

[page 143]

CHAPTER 9
Steps Toward an Art of Discovery

How much higher a thing to discover that by means of which all things else shall be discovered. . . . I must admit the possibility that the art of discovery will advance as discoveries advance.

—Francis Bacon (d. 1626)

It is obviously of more importance to learn how best to utilize that which creates all science than to achieve any given discoveries. It is far more important to teach the art of making inventors than to make any given number of inventions.

—ELMER GATES (d. 1923)

The span of three hundred years from Francis Bacon had indeed produced many discoveries, but undiscovered was the art of making them, nor was it considered the most useful accomplishment or goal.

Gates wrote: “If I had been trying to establish a reputation I would have done more with my successful experiments than convince myself. I saw a mighty goal and with almost bated breath hastened on, knowing full well the value. What avail even a dozen reputations, or hundreds of discoveries in the sciences, or thousands of inventions in the arts if thereby I were to lose the one main and significant result of my life’s effort,

[page 144]

that knowledge about Consciousness and Mind which I knew that I knew how to discover. I hurried night and day for over 33 years in order that I might find and demonstrate the *fundamental method of social progress*, which I from the first have known to consist of the mental methods of discovering, validating, learning, and applying knowledge to industry and character. Of what else could it consist?”

It had long been his desire to devote his life to the kind of activity that would make the most useful contribution to the human race. To be done any real good, the race, he believed, must be *taught* how to avoid want, ignorance, and misery. It would require the best effort of the two billion people living to reform the world, and the practical questions were, How can we best induce them to put forth the effort at self-improvement? and, What kind of self-improvement shall they be taught? The answers were not in doubt. The fundamental way to teach a man to help himself is to teach him how to more *efficiently and correctly use his mind in discovering and applying truth*. The way to induce him is to train

him into an acquaintance with his mind so as to understand it both subjectively and objectively.

Because Gates realized this, his motto became: "Get more mind and learn how best to use it in discovering and applying truth to the betterment of life and its environment." His confidence in the art of mentation was based not only on its performance but on what the method was destined to accomplish: "It rationalizes, systematizes, and vastly extends that method; it does more—it improves, extends, and accelerates the mental capacity by which this method, or any method, must be applied; and it reduces to a scientific art the process of discovery itself. Moreover this art contains within itself the method by which it will perpetually be improved." So he considered his maturing Mind Art.

Throughout the later stages of his previous researches he had frequently and forcibly observed that fatigue prevented certain results, Numerous

[page 145]

experiments proved, for example, that doing mental work at a temperature that would allow the least loss of heat from the body conserved energy; that a poorly masticated meal wasted energy in digestion; that all noticed or unnoticed sensory disturbances lowered the fund of energy; that every unpleasant emotion took energy to maintain; and that every emotion or feeling that did not directly contribute to the daily work was a loss of available energy, as was every muscular movement and conscious state not needed. "Aghast" at the realization that on the average fully 90 percent of his available vital energy was wasted, Gates sought methods to conserve it. His conclusion from many studies was that the first condition of efficient, normal, and vivid mental activity, especially of the higher functions, is *available surplus vital energy*; and especially that the body and mind be so trained as to have an augmented capacity for quickly *generating superabundant energy*. whereas originitive work was more frequent and of a higher order with a plentiful supply of vital energy.

As noted, this required an environment that had been selected and regulated to promote and not hinder mental activity, and the inhibition and dropping by quiescence-habits of useless movements and mental activities. More especially, it required a regularly active life that led to the *daily generation* of sufficient energy for the *maximum needs* of that day. Most important, the body must be trained to create just a little more daily energy than was required for the largest amount of work ever done in a day. On days when less was done, nearly all the surplus should be used in sportive exercise or amusements to maintain the habit of

creating the daily maximum. Its attainment had to be gradual to avoid strain.

A strain was harmful, requiring a long recovery time, and involving disabled muscles or paresis. It predisposed to further strain, and established a limit that was passed with difficulty and danger unless guarded by scientific methods. Prolonged overwork and severe strain could result in permanent decrease in efficiency. To avoid strains there was the infallible guide of fatigue.

Fatigue is always a psychologic signal of physiologic distress foreboding danger to tissues and functions. Any activity actually

[page 146]

fatigued should be rested to full recuperation, then gradually put to work again. Introspection of work of various kinds carried to prodromatic fatigue enabled Gates to detect its prodromata and stop further work before actual fatigue was felt, for then the damage had begun.

