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CHAPTER 2. SOME EXPERIMENTAL BACKGROUND

Fundamentally a group of related ideas from a thinker or discoverer is the product not only of his mind but also of his body and local and total environment. What a man discovers and thinks and does is also a product of his times. No attempt will be made to give a complete account of the author's researches on mentation, nor of the general scientific background. A few basic experimental results and conclusions may, however, give a partial understanding of the reasons for some of the steps in the curriculum and their importance. Of course the student must actually take a step, make it an accomplished fact in his life, before some of its significance is appreciated; and many steps must be achieved before the full value of any one is discernible. Then again, it is the practical utility of the method of systematic mentation that is of importance, not any particular conclusion or result.

One essential in scientific mentation applied to invention and research consists of a preparatory education in the sciences and arts to which the subject of the proposed research relates. The student re-builds or further builds his brain by embodying more mind with reference to the domain of Nature in which it is proposed to make discoveries and inventions or enjoy knowledge; so he may have the right kind of mental content and structure with which to do mentating; so this content may truthfully represent the facts of his self and environment, and so he may be a truth-yielding mind mechanism.

Another essential, and one which is not further considered in the curriculum, consists of a bodily and physiologic and hygienic preparation of the student to make him or her an efficient instrument or *machine* for the work of mentating, so the mind may perform its functions efficiently and productively. The individual investigator should be a healthy animal with hygienic habits and all physiologic processes at normal.

Effect of Bodily Conditions on Mentation. Early in his researches the author noted that on some days and during some periods original results did not come regardless of the effort expended, while during other times the mind was easily original. A partial answer was found in a study of the effects of bodily and environmental conditions on mentation.

Anatomical and physical normality was found to be essential to

completetest mentation. A sound mind requires a sound body, and to the extent that it is practicable the resources of modern science should be utilized in keeping the human organism as

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complete as possible in its parts and as correct as possible in their position. Defective teeth alone may interfere with an important mentative period by a painful toothache at the critical time. Defective eyesight may prevent the acquisition of complete and accurate images and interfere with observation of phenomena, and the same is true of the other senses.

The position of bodily parts was also found of great importance. Thus it is particularly desirable to acquire and maintain a normally erect spine, to develop a full chest and lung capacity and a habit of sufficient but not over-sufficient breathing. Wrong bodily attitudes by interfering with respiration, circulation, digestion, and nerve action, by putting muscles into a prolonged strain, often obstruct mental processes and it is impossible for one to assume such a position and hold it for a long time without lessening the discriminative power and obstructing the productive mental capacities. When mental efforts are made that almost but not quite succeed, they may sometimes be made to succeed by assuming the expressional (gestural) attitude that is natural to the emotional condition accompanying the given kind of mental work. Strains are harmful and should be avoided. It takes a long time to recover from a muscular or mental strain.

Disease of the bodily organs, for instance the liver, stomach, or kidneys diminishes the discriminative powers, lessens originality, and interferes with formation of mental dominancies. Abundant psychophysical measurements prove that sickness of any kind, by means of pain and suffering, at once exerts a deadening effect upon some or all of the mental functions, but attention here is directed to the physical conditions accompanying disease.

Poisons directly interfere with successful mentation, and it often happens that a lessening discriminative power is due to some insidious poison taken in infinitesimal quantities in food, air, or drink. It is easy to give the student a dose of medicine which will convince that poisons can alter the integrity and acuteness, productivity and reliability of the mental processes.

Wrong metabolism is one of the worst possible bodily

conditions; whereby the recuperative and constructive processes are slowly and inadequately carried on, and whereby katabolism predominates over anabolism, being disastrous to the productive activities of the mind. The body is a mind mechanism; all its structural peculiarities and physiological processes are such as they are because they form a mechanism for the embodiment of mind; and every defect in the mechanical completeness, functional working, nourishment, or elimination of by-products, at once disarranges the mind. Of this there is abundant and convincing proof.

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Fatigue is an example of a bodily condition which was wholly unfavorable to creative work and discriminative ability. Fatigue of course is a mental state, pure and simple. The body cannot get tired; it is the mind that tires. It is not the mental state of fatigue, but the bodily effects, such as accumulation of by-products in muscles, lack of available fuel or energy. After prolonged exertion in any particular line of productive or acquisitive mental labor, the author's mind refused at first to work rapidly and easily; if the exertion was pushed the quality of work deteriorated; and if still further efforts were made, new ideas ceased to come, and pain and exhaustion ensued, inflicting temporary injury to the nervous system. To one who is accustomed to daily acquisitive or original work no experience is more common than the hindering effects of fatigue by prolonged overwork in any one line. Experiments in determining the just noticeable difference in the feeling of the energy of muscular motion gave incontrovertible proof that fatigue diminishes the sensory discriminative power. By passing through the mind as rapidly as possible a succession of several thousand images or ideas, the author was able to prove that both special and general fatigue diminishes the speed and vividness of the imaging and ideating processes.

Lack of sufficient rest, which produces general fatigue, and overwork of any particular mental function, therefore, unfavorably affect the mentative process. Fatigue is always a psychologic signal of physiologic distress foreboding danger to tissues and functions. When an activity becomes actually fatigued, it should be rested to full recuperation and then *gradually* put to work again. By special practice one should learn to recognize the first symptoms or prodromes of fatigue for any given kind of work, and

stop and rest when they occur.

Pain as a mental state distracts the attention, but its bodily effect also diminishes almost immediately the acuteness of the discriminative power, deadens introspection, and shuts off originality. It of course prevents that complete centering of attention which is so necessary to good mental work, but that is not the worst effect; it gradually weakens the will power and energy by which attention is maintained.

Lack of nourishment hinders mental activity. Direct experiment proved that underfeeding for several months diminished the discriminative power of the senses, lessened the speed of the intellective functions, and prevented productive mentation. It was found that prolonged restriction to one article of diet had similar effects. Later investigations amply proved that good mentative results and high mental skill require thorough but not over nourishment.

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Conservation, Augmentation, and Utilization of Vital Energy. One of the first conditions of efficient and normal and vivid mental activity, especially of the higher functions and faculties is that there should be *stored and maintained in the organism an* available *supply* of surplus vital energy; and more especially, that the body and mind shall be so trained that there shall be developed therein an augmented capacity for quickly generating superabundant energy. The body should be caused to create just a little more daily energy than is required for the largest amount of work that is ever done in any one day. On those days when there is less than usual purposeful work done, nearly all the surplus energy should be used in sportive exercise or amusement in order to keep the habit of making that daily maximum quantity of energy.

Perhaps everyone has had evidence that in general every condition which diminishes the quantity or availability of stored energy in the body diminishes the efficiency of the mentative processes. The creative powers of mind are active only when there is surplus energy. The play impulses and artistic or creative instincts are closely allied. Only when the system has fully supplied all recuperative needs and repairs and has yet energy to spare can the originative mental processes do good work.

Few people know how to eat, rest, sleep, so as to have superabundant vital energy for *work.* You should learn how.

Effect of the Environment on Mentation. The environment of any object whatsoever, whether animate or inanimate, is all of the universe except itself. The Cosmos consists of any one thing *plus* all other things. Other than you and your environment there is nothing else whatsoever. In one sense it is convenient sometimes to think of the anatomical organism of a living creature as part of its mind's environment. To this anatomical environment the mind sustains a most close and causal relation, but *not more close* than is *the relation* of the *whole living organism* (body and mind) *to its environment.* The living organism and its environment are composed of the same kinds of substance or matter and of the same kinds of energy; both are subject to the same physical, chemical, biological, and mathematical laws; there is mind in the living creature and there is also mind of the same kind in that which is outside of that creature. In its environment the creature, in the most literal sense, not only "*lives* and *moves* but also has its *being*." Your being is not exclusively in yourself, but to an even greater extent it is in the Cosmos of which you are a portion. Every second of your conscious life is dependent on the momentary intactness of your connection with your environment.

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Man's functional connection with his environment and his constant interaction with the Cosmic whole of which he is an integral and organic part is demonstrated by much experimental evidence; and the importance of maintaining properly regulated psychologic and physical conditions therewith is evident. Man is materially part of his Cosmic environment, he is dynamically part of it; genetically he is born out of it and inherits its nature and possibilities; and he is also psychologically part of it. No wonder then that every change in the condition of the organic body or its environment directly obstructs or assists.

Environmental conditions affect mentation. Can it really be demonstrated that conditions outside the body can adversely or beneficially affect the mind's abilities and productive activities? There are those who claim such high and occult powers and personal attainments as to be free from the effects of their surroundings; but psycho-physical measurements and other experimental evidence obtained by a study of some of these claimants do not warrant such assumptions. If outside conditions affect mental results, then the regulation of environmental changes

opens an important domain.

