The Journal OF Nervous and Mental Disease

An American Monthly Journal of Neurology and Psychiatry, Founded in 1874

Original Articles

WAR AND THE NERVOUS SYSTEM¹

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In how far war and peace respectively have contributed to the progress of mankind is a topic that has long been discussed. Philosophical thinkers and historians form two groups, the members of one school emphasizing the power of reason and attributing human progress chiefly to it, the members of the other school laying stress rather on the power of selfishness and passion. In the Huxley lecture, recently delivered at Birmingham University, Lord Bryce, the former ambassador to the United States, has subjected the arguments advanced on both sides to a critical review, and has expressed the opinion that although war has, in some cases, been found compatible with progress, there is nothing to show that it has caused it. War, he said, will be found "not to have quickened but to have greatly retarded the upward march of man," for "progress has been chiefly due to thought and thought is not helped by war." Into the validity of the arguments on the two sides of this great question, I have no intention at this time to enter. All will admit that despite its horrors and notwithstanding the destruction of life and property that it entails, war gives rise to conditions that profoundly modify thought, feeling, and action, and sets pressing problems for the human intellect to solve. It is obviously the duty of the representatives of each division of human activities, in the midst of so much that is evil, to garner all available good. With this in mind, it has

¹ Presidential Address, American Neurological Association, Washington, D. C., May 8, 1916.

seemed to me fitting that, this year, the half-hour of the president's address to the American Neurological Association be devoted to the subject "War and the Nervous System."

Though doubtless we shall have to await the lapse of several years after the cessation of the war to evaluate fully the extension of knowledge of the nervous system accountable to this war, enough interesting papers have already appeared in the several belligerent countries, to permit us, I think, to judge fairly well of the directions, at least, in which neurological advances are being made. Time has not permitted me to study all the publications on the subject, but the papers that I have read in English, French and German journals indicate that we may expect an enlargement of our knowledge (1) of organic nervous lesions, (2) of functional nervous disorders, (3) of psychiatry, and (4) of normal psychology. I shall, therefore, refer briefly to the relations of the war to these four subdivisions of knowledge, each of which interests more or less every neurologist.

THE WAR AND ORGANIC LESIONS OF THE NERVOUS SYSTEM

Neurologists and surgeons have had manifold opportunity in this war to study the effects of shot and shell upon the most different parts of the central and peripheral nervous systems; they have observed the results of different methods of treating the wounds involving the nervous system and their after effects; and, as might have been expected, there has been corresponding enrichment of both diagnostic and therapeutic knowledge.

As far as wounds of the brain and spinal cord are concerned, reports indicate that, in general, the accepted views regarding topical diagnosis are being corroborated. One important new fact has been established, namely, that certain lesions of the central nervous system may be caused by modern high explosives without external wound.

The advances that have been made in therapy are perhaps even greater than those in diagnosis of central lesions. Thus surgeons are practically unanimous in urging the thorough investigation of every head wound, no matter how trivial it may at first seem to be; every such wound is widely opened up, and röntgenograms of the skull are made if possible. If a brain lesion be suspected, the skull is trephined; moreover such scalp wounds should never be sutured completely. In fractures of the base of the skull by projectiles entering through a natural cavity like the orbit or the auditory canal, the wound is merely disinfected.

Though the immediate effects of treatment of organic brain injuries have often been brilliant, the later histories of the patients have often been disappointing, for encephalitis frequently follows and the sequelæ are serious. It is feared that many cases of epilepsy will later be met with among those that have recovered from wounds of the brain.

In several places, a systematic effort has been made, in schools established for those that have suffered from brain injuries, to help soldiers to overcome as far as possible the limitations of function that have resulted. In how far such attempts at reëducation after organic lesion can succeed remains to be seen.