A certain degree of tired feeling at the end of the day was the normal condition; but “tired” means only strong prodromata of fatigue. The sleepy feeling was different. Sleep is not only for getting rid of this tired feeling but for recuperating. During sleep the metabolic processes eliminate waste and repair wasted tissue until midnight or about 2 A.M., and then the constructive metabolism of further growth begins. If one retired too late or too tired, then the recuperative metabolism might not be completed before morning and retrogression might take place; that kind of subconscious growth which takes place between periods of practice would be prevented.

The proper regulation of sleep was essential to the conservation and production of vital energy, and the sleep should not be disturbed by dreams. Always on days following a dream-disturbed sleep Gates found his fatigue point lower and mental work diminished in amount and quality. In further studies he found that persons of the same race, age, and sex required amounts of sleep that varied with the kind and amount of work done during the day, the muscular tensions and mental strains consciously or subconsciously maintained, the time of retiring and rising, and the kind and amount of subjective or objective disturbances during sleep. As a rule he found it well to retire early, soon after sundown, and arise and go to work as soon as awakening in the morning.

With the application of these principles and his improved techniques, Gates discovered “re-functional training” the continual re-functioning of the psychotaxic data of a science was *training* the corresponding intellectual processes to a higher efficiency. When well rested, well nourished, and well slept, to have superabundant

energy, at the same time every day, he refunctioned the sensory states relating to the phenomena of a

[page 147]

scientific domain (re-imaging the images), systematically going through his synopsis or list from first to last, and introspecting every step. This gave his mind extraordinary and hitherto unknown skill, constituting a sensory training, or an *art of sensating* and an *art of imaging*. Likewise he re-conceptuated the concepts and re-ideated the ideas, introspecting every step, which gave an *art of conceptuating* and an *art of ideating*. In the same manner he formulated an *art of thinking* (of the several degrees of generalization), giving more power and skill in the processes of thought, especially *originative* thinking. Finally he re-functioned the introspects to get increased introspective powers and skill, setting the whole conatus to work, giving an *art of introspective training and functioning*.

This practice gave not only a new dispensation of knowledge about the mind but a new kind and degree of intellectuating skill and efficiency, amounting to a higher power in intellection. This was a real *art of intellectuating* (which he named noeturgics), a structural development and functional training of the very acts and processes by which the intellect knows and discovers. It was in striking contrast to all mental “disciplines,” he pointed out, but embodied the good in all. By this training the mental states became more vivid, much more clearly minted and complete, while the processes of states acquired much greater celerity and efficiency.

Not only did this procedure strengthen and promote the speed of the intellective process, but perhaps even more important, it taught how to use the intellective processes separately and *independently* of each other or all others—how to image without conceptuating or ideating, to conceptuate without imaging or ideating, to ideate without conceptuating or imaging, and to think without at the same time doing any of the lower intellective processes. Thus, he observed, for the first time in the history of education it became possible, by means of this training, to use the intellective processes separately. So far as he knew, such a use had never even been “dreamed of.”

His next important step was the discovery of “mentative

[page 148]

dominancies.” When the psychotaxic data of a science had been enregistered in his mind, he had acquired a special kind of mental content, and if larger than any other group of data in his mind and of greater interest, it might be said to be a dominant group. When

by quiescence, refunctioning, dirigation, and their corresponding techniques of introspection he began to get the data functionally dominant, he was creating a *mentative dominancy*. Furthermore, when introspected, this group of data became still more dominant in his attention. This dominancy exercised a functional influence over all other parts of his brain, and that subject was dominant over all others. There was produced an unusual degree of originality for him, and an increased productiveness and augmented ability in that line of knowledge and skill. He noted with amazement and delight that this practice created in him the conditions and capacities of genius within that domain. He saw he had discovered not only a new and superior way to carry on a scientific investigation and do creative and inventive work but the way to create a genius. The genius-capacities thus created would be healthy, natural, normal, and not one-sided. As soon as the mind thus yielded its fruitage on any subject, it should not be forced to try for more along that line, as is almost invariably done, but its activities should be shifted to another subject, thus creating a genius-dominancy of another kind and allowing the former one to subside.

Further studies of dominancies gave a clear understanding of the relations of their various kinds, such as intellectual, emotive, and subconscious; when they should be used separately, cooperatively, or successively. This clear knowledge of the relation of functional dominancies was of utmost importance to the Mind Art.

