

# OUR DAY

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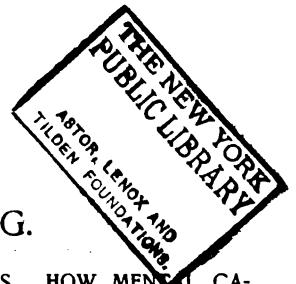
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## THE ART OF BRAIN BUILDING.

A DESCRIPTION OF REMARKABLE PSYCHOLOGICAL DISCOVERIES. HOW MENTAL CAPACITY MAY BE INCREASED.

BY ELMER GATES.

I HAVE been requested to give a brief epitome of the researches I have made in the general lines of psychology as a science, and of its application to human affairs. The science of mind is called psychology, and the corresponding art which has arisen out of this science I have ventured to name Psychurgy. It is a brief epitome of the experimental researches which led to the general conclusions which I am about to bring before you that I shall now give. It was my good fortune to have early in life, from the period of two years of age to thirteen, a governess who taught me as much of the natural sciences as I could receive from nature and not from books. This led me to an early acquaintance with scientific apparatus, and it also led me to respect scientific evidence more than dogmatic authority. I noticed quite early in life that some days I could do better mental work than others; that during some hours I was mentally exalted, and during others, mentally depressed; some hours I could write an essay with great ease, and at others with no amount of effort could I do as well. There were hours when my mind was above par mentally and during such times I could learn my mathematics and languages with great ease. There were other hours when I was below par mentally, and I wondered whether the difference was wholly in myself or wholly outside of myself, or partly both; and I conceived the happy idea of making a series of experiments to discover to what extent environment and bodily conditions could influence my mental life. Accordingly, I made a series of measurements and records of environmental conditions, such as those of temperature, moisture, barometric pressure, electrostatic potential, quality and amount of light, and so on. This scr-

ies of records was kept up four times a day for two years. I also made a series of records of my own bodily conditions; such as those of temperature, pulse, breathing, perspiration, sleep, exercise, how much of each kind of food I ate, the water that I drank, and a careful analysis of the excretions and secretions, and so on. This second series of records was kept up four times a day, for two years. The third series of records consisted of my mental activities. I recorded every phase of my mind's action, especially the hours when I was mentally exalted or depressed, and most especially when my mind was above par mentally or during such time when I originated ideas. I recorded my dreams at night; my emotional conditions by day, and also whatever I learned or read. These three series of records, it will be observed, related first, to environment, and second to the body, and third to the mental activities. Before the second year had expired, I discovered that the hours during which I was above par mentally always corresponded to a certain definite series of conditions in body and mind. This led me to conceive the close functional relationship between my mind and organism and the environment in which that mind was manifested. I practiced and artificially maintained those conditions which were promotive of mentation, and avoided the others, and the result was a great increase in my mental capacity and especially in the amount of original work which I was able to do immediately thereafter. If I may be allowed to digress a moment I will say that the mind was first scientifically studied about fifty-two years ago when, at the suggestion of Fechner, Herbart and others, such men as Wilhelm Wundt and Helmholtz began to measure sensations and reaction times, and thus inaugurated the

science of physiological psychology and psycho-physics. It is probable that the next step in the scientific study of the mind, in chronological order, was taken when I commenced the series of environmental and bodily and mental measurements and records. I believe that for the first time in the history of the human race there was thus discovered an art of directly promoting mentation. By "mentation" I mean mind in activity. Mind is in activity when it feels, or when it adapts acts to ends, or when it knows, and the object of its activity is the discovery of truth and its application to the amelioration of the conditions of life. This art of mentation demonstrated that I had been wasting most of my organic energy; had, in fact, been spending most of my strength in swimming up stream in place in swimming with the stream. A separate publication will describe my researches in this domain. A regulation of environmental and bodily conditions will enable the pupil or investigator to conserve from 60 to 80 per cent of the organic energy which is at present being wasted. The truth is, the human race has been almost entirely ignorant of the fact that in its daily habits it has been violating most of the environmental, bodily, and psychologic conditions of best mentative success. The reason for this state of affairs is that the human race has paid almost no attention to the study of the mind. Speculation and hypothesis have taken the place of accurate observation and scientific experiment. As a matter of fact it is the mind alone that makes all discoveries, that applies all arts; it is the mind alone that learns, and it is the mind's activities that achieve progress and civilization; and from a fundamental standpoint progress consists solely in the achievement or embodiment of more mind and in learning how better to use it. To illustrate the influence of bodily conditions I may state that during a high electric potential all of the mental functions are more intense and rapid, and that during a low electric potential all of the mental functions are slower and less intense. I found that, during the two years of my records, I had not achieved a single original idea except during a time when the elec-