Far more fruitful than the studies of central injuries have been the investigations of lesions of the peripheral nerves. On the diagnostic side many interesting topics have been studied. Thus: (1) the differences in symptomatology when a nerve is totally severed and when it is only partially injured have been carefully worked out; (2) the criteria for distinguishing a true traumatic neuritis from an electrical sub-excitability and hyper-reflexia of reflex origin have been established; (3) the methods of determining whether psychogenous symptoms have been superimposed upon symptoms due to organic lesions have been elaborated; and (4) it has been shown that loss of power due to section of tendons or of muscles may sometimes be confused with paralysis due to lesions of the nerves themselves.

In the cases in which function fails to be reëstablished after nerve lesions, careful microscopical studies have shown that several distinct types of histological change occur and the methods of recognizing these several types clinically are being worked out as well as the kinds of surgical intervention suited to each.

Exact analyses of lesions of single nerves has confirmed the clinical individuality of each peripheral nerve and emphasized the fact that a knowledge of its several functions (motor, sensory, vasomotor, trophic, secretory) is essential to accurate diagnosis. Tables in which the clinical individuality of each of the several peripheral nerves of the upper extremity and of the lower extremity is made clear have been constructed and are now available for all neurological workers. Thus, in the arm, as everyone knows, the striking character of lesions of the N. radialis is paralysis; of the N. ulnaris, a specific claw-attitude of the fingers; and of the N. medianus, pain with vasomotor and trophic disturbances. But the clinical individuality of each of these nerves is susceptible of description in much greater detail, and our knowledge in this domain has, through

studies made during the war, grown gratifyingly in extent and in precision.

The surgical treatment of fresh lesions of peripheral nerves has been markedly improved, but still greater advances have been made in the management of older lesions of nerves that require suture, neuroplasty or liberation from cicatrices for the restoration of function. Satisfactory methods of conducting the outgoing axones to the peripheral stump—indeed to that particular portion of the peripheral stump to which they should go—are being worked out, as well as devices for surrounding a nerve with materials that will prevent its being caught and compressed in cicatrizing tissue during the healing of the wound. Sterilizable electrodes for direct stimulation of nerve trunks in an operative wound have been invented, and the importance of the use of direct electrization of nerves during operations as a guide to the best surgical procedure to be adopted has become generally recognized.

1. THE WAR AND FUNCTIONAL NEUROSES

Many of the more important papers that have appeared during the course of the war deal with the functional neuroses. It has been pointed out that the war may be regarded as a huge experiment on the exogenous causation of functional nervous states under exceptional conditions; for in war we deal with a selected human material, namely, the youngest and healthiest adults of the several belligerent nations. Though it is recognized that the conclusions drawn from observations upon such special material dare not be transferred directly to general practice in times of peace, yet the studies that have already been made go far on the one hand toward confirming many ante-bellum views and on the other hand toward modifying other views that some had believed to be firmly established.

The old problem of the so-called "traumatic neuroses" with which we are all familiar in connection with the accidents of work has been the subject of vigorous and illuminating discussion. Though unanimity of opinion does not, even yet, prevail, still ideas are gradually being clarified, especially as regards etiology, differential diagnosis and treatment.

Contrary to what many expected, patients suffering from nervous states not due to organic lesions, though they have been fairly numerous, have, in reality, made up but a very small proportion of the total number incapacitated by the war. Considering the horrible conditions of modern warfare, the long exposure to artillery fire, and the deprivations that had to be borne, it is really surprising

to find how relatively restricted the number of functional neuroses reported has been.

The cases include ⁽¹⁷⁾ ~~(4)~~ "traumatic neurosis" in which hysterical, neurasthenic, and hypochondriacal symptoms are often combined; 9) ~~(5)~~ hysteria proper; ⁽¹⁸⁾ ~~(8)~~ neurasthenic states; ⁽¹⁹⁾ ~~(4)~~ combinations of organic nerve lesions with functional nervous states (so-called exaggerators) and ⁽²⁰⁾ ~~(3)~~ simulators and malingerers.

