use of talking about that? Anybody knows that." The great difficulty in psychology comes in the organization of these simple facts into a forceful structure and the induction of principles from the study of these facts. The great inventions, the great discoveries, the great artistic creations are usually composed of such simple elements that as we study them we find ourselves saying that anybody could have thought of them. The difficulty lies not in thinking of the elements but in organizing them, in applying them, and in using them to lead us on to more complex creations. The teacher should call the student's attention to the fact that because a thing is simple we should not think that it is unimportant. The teacher should make the lesson as simple as possible, yet at the same time take all precautions to keep the student from under-estimating the importance of

the lesson by considering complexity as a sign of importance.

PLEASINGNESS

Psychologists attach a great deal of importance to the pleasingness of what is being presented to the mind of the learner. Other things being equal, the more pleasing a thing is the greater is the facility with which a person learns it. On the other hand, the more unpleasant a thing is the greater is the difficulty with which a person learns it. To the foresighted student, the more unpleasant the consequences that the learning of a lesson will enable him to avoid, the greater the facility with which he learns it.

During the middle ages it was thought that the more unpleasant a thing was the more impressive it was. Consequently the average teacher believed in beating the knowledge into the heads of the pupils. The trouble with this procedure was that the student remembered the beating but forgot the lesson that was supposed to be associated with it. The teachers who lived during the middle ages seemed to forget that it is also true that

the more pleasing a thing is the greater is the facility with which the student learns it. The type of teachers that prevailed during the middle ages failed to realize the importance of making the subject-matter attractive to the student.

As in the case of clearness, in speaking of pleasingness we must remember that what is pleasing to one person may be thoroughly distasteful to another. It is not how pleasing it is to the teacher that makes the subject-matter easier to learn; but it is how pleasing it is to the student that really counts. The teacher should study the pupil and seek to find out how he can make his instruction attractive to the student.

Certain qualities of style that contribute to the pleasingness of the subject-matter being memorized are: humor, ease, grace, elasticity, variety, fluency euphony, refinement, uniqueness, elegance, sentiment, emotional appeal, beauty, taste and the like. We have constantly heard the expression: "Beauty is in the eye of the beholder." What one person considers beautiful, another person considers ugly, another person considers it to be tacky, another person thinks of

it as being "simply atrocious", etc. What is humorous to one person is simply boresome to another person. What one person considers variety, another person considers a monotonous change from one thing to another. What one person considers refinement, another person considers coarseness. So the individual makes a difference in almost every case. Then must say that what facilitates the learning of a certain amount of subject-matter is not how pleasing it is to the teacher or to people in general, but how pleasing it is to the individual student under consideration. In every case the teacher should adapt his teaching to the pupil in order to accomplish the greatest amount of results.

FORCEFULNESS

Certain qualities of style contribute to the forcefulness of the matter we want the individual to learn. Among the most important of these are: brevity, emphasis, exaggeration, characterization, climactic development, contrast, pathos, sublimity, suspense, emotional appeal and the like. Those qualities that contribute to clearness also contribute to forcefulness. The

qualities that contribute to pleasingness also contribute to forcefulness, for what is pleasing is usually forceful.

THE EFFECT OF THE CONDITIONS UNDER WHICH THE LEARNING IS TO TAKE PLACE ON THE FACILITY OF LEARNING

The first factor that we considered that affects learning was the nature of the individual; the second factor was the nature of the matter to be learned. The third factor we shall consider is the conditions under which the learning is to take place. It is absurd to think that a runner can run as fast with obstacles in his way as he can without any obstacles to overcome. The runner cannot run with a hundred pound sack of flour on his back as fast as he can without it, unless the sack of flour can be made to become an asset instead of a liability. A runner cannot run so fast with a bicycle on his shoulders as he can without it; but if he is allowed to take the bicycle down from his shoulder and ride it it can actually help him to cover the ground much faster than he could without it. Genius sometimes finds ways of turning obstacles into helps.

The environment in which the learning is to take place has a great deal to do with the facility with which learning takes place. The environment that is best suited for learning is different with different individuals and at different times. The best environment for learning is usually a familiar one. Our attention is oftentimes distracted from our work by the novelty of the surroundings in which we are working. I used to study with great difficulty while music was going on. Five people in my family play some form of a musical instrument and all of us are fond of singing and whistling. Being constantly forced to study with music going on, music soon ceased to be a distraction to me. As I grew more and more accustomed to music while studying, it became less and less a disturbance to my studies. Now I believe that music actually helps me to study with profit. I was at one time severely criticized for turning on the radio while I was studying Greek. Having grown accustomed to listening to music while I was studying the radio ceased to be a distraction worthy of any consideration. But a phonograph or a radio would be a serious disturbance to some other person who had become accustomed to studying only in the

quietest surroundings. After spending some time in a quiet little town I moved to a city where noise went on day and night almost uninterruptedly. Automobiles were passing in endless succession and in a railroad yard nearby a train was usually shifting about all day and all night long. At first this noise distracted me considerably. Now that I have grown accustomed to it I never notice it. Sometime ago I attempted to do some studying in a really quiet place, but I found to my despair that the quietness was as distracting to me as the noise had formerly been.

The environment which is best suited for studying then, is one in which the individual "feels at home", or in other words, one to which the individual has grown accustomed. A familiar environment will scarcely distract the individual, whereas an unfamiliar environment will become a serious distraction. Novelty usually attracts attention, and novelty in the study environment will distract the students attention from his studies.

The environment for study should be one in which the individual can be comfortable. As in the case of other topics which I have discussed, we should remember that what is comfortable to one person is not comfortable to another. Recently, I attended the "movies" and saw the film

"The Private Life of Helen of Troy". Helen and her husband were sleeping in the same room. Helen thought that the room was unbearably stuffy, so she opened the window. Her husband, however, was soon awakened by what he considered excessive ventilation, and so he arose and proceeded to close the window. The amount of ventilation that is comfortable to one person may not be comfortable to some other person. The same is true about other things that have to do with the comfort of the study environment. The room which I consider as being comfortably heated my brother considers too hot, and I have studied with people in what I considered a comfortably heated room who considered the same room as being entirely too cold for comfort. The same is true about the lighting of the environment for study. What one person considers an ideal light for study, another person considers an improper light for study. And in nearly everything about the study room this seems to be the case. What is comfortable for one individual is uncomfortable for another individual; what is distracting for one individual is not distracting for another, or may even be an essential part of the study environment of another.

THE METHOD OF LEARNING

We have already considered the effect that the nature of the individual, the nature of the matter to be memorized, and the nature of the environment in which the memorizing or learning is to take place upon the facility with which an individual learns a given amount of subject-matter. There is another factor which has a considerable effect upon the facility with which a thing is learned, and that factor is the method by which the learning is to be done.

Some things are never forgotten once they have been consciously experienced. But the majority of things require repetition in order to become firmly fixed in the mind.

LEARNING BY REPETITION

Edward Stevens Robinson has made a most excellent study of this topic. He said:

"Repetition aids fixation. 'Practice makes perfect' is an old saw pointing out the fact that repetition is a prime factor in fixing a habit. Practice is able to fix undesirable habits as well as desirable ones, however, and before indulging in repetition it is necessary to be sure that it is really the habit we desire that is being repeated." 17

"Repetition should not be too continuous.... If one devoted two solid hours to the rehearsal of some one stroke, such as the service, he is likely

to become fatigued. Now, when one is fatigued, it is natural for him to save himself, and unconsciously he changes the nature of his movements....The nature of the stroke will change as one tries to relieve fatigued muscles. Consequently other movements than the correct one get the benefit of repetition." 18

"The rule, then, is: Take plenty of practice, but spread it out enough to avoid fatigue. It would probably be well to add that this spreading should not be such as to make the periods of practice too short or too far apart in time. If the periods of practice are too short, the learner will not have time to get well settled down to work, and if the practice periods are too far apart in time, the learner will forget between periods and thus lose some of the improvement he has already made. It is impossible to lay down any hard-and-fast rule about just what distribution of repetitions is best. The learner himself has to determine that, but he can help himself considerably in the regulation of his practice by remembering these three important facts: (1) Practice should not be so continuous as to bring on genuine fatigue. (2) It should not be in such short periods that the learner has insufficient time to get settled down to work. (3) The practice periods should not be so far apart in time that the learner has forgotten by one period much of what he learned during the previous period." 19

He also mentions the effect of mental attitude on the effectiveness of practice. He says:

"His practice must be regular and well distributed; he must study his shortcomings and seek patiently and methodically to eliminate them; in brief, he must substitute a professional for a playful attitude toward the undertaking." 20

18. Ibid. Pages 101-102.

19. Ibid. Page 102.

20. Ibid. Page 108.

Homer B. Reed also gives us an excellent summary of the factors that count for efficient repetition or practice. He says:

"The law of repetition refers to the fact that practice makes perfect. Other things being equal, the greater the number of repetitions the more perfect the habit. One must not suppose, however, that all he needs to do to form perfect habits is to multiply repetitions. To use them efficiently he must apply them with attention and vigor, distribute them over a number of periods, increase their number in proportion to the difficulty of the bond to be formed, motivate them by a record of the improvement effected and by knowledge of their results and of the end sought, exercise them at the point of error, and apply them to useful reactions. Considerations of this kind should make it clear that drill is not necessarily good just because it is drill, but because it is the right sort and is used in the right way." 21

It would be a wise plan for us to stop and consider more in detail some of the types of practice, or repetition, that have been found by experimentation to be the most efficient.