tric potential was high and uniform. As soon as a regulation of environmental conditions enables the system to thoroughly recuperate and store up superabundant energy all of the mental faculties become exalted, and the creative spirit begins to predominate.

I applied this art to myself, and taking for my subject the whole question of the relation of environmental, bodily and psychologic conditions, I soon achieved another method of studying the mind, which consisted in giving animals a comprehensive and unusually complete training in some one mental faculty, and then in contrasting their brains with those animals that had not had such a training, and also with the brains of animals that had been deprived of the opportunity to use this particular faculty at all. These results have been widely published, and they have been confirmed by several European experimenters, and the general conclusion is that every conscious mental experience puts in some one part of the brain new anatomical and chemical structures, and that the re-functioning of these structures is essential to the remembering this experience. A memory exists as a structure in the brain and the removal of that structure removes the memory from the mind. The trained animals had a far greater number of brain-cells in that particular area of the brain than the untrained animals. Of course, if this were not true, then it would be possible for functions to exist without structure. If a simple and homogeneous organ could do as varying a functioning as a complex and heterogeneous organ, then it would not be true that the differentiation of mental activity produces a differentiation of organic structure. Whenever the functioning of a structure or organ varies, there will speedily take place a greater complexity of structure in that organ. My dogs were given more mind in the two years' training than nature has given dogs since the dawn of human history. These experiments led me to the discovery of brain-building or mind-embodiment, and it may be definitely asserted that the individual can be given more and more mind to start out in life with or to get his edu-

cation with. I wish again to call your attention to the fact that it is the mind that makes us what we are; that it is the mind that does all that is done. To get more mind is at once to augment every mode of human effort and every form of progress. The second volume of my forthcoming publications will describe these experiments. Out of these new data I was enabled to improve the original art of mentation, which improved art I again applied to myself and discovered a third method of studying the mind and then a fourth, a fifth, a sixth, and a seventh. I will not give a detailed account of these methods, but will characterize them by saying, that in experimenting upon the mind, there are only three factors that can be varied. First, we can vary the environmental conditions, one at a time, of living creatures, or we may vary their bodily conditions, one at a time, or we may vary their mental activities, one at a time. There are no other factors to be varied. Out of these three factors arise six separate branches of experimental research. The first branch consists in varying the environmental conditions and organic structures of living creatures, one at a time, to see what effect each such variation has upon the mentation of the creature. This I have called biologic psychology. If you apply these experiments to your own consciousness, that is, if you vary your own environmental and bodily conditions, one at a time, to see what effect each such variation makes upon your own mind, as you introspectively know it, then you are practicing subjective biologic psychology. If we apply this same line of research to social groups of creatures, as, for instance, to a colony of ants or a swarm of bees, and if we vary their social structure by taking away their drones or slaves, or giving them workers, or if we vary their environmental conditions, we will affect their social activities. Of course, social activities cannot be performed by inanimate objects. Social activities are, therefore, psychologic functionings. When the environmental and structural conditions of a group of creatures are varied in this manner to see how they affect their group mentation, we are practicing sociologic