The main results so far in his lifework Elmer Gates summarized as follows:

A New Method of Studying and Validating Judgments
Judgment Training
Leadings and Insights Regarding the Mind

[page 149]

Quiescence
The New Introspection
Physiologic and Psychologic Rest
Mentative Periodicities
Bodily and Environmental Influence on Mentation
Periodicity and Prognosis
Re-functioning
The Newer Introspection
Total Mental Content
Psychotaxis
Dirigation
The Newest Introspection
Surplus Vital Energy

Re-functional Training (Art of Intellectualizing)
Mentative Dominancies
Discovery of the Nature and Modus Operandi of Genius

These discoveries were almost instinctively combined in his practice, constituting a synthesis of methods of mind-using relating especially to the *art of discovery* by which the originality of the mind was promoted and efficiently directed, and a greater amount of creative work done than otherwise. So far as then developed he described it as an art of cerebrating, of intellectualizing, of introspecting, and of handling data to achieve a greater number of new ideas that would prove true than would otherwise occur to his mind. He practiced this art “assiduously,” and rapidly made other discoveries tending toward its improvement.

These researches were devoted to a study of mental processes and the art of using them. The result was far more than could have been anticipated, the achievement being due more to method than to ability. When results were carefully coordinated, he found he had really formulated a scientific system of arts for using the mind and that this mentative art *was* scientific method. He began to realize that all successfully adapted mentation according to guidance of knowledge, instead of the not-knowledge of the past, is scientific method. Applying it to the mind and

[page 150]

consciousness was his career, and he had been applying scientific method to its own improvement.

“I knew with serene and exalted conviction and with overwhelming impulse-to-do,” Gates wrote, “that I had at last found myself and my lifework. I had to rest a few weeks to take it all in and accustom myself to a wonderful terminus of my researches; a terminus which is but a source of endless new beginnings. I need not dilate and explain, words are useless. Life has afforded me many happy hours, but only one that was more exalting and intense than when I first fully understood that there had been created and evolved a practical art of more skillfully and efficiently using the mind and utilizing Consciousness by *scientific method embodied and incarnate*.”

He applied the Mind Art to invention and discovery in different domains to study mentative methods. He found after a time that the brain would cease to produce new results; then he would take up some other class of ideas, allowing the former functionings to rest and ripen more fruit. This alternation of subject cured unbalanced dominancies and one-sidedness; this systematic functioning of all brain centers in turn he later found to be the cure for brain fatigue and the evil effects of lopsidedness in genius, monomanias, and

such abnormalities. The ideal mental development is an equable one, achieved by acquiring an approximately equal amount of psychotaxic data from each of the six great groups of sciences. Then a *rotation* of mental crops is possible, and the pathological condition resulting from overwork is obviated.

He described some of the first steps of method—the first “Level”—by the following example: In applying this mentative art to discovery in a particular science, such as acoustics, he found it essential first to re-acquire the intellectual data inductively, and several times to re-functionate the memories and mind-activities relating to the subject. To do this most effectively he considered that a complete “laboratory-museum” of that science was required. In its absence he visited shops, museums, and laboratories so that by systematic observation and experiment

[page 151]

he could, so far as possible, repeat the sensations, images, concepts, and ideas of that science to place its actual knowledge vividly in mind, without admixture of theories, speculations, and hypotheses. He found that the latter could not be elements in the intellectual diagram, as they would vitiate the whole superstructure. To acquire the science, he emphasized, it was necessary to be inductively shown in classific groups every object and phenomenon of that science, then by Mind Art methods get correct images, concepts, an ideas systematically to create psychotaxic brain-structures. This caused that part of the universe represented by that science to be, as he said, anatomically, physiologically, and psychologically active in his brain. With his eleven (more or less) sensory capacities he examined every possible object and phenomenon of acoustics to get correct images of objects, correct concepts of groups of objects, and true ideas of their interactions and relations, taking nothing on authority, rejecting all theories and hypotheses, and re-functioning his memories of actual facts only. These data were psychologically classified into sensory, imagive, conceptual, ideative, and so on.