ATTENTIVE REPETITION

Attention has a great deal to do with the results which the student derives from his practice, or repetition. Woodworth says that "the first principle of economy [in memorizing is] observant study, directed towards the finding of relationships and significant facts." 22

21. REED, HOMER B. Psychology of Elementary School Subjects. Pages 11-12.

22. WOODWORTH, ROBERT S. Psychology. Page 338.

Experimental results show that recitation is an excellent form of practice. After the student begins to become familiar with what he is trying to memorize he will find it to his advantage to test his memory out by attempting to recite to himself what he is trying to learn. Woodworth says, with reference to the value of recitation in memorizing:

"After the learner has read his lesson once or twice, he may, instead of continuing simply to read it, attempt to recite it, prompting himself without much delay when he is stuck, and verifying his recitation by reference to the paper. The question is whether this active reciting method of study is or is not economical of time in memorizing, and whether or not it fixes the lesson durably in memory. The matter has been thoroughly tested, and the answer is unequivocally in favor of recitation. The only outstanding question is as to how soon to start attempting to recite, and probably no single answer can be given to this question, so much depends upon the kind of material studied, and on peculiarities of the individual learner. Where the sense rather than the exact wording of a lesson has to be learned, it is probably best to recite, in outline, after the first reading, and to utilize the next reading for filling in the outline." 23

"Whence comes the advantage of recitation? It has a two-fold advantage: it is more stimulating, and it is more satisfying. When you know you are going to attempt recitation at once, you are stimulated to observe positions, peculiarities, relationships, and meanings, and thus your study goes on at a higher level than when the test of

23. Ibid. Page 339.

your knowledge is still far away, with many readings still to come. You are also stimulated to manipulate the material, by way of grouping and rhythm." 24

"On the side of satisfaction, recitation shows you what parts of the lesson you have mastered and gives you the glow of increasing success. It shows you exactly where you are failing and so stimulates to extra attention to those parts of the lesson. It taps the instincts of exploration, manipulation, and mastery more effectively than continued re-reading of the same lesson can do. The latter becomes very uninteresting, monotonous and fatiguing." 25

"Perhaps, after all, the greatest advantage of reciting is that it makes you do, in learning, the very act that you have later to perform in the test; for what you have finally to do is to recite the lesson without the book. When reading, you are doing something different; and if it were altogether different, it probably would not help you at all towards success in the test. But since intelligent reading consists partly in anticipating and outlining as you go, it is a sort of half recitation, it is halfway doing what you are trying to learn to do. Memorizing consists in performing an act, now, with assistance; that you later wish to perform without assistance; and recitation first stimulates you to fashion the act conformably to the object in view and then exercises you in performing that act." 26

SPACED REPETITION

Psychological experimentation has revealed the fact that spaced repetition is more efficient than continuous repetition. It has been found that it is better to repeat at intervals what we wish to memorize than to keep steadily going

24. Ibid. Pages 340-341.

25. Ibid. Page 341.

26. Ibid. Page 341.

through it without any intermission between repetitions. Woodworth says:

"Spaced repetitions are more effective than unspaced....What exact spacing would give the very greatest economy would depend on the length and character of the lesson." 27

"Spaced study also fixes the matter more durably. Every student knows that continuous 'cramming' just before an examination, while it may accomplish its immediate purpose, accomplishes little for permanent knowledge." 28

With reference to spaced repetition

Stephen Sheldon Colvin says:

"Among the reasons why distributed learnings are better than concentrated learnings may be mentioned first the fatigue of long periods of learning, with accompanying loss of interest and the falling off of attention. The principal reason for the superiority of learning in several sittings over learning in a few seems to lie in the fact already referred to, that the age of the associations is an important factor in retention. So it happens that if the learning of the memory material has covered, for example, a week, at the end of the period of learning the age of the associations, being extended over a greater period when the material is distributed, have greater opportunity to become permanent and to acquire significance." 29

"It is a fact well known that cramming is a bad method of learning. It is quite possible for a clever student to prepare for an examination in a few days and to pass the test with a high grade. The more systematic worker, however, who has been preparing his material for weeks and months, although he may not obtain any better results on the immediate test, will carry the

27. Page 342. Ibid.

28. Ibid. Pages 342-343.

29. COLVIN, S. S., The Learning Process. Page 162.

substance of his studies much farther than will the person who learns in haste, and the significance will be far greater. There is a prevailing opinion that a great deal can be accomplished by spurts; and while it is undoubtedly true that there is a certain value arising from a great expenditure of energy at particular periods, the final results accomplished by the person who works in spurts cannot be compared with the results obtained by the systematic worker, who can keep his learning distributed over long periods with a fixed degree of regularity and with permanent interest." 30

WHOLE-PART-WHOLE LEARNING

The question has been raised as to whether it is best to learn a given amount of material as a whole or part by part. Experimentation has revealed that the whole method of learning is more effective than the part method, except in a number of rather exceptional cases.

Experimentation has also revealed that the use of the part method in combination with the whole method is still more efficient than absolute adherence to the whole method.

This question being settled, the next question which is raised is: What combination of the whole method and the part method is the most efficient? It has been found that the best combination is that one which is known as "whole-part-whole learning". By this method of learning the student repeats the selection

as a whole until a good portion of it is memorized then he devotes his attention to the mastery of the difficult parts by practicing on these parts separately. After the difficult parts have been thus memorized he continues to repeat the selection as a whole.

OVERLEARNING

If we wish to retain what we have memorized for any considerable length of time, we must resort to the practice of overlearning. Stephen Sheldon Colvin says:

"Learning beyond the threshold of reproduction. If material is to be retained for any length of time, a simple mastery of it for immediate recall is not sufficient. It should be learned far beyond the point of immediate reproduction, if time and energy are to be saved." 31

PURPOSEFUL REPETITION

Psychological experimentation has revealed the fact that aimless repetition is not very efficient. It is a well known fact that fewer repetitions are essential for the learning of a selection when the individual is trying to learn, or in other words, when the individual purposes to learn, than when he has no intention of learning what is being presented to his mind. Woodworth mentions two

31. COLVIN, S. S. The Learning Process. Page 167.

incidents that show in a striking manner the futility of aimless repetition, or of repetition in which the individual does not purpose to remember what is being presented to his mind.

He says:

"There is a famous incident that occurred in a Swiss psychological laboratory, when a foreign student was supposed to be memorizing a list of nonsense syllables. After the list had been passed before him many times without his giving the expected signal that he was ready to recite, the experimenter remarked that he seemed to be having trouble in memorizing the syllables. 'Oh! I didn't understand that I was to learn them', he said, and it was found that, in fact, he had made almost no progress towards learning the list. He had been observing the separate syllables, with no effort to connect them into a series." 32

"Another incident: subjects were put repeatedly through a 'color naming test', which consisted of five colors repeated in irregular order, the object being to name the one hundred bits of color as rapidly as possible. After the subjects had been through this test over two hundred times, you would think they could recite it from memory; but not at all! They had very little memory of the order of the bits of color. Their efforts had been wholly concentrated upon naming the bits as seen, and not in connecting them into a series that could be remembered." 33

These two incidents tend to prove that repetition is practically futile unless the individual purposes to remember what is being presented to his mind.