psychology. These three branches are concerned with the experimental variation of environmental and structural conditions to determine the effect upon the mentation, and one of the general conclusions of these three lines of research is, that every variation in quantity or kind, of any environmental or bodily condition, produces a qualitative and quantitative effect upon the mind of the creature experimented upon. To this I have not, during sixteen years, found one single exception. The other three branches are the converse of the three just mentioned; namely, psychologic biology is concerned with the experimental variation of the mental activities, one at a time, to see what effect is produced upon the organism of the creature and upon its environment. If you introspectively vary your own mental states, one at a time, to see what the effect may be upon your body and upon your environment, you are practicing subjective psychologic biology, and if you vary the mental activities of groups of creatures, you are practicing psychologic sociology, and these three branches of research are concerned with the variation of the mental activities, one at a time, in order to discover the effect upon the bodily and environmental conditions; and one of the general conclusions of these three lines of research is that every qualitative and quantitative change in the mentation of a creature produces a qualitative and quantitative change in its structure and in its environment. To this there is not a single known exception. Out of these six lines of research has arisen, what I believe to be, a more comprehensive and newer science of psychology. Of course, it includes within its survey all that the mind had done, and, therefore, it includes every science and every art as a product of mentation. The mind has produced all sciences and all arts, and the mind alone can create progress in the sciences and arts, and it follows that these sciences and arts can best be studied as mental products, and as modes of mentation, and as kinds of mental content. Psychology is, therefore, co-extensive with the whole domain of knowledge and with the whole scope of human effort. Psychology is not

a subdivision of some more comprehensive subject under which it is subsumed together with other subjects, but it is the one all-inclusive subject under which all other subjects must be subsumed. If you will think over the matter, you will find that if it is true that the mind alone can create and know a science, then it must follow that the science of the mind underlies all other sciences; it is the science of sciences. I predict for it a prominence in the immediate future which no other subject has ever before had, and the richest fields of research lie in the psychologic domain. The experimental study of psychology opens in so many directions and affords such inviting fields, that I am sure the leading minds of the world will soon concentrate their best efforts towards the betterment of accurate knowledge, not theories, about the mind. I have in my two laboratories assembled many new instruments relating to each of these six lines of research, and have been fortunate enough to make discoveries in each of those lines, but I have done scarcely more than simply to discover where rich treasures lie.

Out of this science of psychology there has arisen, step by step, from the time of my first discovery of the art of mentation up to the present time, a series of practical applications of this knowledge of psychology; that is, out of the Science of Mind there has arisen a corresponding Art of Mind, if I may so speak. This art of mentation I have ventured to name Psychurgy, which is the art corresponding to the science of mind. This application of psychology to human affairs includes, of course, all arts, and inasmuch as it is the mind that must learn an art, and as it is the mind alone that can apply the art, and as it is the mind alone that can acquire skill, it follows that the art of mentation underlies all other arts, that is, psychology is the art of arts. Formerly I called this application of psychology the Mind-art, but it was suggestive of certain fads, and I thought it best to change its name to psychurgy, which has been very favorably received. This art of mentation is divided into two great branches. The first branch is concerned with the getting

of more mind by means of the process of mind embodiment, by means of brain-building, and by means of education in special knowledges, and by means of moral training and the curing of immoralities.

The second branch of psychurgy consists in the art of utilizing or using the mind for the discovery of truth and its application to human affairs by means of methods for promoting conscious mental activities, and by means of methods for promoting sub-conscious mental activities, and by means of methods for promoting co-operative mental activities, and organized scientific co-operative research. Most briefly will I describe the art of getting more mind. In a subsequent part of this talk I will describe the art of brain-building, but I will at present only refer to it by saying that every consciously-performed activity of the mind produces a brain structure, which is the embodiment of that memory. If I were to omit from the training of a normal child any one sense, I would cause that part of its brain to remain empty and fallow of the brain-cells or memory-structures which that child might have had. Likewise, I would produce an over-development of one part of its brain and an undevelopment of another part, thus making it lacking as an anatomical whole and as a psychologic whole. If I were to omit from the child's training memories of one great scientific group of objects, such as the chemical group, or the optical group, I would omit from one part of its brain, structures which it might have had. I would omit to give it a symmetrical, logical and psychological development; one part of the universe would not be functionally active in its brain. The whole course of evolution in organic life has been a process by which mind activities have embodied themselves in structures. If progress does not mean the getting of more mind then it is not worth having. To speak of progress as the getting of less and less mind is an absurdity. That animal which can most easily detect in its immediate environment opportunities and dangers and apply that knowledge to the betterment of its condition, will, other things being equal, suc-