At first he, for several months, re-sensated all the sensations, exercising them just at the point of their least discriminable capacities, thus training the attention and developing a smaller just-noticeable-difference, making the senses more vivid, accurate, and sensitive. In like manner, an hour or two daily for several months he spent re-imaging the images (recollecting or bringing into memory the images of an object), from the beginning to end of the list-re-visualizing them, re-audializing them, re-tangializing them, and so on with all the other senses. This practice made the corresponding parts of the brain functionally active, sending more blood, increasing metabolism and elimination, augmenting their

growth and functional capacities, causing (after several weeks of continuous practice) the digestive and respiratory systems through corresponding appetites and hungers to supply the blood with the kind of nutrients best adapted to promote that kind of functioning, intensifying the conscious states constituting these images, and greatly increasing the imaging speed and accuracy.

[page 152]

All this constituted an art of imaging. This procedure was repeated, again and again, for six weeks (under the predetermined optimum conditions of body and environment), until he could go through the list in one tenth the time, the images being more vivid and the effort less. Those that required more effort or were less vivid were re-imaged to be equal.

In like manner, several hours daily for three or four months were spent re-conceptuating the concepts of the list, making those parts of the brain and subcerebral ganglia grow and giving a new kind of skill in an art of conceptuating. Then he related each concept to the others, which gave many new and true ideas (to be temporarily recorded until experimentally verified). Every new concept always implied a number of new ideas; and for the first time, to relate new concepts was always a rich opportunity for new ideas. When the various processes of imaging, conceptuating, ideating, and thinking led to no further results, he would by introspecting get a series of introspect-memories of the acoustical data; then by introspective dirigation he would call into activity the subconscious processes, and almost always, after several days or weeks, one or more new insights, methods of research, or generalizations would arise.

This re-functioning of images made the corresponding nervous structures grow in strength. It was obvious that "botanic" images, for instance, were concerned with a different set of brain-structures than "chemical" images, else differences of function could take place in similar structures. Conceptuating involved different structures than imaging, or the same ones in different ways. In either case conceptuating produced a different set of structural growths than imaging; and so with ideating and thinking. While he was thus engaged, there would spontaneously or apperceptively occur new concepts, ideas, and thoughts, which were the first kind of results from the mentative process. The brain was permitted to bear its normal fruitage without trying to force the mind into ruts and specialties as is usually done, but by allowing it its own time and way. When the mind by its own spontaneous inductive, differentiative, and integrative growth

[page 153]

produced no more new ideas and thoughts, he then applied to the mentative data the deductive ratiocinative process. Many new ideas and thoughts resulted, but being deductive, only those were recorded in his synopsis that could be inductively verified.

Next he introspectively dirigated to those intellections relating to the subject, and after several days the subconscious processes produced various results, such as new concepts, ideas, thoughts, or methods of experimental investigation. Then he again applied deductive reasoning to each concept, idea, and thought. Many deductions resulted, to be verified by observation and experiment.

Carrying out this mentative process required constant *experimental investigation*. He went over the new ground experimentally and got many additional data; many new phenomena afforded new sensations, images, and concepts. Each new concept was then experimentally related to each one previously in the list, thus affording new ideas. This enlarged synopsis was again taken up in the same way to obtain more data, and so on.

This re-functioning of the conscious states constituting the psychologically classified data of the science was a wholly *new kind of intellectual training*, and taken in connection with the memory-content that was re-functioned, it produced a psychologic dominancy of that psychotaxic group of conscious states in the mind as a whole, and a physiologic dominancy of the corresponding brain-structures and other bodily organs, creating a *mentative dominancy* of that science in that mind. This was the practical condition of creative and productive genius, during which the mind had superior powers along that line and made important discoveries and inventions. This is the *modus operandi* of genius, by which it is taken out of the haphazard modes of nature and systematized.

Gates found it extremely difficult to explain this art of discovery without many special technical terms that could be understood only from a systematic exposition learned with laboratory work.

The above example describes the first Level of the art of

[page 154]

discovery; he used other Levels, not only intellectual ones but similar psychotaxes and re-functionings and dirigations and dominancies relating to the feelings and emotions (Uplifts, as he technically termed them), and to the voluntary functionings and efforts (Powers). In this way the capacities of genius, so frequently dormant, are scientifically augmented, developed, and utilized; instead of being hampered by false beliefs and wrong

methods, they are rendered effective by rational method and scientific knowledge and trained mental processes. In this way the mind of genius need no longer be one-sided and unbalanced, or pathologic by overworking one group of brain-organs, with disuse of others.

