THE SYNTONIC PRINCIPLE

Its Relation to Health and Ocular Problems

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By

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Dedicated to

FREDRIC A. WOLL, PH.D.,

whose example, kindly and gentle counsel, fatherly interest and scientific inquisitiveness have proved a constant inspiration to the author.

PREFACE

In the preparation of the following presentation the author will endeavor to present certain experimentally determined facts and some clinical evidence in support of his thesis that radiant energy in the photic range of the electromagnetic spectrum plays an important part in the development of, and the health of human beings.

Further, effort will be made to make it clear that the frequency of light in the photic range, and not its intensity, when incident into the eyes of man, and most animals, has a determining effect upon his growth, development, and functions, physiologic, ocular, and psychic. No effort will be made to give light frequency prescriptions for altering responses because such attempts must be predicated upon a full understanding of each case.

The author freely admits that in the selection of material for the many citations in the text he has been primarily motivated to select material which would complete the "mosaic" of the syntonic concept, although many citations which appear contradictory upon first thought were also included because they illustrated a point to be discussed at the time, or later in the manuscript.

The author is fully aware that there will be criticism of his material, perhaps his conclusions, and he will welcome constructive criticism by informed and qualified critics, yet in extenuation of his conclusions he wishes to remind readers that the facts speak for themselves, regardless of his attempts at their explanation.

In an addendum will be found a small series of clinical case reports illustrative of the application of the principles involved. It has well been said that clinical results prove nothing. That is true. Yet in all of the biological professions, the clinical test is the final test of effectivity. For that reason a clinical effectivity tabulation of over three thousand cases has been included in the appendix.

Grateful acknowledgment is made by the author for the stimulus to continued effort in the preparation of this work to the gentle and sometimes not so gentle prodding of those having his interest at heart, and for the able assistance in preparing the

manuscript given by his secretary, Edith Donohoe; also for the drawings and work on the index by Evelyn Kuns.

Confession is further made that the author undoubtedly would be able to find passages which he might well rewrite to make them meet possible criticism by others as well as his own. It is in the spirit of John Henry Newman, expressed in the following that motivates release of the material at this time just as it is:

"Nothing would be done at all, if a man waited 'til he could do it so well that no one could find fault with it."

H. R. S.

Eaton, Ohio
April 25, 1939

Publisher's Statement

This book is in part an abridgement and in part an amplification of a thesis in part fulfillment of academic requirements for the Doctor of Philosophy degree.

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PART I

THE PROBLEM

Chapter I

It would seem that the logical order of approach to a discussion of the subject matter of this research dictates that the basic terms be defined as the first step.

Webster's International Dictionary defines *syntonic* and *syntony* in terms of physics. The origin of the word is stated to have been from the Greek *syn* meaning "like or the same"; and *tonos* variously translated as "tone, pitch, tension, and tonicity." *Webster* then defines the word *syntony* as "the state of being adjusted to a certain wave length; agreement or tuning between the time period of an apparatus; agreement."

Syntonic is defined as "the state of syntony between transmitting and receiving apparatus." Syntonizer is defined as "one that syntonizes or produces syntony; one who tunes; a device for tuning such as is used in wireless telegraphy."

The foregoing definitions obviously do not apply to physiologic processes, but are limited to mechanisms which may be caused to have equal tensions and masses in order that they may be tuned together, i.e., to the same frequency or pitch. In physiology no such fixed frequency exists unless perhaps the Berger rhythm might be so considered. This rhythm will be discussed at length later.

Syntonic does have a connotation in the field of the physiology of the nervous system and its use is accredited to *Bleuler* who used the term to describe a "stable integrated type of personality," as quoted by *Dorland's* Medical Dictionary. *Syntonic* is also used in the adjective form to indicate a balanced integrated nervous system particularly the autonomic in which division there exists a state of dynamic antagonistic tension between its two systems. When these tensions are equal the nervous system is said to be in syntony or in the syntonic state. It is in the last two senses that the word will be used in the amplification and discussion of the problem being undertaken.