ceed best and survive. The same is true of modern civilization. It consists in discovering truth and in applying it to the betterment of human affairs. We do not differ in kind from the lowest known form of life. An amoeba can feel stimuli, and profiting by such knowledge, adapts acts to ends, and that is what we do. To lose from the mind one class of memories is to get less mind. A single celled organism has less mind than a many celled organism, and a simple vertebrate, like an amphioxus or a snake has less mind than a man. It is in this sense that I mean the getting of more mind means the acquisition of structures more complex. In fact, the body of a living creature has meaning only when we think of it as a mind-manifesting mechanism. I have known people who thought that it was extremely fortunate for the body that it had a mind; that it would be most awkward for the body if it did not have a mind. The fact is, as I have elsewhere shown, that mind is synonymous with life; that vitality is mentality and physiology is psychology. Only an animate thing can adapt acts to ends and feel. A cell adapts acts to ends and feels, and as only mind can feel and adapt acts to ends, it follows that the so-called vital phenomena of a cell are in reality psychologic phenomena. Education in special knowledges is part of the general process of brain-building or mind-embodiment. In fact, mind has not been brought up to the present possibilities of civilization until it contains within itself the content of all verified knowledge. By all means I do not wish you to think that I intend to include hypotheses, theories and speculations under the head of verified knowledge. And remember in this connection that knowledge consists of the sensations which objects may give us, of images of those objects, of concepts of grouped objects, of ideas, or relations between such concepts; and of thoughts or relations between such ideas. There is no other kind of knowledge possible, and such knowledge is not made up of hypotheses, speculations and theories. Moral training is also part of the process of getting more mind, for the simple reason that the immoral tendency and wrong emotion is just

as apt to mislead us as a wrong concept or a wrong idea. The evil emotions, as I shall elsewhere show, produce poisons which retard the processes of life. The evil emotions are immoral from the very chemical nature of the universe itself. A wrong memory, whether of an emotion, or of an intellection, votes wrongly every time we try to form a conclusion. To acquire wrong memories is to put into our brains structures which retard life's development. That is, they are processes of mind-disembodiment. The cure of immoralities is itself a proof of the general process of mind-building. A sexual pervert or a criminal is first psychologically analyzed to determine what kinds of the nine sensations he has that are wrong and to what objects, organs, or acts they relate. To determine what images, concepts and ideas he has that are wrong, and to determine what emotions he has that are wrong. This having been determined, the next step consists in putting into the same parts of his brain a set of new sensations, images, concepts and ideas, relating to the same objects, organs and acts, but instead of having been derived through immoral usages, they are derived by scientific study of these objects, and the work is kept up until at least 100 times as many good memories have been built in those parts of the brain where he had bad memories, and then the work is half done. The next step consists in causing the pupil to re-function these good memories oftener each day than he can have a chance to functionate the bad ones. The result is that the new structures grow in size and in anabolism and become dominant in consciousness and thus dirigate to themselves most blood, whilst the other, or evilly functioning structures, atrophy and pass out of consciousness. I think it will be seen that immoral memories, like false ideas and concepts, are processes of mind-disembodiment. It may be said that every act which, either immediately or remotely, produces more mind-embodiment, is right, and that every act which produces less mind-embodiment, either immediately or remotely, is wrong, and we have thus an experimental standard for ethics. The art of getting more mind by a systematic