All the well-known types of functional nervous disturbances have been met with, including hemiplegia, monoplegia, paraplegia, contracture, hemianesthesia, mutism, stammering, amnesia, amaurosis, aphonia, and aphasia. Any one or several of these symptoms may occur in cases of hysteria or in traumatic neurosis with hysterical symptoms predominating. In the neurasthenic types, fatigability, headache, dizziness, insomnia, mental depression, irritability, sensitiveness to auditory and other stimuli, tremor, sweating, palpitation, etc., are the symptoms chiefly complained of. A group of cases known as "cramp-neurosis" (pseudo-spastic paraparesis with tremor, or innervation-spasm with tremor) has been described. The frequency with which lesions indisputably organic have been associated with nervous states of functional origin has been generally commented upon.

As to the question of simulation and malingering, there is considerable divergence of opinion. Those interested especially in organic neurology think that the number of simulators and malingerers is large, whereas those that have had more experience with the psychoneuroses, and especially those that have been well-trained in psychiatry, believe that the number of true or vulgar simulators (who deliberately create what appears to be disease, who know the falseness of it, and who can make it disappear by the will alone) is very small. Psychiatrists point out that simulation or malingering is itself a psychopathological symptom, and they also call attention to the fact that a trouble manifestly simulated on one day may cease to be simulation on the next; for just as a liar may be caught in his own snare and come through repetition of the lie to hold his fiction to be reality, so a person who has in the beginning simulated a contracture or a paralysis with the intention of deceiving the authorities, may come at length, through suggestion, to be the victim of his fraud. Most interesting examples of malingering have been discovered. Among them I may mention voluntary mutilation, especially of the fingers and toes; jaundice, simulated by swallowing picric acid; facial dermatitis; conjunctivitis; albuminuria, simulated by injection of egg albumen into the bladder; and phlegmons pro-

duced by coal-oil injections. For neurologists, however, the simulators that feign nerve lesions (paralysis, contracture, etc.) are the most interesting, and in such persons the difficulties of diagnosis have, sometimes, been very great indeed. There seems to be no objective character that permits one to distinguish "phenomena that are suggested" from "phenomena that are simulated," provided the simulator be adroit and keep a careful guard upon himself. As a rule, a skilled neurologist, who spends much time with his patients and subjects them to continued and attentive supervision, will be able to arrive at a just conclusion, particularly if he have had a psychiatric training.

The importance of minute neurological examinations by men of particular competence, who have special apparatus at their disposal, for all nervous cases, whether they be organic or non-organic, has become clear, and arrangements have been made, at least in some of the armies, for the speedy transfer of all nerve patients to specialized neurological services. This arrangement, obviously important for the nerve cases requiring surgical intervention, has also been proved to be especially advantageous for the functional nervous cases. In hysterical patients, for example, the symptoms can often be made to disappear very quickly if treated while in the nascent state by some one of the several forms of psychotherapy, whereas if the treatment is attempted in the general hospitals and especially if a wrong diagnosis be made, the symptoms may be tenacious and become very refractory to treatment; even if such patients, at a later stage, are transferred to competent neurologists or psychiatrists for treatment, the therapeutic problem may have become seriously complicated. The functional cases of neurasthenic type respond much more slowly—less "miraculously"—than the hysterical cases to psychotherapeutic treatment; but they, too, do far better in the specialized neurological services than when left to the management of physicians in the general hospitals.

When patients that are believed to be suffering from non-organic nervous troubles do not respond quickly to psychotherapeutic treatment in the specialized neurological services, they are transferred to a still more specialized service organized for persons in whom simulation and exaggeration are suspected; there, they are simultaneously subjected to the closest medical surveillance and to a rigid military discipline.