It has long been a matter of common observation that individuals react differently in the same environment and to the same

stimulus. Many efforts have been made to account for these differences on the basis of heredity, environment, and even nutrition. Obviously, no two people except blood brothers and sisters can have the same heredity, but it is a matter of common observation that blood brothers and sisters, and even identical twins, do not always react the same way to the same environmental conditions nor to the same stimulus.

In all people with the exception of surgically mutilated persons we have similarity of structure and the same number of organs and parts which function on approximately the same levels and in like manner. It would seem, then, that there could be very little if any difference in response. On second thought, it is a matter of common knowledge that even machines, which have been accurately built, do have variations in their ability to execute the functions for which they were produced. Machines do not possess any of the many varying processes which are found in living things, hence variation in execution can only be attributed to imperceptible differences in the structure of their components.

Anthropologists have spent years making accurate measurements of structural differences in human beings in efforts to determine, if possible, what part variations of structure play in the observable differences of response. Enough has been learned to indicate that to some extent functional differences can be interpreted in terms of recognizable structural differences, yet not enough work has been done in this field to justify the setting up of standards that can be considered absolute, because any such standards must obviously be relative to the accuracy of the measurement and to the considered judgment of the observer who undertakes to study function in connection with structural differences.

Recently a school of thought has come into being which seeks to account for functional differences on the basis of so-called conditioned reflexes or more properly, *conditioned responses.* This school developed as a result of the original work by *Pavlov* in which it was found that stimuli not normally present in an animal's environment could be used to excite responses identical with those excited by stimuli that *are* normally present in the environment. The results of his work indicate that it is pos-

sible in a large number of instances to so "condition" physiological processes that they respond, in a manner similar to reflexes, to the application of what would normally be an abnormal stimulus. The entire behavioristic school of thought, championed by *Watson,* is based upon this "conditioning" concept.

But, does the conditioned response explain recognizable variations in conduct, behavior, or physiologic responses? It seems that it does not because it is a known fact that conditioned responses tend to and do revert to their originally unconditioned status unless the conditioning stimulus is more or less constantly repeated. The result is that a previously conditioned animal or individual will revert to the original unconditioned state if removed from the influence of the conditioning stimulus. If the behavioristic theory is to stand as the sole cause for differences in response it must find some way to explain away this weakness in the theory in view of the facts.

In this research we are primarily concerned with deviations from, and variations in, responses that are not usually considered normal, yet the variations will remain within the physiologic limits of the normal. By this we mean responses that are not due to structural change of cells and tissues in the pathological sense. It must be kept in mind, however, that a long continued functional response, near the extreme limits of the physiologic activity, may result in structural changes which may be considered either as compensatory adaptive changes or perhaps could, in a strict interpretation of the term, be called pathological, because they are not the structural states which would exist in the absence of long continued extreme function.

It is one of the axioms of biological phenomena that "structure governs function." While this is true within reasonable observational limits it is not necessarily a one hundred percent. statement. In the main, we would expect a rabbit to be a herbivore and to defend itself by flight. We would also expect a giraffe to be a herbivore and to also defend itself by flight. Due to structural differences, we would *not* expect the giraffe to be a grazing animal at ground level, nor on the other hand, could we reasonably expect the rabbit to use tree foliage as the source of food. The lion and the seal are both carnivorous animals, but due to structural differences we certainly would not expect the

lion to get its food from the sea, nor would we expect the seal to secure its food on land.

The structures of these cited instances differ markedly due to the difference in heredity in the animals. In this sense heredity governs structure. Completing the syllogism we might, therefore, say, "heredity governs function." But, *does* heredity govern all function or functional deviations? Obviously it does in terms of genus and species. But in the same genus and in the same species we find variations of behavior and function. Not only that, but we find wide variations in structure in terms of height, mass of head, size of the chest, relative length of extremities to trunk, and other well known differences.

The "conditioned responses" school of thought maintains that the environment in which the animal is reared accounts for response differences, but few of them hold that environment will cause structural differences. Another breakdown in this school of thought is thus brought to light.