In every step of this art there is constant practical reference that mentation cannot be produced by the brain alone. Every moment of conscious activity is the product of the physical and psychological interaction of the individual with his total cosmic environment, Gates reiterated. Let the pupil understand it is the Cosmic Process that is doing the thinking, the understanding, the introspecting, the willing, during any given lesson or experimental work. In the whole history of the sciences Gates was unable to find a single instance of the discovery of scientific knowledge except as the result of the mental processes of those who made the discoveries. He was able to trace the genesis of every discovery and invention of his to the conscious or subconscious apperceptive elaboration of the mental content that he had acquired.

He found that these ideas were not necessarily true because they were new. They were modified by the accuracy of the data, and especially they were colored, interpreted, and vitiated by his theories and beliefs. This was his first insight that hypotheses and theories were not the best guides to experimental research. Instead, he found that an inductive study should be made of verifiable data. The truth of new ideas depends on accuracy of the mental data and normality of the mental process, and on letting new ideas accumulate without reference to proving or disproving anything. The subconscious processes, directed largely

[page 155]

by predilection, simply differentiated and integrated in accordance with the nature of the mind whatever had been presented to them, and apperceptively elaborated conclusions that were generally apt to be a little more correct than original data but always colored and shaped by them.

He again began the study of a special subject by these methods, and found that false images, wrong concepts, and untrue ideas of outward things as well as inward processes were capable of wholly misleading the judgment, and that hypothesis and theory were not the right kind of mental content for invention and discovery. He therefore set to work again on this question of collecting data; he recorded no scientific datum unless personally verified by experiment, and classified his data psychotaxically. He firmly resolved, as far as was in his power, not to be misled by any false statements, unproved beliefs, theories or hypotheses. He was confronted with a task both "vast and difficult" but began the work

of getting together not merely the axioms and “Eternal Truths” in the manner of Descartes but more particularly the demonstrable facts of several sciences, and to that work he never ceased to devote part of his time.

Having arranged a brief psychotaxis of his collected and verified data of several sciences—“most fragmentary and imperfect”—he applied the process of mentation and found a greater number of true results than before.

This practice led to the beginnings of his “askeotechnical” method of bringing successively into consciousness each datum in the list to systematically include in the re-functioning and introspective dirigation all the known data in taxonomic order, beginning with the simpler intellective integrants and proceeding toward the more complex, to avoid mixing the different degrees of generality in the same conscious process; that is, to finish imaging before taking up ideation, and so on.

But this systematic handling of each datum had a long antecedent in his early practices. It had been his custom to pick up, for instance, a book on physics (then called “natural philosophy”), and taking each fact by itself, try to discover interesting

[page 156]

new relations to each other fact in the entire book; and his laborious efforts had often been rewarded. Thus starting with some concept, he would in turn attempt to think out, reason out, or ideate out new relationships of this phenomenon, law, or force to each other one in the book—such as gravity to mechanical power, speed, sound, heat, radiant energy, and so on; and many new and true ideas resulted.

He would also apply each statement or principle to each one of the arts to see if it could improve any methods or tools, and his success was not only frequent but sometimes interesting and valuable. He would hold in mind an improvement needed by some art and look through a book on physics, reflecting inventively upon each statement, to see if he could devise the desired improvement, and often succeeded. He observed that this process made him quite familiar with physics, and gave an equable knowledge of, and interest in, all parts, and produced greater mental readiness and originality. But more particularly this practice led to combining the method of going reflectively through books with other steps in systematic intellection, such as re-imaging the images.

When he concluded that he had achieved the beginning of a systematic formulation of an art of using the mind, he was so filled with the joy of discovery that his enthusiasm almost constantly led to over-work, and several times he nearly broke down through not

heeding hygiene and physiology and his own psychologic teachings. He would not take sufficient time to eat meals properly and would often forget them, would sleep only a few hours, and was twice threatened with dyspepsia. But he soon learned that he could get along more rapidly by obeying the laws of health, which is one of the unavoidable rules of a successful Mind Art.