Minute changes in environmental conditions also affect the body and mind. There is an optimum at which the best work is done, as indicated by experimental evidence. A laboratory study of artificially regulated environmental conditions soon disclosed the intimate nature of one's connection with the environment. The first essential was an environment that could have any one of its conditions varied or regulated while the others are maintained. Under natural conditions these factors are changing too frequently and indefinitely, and seldom is one changed without some other. Consequently an Insulated Isolation Chamber was constructed in which, with some degree of success, could be maintained a uniform environment. In this chamber normal mental activity could be determined, then the environmental factors varied one at a time to study the effects.

It was found that when the temperature was slightly above or below the normal, for instance, fatigue at some definite muscular or mental work came sooner than when the temperature was normal; and the same was true for barometric pressure, humidity, electrostatic potential, amount of oxygen; or with a slight excess of carbon dioxide in the air, or when the air was loaded with smells and vapors, or when the room was too light or dark, and so on with other factors.

It was found that frequent fluctuation in any one or more of these conditions was wasteful of vital energy. Each change required a physiological readjustment, on the part of the body which takes time and energy, and consequently fatigue occurs

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more quickly.

The method of determining fatigue was such as the following: the arm was caused to lift a given weight to a given height a given number of times per minute, keeping time with a pendulum; or the mind would pass the propositions and corollaries of plane and solid geometry understandingly through the consciousness at a given number per hour (previously regulated by trial tests). These or similar kinds of work were continued until fatigue commenced. After a number of successive trials, the average for each kind of work without fatigue was determined for a uniform environment. Then one of the factors was varied and the bodily or mental tasks repeated to note the effects on the fatigue point and other bodily or

mental conditions, including not only the quality of work but also the time required for recuperation; and the effect on the secretions and excretions; and other such factors. Without citing details of a large number of experiments, suffice it to say that even very slight variation of environmental conditions from the normal, above or below, noticeably affects the quantity of the mental work. In addition, frequent fluctuations in any one or all of these factors decidedly affects the quantity of the work and hastens fatigue.

It is therefore one of the practical rules of mentation that uniform and normal environmental conditions be maintained in the workshop and laboratory during the daily mentating periods. Mentation is actually promoted and augmented, not merely relieved of hindrances.

These instances are only the more common ones. There are *many* conditions which modify mentative processes, and even though some effects can be overcome by natural effort, it takes energy. Failure to overcome the disturbing effects of environmental conditions, either by mental effort or artificial regulation, results in a waste of life's energies and keeps down to a lower potential that surplus of vital energy out of which originative mentation arises. It is not alone in avoiding the bad effects that this knowledge is desirable, but more particularly that one may take advantage of good conditions and favorable seasons, times, and places. A study of the effects of your surroundings on yourself will lead you to put forth the right kind of effort at the right time. You will wait until the tide flows the way you want to go, and you will not waste strength swimming upstream when you might float downstream.

It was demonstrated that during certain days and hours the author could perform intellective labors more easily and do better and more original work than during others. To determine to what extent this difference in mental capacity was caused by conditions in and outside of the body, there was made not only a

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record of changes in environmental conditions, but also measurements of bodily changes such as diet, breathing, perspiration, chemical composition of excretions and secretions. Particular attention was paid to the hours when new ideas were attained and the mind otherwise above par. It was found that generally these times of greatest mental capacity were concomitant

with certain definite environmental and bodily conditions while the times of lowered capacity corresponded to a different set of conditions. Only generally was this true; it was discovered later that the apparent exceptions were due to the fact that proper intending the mind, or introspective "dirigation" as described later, during the unfavorable conditions will often produce better results than improper or no dirigation during favorable conditions. But of course it requires much greater expenditure of energy.

Interruptions; The Mental Maximum. A study made of the time generally lost from daily work by avoidable interruptions and by doing various minor acts that might just as well have been done outside the mental working hours, disclosed that it would pay to regulate conditions to save this time.

Remember that the mind is a machine or organism adapted to turning out a product called mental work, and that this machine cannot do good work all day, but only for three to six hours. In a whole life there are only a few years, comparatively, when this machine is at its best and therefore its mental working time should be economized. In early life, or when first engaging in a new kind of work, the mind has naturally a shorter daily period of effective mentation, but as one grows towards middle life or inured to a given kind of work, the mind is naturally capable of longer hours, and it should be *gradually* accustomed to them. It is a rare combination of circumstances when the mind can work at its best eight or ten hours, and even then there must be frequent and adequate vacations between tasks.

By a number of tabulated observations upon the author and many others, surprisingly it was found to be not unusual to have wasted one half to two hours daily out of the five hours working time. That would be 180-730 hours annually, or 36 to 146 days of five hours each year. In an active life of say 50 years, this means a loss of five to 20 years; enough to change what would have been a great life success to a partial success, or even failure.

The mental working day is estimated at about five hours because it was found by numerous observations on many people that the mind cannot do, continuously from month to month, *first class* productive, original, or creative work for a period much longer than the five hours daily, and then only when health and strength are at their highest and no energy is used in other kinds

of work. One can indeed keep busy 10 to 15 hours daily at any ordinary kind of routine drudgery, but the mind is no longer at its best in any original work. It may be *forced* for a few hours longer for several days in succession, but it soon rebels and then long recuperation is necessary before it again will spontaneously attain its original creative vigor. The shortness of this effective day makes the saving of time all the more valuable.

However, a much more serious loss than the time, as abundantly proved, is the notable loss in the quantity of the mental work, in the number of original ideas, amount of creative work, and in the number of problems solved. Only by a continuity of attention for several hours at a time can the highest daily degree of functional efficiency be attained. After fully attaining this *daily maximum* which was the normal best to be expected, much more mental work could be done than if it were not attained.

The interruptions and distractions of the attention also were found to lower the functional excitement or "frenzy" of the creative imagination that produces inspirational capacity. In fact this distraction is so serious a disturbance to creative mental activity that the mind naturally and instinctively becomes so "absorbed" in its subject and so "absent-minded" about everything else that it does not consciously notice any ordinary disturbance.

No single feature of this study of the mind's functioning is more impressive in its practical importance than the fact that the mind had to *get worked up* to a certain degree of enthusiasm and alertness, where its abilities are at its highest, before original or creative work could be done at their best; and that it *takes time and great effort and strong incentives* to bring about this *mentative maximum,* and it uses energy. Rest and recreation must follow. One cannot, for instance, without great effort, get the mind thus "worked up" more than once a day; and even with the very greatest effort it cannot be done with equal success every day; generally several days rest, even to complete idleness must follow. But by systematic daily practice a comparatively uniform series of results can be attained — provided the attention is not distracted during this time.

Distractions and disturbances cause the mind more quickly to become fatigued and a lower mentative maximum results. Unnoticed disturbances affect mentation, even when the sensory stimuli are too *faint to be consciously perceived.* The experimental

proof is conclusive that the fund of available energy is thereby exhausted so fatigue occurs much sooner and the quality and quantity of the mental output is diminished. The attention can be kept in efficient operation only a few hours at a

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time; during the five hours daily mental work there is only a short period of maximum activity under the strongest and brightest "lime-light" of attention — say 10 to 40 minutes. This short period is the *culminating opportunity* of that day's work.

These experiments were made upon persons who were kept in ignorance that disturbances were made one day and not another, thus eliminating the factor of suggestion; and of course were made in an environment that was uniform day after day.

When the mind becomes much accustomed to any sensory disturbance, as the ticking of a clock, it ceases to notice it, especially when the attention is occupied with something else. That the disturbance may not be noticed, a subconscious effort constantly takes place. Now a subconscious or automatic process takes less energy than a conscious one and there is thus an obvious advantage in becoming accustomed to the unavoidable disturbances of the work place. The same is true for disturbances that cannot be consciously noticed but which nevertheless are subconsciously noticed. A change in place of study or work means that the mind must become accustomed to the new set of conditions.

One must form a *habit* of doing regular mental work at certain times daily, say forenoons, so the mind will do its best work for the aforesaid three to six hours. Now if through interruptions and distractions the highest mental maximum is not attained, then the most evanescent and higher generalizations, the more subtle distinctions and more beautiful conceptions will not be attained but instead a lower series of ideas and distinctions and conceptions will result from that day's work. With results that are less true and beautiful than they otherwise might have been, the mind starts out for the next day's work, its data more imperfect than they might have been. Oft-times ideas are born with difficulty — an idea evades the apprehension time and again and finally we see it darkly, as through a mist, and for a brief period we realize that the insight is about to enter consciousness, but we know that it *may not* do so and, as a matter of fact, we know that it often *does not quite*

enter into our possession but remains unknown for that day or for that generation. Now at the moment when the curtain that separates the Known from the Unknown is about to rise, if a disturbance occurs so that the Scene-Shifter, ATTENTION, gets the ropes mixed, then that expected vision will not be presented, but some other or none at all. Or if the vision does occur, if the new insight does dawn, it will be less Complete and distinct than it would have been if the mind had been a little less fatigued by useless work and useless acts of attention.