32. WOODWORTH, ROBERT S. Psychology. Page 346.

33. Ibid. Pages 346-347.

LEARNING BY ASSOCIATION

The term "association" has many meanings.

I shall use it to mean the observance of relationships between the matter to be learned and the matter which has already been learned in the past.

Homer B. Reed says:

"The law of association refers to the fact that making material meaningful increases the ease of learning. Usually any learned connection between stimulus and response is called an association, but in this book we shall use the term in a more restricted sense. It refers to the connection between stimulus and response that has been formed by means of some intermediate term or terms; but when the connection is made mechanically or by rote without any intermediate term, we shall speak of it as learned by repetition. In learning the pair of words elephant, steeple, a young woman formed the association 'the elephant's trunk is like a steeple'. When later the stimulus word elephant was given, she immediately thought of her previous association and responded with the word steeple. The formation of that association enabled her to learn the pair quickly and retain it well. If she had learned the pair without any intermediate association or the observation of any relationship, we would speak of it as learned by repetition. The law of association may be stated in various ways: that the ease of learning is increased by making the material meaningful; or that the ease of learning is increased by the observation of relationships in the material to be learned; or that a response to a situation is strengthened by increasing the number of connections between them; or that the ease of learning something is increased by relating it to the child's experience and activities; or that the new is learned by means of the old. Each of these expresses in its own way the essential point of the law - learning through intermediate connections.... Its advantages are that it greatly reduces the

number of repetitions or the amount of time required to learn, that it makes a thing easy to remember, that it makes possible the transfer of skill from one subject or activity to another, and that, in brief, it contains the secret of economical learning." 34

This author has dealt with the subject so masterfully that I shall not attempt to add anything to what he has said, but, instead, I shall devote my attention largely to a form of learning by association that is known as Mnemonics.

MNEMONICS

Mnemonical learning consists of the use of little devices or fanciful associations between two or more things that have apparently no relationship to each other. A mnemonic device is an artificial association between two or more things. Mnemonics is the basis of the majority of the so-called memory courses that are so extensively advertised today in our papers and magazines. It is not at all difficult to find some flaring announcement of a memory system which will improve your memory almost over night to a remarkable extent.

24. REED, HOMER B. Psychology of Elementary School Subjects. Pages 11-12.

The principle involved in every mnemonic device is usually that of making some fanciful association between what you are trying to memorize and that which you already know.

Mnemonic devices have been frequently compared to crutches, spectacles, and the like. When natural eyesight fails, spectacles may be of use; but to the individual who has good vision spectacles are prejudicial. When we are unable to use our legs crutches may sometimes enable us to get about.

Nearly everybody uses some form of mnemonic device at times. Counting on the fingers is a mnemonic device. We frequently see speakers on the platform keep count of the number of the point under consideration by holding out a certain finger. When one of these speakers come to his first point he sticks out one of his fingers, when he comes to his second point he sticks out another finger, and so on. It has been remarked that the reason we have a decimal system of numbers is that men had ten fingers, and since men were accustomed to counting on their fingers the number 10 was chosen as the basic number for our numerical system.

If this assumption be true it would show the tremendous influence which the simple and innocent little mnemonic device of counting on the fingers has had upon the mathematics of the world.

Tying a string around the finger to remind us of something we wish to remember is another little mnemonic device that is quite common. Such mnemonic devices may sometimes lead people into the most ridiculous situations. Unless we can remember the fanciful association or mnemonic device we fail to remember what it is supposed to remind us of. I attended a lecture by a celebrated humorist. He spent the entire time of his lecture reporting ridiculous situations brought about by the use of mnemonic devices. He pointed out that the effort it takes to find a suitable mnemonic device and to commit it to memory would be more than enough to fix in mind the fact which we want to remember. At times, however, mnemonic devices can be used with great profit.

There is a little mnemonic device that has been quite useful to me. I could never keep from getting the two terms stalagmite and stalagtite mixed up in my mind. I could recall both of them without any difficulty, but I never could remember which was which. On visiting a well known

cave, I explained my difficulty to the guide who showed me through the cave. He told me of a little mnemonic device that has enabled me to keep these two terms from becoming confused ever since. It was as follows:

"The stalagmite might get to the ceiling
some day if it keeps on growing;
The stalagmite has to hold on tight so
as not to fall off."

Now I have no difficulty in keeping these two terms straight. Practically every vocation has some form of mnemonic devices that are employed by those who represent it in memorizing certain facts which must be learned by those belonging to the vocation.

A type of mnemonic device which I have found to be extremely useful in studying for examinations consists of the plan of outlining the material to be covered, then outlining that outline and picking out the topic word of each topic in the outline. Then I memorize the topic words in their correct order. When time comes for me to answer the question on examination, I recall the topic words and each of these suggests the point which it represents. I have never seen this device mentioned in print. It is a rather laborious one, although

it insures a greater degree of accuracy than perhaps any other system that can be applied generally considering the amount of work that is done in memorizing certain facts.

Another device for memorizing the topic words is to use them in some fanciful and even ridiculous sentence and memorizing the sentence. The more ridiculous the sentence the more easily is it recalled. When you recall the sentence you also recall all of the words.

The words to be remembered can sometimes be arranged into a sentence without the use of any intermediary words. In preparation for a recent examination, I was attempting to memorize a list of the types of schools that were transplanted from England to America. I began to search for a mnemonical device. I found that by rearranging the order of the words I had what was an almost perfect sentence. It was as follows:

"Pauper dame writing latin to apprentice."
I had no difficulty in memorizing this sentence. By recalling the sentence I could immediately remember the complete list of the types of schools that came to America from England. They were:
Pauper Schools, Dame Schools, Writing Schools, Latin Grammar Schools, and Apprentice Schools.

We must remember that mnemonic devices do not improve the memory, but are merely an aid to the learning of certain facts. They consist simply of fanciful associations between something that is hard to remember and something that can be remembered with ease, or between something which we have not yet learned and something that we have already memorized, and so on. Mnemonic devices are quite limited in their application and, for this reason, they cannot always be depended upon for bringing us out of our memory difficulties. Mnemonic devices, when applicable, are at times found to be quite useful.

RETENTION

Various terms have been used by various writers to designate that phase of memory which I shall call retention. The terms that are most commonly used to designate this phase of memory are: conservation and retention. Retention may be discussed from the view-point of retention proper, or it may be discussed from the view-point of forgetting, or the failure to retain. The great bulk of the literature on this subject deals with it negatively, or, in other words, from the standpoint of forgetting.

Robert S. Woodworth describes that phase of memory which is commonly known as retention in the following terms:

"Retention is a resting state, in which a learned reaction remains until the stimulus arrives that can arouse it again. We carry around with us, not the reaction, but the machinery for making the reaction." 35

It seems that forgetting offers more puzzling problems for the psychologist to solve than does remembering. Nearly everybody can think of experiences in which they have been unable to recall to mind certain facts, or impressions,

35. WOODWORTH, ROBERT S. Psychology, Page 348.

which they were quite sure that they would never forget. The pessimist would certainly find a fertile subject upon which to meditate in the fact that a whole lot of things we would like to forget we cannot forget, and a whole lot of things we would like to remember we cannot remember.