Disputes regarding the etiology of the several functional nervous states still go on; the relative importance of mechanical insult, of emotion, of covetous ideas, and of autosuggestion, has been variably

emphasized by different writers. Most neurologists seem to have been impressed with the quick recuperation of soldiers suffering from the functional neuroses and they attribute the discrepancy between experience in the war and that in peace-practice to the youth and vigor of the patients before their illness, to the absence, as a rule, of disposition, to the military environment in which there is no excess of sympathy or of anxious solicitude, and, finally, to the lessened opportunity for the development of those "ideas of covetousness" that play so important a rôle in prolonging these illnesses in peace-practice. (23) As an aid in limiting the number of relapses and in preventing a patient with recurrence having his illness mistaken for organic disease, it has been recommended that soldiers that have recovered from a functional neurosis have inscribed upon their military papers the statement that they have "suffered from a neuro-pathic trouble that is not organic in origin, is not serious, and is curable by psychotherapy." Such a diagnostic label prevents confusion with those nervous affections the organic reality of which is incontestable. x

WAR-AND THE OUTSPOKEN PSYCHOSES (24)

Though much that I have referred to under the heading of the functional neuroses belongs in the domain of psychiatry, it is desirable that something should be said regarding the more outspoken psychoses that have been met with among soldiers in the great war. Here, too, we meet with a surprise in the small number of cases of insanity that have been reported. During the period of mobilization, it is true, suicide and alcoholic deliria were frequently observed, and after the campaign was well under way a certain number of psychoses made their appearance, owing doubtless to the great strain to which all soldiers were subjected. Among the psychoses that have developed in the war may be mentioned hysterical twilight states, different forms of dementia præcox, and dementia paralytica. Occasionally, psychoses of the manic-depressive group have been observed but these appear to have been seen more rarely than other forms. Most authors agree that there are no peculiar "psychoses of war"; they say that the psychoses met with during war are of the same types as those seen in peace times, though it is admitted that the contents of the delusions and the character of the hallucinations may be modified by the environment of war. It is further asserted that by far the majority of those soldiers in whom psychoses have been observed had either shown symptoms of the disease at some period before the war or given evidence of definite predisposition to mental disorder.

69 The way in which, in belligerent countries, the nervous systems of combatants and of non-combatants alike have stood the stress of the war, discredits the theory that the human race has undergone marked degeneration; indeed, the evidence seems to favor the view that the human nervous system is today better able to stand strain than ever before in its history.

THE WAR AND INDIVIDUAL AND COLLECTIVE PSYCHOLOGY

No generation ever had better opportunity than ours to study the psycho-biological reactions occasioned by war, and there is good reason to hope that during the war and afterwards the study of individual and of collective psychology will be greatly stimulated and advanced. For the materials we have only to turn to our own thoughts, feelings and impulses, to the behavior of those with whom we come in contact, and, above all, to the records in daily newspapers, magazines, and in current books, of the knowing, the feeling and the striving of individuals and groups in both belligerent and neutral countries. Something regarding the psychology of the time can, perhaps, be gleaned from the medical journals, but the richer harvest is to be garnered from "letters to the editor" written by deeply-stirred individuals, from magazine articles and from books, in which all phases of the war are discussed, by militarists, pacifists, economists, philosophers, politicians, university professors, diplomats, international lawyers, psychologists, and *literati*. The most cursory examination of these materials will quickly convince anyone trained to think biologically that to understand this war, it is necessary to examine not the thoughts alone, the feelings alone, or the strivings alone, of the several peoples concerned, but all the stimuli and all the psychological reactions together, namely the combined thinking, feeling, and striving, that represent the instincts, the sentiments, and the ideals of individuals and of nations. Students of the nervous system will, I believe, be eager to avail themselves of the great opportunities afforded by this war for the collection of data upon, and the organization of knowledge concerning, individual human behavior on the one hand and national behavior on the other, preceding, during, and after the war.

The comparative psychologists have, it seems to me, given us the clues for approaching the materials and for constructing from the facts a useful body of knowledge. The evolutionary psychology of the nineteenth century has made it very clear that adequately to understand human motives, human behavior, and the complex mental life of society, we must first become familiar with the funda-

mental instincts that human beings share with other animals. They have shown us that it is in the instincts and in other native tendencies that we must look for the bases of character and will, not only in persons, but also in nations. They have given us the rudiments of a science, social psychology, that may ultimately inform us how the complex nervous system of man, with the animal instincts as its basis, permits of the development of human personality, of the moralization and socialization of the individual, and of the formation of sentiments and ideals that lead men to behave as we see them do, in families, in communities, and in nations.