It is well established that in any process of physiological or

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psychological deterioration it is the *very highest* faculties that *first disappear;* those mental capacities which have been attained last in the phylogenetic course of evolution are the first to be destroyed when a degenerative ontogenetic process sets in. Now fatigue is such a degenerative process, and everything that prevents continuity of attention is a retrogression, and the very highest faculties are the first to be affected.

Consequently, the main purpose in preventing interruptions of the daily working period and in preventing disturbances of the attention is that the daily mental maximum of functional activity may produce a better and higher quality of ideas, generalizations, conceptions, inventions, enthusiasms, appreciations, motives, and conduct.

The mentator should select a proper altitude and locality where the air is pure or artificially purified, where the temperature is agreeable or artificially made so, where the moisture is right or regulated, where interruptions and distractions are absent or artificially prevented or minimized, and where all things needed during mentation are quickly and easily accessible. Otherwise there would be many hours and days when the best mental work could not be done.

In selecting the environment for mentative work it will save much time and expense to get in that locality where are the opportunities and things you will most need in carrying on your work, such as libraries, supply stores, practical people, and specialists engaged in your line of endeavor. To be far away from the great centers of business and society is at times advantageous and even necessary for certain kinds of mentation — such as introspection, inspirational and creative work; but even these

periods of solitude are capable of being advantageously utilized only when there has been previous scientific preparation in places where all natural and artificial advantages are at one's disposal.

The merits of a machine are judged by the quality and quantity of the work it does. If by any simple expedient, without increasing the power to run it, the output could be increased from 10 to 40 percent as well as increasing the quality, it would be considered bad management not to apply that expedient. Now a person is a mentating organism or a mind machine whose output in ideas or in creative results can be augmented from 10 to 40 percent over that of average mind workers by avoiding disturbances and interruptions and by keeping the attention persistently active without conscious or subconscious distractions for several hours at a time at regular periods; and the quality of the work is thereby also enhanced.

A man is fortunate indeed if the exigencies and changes of an

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active life permit him to put 20, to say nothing of 50, years of continuous application to mental work. Ordinarily two or three periods of from one to four years each is as much as is accomplished; not quite enough to effect complete preparation and get adequate skill in any one of the undertaken lines. If so short a period is all that an average investigator can ordinarily expect to devote to one subject, how important it is that those few daily mentative hours shall not be disturbed. A greater number of persons should, for the world's good, take up lines of research and give their lives to them, and such persons should value their time too much to allow it to be wasted and their work too much to allow its quality to diminish by hindrances that can so easily be avoided.

It is needful to remark that whilst a proper regulation of the environment is highly important as a saving of mentative time and as an augmentation of the efficiency of mental activities, it is nevertheless merely an *auxiliary* of the actual getting of the right kind of mental content and of training and manipulating the mental processes.

Functional Periodicities. No one physical aspect of Nature was more noteworthy than the recurrent periodical or rhythmical character of its phenomena, and this is probably true throughout the whole domain of the Cosmos from its largest macrocosmic groups of sidereal systems down to its smallest infinitesimals; from

movements that recur every billion years to those that take place billions of times per second; from the recurrent geologic periods to the annual season, to night and day, to the rhythm of respiration, to the heart beats and to light waves. Within the vast domain of infinite room there occurs the great drama of The Cosmic Process whose separate acts and scenes are marked off by larger and smaller periodicities. Within this space are aggregated all things into one reciprocally functioning Cosmic Whole; they are all composed of the same fundamental matter and motion and mind, materially, dynamically, and psychologically they are alike, they are *tied* together by various forces and interactions with each other and functionally connected so that no one thing is independent of all other things but are inextricably related and interdependent, making ONE FUNCTIONAL WHOLE whose rhythmical interactions are *functional periodicities.* Within the larger whole is our solar system with our earth keeping step with the Rhythmic Goings-on, and on earth is the evolving organic life. Our earth has had its succession of geologic periods, and any age has had its seasonal and daily alternations, and so on in a hundred ways, each species of thing and each thing functions rhythmically, keeping its time and place with other things in that same system.

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The human organism has its growth periods of conception, fetal life, birth, infancy, adolescence, maturity, old age, decrepitude, and death; and within the organism are ontogenetic lines of functional crises. Thus there is the orderly dental line of functional sequence, of osseous development, of muscular, sexual, emotive, and intellectual developments; of social inclination; and so on. There are periodic or rhythmical sequences of functions and periodicities in all organic life and if some are known, others can be determined. Growth passes through regular and determinable stages. Of any animal, if the life characteristics of its race are known, the *approximate* times of these periods may be predicted. The different lines of development are so closely related to each other that if the times of successive sequences of events or crises in one line are known, the approximate times of other crises may be predicted.

To determine the times of these ontogenetic periodicities and conform to them is to be *doing that which nature is doing at the same time that nature is doing it.* When periodicities occur in any

organism, THEN is the time for THAT kind of functioning *to take place easily and naturally,* because that kind of functioning is *then and there* the trend (Trieb) of events for that *thing* and for the Cosmos of which it is a functional part. To determine the times of the beginnings of natural functional periodicities and conform to them is to float upon the Cosmic Tides and not battle uselessly against them. Particular kinds of bodily and mental work should be performed at certain ontogenetic periods and seasons, so as to take advantage of the great physiologic, physical, and psychologic tendencies of these periodicities.

When a function or faculty first becomes ontogenetically active, then, as the old pedagogy has taught, is when it should first be trained. When some other faculty begins its periodicity all other matters should be temporarily dropped, as a new pedagogy will teach, and the new functioning given its opportunity for uninterruptedly starting its development and growth. The attempt to train or use an activity before the ontogenetic time of its functioning is time worse than wasted; to wait until after this period of activity is just as wasteful.

Finally, in forming *habits* of work one should conform to the ontogenetic life periods when that kind of work is *due;* and in that period that kind of work should not be skipped. This work should relate to predilective abilities (genius-capacities), for only dominant capacities find any role in a system of capacities.

These are the main results of the author's study of periodicities.

An Early Experimental Study of Judgements. Are not some kinds of judgements better than others? If so then follow the best

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kinds in selecting lines of research and ways of thinking about facts. In the scientific literature was found nothing more decisive than the relative validity of the inductive method. So a study was made of practical judgement values, by making a record of decisions to determine in the light of subsequent events which kinds proved more effective and reliable: judgements based on conscience, knowledge, feelings, beliefs, superstitions, previsional intuitions, or subconsciousness.

Some of the least technical conclusions were that conscience is merely an automatic alarm that rings whenever our actions do not correspond to our beliefs; that it took a long practice to eliminate the misleading effects of fear and hope and desire and superstition;

that in all matters of volitional action knowledge-judgements are incomparably best; in matters outside of conscious knowledge the judgements of the mind's subconsciousness are more reliable (being based on knowledge experiences that do not ordinarily get above the threshold of consciousness); and that feelings and emotions are not guidance-judgements but imperative and unreasoned commands, concerning which we may exercise judgements.

Further study led to the conclusions that the voluntary activities (conduct) of certain persons almost invariably led to undesirable or worthless consequences, whilst that of other persons led to desirable and useful consequences. Inasmuch as there is an invariable and determinable causal relation between the *kind* of act and *kind* of consequence, there ought to be a determinable relation between the judgements which lead to the acts and the consequences of them. In the instances studied, 10 percent failed because of insufficient attention to the matter in hand, 51 percent because of lack of knowledge and ability, and 20 percent because of mistaken judgements. Contrary to expectation, the failures were not nearly all due to wrong judgements, unless the failure to pay attention to the matter in hand was caused by wrong judgements on the part of the 10 percent at the time the matters were first planned. In like manner the lack of knowledge and ability may have been due to wrong judgements at earlier periods in the lives of the 51 percent, leading them not to acquire the needed ability and knowledge.

These questions re-opened the whole investigation. What was the difference between the impulse of the successful man as compared to the unsuccessful one? Inasmuch as conscience can be trained, it follows that it can be set to ring an alarm when our actions do not correspond to our knowledge-judgements and thus get conscience to act as a mentor, like a fully formed habit (to which class of mental processes it introspectively belongs). Conscience acknowledges no master but belief, except that

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sometimes it seems to be a "reflex" of fear or desire.

A tabulated record was kept of all kinds of judgements that led to acts, by the author and others, and the results. A study was then made of the relative values of these judgements as exhibited by the results of the acts to which they led, and judged of the merit of the

acts by other subsequent events. The author systematically exercised each kind of judgement on each motive, plan, event, and act; tabulating the approvals and disapprovals, and afterward recording the consequences.