Some psychologists have raised the question as to whether or not we ever forget anything altogether. William Walker Atkinson said:

"The best authorities now generally agree that there is no such thing as absolute forgetting of even the most minute impression, notwithstanding the fact that we may be unable to recollect or remember it, owing to its faintness, or lack of associated 'indexing'....Hamilton says: 'The mind frequently contains whole systems of knowledge which, though in our normal state they may have faded into absolute oblivion, may in certain abnormal states, as madness, delirium, somnambulism, catalepsy, etc., flash out into luminous consciousness.'....Lecky says: 'It is now fully established that a multitude of events which are so completely forgotten that the statement of them calls up no reminiscence, may nevertheless be, so to speak, embedded in the memory, and may be reproduced with intense vividness under certain physical conditions.'.... In proof of the above, the authorities give many instances recorded in scientific annals. Coleridge relates the well-known case of the old woman who could neither read nor write, who when in the delirium of fever incessantly recited in very pompous tones long passages from Latin, Greek and Hebrew, with a distinct enunciation and precise rendition. Notes of her ravings were taken down by shorthand, and caused much wonderment, until it was afterwards found that she had been

employed as a servant in the house of a clergyman who was in the habit of walking up and down in his study reading aloud from his favorite classical and religious writers. In his books were found marked passages corresponding to the notes taken from the girl's ravings. Her subconscious memory had stored up the sounds of these passages heard in her early youth, but of which she had no recollection in her normal state." 36

It is interesting to notice in the case mentioned above that forgetfulness is the normal state and memory is the abnormal state. Theodule Ribot in discussing the diseases of memory brings out this fact. He said:

"We arrive, then, at this paradoxical conclusion: that one condition of memory is forgetfulness. Without the total obliteration of an immense number of states of consciousness, and the momentary repression of many more, recollection would be impossible. Forgetfulness, except in certain cases, is not a disease of memory, but a condition of health and life." 37

We must remember that forgetfulness is a normal characteristic of the human mind. It is simply pitiful that so many students are forced to memorize so many things that are of little or no interest to them only to forget it in a very short while after being tested on it. It is quite true that the college student learns an enormous amount of information, but we must remember that he also forgets a very considerable portion of that which he has learned, after he has been tested on it.

36. ATKINSON, W. W. Memory. Pages 50-54.

37. RIBOT, THEODULE. Diseases of Memory. Page 61.

W. H. Grove quotes Dr. Gregory as giving an example in which this enormous waste of energy in our educational systems is made quite vivid. He said:

"D. S. Gregory, D. D., LL. D., in Homeletic Review, July, 1900, quotes the honor-man in one of our great institutions: 'I passed through the four years of hard drudgery. The professors poured in and poured in knowledge on the whole range of subjects in the curriculum and when I came to the end of the course they asked me to pour it out.'....So nine-tenths of a student's life is often wasted and worse than wasted, - for all such knowledge is rubbish, mechanically gained, mechanically held, if held at all, and mechanically lost in the end." 38

Somebody has compared college students to just so many jugs into which knowledge is poured, like molasses into a jug. When examination time comes around the professor gets the students to pour out the knowledge which he has poured into them. The students pour it out, and it stays out, never more to occupy their overloaded minds or to disturb the tranquility of their spirits. The professor has every reason to be thankful if only a small portion of the knowledge he has poured into the students, sticks to the sides of the "jugs" after the examinations are over. In trying to find out how much knowledge a college student actually has, it is not sufficient

for us to find out the courses he has taken and the grades he made on them. This would only show us how much was "poured" into the jug. "This would fail to tell us how much actually "stuck" to the sides of the "jug". A thousand gallons of molasses can be poured into a single one-gallon jug, if each gallon is poured out before the next one is poured in. After one gallon has been poured into the jug, another gallon cannot be poured in until the first gallon has been removed. So it is with the student. He finds himself frequently clearing out the rubbish from his storehouse of knowledge, in order to make room for new knowledge that may be of greater importance to himself. We must remember that students know only a fraction of what they have learned.

I am inclined to believe that, if seniors in college were given tests in their freshmen subjects by surprise, that only in a few cases would they make passing grades except in the subjects in which they continued to study in the subsequent years of their college careers. Of course, if seniors knew that they would be tested on their freshman subjects, they would have fewer temptations to forget them, and if they continued to study that subject throughout the subsequent years in school

they would be compelled to keep in mind much of the basic material learned in the freshman year in order to be able to grasp the more advanced work which they are attempting to do. The wastage through forgetting in our schools is tremendous and it is quite worthy of the attention of teachers and educators. One of the main reasons why this wastage through forgetting is so great is that so much is required of the student that he has to give up the burden of keeping one subject freshly in mind in order to be able to carry the burdens involved in taking on other subjects. One of the main troubles with our educational system of today is that teachers are placing too much emphasis on the getting of knowledge and too little emphasis on the retaining and the using of knowledge after it is gotten. The student is made to acquire a great deal of knowledge that will never be of any use to him. It is not surprising that he should forget so great a proportion of what he has learned.

THE FACTORS THAT AFFECT RETENTION

The factors that affect retention are practically the same as those which affect learning. How well the individual retains learning depends upon how well he has learned it. Any factor, then, that affects learning will also affected retention as well. Recency is another factor that affects retention. How well an individual retains what he learns depends upon how long it has been since he has learned it. Time has a way of erasing things from our minds. The greater the length of time since a certain thing is learned, the greater are the chances of forgetting it. Another factor that affects retention is the frequency with which the thing remembered has been revived in consciousness. The more frequently the thing learned is brought into consciousness, the better is it remembered. There are other factors which have just as much, if not more, control over retention. These will be found to be more or less the same as those factors that affect learning. Let us consider briefly these factors and notice how they apply to retention as well as to memorizing.

THE INDIVIDUAL

There are great individual differences in capacity for retention just as there were great

individual differences in capacity for memorizing, or learning. The person who learns the quickest is not invariably the person who retains his knowledge the best. Many quick learners are quick forgetters. The native capacities on an individual have a great deal to do with the permanency with which knowledge will be retained, after it has been acquired.

ENVIRONMENTAL FACTORS THAT AFFECT RETENTION

The environment has a great deal to do with the permanency with which knowledge is retained by the individual. If the student remains in an environment that constantly reminds him of his experiences in the past, the chances are that he will remember them longer than he would if placed in another environment. By reminding the individual of previous experiences, by furnishing opportunity or occasion for the use of knowledge acquired in the past, by furnishing motives for the retention of knowledge acquired in the past, etc., the environment can have a great deal to do with the permanency with which knowledge is retained after it has been acquired.

MATURITY

Maturity also affects the permanency with which knowledge is retained. The mind of the very

young child and of the very old adult is in a great many cases quite poor for retention. A young child and a very old person can forget quite rapidly. The young child forgets rapidly, but this fact does not bother him as it does the adult. We find the old person bothered quite constantly over the fact that he has forgotten where he has laid his glasses. Maturity, then, is a factor that has a great deal to do with the permanency with which knowledge is retained.

PERSONAL FACTORS

The personal factors that affect learning, or memorizing, also affect the retention of the impression. The permanency with which knowledge is retained depends upon such personal factors as: the purpose or will to remember, carefulness to avoid forgetting, enthusiasm and interest in what is being retained and the like.

THE EFFECT OF THE MATTER TO BE MEMORIZED UPON RETENTION

There are some things that we forget far more rapidly than others. The quality of the matter which we are trying to retain has a great deal to do with our ability to retain it. Clear things are not only easy to memorize, but they are also easy to retain. So it is with all of the various elements of style which were discussed with reference to learning.

The clearness, the pleasingness, and the forcefulness of the matter memorized has a great deal to do with the permanency with which it is retained. The following are some of the most important elements of style that affect retention: simplicity, concreteness, unity, coherence, humor, grace, ease, elasticity, variety, surprise, fluency, euphony, refinement, pomp, uniqueness, elegance, sentiment, beauty, brevity, emphasis, characterization, climax, contrast, pathos, sublimity, suspense and the like.

THE CONDITIONS UNDER WHICH RETENTION TAKES PLACE

The conditions under which retention is made to take place has a great deal to do with the permanency with which knowledge is retained. If the individual is constantly forcing his mind to devour more and more knowledge, the chances are that the acquisition of new knowledge will cause many old things to be cleared away from the mind in order to make the acquisition of new knowledge possible. The individual who sees an opera for the first and only time remembers far more about that particular opera than the individual who since attending that one opera has attended a hundred more. Oftentimes certain experiences can play havoc with the memory of certain individuals. We sometimes hear of people

who after going through some terrible battle of the world war forgot even their own name. Although extreme cases of this type are usually due to some lesion on the brain itself, in other cases it might be due to the mental horror and anguish through the individual is made to pass. Usually the individual who lives in comfortable, or in healthful surroundings has better capacities for retention than those who live in disagreeable and unhealthy surroundings.

THE EFFECT OF THE METHOD OF RETENTION UPON RETENTION

There are many ways of retaining knowledge. One way, is just to allow it to remain in the mind, no effort being made to strengthen its hold on the mind. When this is done, the individual may forget quite rapidly. If we desire to retain something permanently, we must strengthen its hold upon the mind by drill, practice or repetition, and by discovering new relationships and forming new associations between it and other things that belong to our conscious life. New associations aid us in retaining old facts more permanently. We must be constantly reviewing our knowledge and forming new associations with it if we wish to retain it permanently.