It has been largely through comparative psychology that we have been made familiar with the instinct of flight and its emotion of fear, the instinct of repulsion and the emotion of disgust, the instinct of curiosity and the emotion of wonder, the instinct of pugnacity and the emotion of anger, the instinct of self-abasement and the emotion of subjection, the instinct of self-assertion and the emotion of elation, the parental instinct and the tender emotion, the instinct of feeding, the instinct of sex, the gregarious instinct, the instinct of acquisition, and the instinct of construction. Through comparative psychology, too, we have learned much regarding the importance of certain general native tendencies like sympathy, suggestion, imitation, play, habit-formation, and temperament. Further, the study of human psychology has shown us how the primal emotions of two or three instincts may be combined into less simple emotions; thus admiration is a combination of wonder and submission, scorn is a compound of anger and disgust, whereas in the emotion of revenge we see a union of self-assertion and anger. The study of the human mind has revealed, too, the existence of mechanisms through which still higher syntheses known as *sentiments* arise, as well as the constitution of the more complex emotions that accompany them. In a typical sentiment like the love or the hate of a person or of a country, several of the primary instincts and their accompanying emotional tendencies are organized into a system of thoughts, feelings and impulses that centre in a definite object. The development of such sentiments is of enormous importance for the character and conduct of persons and of society. It is particularly the growth of self-consciousness and of the self-regarding sentiment under the moulding influences of the social environment that is significant for the understanding of the origin of the moral ideas. We have begun to understand how a human personality develops. Starting with simple instincts, developing through sentiment-formation, and especially through the growth of the self-regarding senti-

ment, the child is influenced first by rewards and punishment, then by parental praise and blame, and later by public approval and disapproval; finally, advancing to the higher planes of social conduct, the adult may become able not only to resist the promptings of his strongest instinctive impulses, but also to stand up against public opinion and to do what he judges to be right and in accord with some ideal of conduct that is in defiance of it.²

Often a sentiment will become crystallized in a phrase or a sentence that, through the mysterious influence of crowd psychology, may be used on occasion profoundly to stir a whole people. Every war has its instances. We need only recall the sentiment of democracy at the time of the French Revolution with its watchwords *Liberté, égalité et fraternité*, the sentiment of naval supremacy in England with its song *Britannia rules the waves*, the indignation of the people of the United States at one time toward Spain with the injunction *Remember the Maine*, the love of the German people for the ideal known as *das Deutschtum* voiced in the phrase *Deutschland über alles*. In the United States, at the present moment, a systematic effort is being made, by appealing to our instincts and to sentiments that already exist, to cultivate a new functional system of mental dispositions that will result in better readiness for national defence; the watchword *preparedness* symbolizes a comprehensive synthesis of primal feelings and strivings.

The assertion that the native propensities of man have not grown weaker under a long period of civilization is not likely to be challenged at a time such as that in which we live. The veneer of law and custom has been scratched only to discover, underlying it, primitive man. Before the war duelling had disappeared but individual pugnacity was not always controlled. The terrific effects of collective pugnacity, we are now having unprecedented opportunity to witness. If the time shall ever come when the collective combat of nations will be rendered as unnecessary as has become the bodily combat of individuals, it will doubtless have been preceded by a long period in which it was gradually discouraged by the evolution of international law and custom. Life and growth necessitate change. Nations cannot continue to exist without change. Possibly neurologists and psychiatrists studying instincts, sentiments and ideals may discover methods by which necessary changes may be affected with less that is horrible than seems unavoidable today.

² See W. McDougall's *Introduction to Social Psychology*; also, A. F. Shand's *Character and the Emotions*; M. Ribot's *Theory of the Passions*; and G. F. Stout's *Groundwork of Psychology*.