

Dangers and Opportunities for Change from a Physiologist's Point of View

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An American businessman, who has contributed very much to people's health and whom I consider a friend, sent me a story written by Mark Twain titled: "My first lie and how I got out of it." It was about the human tendency to avoid seeing what we do not want to see. Twain addressed an instance of widespread "lying" of that time – the failure to see that slavery was a problem.

It has been only recently that physiologists studying the human brain have begun to understand the reasons behind Twain's observations. These discoveries have profound implications for human survival. They reveal that our brains, when functioning properly, have the creative capacity to produce solutions to today's most urgent problem – the arms race and the potential for nuclear catastrophe. They also reveal why so many millions today are prone to "lie" about that threat – to convince themselves and others that no special action is needed; that the threat of war is not really a problem.

Careful studies of electrical potentials in discrete zones of the human brain have demonstrated the power of sustained negative emotions, such as fear of approaching disaster, to "unbalance" the brain's normal state. (1, 2) An imbalance causes the electrical levels to rise too high or fall too low. When that happens, a person can become either excessively excited on the one hand (close to "mental breakdown") or emotionally shut down on the

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other (emotional dullness, numbness). This robs the individual of the ability to fully respond to life situations and also robs society of that person's creative potential at a time when great creativity is needed to avoid devastation. The best therapy for the individual human brain turns out to be precisely what is needed by society as a whole: active engagement with others in the solution to our predicament.

Recent advances allowing measurement of the brain's electrical activity have led to a clearer understanding of the inner workings of the brain – how it perceives external events and how it processes direct information. These direct measurements have shown that most small areas of the brain (discrete "zones") are multifunctional – they participate in more than one activity – and that the brain works as a whole, integrating information from its various zones to provide the individual with the ability to function under the most favorable conditions possible. (3) The same zone that may participate in maintenance of mental processes, emotions, and body movements also may assist in the function of internal organs like the heart or intestines.

For any particular function, certain zones (sometimes called "rigid" or "skeletal" zones) are especially important because they must participate consistently for our brains to perform that function (e.g., to complete a certain action or to feel a given emotion). Other zones are optional, flexible (i.e. they do not participate consistently or regularly). If one of these supplementary areas "takes a rest," so to speak, its function is handled by another which is activated at the moment of need.

The essential point is that our minds have a potential flexibility and richness for maintenance of thought and emotion. To realize maximal capability, each human's brain must have most of its zones and their interactive capability in an optimal functional state.

Infraslow Physiological Process and Its Most Stable Part – The Steady Potential

How does a zone maintain its function in an optimal way? There is always a certain level of slowly changing activity in each zone, a small voltage called the "steady potential." Infraslow Physiological Process (ISPP) is a complex consisting of the steady potential as well as slow physiological modulations of different duration. Work has shown that this steady potential has a definite optimal range which is different for different brain zones. These steady potentials play a decisive role in the functioning of the normal brain. It has been shown repeatedly that defined areas of the brain exert their own particular kind of influence, or abstain from doing so, depending on the level of the steady potential.

Our clinical work demonstrates that when the steady potential for any brain zone becomes too high or too low, thus leaving its optimal range, the

brain area either fails to act or its capacities for action drastically diminish. The rich endowment of the brain is lost. It may have to concentrate all of its energy to be able to maintain just one activity.

This discussion of the brain's functioning is based upon quantitative measurement of parameters directly obtained from the brain itself. (4,5) These were obtained clinically through a long series of investigations with patients over a twenty-five-year period where direct contact with the brain was accomplished using forty to seventy implanted gold electrodes, applied for diagnostic and/or therapeutic purposes. Measurements were taken during various states of the patients' emotional reactions under conditions linked with their main illnesses. These data were supplemented by additional investigations under presentation of emotion-inducing tests. These investigations as a whole proved very helpful in both diagnosing the patients' illnesses and their subsequent treatments.

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In normal conditions, emotions play a predominant role among the factors which affect the ISPP, the level of steady potential in particular, and thus the brain's information handling capacity. Emotions can decrease the capacity of the brain to such an extent as to induce a state of disorder. The first and foremost function of the brain to be lost is creative thinking. Emotions "capture" the individual by taking possession of more and more cerebral areas.

The Effect of Long-Term Stress

Everybody knows how difficult it is to think when one is emotionally upset, or when our blood pressure has fallen or risen. We may read words in a text, reread them, trying to understand: "What is this all about?" "What is the matter with me?" But we are not usually aware of the decline in our brain's capacities if the condition has resulted from gradual changes in steady potentials which have occurred under the constant influence of negative emotion-inducing factors. Such factors may be personal troubles, the continuing arms race, or failure of superpower disarmament meetings. Under these conditions, the steady potential changes in most of the brain zones, which inevitably leads to decreased brain function, first of the less "enduring," supplementary zones and later of the whole brain.