THE RATE OF FORGETTING

Psychologists who have studied the rate of forgetting have discovered that what has been poorly memorized is forgotten quickly at first, then more slowly. That which has been thoroughly memorized is lost more gradually at first than that which has been poorly memorized. Woodworth says:

"The curve [of forgetting] sinks at first rapidly, and then slowly, from the 100 percent. line towards the zero line, 100 percent. here meaning perfect retention, and 0 no retention." 39

"It is a curve that first goes down steeply, and then more and more gradually, till it approximates to zero; which means that the loss of what has been learned proceeds rapidly at first and then more slowly....More is lost in the first hour than in the second hour, and more in the first week than in the second week. Few of the experiments have been continued long enough to bring the curve actually to the zero line, but it has come very close to that line in tests conducted after an interval of two or four months." 40

"It must be understood that this classical curve of forgetting only holds good, strictly, for material that has barely been learned. Reactions that have been drilled in thoroughly and repeatedly fall off very slowly at first, and the further course of the curve of forgetting has not been accurately followed in their case. A typist who had spent perhaps two hundred hours in drill, and then dropped typewriting for a year, recovered the lost ground in less than an hour of fresh practice, so that the retention, as measured by the saving method, was over ninety-nine per cent." 41.

39. WOODWORTH, ROBERT S. Psychology. Page 350.

40. Ibid. Page 351.

41. Ibid. Page 352.

ARTIFICIAL RETENTION

In studying memory, we should deal primarily with mental retention, but there is another form of retention that deserves at least a passing mention - artificial retention. Artificial retention of unimportant facts enables us to devote our energies more fully to the mastery of those things which are more important. We retain things artificially by the use of many devices that have been invented largely for that purpose. For example, we retain sights by means of photographs; moving pictures and the like; we retain sounds by means of a phonograph; we can retain a certain interpretation of a piano composition by means of a recording piano and a player piano; we can retain verbal ideas, or ideas that can be expressed verbally, by means of written records of all kinds. Memoranda, mementoes, souvenirs, notebooks, books, memorials, monuments, records, inscriptions, commemorative holidays and the like are all artificial means by which the memory of certain things is preserved. Artificial retention may be, and usually is, far more accurate than mental retention and for this reason it should not be altogether overlooked in such a discussion as this one.

The third formal step of memory which I shall endeavor to discuss is recall. I use the term "recall" in its broadest sense, which includes recognition as one of its phenomena. Many authorities use the word "recall" in its strictest sense and therefore discuss recall and recognition separately. Various terms are used by different writers to designate that phase of memory which I call "recall". The following are among the terms most commonly used by these authorities: retrospection, recollection, reminiscence, recitation, reproduction, revival of mental impressions, revival of mental images, perseveration, remembrance, and so on. Each of these words expresses a slightly different shade of meaning.

Retrospection, in the literal sense of the term, means the act of looking back. The true meaning of the word then would apply to the act of looking back mentally over, or upon, the past.

Recollection, in the literal sense of the term, means the act of re-gathering. The true meaning of the word then would apply to the act of searching in our mental storehouse and gathering the scattered fragments of whatever we are trying to recall. Recollection, in the literal sense, would

involve volition. It would imply the making of an effort to bring some relatively obscure mental image into a state of vividness, or at least clearness. The term recollection is usually used to apply with reference to the act of recalling whatever is recalled with considerable difficulty.

Reminiscence, in the literal sense of the term, means to remember again. This term is usually used with reference to the act of day-dreaming about experiences, scenes, or events belonging to the remote past. The word reminiscence is rarely applied by the best authorities with reference to the act of recalling ideas, facts, rote material, and the like. It is rarely used to apply to the act of recalling that which has been previously "memorized". In other words, it is rarely used with reference to the act of recalling that which we have made a particular effort to learn.

Recitation, in its literal sense, means the act of citing again. The word recitation is usually used with reference to the act of speaking from memory, usually rote memory. It is used with reference to the act of repeating some verbal material which has been previously

memorized by rote. It is also commonly used with reference to the act of answering verbally such questions as are asked by a teacher about a lesson which had been previously assigned for study. The term recitation usually applies to oral and verbal recall.

Reproduction, according to the literal meaning of the term, means to produce again. The term reproduction is usually applied to the repetition of some action involving manual or physical activity. It might be called a muscular or physical form of recall.

Revival of mental images, or of images of mental impressions refers to that type of recall that is purely mental. This term is usually used with reference to the act of calling to mind the images produced by any form of sensory experience. We can revive the image produced by an electric shock, or a burn, or a pain, or a sight.

Perseveration is a term which is used to applied to what we might call, "involuntary recall" or "non-voluntary recall". With reference

to this type of recall, Robert S. Woodworth says:

"There is an exceptional case, where recall seems to occur without any stimulus. This form of recall goes by the name of perseveration, and a good instance of it is the 'running of a tune in the head', shortly after it has been heard. Another instance is the vivid flashing of scenes of the day before the 'mind's eye' as one lies in bed before going to sleep. It appears as if the sights or sounds came up of themselves and without any stimulus. Possibly there is some vague stimulus which cannot itself be detected. Only a slight stimulus would be needed, because these recent and vivid experiences are so easily aroused." 42

Remembrance is usually used to apply to the act of keeping certain matter within the grasp of the mind, although it may, or may not be consciously before the mind. It is quite possible for a person to remember something which he is unable to recall at the time.

Recognition, in its strictest sense, is usually used with reference to the act of identifying some present mental experience as being similar to, or identical to some other experience belonging to the past. Some authors define recognition as a "feeling of familiarity with an object". The difficulty with this definition is that in certain abnormalities of memory the individual may feel that a certain scene or event is perfectly familiar to him, when in reality he is going through that experience for the first time. There is a

phase of paramnesia, known as "identifying paramnesia", or "double memory", or "false familiarity" in which the patient feels that what he is experiencing for the first time is perfectly familiar to him. The patient feels that he can actually predict exactly what is going to happen next. In this case the patient feels the greatest familiarity with the sight which he is seeing, or the experience which he is experiencing for the first time. This is only a false familiarity. We might speak of this type of recognition as "false recognition", but the term "recognition", in the true sense of the word, should be used only with reference to the act of identifying some object, scene, sound, or experience of any kind as being similar or identical to some other object, scene, sound or experience that was made conscious to the mind in the past.

It is usually much easier to recognize something than to recall it. This is one of the reasons that plus-and-minus tests, yes-and-no tests, true-and-false tests and the like are easier to answer than the old fashioned question and answer tests. It is far easier to recognize a statement as being true or false than it is to recall the essential features of that statement.

FACTORS THAT AFFECT RECALL

The facility with which something is recalled depends first upon how well it was memorized. In the second place it depends upon how well it has been retained by the mind, after it was memorized.

In discussing recall we must remember that psychologists in testing the individual's ability to learn and to retain knowledge must do so largely by testing his ability to recall what he has learned, or what he retains. We must not overlook the fact that whatever interferes with the individual's ability to recall during the tests for learning ability and during the tests for retention would naturally viciate the score made on these tests. Worry, anxiety, fear, discomfort, pain, distraction and other similar things affect recall, and if present at the time of the test for learning ability, or for retention, the score which the individual will make on the test will naturally be a viciated one.

The question is raised by some authorities as to whether or not it is possible for us to be unable to recall something which we are able to retain. My experience has demonstrated this fact to me over and over. For example. in performing

Chopin's Polonaise Militaire on the piano I sometimes find that I am altogether unable to recall a certain portion of it correctly. By repeating that portion I find that I can recall it without the slightest difficulty. A considerable portion of this composition consists of the repetition of sections which have previously occurred in the composition. In playing the composition through, I find that I can recall a certain portion of it perfectly, but when in a few seconds later I attempt to repeat the same passage I find that I am altogether unable to recall them. A few minutes later I may be able to recall the passages which I was unable to recall at first without the slightest difficulty. I think this experience demonstrates forcibly the fact that we are oftentimes unable to recall that which we are able to retain.

If we consider carefully the factors that affect learning and retention we find that these same factors also affect recall.