Speaking in terms of animals, a difference should be noted here between instinctive response and the drive or urge leading to that response. These two are not one and the same thing. The urge to commit an act, functional or otherwise, is largely an acquisition resulting from the interplay of two factors, the heredity and the environment in which the animal has been reared. The urge or drive to commit an act can be and is altered by conditions that may exist at the moment or under the influence of which the animal has been reared. But once the urge to commit an act has been strong enough to lead to its execution the behavior from that time on is one of instinct, in that instinct governs and controls the *way* the act is performed. To illustrate these differences, one may have the urge or drive for copulation, but due to existing circumstances or prior environmental training must resist and repress the urge. But if conditions were such as to permit the execution of the drive, then the way the act of copulation is performed is instinctive and is the same for all animals of that genus and species. In other words, one is not governed by his instincts in terms of the will to commit an act, but once the will to commit an act takes control of the individual, its execution takes and follows a very definite form pattern. Instinctive behavior is so much alike in animals of the same genus

and species and is so predictable that its study becomes a dull monotony.

It seems, therefore, that environment and its conditioned responses only operate to determine the time and place of the execution of instinctive acts, which latter are inherent largely in the structure of the animal. Does, then, environment alter or prevent instinctive structural manifestations of function, either physiologic or pathologic? The writer's thesis is that it *only* alters the drive or urge and does *not* alter structural instinctive function.

Mendel's researches in heredity have clarified differences of structure. Even within the same family, the members of which live largely in the same home environment is found differences in function. Authorities are virtually agreed that functional departures from the normal within physiologic limits may also be due to neurotic or psychotic states, the which are generally recognized to be a result of early environmental conditions. But, is this the sole factor? Is there a common environmental factor, common to all individuals of the human race, which could and does vary for the several members of the race, or the several members of the same family, which could account for the observed differences?

What are some of these environmental factors which are common, and which ones of them are found to vary as between individuals? The first factor is, obviously, that of heredity which as can clearly be seen, varies as between families, but does not vary in the same family. It seems, then, that heredity cannot be the factor sought. A second factor, the school and family environment should now be considered. Within each family insofar as housing, food, clothing, we find a practical constant for that family. The school environment may be a widely different one for any given individual member of the family when thinking in terms of his home environment. But the school environment is common to all members of the same class. Hence, it would seem that this is not the factor sought. A third factor would be endocrine differences as between individuals. Here we find wide differences between the members of the same family, as well as differences between all individuals of the race. The endocrine factor is inherent in each individual and varies from

day to day in that individual, but no criteria have as yet been established which can be used with a fair degree of accuracy for evaluating endocrine differences nor for determining all of the reasons for these differences. Fourth, the food intake does vary as between individuals. It also varies in terms of communities, races, religions, and geographical locations. Food intake also varies with the likes and dislikes of the individual. Here, again, no criteria have or can be set up for the evaluation of this factor.

A fifth factor, which seems to be the most important one, is that of the several forms of radiant energy absorbed by individuals. In one instance this radiant energy takes the form of the well known Hertzian waves, now so commonly in use in wireless telegraphy, and the more common radio transmission of sound. This factor does not vary between individuals because all living things are subject to the absorption of the same energy simultaneously. Another form of radiant energy is the infra-red radiation, a low frequency radiation, whose frequency is too low to stimulate the photoreceptors in the eye. Absorption of infra-red energy results in the production of heat. The absorption of infra-red radiant energy does vary between individuals due to differences in body coloring and rate of metabolism within the individual. But it is not believed that the variation is great enough to have marked significance to the problem under consideration. A third form of radiant energy is the photic range or the so-called visible range. This form of energy varies for each individual at all times, due to selective absorption of light by transmitting or reflecting media or bodies. It seems that here we have a factor which can be studied and should be studied as the one universally variable for all individuals. Other forms of radiant energy are the ultra-violet rays, the Grenz and x-rays, and those of the radium compounds. These radiant energies, with the exception of the ultra-violet, are not common to the environment of all people, although ultra-violet may vary considerably as between geographical locations. Another form of radiant energy, is the so-called cosmic radiation, which is common to, and identical for all persons, hence could have little if any effect as between individuals.