From these data and further experience, in still another way the conclusion was reached that there is a great difference between the reliability or guidance value of the different kinds of judgements, even for the same kind of judgements in different persons, and even in the same person at different times. This difference in a great measure depended upon the way in which the judgement arose. In one man it may arise out of a long and profound conscious and subconscious *gestation* of all the knowledge and feeling and other kinds of experience he has had upon that subject; and in another it may arise in an off-hand manner without having consulted all, but *only part, of his mental* content. In one man an impulse-to-do is often a transitory whim, not belonging to his dominant predilections, whilst in another it is an overpowering mandate which he cannot resist. What is the cause of these differences? In the first place the conclusion was reached that a judgement of any kind which is (1) based upon less than the *total mental content* (insofar as relevant thereto) is not as reliable as when it is based on the total rememberable content, provided (2) his mental content relating to these matters consists of true knowledge and normal feelings and tested skill; whilst if this mental content is made up of true and false data, his judgements are *just as apt to be wrong as right.* Also that habitually an average mind that has not been trained in systematic mentation of a classificatory synopsis of its mental content furnishes itself when called upon (that is, presents to its attention) only some small portion of its knowledge and feeling relating to any subject.

Inventory of Total Mental Content. What constitutes the total mental content of an average human mind? Of what does its total conscious content consist? What percentage of its memories are useful or true? How does the content of one mind differ from another? What bearing have these variations of total mental content upon conduct? These were questions about which the author wanted knowledge and not guesses. He began the work of making an analytic study of everything his mind could remember or that it could introspectively notice in its daily and hourly experience; such as its intellections, its feelings and

appetites and emotions, its act experiences, its dreams, hoping that he might be able to point to the assembled multitude of experiences and say, that is a mind.

If it is said of an object, "That is a microscope," it will be true only if on examination it contains all the essential parts of such an instrument, but it would not be true if, for instance, the lenses were missing. Now, what is it that must be present? What details must not be missing so that it may be wholly true when it is said of something, "That is a mind," How can it be found out except by making a complete inventory of a mind? But a mind begins its terrestrial development at infancy or rather at a pre-infantile state and grows through various stages to maturity and old age, thus passing through a series of developments, *all* of which steps with their concomitant states, processes, functionings, and products must be referred to if it is said, "That is a mind." Not only one, but many such inventories of the whole life of minds need to be made, tabulated, and studied, if we wish to know what is a mind.

The author systematically recollected every experience in his whole life as far as possible; recorded it under its proper sensory, intellective, introspective, emotional, and conative heading. In several thousand pages of details, conveniently classified, all was recorded that could be remembered of his experiences with or about such things as stars, planets, animals, minerals, chemicals, mechanics, literature, languages, mathematics, logic, history, fine arts, religion. His total vocabulary was included, and all experiences with emotions relating to parents, friends, school days, social happenings, wrong-doings, angers, griefs, joys, laughter, amusements, and so on; and all things that had been made and done as concrete results. He was amazed not only at the magnitude of his inventory, but equally so at the vastness of the domains still unknown regarding each of these subjects.

The making of such an inventory is a long and laborious task. Many times when it was believed that certain portions were complete, a number of additional incidents would be recalled that happened in the world of outer events or in the world of inner or subjective events, which had to be recorded. Maybe it was a book long ago read and it was a task to record all that could be slowly and indistinctly recollected of it. Maybe it was a slight illness or visit or a conversation or a walk that was forgotten, or maybe a dream. Maybe it was an early acquaintance who had to be located

and interrogated to get assistance in recalling all that had taken place, or perhaps the only clue was some scrap of paper or part of an old letter. Maybe it was by repeating a walk or trip once taken that things and places could be recalled. Or books

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were re-read, and the experiments of earlier years repeated. It was found peculiarly difficult to recall with sufficient definiteness to state them, the emotive pleasures and joys, the pains and sorrows of earlier life.

Although the author had almost entirely escaped the swarms of pestiferous superstitions and the usual broods of ghost and fairy stories, Arabian Nights' tales, Munchausen fictions, Gulliverian legends and mythologies, and although his training had been unusually inductive, yet nevertheless most of his mental content was obviously useless, theoretical, irrelevant, false. It was startling to learn what a large portion consisted of *utter trash,* irrelevant matter, superstition, fairy tales, myth, belief, the unproved, the plainly untrue, the unimportant, dream-memories, and the thousand-and-one things that fill the mind like rubbish in an attic or a pile of drift after a flood. For example, when calling on Aunt Martha yesterday it was noticed that one corner of her rug was rolled over; her pet lamb walked into the house; two sparrows were fighting out in the lilac bush; the chemistry book has an ink spot on the back; two men were walking up the street last winter when there was snow on the ground; Johnnie Weaver has three old pocket knives in his playroom; there was a broken doorknob on the door of a house near the Depot; and so on *ad infinitum.* At the very least 90 percent of this mental content was mere waste; and for every one of many of these unimportant details there were hundreds of *duplicate* memories beyond the utmost need of any lesson that might be derived therefrom. It is certain that the amount of this worthless mental content is not overestimated. Think of it!

Results were checked by selecting other minds of the usual ability and education and obtaining an inventory of their mental contents. To the extent that the author was able to get others of his own age to make this inventory, an equally large percentage of trash was found.

Think what it would mean in getting a knowledge education if this 90 per cent of worthless memories could be exchanged for

actual and useful knowledge of the sciences and arts. A young person would have room in his mind and time sufficient to learn twenty times as many facts and formulas and laws. He could get an ordinary education in one fourth the time. If every day of his life a child were to acquire one fifth as many worthwhile memories as he habitually acquires of useless ones, if he were to psychologically acquire them in *classific* groups of naturally related data by being shown the corresponding objects and their interactions and interrelations, so as to know them for sure, not on the mere authority of some teacher or textbook, but upon the *direct* evidence of his first-hand experience, how much time, do

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you think, would be saved in getting an education?

In the second place, as important as it is, that saving of time would not be the greatest advantage; it is the elimination from the mind of the misleading influence of the untrue and the encumbering and clogging presence of the useless mental content that counts most. The valuable content in a mind is at present so mixed with a larger mass of encumbering and untrue and worthless content that the truth is too much diluted — the intellectual brew is too weak and insipid to be stimulating.

Realizing the practical value of these conclusions, the author selected from the entire mass of his total mental content those specific intellections and feelings and acts which he knew to be true from his carefully considered actual experience, and introspected and re-functioned (that is, recollected and passed them through the memory in systematic and classific order) weekly (it took that long) and by this re-functioning them and simultaneously neglecting the other kind, the valid and true part of his mind *arose into dominancy* and the untrue and unclassified and katabolic part subsided functionally so as not to contribute as much to his mentative conclusions and insights and impulses. This practice is of utmost importance. Its application to mentation will be noted in the curriculum.

It is not expected that the student will have the patience and time for such an exhaustive undertaking as making the inventory of his total mental content. However, for the student of special abilities and purpose no task will prove more rewarding than to acquire such an intimate knowledge of his mind and thus appreciate the value of its useful content. A partial inventory using

such modern sampling techniques as are applicable may well suffice to gain this insight.

Psychological Classification of the Data of a Science. In order to discover something more about the nature of knowledge the author recorded every conscious step in the process by which the mind, through its inductive experience with the phenomena of a science while engaged in learning it, actually acquired the conscious states which constitute the data of a science. Thus was discovered what are the actual data of a science expressed in terms of the mind's conscious experiences with the states derived from the things of that domain; and how these data could be psychologically classified, constituting a "psychotaxis" of the data of a science.

For this purpose acoustics was selected and taught to several persons experimentally by the author and to himself, by supposing he knew nothing about the subject. Important things were found; first, that the only kind of mental content that is worth introspecting and re-functioning is the data of a science;

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second, that this method of learning a science (psychotaxically) automatically eliminates much of the statements that are not true; and third, that more acoustical discoveries were made than otherwise.

By much experiment, observation, and introspection the author proceeded to make an inventory of the mind's experience with the phenomena of this science. He found that if, like Condillac's stature, he had been born with a marble exterior so that he could not experience any sensations — if he could not *touch* objects, of *press* upon them, or *feel* whether they were *warm* or *cold,* or exert *muscular strength* upon them, or be *tickled* by them, or *smell* them, or *taste* them, or *see* them or *hear* them, if he could not have any of these kinds of sensations (at least nine kinds) produced by these objects acting as stimuli upon his sense organs, then he could not possibly know anything about their characteristics or even of their existence. Therefore it was concluded that the first chapter of any natural science, the simplest and most fundamental data thereof, consists of SENSATIONS; that is, of the sensory experiences with the phenomena of that realm of Nature.