THE INDIVIDUAL

In discussing this factor before we found that the individual's ability consisted of his native capacities, modified through the play of environmental

forces in his life, modified by the degree of maturity to which his mind has attained, and further modified by certain personal traits that are characteristic of himself. Each of these causes of individual differences in learning ability has some bearing upon the facility with which a certain thing is recalled by a given individual.

Differences in native ability oftentimes explains the reason for the fact that some individuals are able to recall their knowledge with greater facility than others. Native ability certainly has a considerable influence on the ability to recall.

The environmental influences which have entered the life of an individual, such as his training, education and the like, also have a considerable influence upon the individual's power to recall what he has learned. This fact is easily demonstrable by comparing the results obtained by an individual who has been trained to recall with those obtained by an individual who has not had this training. Take, for example, the case of public speaking. Other factors being equal, the individual who has had the most

experience in public speaking recalls a speech with much greater facility than the individual who has not had this training. One of the main reasons for this is that the individual who has had the most experience on the rostrum feels more at ease on the rostrum than the individual who has had no experience of that kind, and in feeling at ease before the public he is aided in recalling what he has to say.

The maturity of the individual also has a considerable influence on the individual's ability to recall his knowledge. An older person usually feels more at ease before the public than a child does. He looks down from the rostrum upon his equals and his inferiors (from the standpoint of age), whereas in the case of the child the speaker finds himself facing the critical eyes of those who are older, more experienced and, quite probably, better informed than himself.

The personal attributes of the individual as to traits of character and personality also have a great deal to do with his ability to recall knowledge. The courageous individual, when attempting to recall a speech before the public recalls it with greater facility than does the person who lacks this trait of character. The

individual who is enthusiastic about the subject which he is attempting to discuss recalls with greater facility what he has to say than the individual who lacks this enthusiasm. In like manner we would find that a large number of these personal factors have quite a considerable influence upon the individual's ability to recall.

THE EFFECT OF THE MATTER TO BE RECALLED UPON THE INDIVIDUAL'S ABILITY TO RECALL IT

Some things are far easier to recall than others. The elements of style which we have considered before will also be found to apply in the case of recall. There are many factors, or qualities of the matter to be recalled, that affect the individual's ability to recall certain things. Many of these are so elusive in nature that it becomes almost impossible to enumerate them.

THE EFFECT OF THE CONDITIONS UNDER WHICH THE RECALL IS TO BE MADE UPON THE FACILITY WITH WHICH RECALL TAKES PLACE

The conditions under which recall takes place has a great deal to do with the facility with which certain things are recalled to mind. For example, some time ago I entered a public speaking contest. I knew my speech almost to perfection in my own room,

but when I attempted to recall the speech in public and with the sore throat and bad cold which is characteristic of practically all people who are modestly attempting to use their voices in public, I found that certain parts of my speech were gone. There was nothing that I could do to recall it. So I found myself obliged to improvise and extemporize little sections which would connect the parts that I was able to remember, but the speech lost much of its force because I was forced to devote my attention to what I was going to say and how I was going to express it, rather than to how I was going to "deliver" it. In the above case we might notice that the same individual was attempting to recall the same matter under different conditions. The difference in the conditions made all the difference in the world.

Music teachers in preparing their students for their formal debûts have found out that it necessary to get them to practice in public the selections which they are to perform in their formal debût. With this in view, the teacher requires them to appear in many informal recitals in which only the friends, the relatives and those with whom the student is associated are present. By means of these informal recitals, the teacher prepares the student for the formal event which crowns his efforts.

Many a debut has resulted in an almost complete fiasco, the student's musical reputation has been practically ruined, and many a teacher's efforts brought to nothing for the simple reason that the teacher or the student failed to realize that in order that the student may recall perfectly what he has learned he must practice under conditions which are as nearly like those under which the recall is to be made as possible. Music teachers sometimes think that if a student can perform well in private he can perform equally well, or relatively as well, in public. Usually, such teachers soon find themselves suffering from a painful disillusionment.

Students sometimes notice that they are unable to recall during an examination, a test, or a recitation the facts which they recalled with ease in their study rooms. We must remember that the conditions are different to an extent in these cases. The best way to prepare for a recitation is to recite. The best way to prepare for a test under a teacher is to get someone to test you before you are to be tested by the teacher, or when this is impossible, to test yourself. By writing out a list of questions that will probably be asked in the examination and asking yourself these questions and answering them you can prepare

yourself far more efficiently for the examination than by merely attempting to drill certain facts into your mind.

In preparing to recall something in the future we must remember that a change in the conditions under which the recall is to be made may greatly affect the facility with which the recall is made.

There are many things which might interfere with recall. Woodworth makes the following mention of some of the outstanding things that interfere with recall:

"One type of interference is emotional. Fear may paralyze recall. Anxious self-consciousness, or stage fright, has prevented the recall of many a well-learned speech, and interfered with the skilful performance of many a well-trained act. Distraction is an interference, since it keeps the stimulus from exerting its full effect." 43

On the other hand, we find that fearlessness, courage, self-confidence and other similar mental attitudes greatly reduce the liability of the individual's failure to recall that which he has thoroughly learned. The use of reminders, outlines, summaries and the like may greatly aid the individual in recalling things, but it is not always possible to use these "crutches" that aid recall. The expedient of having some one to prompt us when we

find ourselves absolutely unable to recall something is also helpful at times and in some cases. There are many times when prompting occasions more disastrous results than the failure to have this expedient available, for we will rely too much upon it and we finally find ourselves in a position in which we cannot recall what we wish to say without the assistance of some one to prompt us. I have seen many a good oration ruined by the fact that the speaker relied on some person to prompt him in case he should find himself unable to recall what he had prepared to say.



QUARTER

SEPTANCHEROND

PART V

MADE IN U.S.A.

THE IMPROVEMENT OF MEMORY

The question has been raised by many prominent authorities as to whether it is possible or impossible for an individual to improve his memory. Many authorities are of the opinion that we can improve our memories to quite a considerable extent. Memory cannot be greatly improved overnight, however. If we can improve our memories at all it must be by a gradual and slow process of development. Many memory courses that are advertised at present, make the claim that all that an individual has to do to have a good memory is for him to spend a few hours studying these courses. The cultivation of memory is not such a rapid process, however. If the memory can be improved it must be through patient and persistent effort directed towards the goal of improving the memory. All that a course, or a book on memory can do is to inform the individual as to the principles that should guide his efforts to cultivate his memory.

I shall consider the improvement of memory from the standpoint of those factors which, in our study of this subject, have been found to be responsible for individual differences in memory ability.

MEMORIZING

Some authorities have raised the question as to whether it is possible or impossible for an individual to improve his "native capacity" for memorizing. A considerable amount of discussion has resulted from the raising of this question. Differences of opinion as to whether it is impossible for an individual to improve his "native capacity" for memorizing seem to be due very largely to the fact that most authorities have failed to tell what they meant by the term "native capacity". Some authorities seem to think of "native capacities" as being solely the result of hereditary forces that act in the life of a given individual. Heredity, being a thing of the past in the life of an individual, we can say without fear of contradiction that an individual cannot improve his heredity. If "native capacities" are solely the result of hereditary forces that act in the life of an individual, and if an individual is powerless to improve his heredity, we can say, without fear of contradiction, that it is absolutely impossible for an individual to improve his native capacities, of whatever sort they may be. I use the term "native capacities"

with reference to the various hereditary forces that act in the life of an individual. I can say, then, that it is impossible for an individual to improve his native capacities for memory.

Other authorities think of the term "native capacity" as being synonymous with "ability". It can be easily observed that an individual can improve his ability to memorize and to remember certain things to a considerable extent. Authorities who think of the term "native capacities" as being synonymous with "abilities" are led to the conclusion that the "native capacities" can be improved. In the sense in which I use the term "native capacities" we must agree that the "native capacities" for memory cannot be improved, although when we think of the term "native capacities" as being synonymous with "ability" we must agree that the "native capacities" for memory can be improved. The question is really over the definition of terms and not over the facts observed.

Heredity sets the limits to which an individual may achieve. Some individuals are naturally gifted through heredity with better memories than others. Native endowment has a great deal to do with the amount of improvement that may be made with the memory of a given individual. Some individuals

would never develop outstanding memories in spite of all the opportunities and training that may be given them. John D. Comrie said:

"No training will make up for a deficiency of nerve-cells or association fibres, which are inborn characters, and probably no mere education would produce all-round genius of memory like Napoleon or Macaulay." 1

We must not forget, however, that the average individual falls far short of reaching his possibilities. The average individual is capable of improving his memory to the extent that few individuals ever reach.