It can readily be seen from the foregoing that the one constantly present, yet constantly variable environmental factor is energy in the photic or visible range of the electromagnetic spec-

trum. Is it possible to show that variations in this range can and do have effects on functional activity? And if so, *what is the mechanism* whereby functional variations are brought about?

Is it possible by altering or controlling the frequency of the photic range of the electromagnetic spectrum incident into the eye, and as a result of these changes to predict altered function, and to *what extent* and in *what manner?* In other words, do changes in the frequency of energy in the photic range incident into the eye cause altered function, altered behavior, altered physiological responses, and are these variations of a similar kind in all individuals?

This is the problem, a solution of which was sought in undertaking this research.

Chapter II

SOME PRIOR APPROACHES

The use of light and its modifications to influence physiologic responses is apparently as old as history, if the records are to be believed. It is perhaps specious to mention that the forty-sixth word in Holy Writ is the word "light."

Genesis—Chapter 1.

1. In the beginning God created the heaven and the earth.
2. And the earth was without form, and void; and darkness was upon the face of the deep. And the spirit of God moved upon the face of the waters.
3. And God said, Let there be *light;* and there was light.

Whereas this mention has no great importance for the purpose in hand it is, however, an indication that light has been considered to be a necessity to life by the human race since the earliest records.

The philosophy of the ancient Egyptians and their religions make frequent reference to the sun as the source of not only light but life, particularly that of plants. There is some question in this regard as to whether the Egyptians recognized the close connection between animal life and its dependence upon plant life. There seems little doubt, however, that the dependence of plant life upon sunlight received early recognition.

The Hindu philosophies abound in references to the use of colored light for the attainment of the contemplative attitude. Insofar as this writer knows there is no particular reference to the use of light or colored light for what is now recognized as a therapeutic purpose.

The first reference this writer has found to the use of modified light for its physiological or functional effect is found in the thirtieth chapter of Genesis from the thirty-first to the forty-third verses, both inclusive:

31. And he said, What shall I give thee? And Jacob said, Thou shalt not give me anything: if thou wilt do this thing for me, I will again feed and keep they flock.
32. I will pass through all thy flock to day, removing from thence all the speckled and spotted cattle, and all the brown

cattle among the sheep, and the spotted and speckled among the goats; and of such shall be my hire.

33. So shall my righteousness answer for me in time to come, when it shall come for my hire before thy face: every one that is not speckled and spotted among the goats, and brown among the sheep, that shall be counted stolen with me.

34. And Laban said, Behold, I would it might be according to thy word.

35. And he removed that day the he goats that were ringstraked and spotted, and all the she goats that were speckled and spotted, and every one that had some white in it, and all the brown among the sheep, and gave them into the hand of his sons.

36. And he set three days' journey betwixt himself and Jacob: and Jacob fed the rest of Laban's flocks.

37. And Jacob took him rods of green poplar, and of the hazel and chestnut tree; and pilled white strakes in them, and made the white appear which was in the rods.

38. And he set the rods which he had pilled *before the flocks in the gutters in the watering troughs when the flocks came to drink, that they should conceive when they came to drink.*

39. And the flocks conceived before the rods, and brought forth cattle ringstraked, speckled, and spotted.

40. And Jacob did separate the lambs, and set the faces of the flocks toward the ringstraked, and all the brown in the flock of Laban; and he put his own flocks by themselves, and put them not unto Laban's cattle.

41. And it came to pass, whensoever the stronger cattle did conceive, that Jacob *laid the rods before the eyes of the cattle in the gutters,* that they might conceive among the rods.