functioning of all of the mental processes is very optimistic for the future of the human race. We have at least got sight of a method which will enable the individual to take his evolution into his own hands, and not trust to the slow survival of the fittest processes of nature. And in this matter we have two safe guides. First, there is a natural order of growth for the brain which we must follow, and in order to follow it we must scientifically determine it by a long series of psychologic measurements upon many thousands of people. Second, there is a logical order for the development of each of the sciences, and in that development no one logical step can be skipped. The attempt to develop any one domain of knowledge more than any other will produce one-sidedness, disease and insanity. All classes of mental content must be equally acquired, and thus it is that the taxonomy of science and the ontogeny of the brain become criteria according to which we can arrange our educational curriculum. The second branch of psychurgy consists, as I have said, in the art of utilizing or using the mind. I will briefly explain this by giving you a concrete idea of the method by which I would train a person in the art of conscious mentation in some one science. We will suppose that one of you desires to learn how to invent and discover in the domain of electricity. I would first take you into a room into which I have placed every known object of electrical science, and where I could show you experimentally every known phenomenon of science. Then these would be taxically classified and grouped. I would first give you, every one of the nine kinds of sensations which these objects and phenomena could give you, and I would five times repeat each of these sensations. Then I would proceed to give you correct images of every object of that science, and your image of no single object would be complete as long as it would be capable of giving you a single new sensation. Thus, if you did not know, for instance, that it was black on the inside, or that it had a smell, you would not, in a psychologic sense, have a complete image of that object. I would seek to give you in taxonomic groups, and with equal

vividness, every image of that science. The other step would consist in grouping these images of objects into classes of like kinds, putting, for example, motors into one class, dynamos in another, telephones in another, batteries in another, and so on. This would create concepts, and your concept outruns your experience. As soon as you have had every concept correct, every single one known to the science, the next step would consist in relating these concepts; that is, in discovering experimentally what relations existed in nature between one concept and another. Having arrived at a concept of magnet, by grouping images of many kinds of magnets, and having arrived at a concept of heat, you next discover their relation by seeing what effect heat has upon magnetism, and in trying the experiment you discover that heat diminishes magnetism, and you have arrived at an idea, namely, that "heat diminishes magnetism," which consists of two concepts related. When you have thus related each concept with each other one, you will have finished the ideative part of electrical science. In the sense in which I use the word "idea" the relation between the concepts must be known to exist. To make a statement that is false by coupling two words in a sentence is not to produce an idea. Thus, if I say that an onion deprives a magnet of its attractive power, as was said by Bacon, I am not stating an idea because no such relation exists between an onion and a magnet. The next step consists in relating ideas into thoughts of the first order, and the next in relating thoughts of the first order into thoughts of the second order and so on. At the thoughts of the third or fourth order nearly all sciences reach their present culmination. In thus mastering a science, first hand without dogmatism, without theory, speculation and hypothesis, you put into your brain a series of taxonomic structures which may be said to epitomize that part of the universe. You have derived great knowledge and your authority is nature itself, and your own mind. That which is the great Cosmic environment has produced your mind and your mind cannot be in fundamental antagonism to it.

Bring your mind face to face with the objects of a natural science, and you can derive your own sensations, images, concepts, ideas, and thoughts first-hand, and this will be to you a true and invincible revelation. You then proceed to get together all of the known sensations, images, concepts, etc., belonging to that science. You may not have had every known object belonging to that science in that room; you may not have witnessed every known experiment; in order to be sure upon this point it is necessary to refer to the literatures upon this subject so as to get every alleged truth regarding electrical science, so that you may, by trial, discover the whole sum of knowledge and make of it a mentative synopsis, classified into sensations, images, concepts, etc. Then under proper bodily and environmental conditions, which must be determined for yourself by psychological measurements, you should spend several hours a day in functionally applying each one of your intellectual faculties to each datum of that mentative synopsis. What I mean is this: You spend several hours a day, for two or three weeks, in passing through your mind the images of electrical science, and when you have once gone through the list, from beginning to end, you go through it again and repeat this process four or five times. This not only makes all the images equally vivid in your consciousness, but it makes those parts of the brain grow in strength and become more conscious, and causes a stimulation of the subconscious functionings, out of which the conscious functionings arise. Then you pass through your mind, in a similar manner, all the concepts, from beginning to end, one or two hours a day, for several weeks, and this teaches you the difference between conceptuation and imaging and also develops the conceptuating structures and their subconscious functionings. Then you take up ideation and pass through your mind, from first to last, each idea known to electrical science, and this teaches you the difference between ideation and conceptuation and causes those parts of the brain to grow in strength. Then you take up thoughts of the first order and of the second order, in