ENVIRONMENTAL INFLUENCES

By environmental influences is meant everything that enters into the life of an individual, such as education, training, experiences, and the like. Most authorities recognize the value of training, drill, practice and the like in the improvement of memory. Quintilian said:

"If anyone ask me what is the only and great art of memory, I shall say that it is exercise and labour. To learn much by heart, to meditate much, and, if possible, daily, are the most efficacious of all methods. Nothing is so much strengthened by practice or weakened by neglect as memory." 2

Professor Kendrick said:

"We train the muscles by exercise, and so we may train the different organs of the brain by proper

1. COMRIE, JOHN D. Black's Medical Cyclopedia. Page 375.

2. QUINTILIAN. Quoted by David Kay. Memory. Page 325.

exercise also, by intellectual work, by strengthening the power of the will, and by regulation of our emotions." 3

David Kay said:

"Further, in order to improve and strengthen the memory, we must be constantly exercising it. We must be constantly supplying it with materials fitted for its use." 4

William Walker Atkinson said:

"In some of the celebrated cases, the degree of recollection manifested is undoubtedly abnormal, but in the majority of the cases it may be seen that the result has been obtained only by the use of natural methods and persistent exercise. That wonderful memories may be acquired by anyone who will devote to the task patience, time and work, is a fact generally acknowledged by all students of the subject. It is not a gift but something to be won by effort and work along scientific lines." 5

"There is no Royal Road to Memory. The cultivation of the memory depends upon the practice along certain scientific lines according to well established psychological laws. Those who hope for a sure 'short cut' will be disappointed, for none exists. As Halleck says: 'The student ought not to be disappointed to find that memory is no exception to the rule of improvement by proper methodical and long continued practice. There is no royal road, no short cut, to the improvement of either mind or muscle. But the student who follows the rules which psychology has laid down may know that he is walking in the shortest path, and not wandering aimlessly about. Using these rules, he will advance much faster than those without a chart, compass, or pilot. He will find mnemonics of extremely limited use. Improvement comes by orderly steps. Methods that dazzle at first sight never give solid results.'" 6

3. KENDRICK, PROF. Quoted by Kay. Memory . Page 121.

4. KAY, DAVID. Memory. Page 325.

5. ATKINSON, WILLIAM WALKER. Memory. Page 36.

6. Ibid. Pages 21-22.

"We urge, first, last, and all the time, the importance of the use and employment of the memory, in the way of employment, exercise, practice and review work. Like any other mental faculty, or physical function, the memory will tend to atrophy by disuse, and increase, strengthen and develop by rational exercise and employment within the bounds of moderation. You develop a muscle by exercise; you train any special faculty of the mind in the same way; and you must pursue the same method in the case of memory, if you would develop it." 7

"Most important of all - get to work. The rest is a matter of practice, practice, practice, and rehearsal." 8

Practically all authorities on the subject of improving the memory recognize the value of intelligent training, exercise, and the use of the memory in improving the memory.

Authorities who have made the most careful investigations about the effect of practice upon mental functions call our attention to the fact that practice brings specific results more particularly than it does general results.

Robert S. Woodworth said:

"And so it is with any kind of material; practice in memorizing it brings great improvement in memorizing that particular material." 9

"Whether practice with one sort of material brings skill that can be 'transferred', or carried over to a second kind of material, is quite another question. Usually the amount of transfer is small compared with the improvement gained in handling the first material, or compared with the improvement that will result from specific training with the second kind." 10

7. Ibid. Page 20.

8. Ibid. Page 26.
9. WOODWORTH, ROBERT S. Psychology. Page 361.

10. Ibid.

Before devoting much time to drill and practice on memory work it is a wise plan for the individual to make a diagnosis of his situation. He should ascertain the lines along which his memory encounters the most trouble. In practicing on memory work the individual should chose that type of material with which he has the most trouble. He should devote his attention and effort primarily to the doing away with these difficulties. If the individual finds that he is troubled more with a poor memory for names than for anything else, he should devote his attention primarily to the exercise of the memory and the improvement of his mental tactics along the line of memorizing names.

Robert S. Woodworth reports the following case in which a certain man strengthened his memory for names by means of exercise and the improvement of mental tactics along the line of memorizing names:

"It was said of a certain college president of the older day that he never failed to call a student or alumnus by name, after he had once met the man. How did he do it? He had the custom of calling each man in the freshman class into his office for a private interview, during which, besides fatherly advice, he asked the man personal questions and studied him intently. He was interested in the man, he formed a clear impression of his personality, and to that personality he carefully attached the

name. Undoubtedly this able scholar was possessed of an unusually retentive memory; but his memory for names depended largely on his method of committing them to memory." 11

"Contrast this with the casual procedure of most of us on being introduced to a person. Perhaps we scarcely notice the name, and make no effort to attach the name to the personality. To have a good memory for names, one needs to give attention and practice to this specific matter. It is the same with memory for errands; it can be specifically trained." 12

There are many mnemonical devices which are of value in aiding the individual to remember names. Teachers frequently meet with great difficulty in learning the names of their pupils. Specially is this true in our colleges and universities where many students attend school for such short time. A clever mnemonic device which some teachers use, specially those who have large classes, is to assign a special seat to each pupil. Then the teacher makes a chart of the seats in the class and places upon the chart the number of each seat and the name of the pupil that occupies that seat. If the teacher meets with any difficulty in recalling the name of a particular pupil he can easily refer to the chart and with little difficulty ascertain the real name of the student. This is a

11. Ibid. Page 362.

12. Ibid. Page 362.

much better way of recalling the name of the student than that of fumbling about ~~over~~ the names of the various students in the hope of recognizing the right name.

I was talking to a certain teacher who uses this mnemonical device, when a lady came in and asked him whether he remembered her. He replied that he remembered her quite well. He immediately recalled her name and told her exactly where she used to sit in his class. She expressed her surprise in his ability to recall her name since she had been in his class only for a very short time and it had been quite a considerable amount of time since she was in his class. I asked him how he was able to recall the name of that lady with such facility. He immediately explained to me, that the use of the class chart enabled him to learn the name of each student with great ease and rapidity. Every day and in every class he would go over the chart as he called the roll and strengthen the associations between each student, his position in the class and his name on the chart. In the course of a few days he would know the names of every student in his classes.

Mnemonic devices, when applicable, greatly reduce the difficulties involved in learning certain things. By learning mnemonic devices and learning how to use them, the individual can greatly improve his memory for certain facts.

IMPROVING THE METHOD OF MEMORIZING

An individual can greatly improve his memory by improving his method of memorizing. In a former division of this work, we considered two of the main types of learning, namely: (1) Learning by repetition and (2) Learning by association.

LEARNING BY REPETITION

Certain types of repetition have been found to yield better results than other types. The following are some of the most efficient types of repetition: attentive repetition, purposeful repetition, spaced repetition, whole and part repetition, etc. The individual can improve his memory to a considerable extent through the application of the most efficient types of repetition. These have been discussed in considerable detail in a previous chapter and it will not be necessary for me to repeat what has already been said about them.

LEARNING BY ASSOCIATION

The individual can greatly improve his memory by learning to properly associate his knowledge so that one idea, when aroused in the mind, will arouse other related ideas. When the individual has learned the art of forming intelligent associations between the things which he retains in mind he will find that his memory has been greatly improved.

Some authorities are of the opinion that the most fertile secret of the art of improving the memory is that one of learning to form intelligent associations. No one can deny that we can greatly improve the memory by learning to form intelligent associations.

THE PERSONAL ELEMENTS

Perhaps the most important factor to be considered in the improvement of the memory is the personal factor. How much an individual may improve his memory depends very largely upon his mental attitude towards the improvement of his memory. So many people have such poor memories largely because they do not want better memories badly enough to cause them to be willing to pay the

price of developing it through the proper kind and amount of exercise. Not only is the will or purpose to improve the memory important, but such traits of character as persistence, perseverance and the like have a great deal to do with the improvement of the memory. Certain traits of character are essential to success in any undertaking and they should not be overlooked in a discussion of the psychology of improving the memory. Perseverance and persistence are among the most important of the traits of character that make it possible for an individual to improve his memory.