42. But when the cattle were feeble, he put them not in: so the feebler were Laban's, and the stronger Jacob's.

43. And the man increased exceedingly, and had much cattle, and maidservants, and menservants, and camels, and asses.

A close reading of the foregoing quotation conveys the impression that the mere act of placing striped or spotted objects before the eyes of animals would cause a change in the pattern of pigment distribution in the hair.

These changes are now-a-days usually considered to be hereditary, but there are two instances which have been cited to the writer by *Dr. R. L. Cassell,* of Cadiz, Ohio, who reports that they were mentioned to him by a veterinarian who observed them. These instances were that of pure bred stock, horses in this instance, where the color lines and strains were known for a number of generation. During the act of copulation in both of these instances, reported to *Dr. Cassell,* the animals involved in the act visually observed another animal of the same species having a coloring which was totally unlike the hereditary strain colors found in the animals involved in copulation. In both of these instances the colt carried the color and markings of the observed animal and *not* the hereditary coloring which would be expected. These are only two reported instances which might be supportive of the Biblical matter quoted above and are here mentioned purely because they are interesting, and not for their scientific value.

Hippocrates who lived 400 years B.C. and who is reputed to have been the father of medicine, is reported to have made use of sunlight in his practice at that time. *Herodotus* advised sun baths for those whose muscles were weak and flabby. This advice by *Herodotus* has been repeatedly confirmed in our present day by numerous investigators.

Pliny, reported editorially,[1] is said to have gazed through an emerald when his eyes were tired in an effort to "strengthen them." There are several other reported instances of the use of the emerald for this purpose.

Goodman[2] reports that red cloth was placed over windows and red clothing worn by smallpox patients during the middle ages in an effort to cure the disease and to prevent pitting. *Hammer*[3] in Medical World reports his use of red silk over the faces and exposed parts of the body of smallpox patients as recently as 1938. As a result of this use of red silk, he claims quicker cures and practically no pitting. The red silk was used in the form of a mask over the face with holes out for the eyes, so whatever

[1] Optical Journal and Review, June 1, 1932.

[2] Goodman, "Basis of Light in Therapy," Medical Lay Press, 1928.

[3] Hammer, "Skin Lesions, Diagnosis and Treatment," Medical World, 37, 2, 107–8.

effect the red light may have had was directly a tissue effect and not an indirect effect influenced by the eyes having red light incident into them. *Marchant* published, in 1493, his brochure, "Kalandar and Compost for Shepherds," in which he mentions the use of various colored lights and attributed to them certain curative effects.

In 1777 *Favre* first mentioned the use of sunlight for the cure of ulcers. *Pleasonton*[4] began experiments in 1861, with greenhouses having alternate streaks of white glass and blue glass. He reports that by using this method he increased the growth of grape plants and further reports an increase in quantity and an improvement in quality of the fruit. In 1871 *Pleasonton* was granted a patent, No. 119242, covering his procedure, in which patent he also included the use of violet and indigo glass in addition to the blue, and specified their use with sunlight, and with artificial electric light. Presumptively, the electric light used by *Pleasonton* was the arc, because so far as this writer knows, there was not in use at that time an incandescent source of electric light. It is interesting to note in connection with *Pleasonton's* patent that he found as follows:

> I have also discovered, by experiment and practice, special and specific efficacy in the use of this combination of the caloric rays of the sun and the electric blue light in stimulating the glands of the body, the nervous system generally, and the secretive organs of man and animals. It, therefore, becomes an important element in the treatment of diseases, especially such as have become chronic, or result from derangement of the secretive, perspiratory or glandular functions, as it vitalizes and gives renewed activity and force to the vital currents that keep the health unimpaired, or restores them when disordered or deranged.

Notice should be taken that he mentions stimulation of glands in the body, effects on the nervous system, and effects upon the secretive organs of both man and animals as a result of the use of blue light, using either the sun or an electrical source of light.

Pleasonton also reports on the effect of violet light and blue light in the taming of an obstreperous mule which could not be harnessed. This mule was placed in a stall in a barn that was

[4] Pleasonton, "Blue Light and Sunlight," 1877.