An inventory of these sensory data involves no hypotheses or theories whatsoever. Even if according to Berkeley and certain

Idealists we philosophically conceive those phenomena to be non-existent, nevertheless we do actually have these kinds of sensations and such and such clusters of sensations. Out of all the sensory experiences derived by the mind from any given object arises an integration of these sensory data called an IMAGE; and in the sense used here is meant not only a pictorial or visual image, but combined therewith also an auditory image of that object, and its tangible image, and the images of all the other senses; the image being complete only when each one of the sensory capacities have contributed to it all the data which they are capable of deriving from the corresponding object. To omit from this synthetic image any datum of any phase of any one of these sensory capacities is to leave it incomplete and incorrect with certain physical characteristics of that object unknown and unrepresented in that image. Accordingly when the mind tries to classify images that are so imperfect, it creates wrong groups. The mind does not classify objects because objects are not in consciousness but only the sensorily-derived images of the objects. Wrong and incomplete groupings or classifications will be made and the whole intellective superstructure arising therefrom will be distorted and abnormal and untrue; the memory enregistrations in the brain will be abnormal. The second chapter of the data of any science consists, therefore, of IMAGES.

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In classifying images the human race has been guided largely by philosophical speculation and linguistic peculiarities, but according to this method the mind, guided by its fundamental capacity to detect likenesses and differences between its conscious units, groups the images into classes or concepts. The usual morphologic, genetic, and philosophic principles of classification thus were abandoned, creating a new and more truthful grouping of images into concepts. These conceptual groups of objects are therefore somewhat different from those found in textbooks or that are named in the languages of the world, and more nearly true to the nature of things. The third chapter of the data of a science consists, therefore, of CONCEPTS.

The next step consists in discovering the interactive and other relations between conceptual groups of objects. Thus for instance, the author's concept of "magnetism" represented an actual group of magnetic bodies which he had in mind of sensorily-derived

images; and his concept of "heat" represented an actual group of hot bodies of which he had in mind sensorily-derived images. When by means of experimentally conducted sensory or perceptual observation he discovered that "magnetic bodies" have an observable effect on the temperature of "hot bodies," he thereby attained to an idea of that kind of relation between the concepts magnetism and heat. If the reciprocal relation is observed, he would discover that hot bodies diminish the attraction of magnetic bodies, and thereby attain the idea of that kind of relation between the concepts heat and magnetism. In a similar way he may try to discover a relation between "magnetism" and "odor" and finding none, would have no idea of such relation. In the same way he may try to discover the relation between magnetism and each other concept belonging to that science or other sciences, but it must be a *discovered* relation and not a fiction or it will not, in this sense of the term, be an idea at all; and it must not even be a successful guess because in that ease we would not scientifically know it to be true until inductively demonstrated. When Bacon said that the odor of an onion will deprive a magnet of its virtues he was not stating an idea, because the statement is not true. If it is not true, these two concepts cannot thus be related into an idea.

If there are 1000 concepts in a science, then the whole business and opportunity of the experimental and observational investigator consists in trying to "relate" each concept of that science to each other one; the first concept on the list with each other one on the list, the second concept with each other one in the list, and so on, including the reciprocal relations as the second with the first. When he has accomplished it, he has to the extent

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of his mental capacity systematically ideated every concept of that science. (In the above instance there would be 999,000 possible relations or ideative efforts.) Hitherto this has all been done without such comprehensive system and rational method, and it thus happens that the human race has attempted only a comparatively small part of the ideative possibilities offered by the concepts of any science. In fact, it could not be done at all with the present arbitrary, theoretical, and non-psychotaxic list of concepts. But with the psychotaxic concepts *systematic ideation* becomes practical and startlingly fruitful, reducing experimental investigation to a scientifically comprehensive system and the

mentative processes connected therewith to a scientific art. Bear in mind that the words image, concept, idea, and thought as herein used have meanings more definite and somewhat different from those usually given in dictionaries and textbooks, in which these words are largely defined in terms of each other, meaning everything and therefore nothing in particular. The fourth chapter of data in a science, therefore, consists of IDEAS.

Out of ideas the mind constructs a new and higher kind of mental unit called a *thought* (or law of the first degree of generalization.) A truth common to two or more ideas is a thought, which will not be further considered, nor will laws of the second and third degrees of generalization. Suffice it to say that the fifth, sixth, and sometimes seventh chapters of data in any science consists of THOUGHTS.

A psychological classification or psychotaxis of the data of a science is thus a classification of its sensations, images, concepts, ideas, and thoughts. It is only out of accurate images that accurate concepts can come, only from true concepts can true ideas be relationed, and so on. To repeat the author's experiments special facilities and trainings are required. The method of the curriculum using its Topics instead of concepts is the *only* practical substitute.

Strict mentative methods cannot be learned outside the laboratory. The data for an art of discovering must be derived from an inductive study of the objective world by observation, experimentally directed, and of the subjective world by introspection, experimentally directed. A theory is not a true mentative datum; only a fact is such a datum; and it is not one if you have only heard or read about it. Then it is only an "accept," to use Major Powell's term. To be an inductive mentative datum in your own mind, you must inductively acquire it by the only way one can ever acquire it; by doing your own sensating, imaging, conceptuating, ideating, thinking, analyzing, synthesizing, introspecting. In no other way can a fact become psychologically operative in your mind to produce mentation.

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From this standpoint an idea is not an idea unless it be true; otherwise it is a fiction, fancy, or falsehood.

Valid mentative data consist of actually experienced sensations; of images derived from actual objects by inductive observation; of concepts that have been actually acquired by

grouping images of objects; of ideas that have been inductively acquired by experimentally relationing concepts of groups of objects; and so on. Data not thus acquired, and for which you have not all the subunits, are not for you mentative data.

A further conclusion was that *cooperative mentation* was a different process from cooperative research in which a number of persons worked together upon the same subject. In it a number of minds could be organically and psychologically interactive, and the new ideative results of any one of the mentators could be constantly unified by the mentative data process so as to be immediately available for the use of the others.

Psychotaxis of the Sciences. A classification of all the experiences which the mind of man is able to get from a study of some one class of natural phenomena, as for example from the study of chemicals, constitutes the *science* of that domain of knowledge and Nature. There are, or should be, as many sciences as there are groups of objective and subjective things and classes of relations. What classes of experience can the human mind have? That is, from how many distinct domains can the mind get intellections (sensations, images, concepts, ideas, thoughts)?

The first step in answering this question was making the inventory of the total mental content and classifying it, as previously described. It was a long and tedious task (it took over five years.) Each memory as it was recalled was listed with some like group. Every thing and meaning that had been named in the English, German, French, Latin, Greek, and several other dictionaries was likewise, word by word, assigned to its place.

It was found after many corrections, additions, and approximations that all data related to certain great groups of subjects or domains of Nature (objective and subjective); and that no data could be found that did not come within the scope of some one of the groups. The classificatory groupings grew out of the assembling and assorting of the data and did not arise by philosophizing or by determining a priori what they should be. About everything had been classified that the language of man had named and everything that could be fished out of the memory of the author and several others, and no other data could be found. (There are more data, of course, for considerable was omitted, but the omissions do not affect the general conclusions).

The following classification of the sciences resulted.

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1. The mind's experience with CONSCIOUSNESS (Cognostology), not further described.
2. The mind's experience with ITSELF, such as subjective individual psychology.
3. The mind's experience with OTHER MINDS, such as comparative psychology, sociology, biology.
4. The mind's experience with MATTER, such as chemistry, radiology, geology, astronomy.
5. The mind's experience with MOTION, or all of physics broadly.
6. The mind's experience with MAGNITUDES, or all of mathematics.
7. The mind's experience with TIME-SEQUENCES, such as history and evolution.

This classification is given more in detail in the curriculum as the Synopsis of the Six Groups of Sciences used as a skeleton outline to aid in the work of the Third Stage.

This method of classification differs from that of Compte, Rain, Spencer, and Ward in the fact that it is a psychological classification (psychotaxis) of the sciences, and therefore conforms more nearly to the way in which the mind knows and creates them. The method consists fundamentally in psychologically grouping them according to their likenesses and differences as mental states; a classification in terms of the mind's actual experiences with the phenomena of that domain of Nature, resulting in a new and more true classification, far more compact and more easily understood, learned, and remembered than any other taxonomy.

An important law was established, that a psychotaxis of the intellective states relating to a science is at the same time a psychotaxis of the data of that science and the two are mutually corrective. This standpoint treats all sciences as psychologic phenomena, making psychology the one science of which all others are sub-divisions.

Many introspective experiments in the capacity to study a subject found that a little different process was required with the different sciences; that each science existed in the mind not only as a kind of mental content but that it was a *mode* of mentation.