He summed up a practical synthesis to more effectively practice the art of mind-using. He saw that his earlier insights were now justified by results. He so arranged his laboratory that interruptions and disturbances were practically eliminated. By special devices he supplied his study with purer water and air

[page 157]

than otherwise, and provided himself with a larger variety of agreeable-tasting foods than usual and masticated them better. When the maximum day's work did not consume all his surplus energy—which was seldom—he would make up the deficiency with exercises. He avoided strains, kept fully rested and recuperated (except at the few periods of overwork), and always stopped work at the onset of the first prodromata of fatigue, went to bed and was generally asleep soon after sundown and was up at work at sunrise. Always as soon as he had taken up a new kind of work, he sought to establish periodicity of habit by doing it at the same time each day; and in order to follow the ontogenetic periods of development as closely as possible, he would, if practicable, take up those studies and work for which his mind at that time had the greatest interest and predilection. He took exercises for the development of a normal anatomy, especially an erect spine (he frequently curled up like an interrogation point), and for full lung capacity and breathing. He succeeded in acquiring that degree of periodic habit of quiescence which enabled him to inaugurate the new methods and technique of introspection; and he opened up several new lines of psychologic research. He discovered other psychological illusions than sensory, and a method of training to get rid of them. He discovered a training to prevent, quite largely, the misleading influences of suggestion. Out of these results, combined in various ways and orders of succession, he formulated the incipient Mind Art, constituting the first stage in its discovery and development.

He did not then know about the work of Wilhelm Wundt and his followers in psychology. This work would have been of great interest but might, he later considered, have diverted his mind from its own lines of originality. In re-traveling the paths of others there is not so much likelihood of discovering as when the mind strikes out in entirely new directions.

Gates had before him at that time the definite and inexorable purpose to evolve out of the results of modern science, and his more special researches, a scientific art of mind-using. Encouraged by his decisive steps, he resolved still more fully to

[page 158]

apply his new methods: to attain the conditions of efficient mental action, to collect a larger amount of reliable data, and to practice periodically the psychotaxic enregistration, re-functioning, dirigation, and introspection of the mental activities, during physiologic rest and psychologic quiescence, by which the mind makes discoveries and inventions, does creative work, and learns.

These results caused him to rewrite his whole record of experimental researches. He reclassified cognitive psychologic phenomena into six great classes growing out of the three factors that may be experimentally varied: environment, body, and mental activities. There were no other factors then known to him. These six classes were three sciences of Biologic-Psychology, in which the environmental and bodily factors are varied to find the effect upon the mental factor: Comparative, Subjective, and Social; and three sciences of Psycho-Biology, in which the mental factor is varied to find the effect upon environment and body; Comparative, Subjective (varying the introspectively known mental activities), and Social (varying the group mentation of social aggregates).

This classification, which was retained for many years, emphasized his new distinction that mind-activity creates organic structure and that body and environment causatively affect the mind; it clearly drew the lines between comparative, subjective, and sociologic psychology, and made a more systematic and comprehensive experimental method possible. The classification led to a more definite experimental sociology, varying the social anatomy of groups of creatures (like taking away the workers in an ant colony or supplying them with slaves). He studied the effect of environment, mentation, introspection, and social phenomena upon each other.

The mentative art was applied to itself with results as described. One result was the useful classification into two great branches: the art of embodying more mind and the art of most efficiently using the mind. Mind-embodiment consisted in brain-building, education in special knowledges, and moral training. Mind-using, by which the individual conserves organic energy

[page 159]

and correctly functionates each of his mental capacities for the discovery of truth, consisted in conscious originative mentation, subconscious mentation, cooperative mentation, and research.

Under this classificatory insight Gates perfected brain-building as a general process for embodying a comprehensive and harmoniously developed mind, as distinguished from that special technical training for some vocation. He developed more fully the methods of emotional and moral training, and arrived at successful and specific methods for curing immoralities and criminal tendencies. He clearly learned the different technique for subconscious as compared to conscious mentation. He saw that cooperative mentation was different from research that consists in a number of persons working together on a problem: that a number of minds could be organically and psychologically interactive and new ideative results of any one could be constantly unified by the mentative data process to be immediately available to others. He also obtained his first insight into a true psychologic language, each etymon or vocable of which represented a distinct psychologic element in the taxonomic scheme of mentative data, and in which each etymon is carried orthographically throughout all integrations of that element.

He applied the Mind Art to invention in many industrial and esthetic lines, with results of great interest to psychology and the Mind Art. Invention was always a recreation and somewhat of a passion. He enjoyed making mechanical contrivances in inventive problems in much the same way as many enjoy athletic or other sports. But primarily, invention was an inductive and concrete illustration of the Mind Art. It was easy to determine the state of the art in any limited industrial domain, and having become familiar with its technical knowledge, to determine when progress had been made by any invention. By keeping an hourly record of every step and datum of the inventive process he could show what kind of data was most useful and what use to make of the different kinds and so on. He considered it far more important “to discover how to train 100 successful inventors than to make 100 or 1000 inventions.”