order, to learn the difference between thinking and ideation, and when you have finished this process the electrical domain of the universe will have so to speak been embodied in your brain and you will have learned a thing far more important than the utilitarian aspect of electrical science, namely, you will have learned how to use each one of your intellections independently of the others. You will be able to conceptuate an hour, while I measure your pulse, or to ideate an hour, while I measure your breathing, and so on. This is a wholly new feature in psychology; this ability to functionate the intellections separately. Then you are taught how to apply conceptual reasoning to your concepts so as to deduce therefrom possible images and to apply ideative reasoning to your ideas so as to deduce therefrom other ideas, for which the careful student will always afterwards find an inductive verification before recording the same in the mentative synopsis. Then you are taught thinking reason so as to deduce from two or more thoughts a third thought, for which inductive verification must afterwards be found. No normal human being with a mental capacity of average kind, can take this first of the twenty-one steps in the art of conscious mentation without discovering new concepts, new ideas, new thoughts. These new ideas must afterwards be verified in the laboratory because concretely they always differ from the abstract, and then these new data can be recorded in the mentative synopsis and this same process of conscious mentation again repeated. This is a systematic art for invention and discovery which ensures daily original mentation. I will not describe the other twenty steps of this art of conscious mentation; neither will I at present describe the art of subconscious mentation, because in order to understand what I have to say upon these points a much greater familiarity with the art of conscious mentation is first needed. The goal of psychology is the art of using the mind. My first discovery in this direction, made many years ago, consisted in learning how to regulate environmental and bodily conditions so as to save our mental energy and promote its activities. But



these later discoveries have related, not to a regulation of outside conditions, but to a knowledge upon any subject or science, how to manipulate the data when thus obtained, and how to handle the different intellectual functions upon those data so as to quickly achieve new discoveries. This systematic collection of data and classification of mental content into sensations, images, concepts, etc., and this systematic relating of each concept and idea with each one, is above all else a process for the ascertainment of truth and the elimination of error. It is not merely originative mentation, but it is par excellence alethic mentation. Out of these studies of psychology and psychurgy there has arisen an institution, wholly philanthropic in its character, which has for its purpose the study of the mind as we find it manifested in living things, the diffusion of that knowledge amongst all peoples and creeds, without attacking any system or creed, the training of teachers and investigators in the new methods of mentation and research; the organization of a university department where others may receive the benefits of such knowledge; the collection of the mentative data of the different sciences which are now buried in millions of volumes containing repetitions and exploded hypotheses; the getting together of a museum containing a sample of every specie of natural thing to be used in image-building; and the getting together of a laboratory for exhibiting all of the above and the phenomena of all of the sciences; and for carrying on systematic co-operative scientific research. When the organization of this work has been fully achieved, I propose to devote my time to other and higher aspects of the phenomena of the mind, but of this it is

not now my purpose to speak. I would like, however, to call your attention to the dim glimmerings of a new field of psychologic research. All living beings give off electric waves in proportion to the degree of their mentative activity, and electric waves falling upon living things modify their mental activities. Electric waves, as you all know, travel 136,000 miles per second, whilst nervous influence only travels at most about thirty feet per second. We are thus more closely connected with all living things. This makes all organic life upon earth part of one functioning whole. Then again we have evidences of another force connected with the manifestation of emotion, which travels at a greater speed, which also ties all living things into one functioning whole. I have recently made an experiment with the tuning fork which, when heard at the extremest limit of hearing, seems not to be sounding continuously, but to have in it intervals when the consciousness refuses to hear the sound. This is not my discovery, but what I have recently been interested in is that, as far as my experiments have gone, I found this lapse in consciousness to occur simultaneously in all living things. It is synchronous in all living things. It is as though all living things had waded out in a great ocean of life and all felt simultaneously the same waves. We are all [when I say "we" I mean all living things from the cell up to a Solon] materially part of the same universe, and we are dynamically part of it, and many lines of research are proving that we are psychologically part of it. We may, therefore, expect confidently a demonstration of the psychologic oneness in the universe just as much as science has pointed out a dynamic and material oneness.