Re-Functional Training. It was found that this psychotaxic method of learning constituted not merely an acquisitive education

but also a mind training of a new and superior kind, because classifically related groups of conscious states and processes are simultaneously trained, thereby acquiring associational strength and functional coordination; and because there is a more direct training of the mental faculties and processes brought about by the systematically complete

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re-functioning of the sequent series of conscious states and processes and their associated subconscious functionings. It was found that when a whole taxonomic group of data was re-functioned from beginning to end of the list, a short time every day for some weeks or months, it augments the vividness and completeness of the conscious states, increases the efficiency of the mental (conscious) processes, giving additional functional power and productiveness and ability, and sets up the directed activities of the subconscious processes. The conscious states herein are also the data of the science to which they relate.

To pass these states (sensations, images, concepts, ideas, thoughts, introspective memories) systematically through consciousness causes the corresponding structural memory enregistrations in the brain and sub-cerebral ganglia to be re-functioned. This sends more blood to the structures, makes them grow, increases the metabolism, thus manufacturing vital energy and material with which to build brain tissues, augments the elimination of waste materials, increases the functional speed, intensifies the vividness of the conscious states, causes the respiratory and digestive systems to supply to the blood the special nutrient materials needed for that kind of mental activity.

It was found that when a mind has learned the psychotaxic data, then the student has greater interest in the practical questions and doings of that domain and his knowledge is more readily available in the practical affairs of life.

Ideas Do Not Come Out Of Nowhere, as shown by studies in physics. In the study of mental states and processes connected with methods of original thinking, such as original ideating and creative imagination, acoustics was first selected as one of the most clearly demarcated branches of physics at the time. This study disclosed that the largest part of the mental content is not worth introspecting or processing, and that only validated data are worth working with because they are the only normal data. Other

subjects were studied in similar ways and carried to the stage where original ideas began to come. Many different methods were tried in order to discover those which would produce in the shortest time the greatest number of results in the form of *new* ideas which would upon experimental investigation turn out to be *true.*

Another branch of physics was selected, thermodynamics. The author taught it to several persons entirely ignorant of it and re-taught it to himself assuming he knew nothing of it. After several months of experimental work for acquiring anew his mental content relating to heat, and after his mind had ceased to produce any further new ideas relating thereto, daily the

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attention was directed first to one classific group of thermodynamic data and after several months to another classific group and then after several weeks to another group, until all the groups of that science had been covered and thereby found his mind dominant upon thermodynamics. All other subjects were eclipsed in the attention and there arose an intense desire to answer the questions which had arisen and to know more about the subject of heat. The mind was kept "attentioning" (which is not a permissible word) or attending or *intending* upon that subject. After a time new ideas and thoughts, born out of the data in the mind, began to arrive and they turned out to be mostly true; they were not such partial glimpses or often entirely untrue ones like the former insights to which the author had been accustomed. These new ideas were actually discovered relations between actual concepts and the new thoughts were generalizations from the true ideas. As thermodynamic data were continued to be held uppermost in attention the whole subject assumed a degree of vividness and clarity and precision that was new and wonderful to experience; as intense as a vision, every datum of the science in readiness at a second's notice, and only such data occupied the field of consciousness. All that hinterland of useless memories and speculations disappeared from the focus and original thermodynamic ideas of a higher type began to form in mind; some of which were the basis of practical inventions. It was not the utilitarian value, however, but the mental method by which they were discovered which was of interest.

Optics was selected as another branch of physics, and after

twelve weeks of reflection upon what was remembered from a short course taken two years before, but five new ideas were acquired, only one of which was found experimentally to be true. The false ones were the result of a theory which had been accepted as a fact; but the fruitage of the mind was not as prolific, nor as easily acquired as during the previous mentation; albeit harder effort was made. Then the attempt was repeated, but first the data were experimentally re-acquired in that subject, so as to acquire new experiences and eliminate false data. In two weeks of directing the introspective attention to that subject eight new ideas were found, and all of them turned out to be true!

Four years before the next experiment the elements of the electrical branch of physics had been learned. That knowledge had lain idle, like seed sown in soil too dry to cause it to sprout; no new ideas or thoughts had occurred on that subject. Two months were set apart to see if suddenly "that soil could be watered and get the seeds to sprout. First the attention was directed to one

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group and then another of electrical data and thus kept the subject in mind at the same time every day, when well-nourished and well-rested, and in a room free from distractions. Each datum of electrical science would be passed through the consciousness, one at a time; held in mind a few minutes, then passed to the next datum. A synthetic view would be held next of the whole subject for a time; then the *possible* relations of each datum to each other datum, and of each datum to its possible practical uses.

After five weeks of this effort a number of new ideas began to occur on electrical matters. Had these particular mentative steps not been taken these ideas would not have occurred. The mind had been put to work and was producing results on the selected subject. Now while all these "new" ideas were previously unknown to the author, six of them turned out not to be true, and the only one that was true had been previously discovered by Faraday.

Then the electrical data were re-acquired by the psychotaxic method, eliminating false data; and this mental content kept uppermost in attention. In three weeks thereafter eleven important new ideas were attained and all but one were true, and that one was due to a false datum that had crept into the synopsis of supposedly true data.

Then as the acoustical knowledge had lain idle for two years,

the attention was directed to the mentative synopsis of acoustics and music, resulting in many musical inventions and a few important discoveries.

It was evident that this holding of a subject in the mind introspectively produced some definite effect upon the mental processes and perhaps upon the brain, or it would not thus invariably tend to produce new ideas and true ones.

From these experiments the author concluded that while he could elect what subject his mind was to work at during any given time, he could not predetermine what problems would be solved in the selected subject for *that* seemed to be determined (1) by the kind of data in his mind, (2) by the kind of development which his mind made, (3) by the kind of growth which took place in his brain, and (4) by *the next* logical *or classific step in his knowledge of that subject.* This series of experiments was very impressive. It appeared as if one could elect to have musical ideas in July, mathematical in September, chemical in January, and botanical ideas in May. That strange and mysterious something called mind could be called upon to do work for us, and that kind of work which above all others is most important, discovering new knowledge.

That no one may conclude that it was imagined that these new

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ideas came out of nowhere and from nothingness let it be said most emphatically that they were known to be the result of inferences from data already in the mind, or generalizations of data and new combinations thereof and better understandings and insights regarding them, and appreciations and appraisements of their utilitarian application. Intending the mind upon mere vacancy of mental content will not produce new ideas; re-functioning cannot produce results unless there are true data in the mind to be re-functioned. The new ideas are not "drawn out of the ether where they are stored"; they are apperceptive elaborations of mental content, and the results will be true or false just in proportion that the mental content is true or false.

Mentative Data Must Be True. It was quite evident that if only true data and no false data were held in the consciousness, in the awareness, that generalizations from the mind's content of thermodynamics (or other subject) would be more apt to be true than when false data were included in the field of thermodynamic

consciousness. This is part of the technique of the mentative method of discovery; namely, to re-acquire the data of a science so as to eliminate the false data and then render the true data by introspective attention more dominant than the false data that were in the mind; to illuminate with awareness only the true data and leave the false out of focus, so that when relations are discovered by the mind or generalizations made, the result would be true.

Do you appreciate the importance of this step?

When working in optics a device was made whereby throwing the right kind of light upon a tapestry of many colors any one of the colors could be caused to disappear in a photograph and also any one color could be made brighter than usual and thus appear more distinct in the photograph. Now let us suppose that the field of consciousness relating to thermodynamics before the author had re-acquired his data to contain some true data which will be symbolized by the red colors in the tapestry and false data by the green colors; both colors equally vivid, or with the false ones apt to be more vivid. The mind accepts the true and false with equal faith, and when a generalization includes both data it cannot be true. Now by re-acquiring the data in the psychotaxic way, the false data are not included in the classific system of data, the "green" colors are omitted; and then by directing the attention only to the true or "red" data, the latter will stand out vividly and the "green" colors will not be seen. Dr. Armstrong who first heard the announcement of this law said: "You can now quit work and retire; you have done your part for human welfare. All you need to do is to publish this one law and the method of applying it." The illustration by the tapestry is not a very good

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analogy.

These experiments show that the mentative use at any time of a theory, speculation, hypothesis, myth, leads to a vitiation of the mental processes and to a subversion of every conclusion formed by the mind. The whole outlook and inlook of yourself will be clouded and distorted by a single belief that has not for its foundation actual verified data.

Only truth acted out in conduct can lead to good consequences, hence one of the prime factors in mentation is the re-functionation and introspective intending ("dirigation" as described later) of the true part of the mind until it becomes dominant. Is there any

greater practical advice to the individual than this?

It became increasingly evident at each step in these researches that whilst mentative method is of first and prime importance, that possession of validated data is also of first and prime importance. False data lead to wrong conclusions even with right methods, just as wrong methods lead to wrong conclusions with right data.

Intending the Mind — Dirigation. In the introspective study of attention and its effects upon the mind and body, hundreds of experiments were made daily and "dirigation" was discovered. It was found that when the attention was limited to some bodily part, say the little finger of the left hand, a feeling therein would soon be noticed. As the attention was voluntarily prolonged the feeling would become more distinct. After several hours practice daily to a given part for several months, the feeling thus produced became greatly intensified, a sense of fullness and pressure, and indefinite excitations of the nerves of touch and temperature. By much practice, skill was acquired in quickly dirigating intense feelings in any and every part of the body which could be "mentally located" by getting its local sign in the mind.