[page 160]

He applied the Mind Art to the sciences with results of value to them; but vastly more important, he was thus taught the art of using the mind.

He realized that one phase of work naturally arising out of the art of discovery was the establishment of an institution devoted solely to original research for the avowed purpose of discovering truth for its own sake and of disseminating and teaching it. Such an institution would require a body of mentators trained in the Mind Art, and another department to test practically and apply inventively the discoveries to practical life. “This institutional work in connection with the sciences will represent the concrete

result of my studies”—so he said then, and he never gave up this goal.

From its first inception his insight led him to collect all the facts bearing on the Mind Art. However, he always thought of it as a *comparative* mind-art: that there was an art adaptable to each species of living thing. This insight kept him from many a wrong conception, he was sure.

Early in life he saw that new methods of psychologic research were needed. The study of the phenomena of mind had not reached the stage of either successful generalization or synthesis. Psychology was still busy accumulating facts and deducing laws between the relations usually called physiological and mental. Every additional discovery seemed to add to the almost inextricable complexity of the structure and function of the central nervous system.

Some of his most important new methods of psychologic research he summarized as follows:

1. The general method by which he studied introspective psychology, or experimental introspection; the study of the action of mind upon mind. Experimental scientific method had not been applied to introspection. Two special methods were involved:

The first method was the experimental study of the action of any part or function of the mind upon any other part, and the noting introspectively of the mutual conscious modifications of

[page 161]

one conscious state upon another simultaneous, preceding, or succeeding state. This method, which he called *Auturgic Psychology*, is an experimental study of mind upon itself; it was most fruitful, leading to the mentative art.

The second method was the study of the total knowledge-content of the mind by recording all the experiences—intellective, emotive, volitional—that an individual can remember, and to make a classified record of all memory-acquisitions as fast as attained. This chronological record of growth of that person’s experience will give the relation between knowledge-content and bodily and environmental conditions and social connections, and study its fluctuations under different dietetic, emotional, environmental, seasonal, diurnal, and introspective conditions. A comparative study of different individuals is needed in this important realm. A mind consists in its memories; to study part is like studying one limb of a tree or one leg of an animal. To study detached fragments of the mind, as hitherto, is much like studying fragments of some extinct animal: they may be reconstructed into a semblance of the living creature, but the paleontologist is successful solely because he has previously studied animals as

wholes. This method for the first time takes the total content of the mind as the whole that is to be studied; it makes a synoptic record of all memories a person has acquired and compares it with subsequent records made under different conditions; and that person introspectively notices the changes either in his total content or in his knowledge-content of any taxonomic group under different conditions.

2. The general method by which he studied the action of the mind on body and environment, which consisted in artificially or voluntarily varying the mind-activities of an organism or group to determine the physical changes resulting from each kind of mental activity. It consisted in the three special methods of Psychological Biology:

His psycho-bionomical method (of organism and brain-building) determined the effects of mental action on the physical organism; for example, in training a definite mental process in

[page 162]

one animal and not in another in order to discover whether this difference in mental activity produced a corresponding structural difference.

His psycho-physiconomical method studied the action of the mind on the environment; for instance, of heat waves, electric waves, and chemical emanations given off by the body during mentative effort; the structural changes effected by organisms on their environment; and the action of the mind on other minds.

His psycho-socionomical method varied the mental activities (by training) of social groups of creatures to see how it affected their social structures. In addition, there was the dirigational method, which limited the attention to the conscious states that might arise from the objective and subjective stimuli that originated in any selected bodily part, and held the attention to the feelings in that part until the part was functionally augmented. Also, the quiescence method inhibited spontaneities until reposeful rest occurred and vasomotor equilibrium was established.

3. The general method by which he studied the action of environment and body on mind, which consisted in artificially varying one condition at a time (animate and inanimate) to determine modifications of mental activity arising. Its three special methods of Biologic Psychology were:

His bio-psychonomical method varied the organic structures to determine the relation between each kind and the mental activity; for instance, by means of selective propagation he rapidly evolved or retrogressed lower organisms and noted what mental activities appeared or disappeared with changes in structures.