IMPRESSION

The memory of an individual may be greatly improved by improving his capacity to receive impressions. Of course, our capacities to receive impressions is limited by the constitution and condition of the sense organs. There is nothing that a blind person can do to improve his capacity for receiving visual impressions unless there is some means by which his blindness can be remedied. If there is any defect in our sense organs that may be corrected, the first logical step in

improving the memory should be to correct these defects. If this defect is poor eyesight, the fitting of glasses may be the remedy.

Not only has sensation a great deal to do with the improvement of the ability to receive impressions, but we must not forget that perception is just as important as sensation. Perception is one factor that depends, at least partly, on training. It can, therefore, be improved. By improving perception we improve our memory for the things perceived. Reuben Post Halleck says:

"Haziness of perception lies at the root of many a bad memory. If the perception is definite, the first step has been taken towards insuring a good memory. If the first impression is vivid its effect upon the brain cells is more lasting." 13

Back of perception is attention. Lack of attention, or lack of concentration is at the root of many a bad memory. William Walker Atkinson said:

"By attention you acquire the impressions that you file away in your mental record-file of memory. And the degree of attention regulates the depth, clearness and strength of the impression. Without a good record you cannot expect to obtain a good reproduction of it. A poor phonographic record results in poor reproduction, and the rule applies in the case of memory as well." 14

"The way to train the mind to receive clear sight impressions, and therefore to retain them in the memory is simply to concentrate the will and attention upon objects of sight, endeavoring to see

13. HALLECK, REUBEN POST. Psychology. Page 134
 14. ATKINSON, W.W. Memory. Pages 20-21.

them plainly and distinctly and then to practice recalling the details of the object some time afterward. It is astonishing how rapidly one may improve in this respect by a little practice. And it is amazing how great a degree of proficiency in this practice one may attain in a short time. You have doubtless heard the old story of Houdini, the French conjurer, who cultivated his memory of sight impressions by following a simple plan. He started in to practice by observing the number of small objects in the Paris shop windows he could see and remember in one quick glance as he rapidly walked past the window. He followed the plan of noting down on paper the things that he saw and remembered. At first he could remember but two or three articles in the window. Then he began to see and remember more, and so on, each day adding to his power of perception and memory, until finally he was able to see and remember nearly every small article in a large shop window, after bestowing but one glance upon it. Others have found this plan an excellent one, and have developed their power of perception greatly, and at the same time cultivated an amazingly retentive memory of objects thus seen. It is all a matter of use and practice. The experiment of Houdini may be varied infinitely, with excellent results. The Hindus train their children along these lines, by playing the 'sight game' with them. The game is played by exposing to the sight of the children a number of small objects, at which they gaze intently, and which are then withdrawn from their sight. The children then endeavor to excel each other in writing down the names of the objects which they have seen. The number of objects is small to begin with, but it is increased each day, until an astonishing number are perceived and remembered. Rudyard Kipling in his great book 'Kim' gives an instance of this game, played by 'Kim' and a trained native youth." 15

Back of attention and perception is interest.

Lack of interest is at the root of many a bad memory.

The greatest minds have been found to be those of

the deepest and the broadest interests. We should cultivate an interest in our surroundings. By cultivating an interest for something we improve our memory for it.

RETENTION

First of all, memory depends upon impression. In the second place, memory depends upon retention. In attempting to improve our memories we should not only aim at improving our ability to receive impressions, but we should also aim at improving our ability to retain these impressions. We improve our ability ~~to~~ retain impressions by constantly recalling to mind those things which we wish to remember. Facts, ideas, and impressions of any kind are soon lost if they are not occasionally recalled to mind. We can strengthen our mental hold on the things we wish to remember by meditation, self-quizzes and other similar types of recall. After we have acquired valuable impressions we should not lose them by neglect.

Artificial retention is safer than natural retention and it is advisable to keep some form of permanent record of the things we wish to retain. The keeping of a written record to which we may go to refresh our minds from time to time, is of great value in helping us to retain what we wish to remember.

The keeping of a diary and a memory book is of great value in helping us to retain some knowledge of our past experiences. Some people are of the opinion that the use of devices for artificial retention serves to weaken the memory, since the individual will rely on the device rather than on his memory. There is some truth in this statement, but we must not forget that this is not true so long as the individual does not make himself a slave to his device. Artificial reminders are very useful in many cases. Artificial retention serves the purpose of relieving the mind from the burdensome necessity of memorizing facts which in a short time will have outlived their usefulness, and by doing this, it enables the individual to devote his mental energies more wholly to the acquisition of knowledge which is of lasting utility, of continuous inspiration, or of permanent joy.

RECALL

Memory depends first of all upon impression. In the second place it depends upon retention. Then it depends upon recall. We could easily prove that we can learn and retain things which at certain times we cannot recall. It is not

only important for us to improve our ability to receive and retain impressions, but it is also important for us to improve our ability to recall them at will. The ability to recall impressions is improved or increased as the ability to receive and retain impressions is increased.

Many people have poor memories for the simple reason that they do not recall their knowledge until it becomes crucially important for them to do so. It is a wise plan for an individual to stop occasionally in order to recall to mind some of the things which he does not wish to forget. I once heard of a case of a man who claimed that he could not remember anything he wanted to remember. A friend of his advised him to stop every few minutes and think about what he had been doing for the past minutes. He could remember what he had done for the past fifteen minutes quite easily. He was then told by his friend to increase the intervals at which he stopped to recall what he had been doing. He improved rapidly and in a short time he could recall everything he had done during the day. He continued to improve until he could recall everything he had done for the past week, then month, and so on.

Another man met with the same difficulty. A friend of his advised him to stop at the end of each day and tell his wife everything he had done during the day. His memory also improved rapidly through this practice in recalling his experiences.

ASSOCIATION AS AN AID TO RECALL

The use of associations is certainly a great aid to the recalling of our past experiences. The reason so many people cannot recall their knowledge with ease is that their minds are in the greatest confusion due to the fact that they had neglected to establish the proper associations between the various things that they do not wish to forget. The formation of associations in the mind preserves order in the mind. The root of many a bad memory lies in poor organization of the things which are retained. Associations are of great aid to memory. Associations enable us to recall complete trains of thought rather than disconnected and isolated ideas. It is association that enables us to recall the name of a person when we recall or recognize that person's face. William Walker Atkinson says with reference to association:

"Every association that you weld to an idea or an impression, serves as a cross-reference in the index,

whereby the thing is found by remembrance or recollection when it is needed. We call your attention to the fact that one's entire education depends for its efficiency upon the law of association. It is a most important feature in the rational cultivation of the memory, while at the same time being the bane of artificial systems. Natural associations educate, while artificial ones tend to weaken the powers of the mind, if carried to any great length." 16

One of the main reasons why the more we memorize the better our memories become is that the more we memorize the greater is the number of facts which we have in mind with which to associate new ideas. The more we know, the greater are the chances of our discovering or noticing relationships between what we already know and what we are trying to learn. Association is truly an aid to the memorizing of ideas, but its chief value lies in the fact that it is almost essential to the act of recalling ideas.

Just as it is easy to find the papers you want that are properly filed in a good filing system, so is it easy to recall the information or knowledge you want when the proper associations have been formed. Associations keep order in the mind, and by keeping order in the mind they make it easy for us to recall that which we wish to remember.

SUMMARY

The question has been raised by many authorities as to whether it is possible or impossible to improve the memory. Many authorities are of the opinion that it is not possible to improve the "native capacity" for memory. The efficiency with which the "native capacity" for memory may be used may be increased by the following means: (1) By improving the environmental factors that affect memory; (2) Through maturation of the capacity for memory; (3) By improving the personal factors that affect memory; (4) By improving the conditions under which knowledge is acquired, retained and recalled; (5) By improving the method of memorizing; (6) By making intelligent use of associations and mnemonic devices; (7) By improving the individual's capacity for receiving clear and vivid impressions, by correcting defects that may be present in his sense organs; (8) By improving the individual's power of perception through the cultivation of habits of attention and concentration, and through the cultivation of interests in what is being committed to memory; and (9) By learning how to make the proper use of devices for artificial retention.

Obedience to the laws of memory is the only secret for improving the memory. The individual who knows and understands the laws of memory can certainly profit by this knowledge and do much towards making his memory render greater and more efficient service to himself and to his fellow-man.

THE END

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