To understand what is meant by local sign, try to dirigate to the pancreas or spleen or corpus callosium; in order to do so there must first be experienced a conscious feeling in those organs, either from the effects of disease or by taking special medicines in large doses to produce sufficient pain therein to be located.

When the attention was limited through the aid of the local sign to the hand or foot or teeth, refusing to allow any other conscious feeling to enter the mind except those residual in that part upon which the attention was focused, certain noticeable effects were produced. Everyone has doubtlessly noticed the increased pain due to paying attention to a toothache, nausea, or inflammation. Prof. W.B. Carpenter, taking his cue from Harvey, has spoken of the tingling sensation produced by directing the attention to some

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part of the body. He did not say "directing the attention" but called it "thinking" of it; but he carried the matter no further and its significance was not understood.

Dirigation measurably augments the flow of blood to the parts and thus augments the metabolic activities. Mosso, the Italian physiologist, at a later date measured the increased weight of the head due to the augmented blood supply during dreams and mental

excitement, but these dirigation experiments approached the subject from another standpoint, traced its relations to voluntary effort and studied its general effects on body and mind.

By means of a specially designed plethysmometer it was possible to measure the increased flow of blood to the arm or leg due to dirigation, not only proving that by vaso-motor dirigation the amount of blood could be increased in a bodily part but also measuring the degree of success attained. The part gets a larger proportion of the total quantity of blood in the body, making that part measurably larger and bringing its temperature up to that of the blood at its highest.

Fill two glass museum jars with water at blood temperature. Introduce the right arm into one and the left arm into the other, and having taken a comfortable and stationary position for the body, allow the arms to rest naturally in the vessels without muscular strain. When the water which the arms displaces has all run out, take care to have the jars filled so full that an additional drop would overflow; but the overflow must not raise the water above its original level. Then without the slightest movement of the muscles of the arm dirigate to the right arm. In from ten to sixty minutes you will become conscious of no other parts of the body but the feelings and sensations in that arm; that is, if you have previously had adequate training in dirigation. Shortly after this feeling becomes intense some water will flow out of the vessel (through an appropriate aperture) and the amount will vary according to your skill in dirigating. This is caused by blood going into the arm and augmenting its volume. Then quickly take your attention from the right arm and dirigate to the left arm. It will take some little time to get the proper kind of feeling in the left arm because those parts of the brain in which the sensations of the right arm are enregistered have been functionally active and filled with blood, and it will take some time for the blood and metabolism to cease their vaso-motor dominancy in the arm. The phenomenon is herein called functional persistence, or vaso-motor dominancy. The experiment can be better performed with an air plethysmograph.

A functional dominancy tends to maintain itself. After some minutes of effort you will succeed in overcoming the functional inertia of the right arm and you will get a dominancy in the left

arm and corresponding brain areas; then the water will assume a lower level in the vessel in which the right arm is placed, because that arm is shrinking, and water will begin to run out of the vessel in which the left arm is placed, showing that it is augmenting its volume. Thus by voluntary effort you can succeed in changing the vaso-motor dominancy in an organ or group of organs.

It became evident that regular dirigation to bodily organs augments their growth. Thus dirigation to the muscles of one arm soon measurably increased the girth around that arm of a patient who could dirigate. Dirigation to abnormally small organs slowly augmented their size; to a weakly functioning process increased its activity. In addition there was a training of the attention.

The hand was tested upon a dynamometer several times daily for six consecutive days to find the utmost power of its grip; then the experimenter dirigated to this hand six times daily, ten minutes at a time, for five weeks and without using the hand in any form of muscular exercise whatsoever. At the end of that time the strength of his hand's grip had increased 11 percent.

By dirigation it has been shown that it is easy to produce actions similar to drugs; after sufficient practice may be produced emesis, catharsis, euneresis, salivation, lactation, lachrymation, and even sudoresis. But dirigation may also produce appetite and laughter, cheerfulness and strength and exhilaration. Dirigation to a group of muscles revives them during approaching fatigue.

Not only the body and its physiologic processes are affected, but the mind is also subject to its influence. It was found that dirigation could be applied to the sensory nerve endings of the special senses, such as those of touch, warmth, cold taste, smell, seeing, and hearing, greatly increasing the discriminative capacity for detecting minute differences in stimuli. It was found that dirigation could be applied not merely to the nerve endings of the special sense but also to its functional center in the brain after the feeling of its local sign was mentally located. It was also learned, after a long and special practice, how to dirigate to the higher mental functions, such as ideating or thinking. For instance, dirigation to the mental activities concerned in mathematics augmented ability in that line and increased the fruitfulness of that process by which mathematical ideas "pop" into the mind. Musical dirigation made the mind more musical, more able to perform, appreciate, and compose; and so on with other kinds of

mental abilities.

If we water the flowers and not the weeds in the garden of the mind there will be growth of the one and death of the other; so it is with our intellective mental content — if we dirigatively bring

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into consciousness the *true data and* not *the false,* the former will become dominant and the other will atrophy. And so it is with our emotional content; if we dirigate the happy emotions and not the unhappy ones our minds will soon be devoid of depressing conditions; so it is with our motives, and with all other conscious states. In dirigation we have the key to the method whereby we can largely make over our mind. It was through dirigation that the author was first able to say: "I am ruler over my own mind."

When a mentative synopsis of the memories of a special class of phenomena is dirigated, those particular structures of the brain which are functionally involved in maintaining these particular memories become the seat of vaso-motor, metabolic, and libero-motor dominancies; and after some weeks of such practice, growth will take place, and these structures will have become subconsciously stimulated for their task. Active functionings of the subconscious kinds (differentiations and integrations) will occur, and the results will, from time to time, be flashed into consciousness. Evanescent and almost imperceptible shades of meaning will be discoverable owing to the dirigatively exalted functional activity of the parts affected; and the enthusiasm of the rapture of anticipated discovery and new insight increases the total functioning of the organism with reference to this one contemplation. The whole conscious and subconscious mind tends to produce mental evolution in the direction of the understanding of that class of phenomena contemplated. Growth takes place. The attention, to concentrate in those very identical structures which must function in order to maintain the comprehension, renders those tissues most sensitive which are most directly concerned in cerebrating about the problems to be solved. At the same time the other cerebral structures, by correlation of functioning being less active and anemic, the consciousness in contrast with the non-functioning areas becomes vivid. Indistinct changes and shades of meaning, which in ordinary conditions would be unnoticeable, enter the awareness from the great subconscious domain.

By dirigatively stimulating the good emotions, the normal nature becomes dominant; the affections purer, and the bad and guilt memories pass out of dominancy; and thus truthful mentation is enhanced, for true conclusions are as much a product of the moral nature as of the intellective. The acquisition of truth is as much a function of the moral disposition, and of the affective and emotive states, as of the intellective.

Introspective dirigation to motor structures tends to coordinate them more perfectly, increases the energy and endurance, and makes the muscles more responsive. Introspective dirigation of a psychotaxic dominancy produces a greater functional dominancy

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and a superior ability as to celerity and power of apperception. If a chemical dominancy is dirigated it produces a chemical personality, and so on. Under the dirigational influence the faint and evanescent deliveries of the subconciousness are garnered into the consciousness.

These dirigational researches have been very briefly described, not as a guide to the student, who could not be expected to repeat them without special ability and laboratory instruction, but to illustrate the power and scope of *intending the mind.* Attention to any subject naively does this intending, and the natural interest in predilective abilities and subjects makes it stronger and more dominant. The systematic methods of the curriculum utilize the advantages of intending the mind on classific and true mentative data in predilective and originality lines.

The Obstructive Effects of Disapprovals. These researches, and a lifetime of mentative work, brought out the practical value of another psychological discovery of deepest significance; namely, that a disapproval (intellective, esthetic, emotive, moral, religious) with reference to the plans or motives or acts bearing upon any line of original thinking, any qualms of conscience relating thereto, amounts to an inhibitive dirigation producing functional effects in mind and body which diminish or prevent further original results. Any disapproval such as of conscience, judgement, taste, amounts in effect and in fact to a dirigative process tending to inhibit the functional performance of that which is disapproved. A successful dirigation must be one without disapprovals; hence it must be based on that which is true, just, and desirable. The plan or purpose must be *changed until it does meet the approvals.* When

every datum of the plan has been associatively integrated with an approval, and every datum dropped that cannot get the approval, then *dirigation will successfully accomplish* its *purpose,* according to the abilities and plane of the person exercising it.