His physico-psychonomical method altered the environmental conditions one at a time to determine the effect upon each mental function as measured by its products or as known introspectively. This method assumed great importance, because every environmental condition modified every mental process.

His socio-psychonomical method varied the anatomy of a social group to determine the concomitant changes in mentative or social activities.

[page 163]

In addition, he studied the effects of bodily postures and gestures upon mentation.

4. The Mind Art method by which he studied the different conditions—introspective, body, and environment—under which the art produced the best results. By this method was studied the mind-process in relation to its utilitarian value as modified by all conditions that might affect it. Many special methods were used, such as researches into the best method, technique, and condition for applying the art of mentation to mind-embodiment and general education, into discovery and invention, into the diagnosis and cure of disease, into social affairs, into cooperative mentation. These lines of research revealed the true nature of mind from the practical standpoint: the investigator got acquainted with his own mind.

5. The general method by which he studied the sciences and arts as the most notable products of the mind. This method involved mastery of a science or art by the new methods, to examine that *kind* of mental content and to study that *mode* of mentation, and thus to normalize the mind by giving it true content, so as to discover the nature of valid (alethic) mental processes.

The Mind Art itself was discovered to be a new method, and a most important one, of psychologic research.

This Mind Art, reformulated and more fully vitalized, but still crude as compared with later developments, was again applied to his own mind by Elmer Gates, for the further development of scientific method. Taking his new psychology as guide, he began again to collect and arrange data from all available sources, literature, the minds of thinkers, his records. He revalidated and classified them into a psychotaxic synopsis, and applied mentative methods to them and to himself. He attained greater mental capacity and originality, and progressed rapidly, and as he stressed, “never tried to do anything else.”

It was not so much what he had accomplished that gave confidence in the mentative art as what he foresaw in future

scientific investigations in the art, especially by others. He realized fully

[page 164]

that he had merely opened the door to a new field of investigation. It gave him great satisfaction that he had found the method that must eventually lead to the solution of the question “What is truth?” provided an answer is possible; namely, that the mind must solve it by a study of itself and the Cosmos according to the principles of an ever-improving art of mind-using. He quoted from his early study of Emerson: “Then in a moment and unannounced, the truth appears.... But the oracle comes because we had previously laid siege to the shrine.” Gates said, “To attain unto the desired revelation, there is a shrine to which the mind must ‘lay siege,’ and that shrine is THE MIND, and within that shrine is an ORACLE greater than the one at Delphi; namely, CONSCIOUSNESS *per se*.”

These great steps placed the art of mentation, and especially its art of discovery, on a practical basis, seemingly needing only the further refinements inherent in their methods, which were to be well tested by the forthcoming fourteen years of laboratory work. But Gates felt there was still something greater to be discovered, some deeper truth, as indicated by this diary entry of 1892:

“If the scientific problems of the times were all solved and realized, would there not still be a great want and expectation? Mankind expects some great and dawning revelation and actuality—some entrance into higher possibility. I desire some greater truth than usually revealed, with greater power to attract and convince, and should relate more positively to the needs and aspirations and hourly uses of mankind. If I teach the all-important physiological laws and mental maxims and other great matters I will have to wait for a slow and uncertain hearing and will not get my eager audience. Now I want some great incentive beyond all others. Is it the aerial machine? Inventions or the secret of making them, or the practical art of originality? Shall I teach the people and publish the results of their receptivity that stand scientific demonstration? The commonplace is what nature is to most: it has ceased to be wonderful and exciting. They do not know how surpassingly great are the phenomena to

[page 165]

be seen at any time, how wonderful is the inner world at all times accessible to them.

“O let me think the thoughts that thunder down the ages, peal after peal, reverberating from race to race; let me do this glorious thing, but O how much better to let me teach people how to attain

this knowledge, art, and power for themselves. This is the pay I have sought, the joy I have most craved, the boon I have worked and prayed for. Let me ope the portals of the tomb wherein the human mind is buried in a deathlike sleep—let me resurrect the crucified hopes of the world—let me see them transfigured in embodied realities ascending to the heaven of success. O I crave a thought, direction, suggestion to solve my riddle; let it be the greatest truth which the world dare at this time receive. I still await a ‘something’—I desire a knowledge which will enable me to judge when I do get the real, THE thing, for which I have so long studied and waited.”

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