The unhealthy response of the human brain to long-term emotional stress may be in either of two directions. The brain may evolve over time toward an overexcited state, the extreme being a nervous breakdown. Or it may

evolve in the opposite direction – toward psychic numbing due to overactivity of the brain's own defenses. Psychologically, either of these unhealthy states results from the steady potential of the brain moving out of the optimal range. If it goes too high, the condition is overexcitement; too low produces emotional numbing (dullness).

The Overexcited Brain

First, let us consider the case of the brain already suffering from abnormally high steady potential in multiple brain zones. This first shows up as an excessive response to emotional stress. Under these conditions, an additional very weak emotional stress can induce shifts of the steady potential, not only in the zones mainly associated with emotions, but in most other areas as well. The “emotionalized brain” becomes larger, which literally blocks the brain's ability to perform the regular integrative mental tasks which allow an individual to function normally. Usually minor events, such as a delay in the arrival of an airplane, late preparation of a meal at home, or an argument with a co-worker, become major “attacks.” The integrative-balancing state of the brain is lost and with it the possibility for creative thinking. There is a gradual hampering of all the complex processes associated with the thought process. The creativity of the human brain decreases dramatically.

Emotional Dullness (Numbing)

Now let us consider the second possible unhealthy reaction of the brain to emotional stress – psychic numbing – in which the steady potential in most of the brain areas decreases below the optimal range. This is the result of overactivity of “protective” reactions of the brain trying to guard against emotional stress. Our data have shown that this reaction is directly correlated as a counterbalance to repeated excessive emotion and its associated elevation of brain steady potential. Sometimes a person may seem to be on the verge of an emotional breakdown, but the storm passes by. The protective mechanisms, the “power brakes” of the brain, have worked to rein in this horse galloping at full speed. However, if this “brake” mechanism malfunctions or the emotion-stimulating factor is too powerful, or too continuous, the reaction may itself develop into an unfavorable state. Precisely this excessive “protection” (excessive “braking”) may lead to emotional stupor, or emotional dullness.

The laboratory data are quite clear. As a patient having a strong fear episode brings his or her fear under control, one can watch on a recorder reciprocal shifts of the steady potential of the brain and later its return to previous levels.

Everything is fine until the protective reaction becomes excessive. Then

the steady potential dips below optimum in many brain zones. It becomes increasingly difficult to experience joy or sadness. The colors of the world fade. The creative potential of the brain in this second extreme situation decreases as well. For the individual, the world no longer holds previous fears (though the search for stronger emotions with all its negative consequences is quite likely to happen). If these conditions continue for a period of time, brain potential in most brain areas decreases and the person has become emotionally numbed.

A high threshold to emotional reaction, reaching emotional dullness, is a serious problem even though at first glance it may seem to be the way out of the emotional stress faced by the individual. He or she remains literally deaf to problems, both individual and those of other people. It is particularly dangerous for society when this condition develops in people having major social or political responsibilities. They may ignore the necessity for making decisions of extreme importance for humankind.

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If these conditions of the overexcited brain and emotional numbing are allowed to happen in a large number of human beings and our intelligentsia, humanity will see a significant decline in the planet's creative potential. One can visualize this as a sort of "scissor" graph. The ascending line of the graph is the growth of the planet's creative potential in connection with the ever-growing increase in the pool of knowledge. The descending line, on the other hand, is humanity's creative potential degeneration from the impact of the knowledge of our impending doom. The degeneration can possibly outweigh the potential creativity, thus robbing the planet of its creative potential, a unique and most precious treasure. Creativity is needed now more than ever and must be reoriented to the task of preserving humanity as well as all other life on our planet.

The Brain Seeks Steady States

One final point about brain functioning needs to be made. The human brain seems to seek stable states, either normal or – after a period of destabilization due to disease – unhealthy. It is as though the brain adopts a "memory" and gravitates toward the stable state. Stability is a protective mechanism in a normal case and adaptive in a diseased one. Though the brain achieves a stable state in this latter case, it is constant negative

emotions which have driven the brain into this pathological condition. These stable pathological states are hard to overcome since they are fixed in the long-term memory of the brain. The conclusion is sobering: Increasing numbers of human brains in stable pathological states can lead to global instability.

Vigorous Activity: Therapy and Survival

What does it take to break out of this state? It requires more than a minor perturbation. One possible way to prevent a stable pathological state is through activity. In addition to physical activity, oral speech helps. In our clinic we have observed how motion and speech sometimes bring the unfavorable state of the brain back to normal. The steady potential level can again become optimized and the spectrum of brain areas grows richer.

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Activity directed toward the source of negative emotion can be especially effective. Large numbers of people engaged in discussions and actions to prevent the extension of the arms race and the extinction of humanity would help assure the creativity and the goodwill to achieve a world where humanity's survival is assured.

Since it takes more than a minor perturbation to break the stable pathological states, such as neurosis or psychic numbing, into which many people have fallen, the activity level will have to be high. A focused and dramatic movement to shift the course of history is what is needed. By struggling for the welfare of humankind, we would be counteracting the disastrous shifts in our own brain while helping to “awaken” the brains of others who have already become psychically numb. Such a process of change is physiologically sound, practical, and urgent. Everyone must get involved!

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