The True Place of the Subconscious. These experiments and conclusions pointed out the true place and position of the subconscious functions and how better to utilize them as physiologic and psychophysical workers by which conscious processes are carried on. It was evident that there can be no intellective authority in the subconscious; it was demoted as a wise guide in any matter for which there can be the guidance of knowledge. We inherit the physiologic processes and instincts which constitute the subconscious part of our mind just as we inherit our emotional nature, and all these are part of the subconscious, non-volitional *urge of life.* The instincts have been inherited from a phylogenetic past out of which we have evolved.

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If we are in a state of progressive evolution the verdicts of the subconscious are on a lower plane and of a lower order than our present-state conscious mind. If we were in retrogressive evolution some instincts might be on a higher level.

The subconscious is all that portion of the life, mind, and self of a creature which does not become conscious to it, including memories of conscious states while they are being recollected. A mysterious subconscious is not meant, but the actually known functionings that have not risen into our consciousness, that are still below the limen of our consciousness. It is the general name for all organic functioning that takes place below the conscious. It is simply that part of the mind which has become so automatic by generations of repetition that it no longer rises into consciousness; also that part whose stimuli and states are too weak to rise into consciousness.

We inherit no intellections (such as sensations, images, concepts, ideas, thoughts), not *one.* They must be acquired by conscious experience with the present, local, individualistic, temporal, and particular environment and self. They would not be of adaptive value otherwise. With reference to a given individual and environment the guidance of an instinct may be wholly wrong and fatal. If there is not reliable and trusted knowledge relating to any impulse out of the subconsciousness, then we will be at the

mercy of instincts adapted to a kind of self and environment which no longer exists. Our safe guide to action (conduct) is conscious knowledge, and upon its extent and validity is safety and success dependent. It is the province of the intellective processes to utilize only those subconscious functionings which are involved in the physiologic and psychophysical carrying-on of its intellective processes and normal feelings; and in this, scientific knowledge is the only guide.

When in the semi-light you look into indistinctly illuminated regions and see ghosts or gods according as your fancy directs, or when you look upon daubs of coloring on the wall in half-dreaming wakefulness and see sometime a beautiful maiden and sometime an ugly monster, or when in dim light you look on figured wall paper and see all kinds of ever-varying figures, or when you look at the clouds and like old Polonius see a 'whale or a camel' as the momentary whim chooses — so it was found that the subconscious deals with the ontogenetic memories and phylogenetic instincts and desires of an individual, and creates out of them ceaselessly and with astounding rapidity all kinds of false, half-true, and often new and beautiful insights, which the conscious intellective life may validate and use according to its methods, and do safely. To mistake these promptings and

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symbolic visions and insights as coming from something *higher* than the conscious self is one of the horrible mistakes of mysticism and of the past, and is the central danger of inspiration. The word sent to you out of the subconscious is not "the voice from Most High" — it is the cry of slaves for a chance to serve, ever ready and willing when *the task is set.* This power of the subconscious is one of the infra-logical processes which the conscious intellection must learn to use as a tool.

Subconscious Mentation is the stimulation and regulation or *setting-a-task* to subconsciousness by means of conscious states and processes, especially by dirigation, introspection, and still more especially by systematized desire. After having failed to solve a problem or invent a device, the mentator waits for the deliverance of subconsciousness, and while waiting the subconscious processes are directed according to psychologic laws, and thus harnesses Nature's most potent force. It can be shown that holding in the attention the subject of what we want to recall

dirigates introspectively to the brain areas where these memories are enregistered and causes a functioning.

Mentative Dominancies. (The Modus Operandi of Genius.) One of the most important steps in these researches was the discovery of "mentative dominancies." A dominancy is a state of maximum functional activity, perhaps also of anatomical preparedness by enregistrations, accompanied by a maximum interest and attention, and a vividness and intensity of conscious states transcending all other states that by a psychotaxic enregistration and mind-embodiment, use, refunctioning, and dirigation have acquired a conspicuous ascendancy in consciousness and subconsciousness, constituting, at least for a time, the main interest, activity, and joy of that person.

When the psychotaxic data of one of the sciences had been enregistered in the author's mind he had thereby acquired a special kind of mental content, and if it were composed of a larger body of data than any other group of data in mind and if he had greater interest therein, it might be said to be a *dominant group* of data. When he began by mentative methods such as re-functioning and dirigating to get this body of data functionally *dominant,* a mentative dominancy was being created. When furthermore, this whole body of data was introspected and introspective memories added to his mental content, the subject was being made still more dominant in his consciousness and attention. This dominancy exercised a functional influence over all other parts of the brain, and that subject was dominant over all other subjects in his brain. There was thereby produced an altogether unusual degree of originality (for him), an increased productiveness, and an augmented ability in that line of

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knowledge and skill. In fact, this psychotaxic enregistration of the data of a science, this re-functioning of these data, this introspecting of the re-functioned data, and this dirigation created in him the conditions and capacities of *genius* (within that domain). It was seen that not only had there been discovered a new and superior way to carry on a scientific investigation and do creative and inventive work, but that there had been discovered a way to create a genius; that the genius-capacities thus created would be healthy, natural, and normal, and not one-sided. It was also seen that as soon as the mind would thus yield its fruitage on

any given subject, it should not be forced to try to do still more work along that line, as is almost invariably the case. Its activities should be shifted, to another subject, by enregistering the psychotaxic data of some other science, re-functioning, dirigating, and introspecting them, and thereby creating genius-dominancies of another kind, allowing the former dominancy to subside and rest.

Further studies of mentative dominancies and much experience in using them produced conclusive evidence that while carrying on purely intellective processes the functions of feeling, emotion, and sentiment should be quiescent, so as not to detract from the vividness and energy of the intellective states. To the extent that one has emotional dominancy he cannot at the same time have intellective dominancy, and vice versa. For the best results in certain kinds of purely intellective functioning the emotions should be wholly quiescent, and for best results in certain kinds of emotive work the intellect should be at rest. There are, however, other kinds of mental activity where both processes should be concomitantly operative. In like manner there are times when the best intellective or emotive work, separately or combined, require a total quiescence of sensory and muscular activities, and there are times when all should cooperate. It was also proved that the best subconscious functioning occurs during a quiescence of the conscious processes, and that efficient conscious functioning requires a rest of the purposive subconscious activities; and that other kinds of work require their coordinate and simultaneous working.

More Mind — Brain-Building and Mind-Embodiment. From the facts of organic evolution, from special brain-building experiments with animals, and from advances in physiology the conclusion arises that every conscious mental experience creates certain chemical, electrical, and anatomical changes in brain cells or fibers and other ganglia, constituting a physical enregistration of the memories of those conscious experiences. Intellection thus consists of the re-functioning of those memory structures. Enregistration of the psychologically classified data

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of a science produces normal and efficient brain-building and mind-embodiment.

In the process of organic evolution as the mind of a creature

becomes more highly differentiated and complex its nervous system in general and its brain in particular become also correspondingly more differentiated and complex. If this were not true there could be functioning without structures with which to functionate, which is impossible. The acquisition of psychotaxic knowledge means the acquisition of more and better brains and with more mind embodied therein. To get that kind of mental content which is efficient in producing true ideas only, true mental units must be enregistered; and these should come equally from every great group of sciences. If only one science is thus learned the brain and mind embodied will be overdeveloped in those sets of structures corresponding to that science and the brain is apt to be over-functioned along that line, while other parts of the brain and mind will be correspondingly underdeveloped, producing physiologic and taxonomic one-sidedness.

The ideal is an equable development of all parts of the brain and mind by acquiring an approximately equal amount of psychotaxic data from each one of the six great groups of sciences. Then a *rotation of mental crops* is possible, and overwork with the pathologic condition ensuing therefrom obviated. Re-functional psychotaxic dominancies and genius are related causatively, as before mentioned, and this discovery is one of the landmarks of this mentative research.

If it were possible to remove from a mind its total memory content of all its rememberable experiences there would be no mind left. In most minds a large part of this memory content is wholly false, mythical, theoretical, and useless. By enregistering in the mind only psychotaxic data of all sciences, a normal, taxonomic, comprehensive mind, *intellectively,* is attained. There are similar psychotaxies and trainings of the emotions, feelings, and skills, but the intellective normality must be attained first.

More mental ability means more mind. Regardless of the course of further research, the general conclusion appears well established that mind activities differentiate and integrate nervous structure and thus embody themselves in structures.

These researches and many more show that *mind by its* own *activities can increase its* own *powers without limit* and correspondingly modify the organism (and environment) in which it is embodied. Mind is not something apart from Nature; it is integral with it, one of the natural forces and resources of this planet, and systematized mentation will put it to work.

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Experience is not years (of practice or effort), but accumulated facts applied by systematic reflection to a purpose. Your chief purpose should be to let life express itself in and through you. The steps of the curriculum are designed to lead you toward this goal. Your first objective is to learn more about the original part of yourself and your mind.