Battle for the Mind

We have still much to learn as to the laws according to which the mind and body act on one another, and according to which one mind acts on another; but it is certain that a great part of this mutual action can be reduced to general laws, and that the more we know of such laws the greater our power to benefit others will be.

If, when, through the operation of such laws surprising events take place, (and) we cry out… "Such is the will of God," instead of setting ourselves to inquire whether it was the will of God to give us power to bring about or prevent these results; then our conduct is not piety but sinful laziness.

George Salmon, D.D.
A Sermon on the Work of the Holy Spirit (1859)

BATTLE FOR THE MIND

A PHYSIOLOGY OF CONVERSION AND BRAIN-WASHING

by
William Sargant
with a Preface by
Charles Swencionis

MALOR BOOKS

This is a Malor Book
Published by ISHK

P. O. Box 176, Los Altos, CA 94023

First Published in 1957 by Wm. Heinemann Ltd.
Second edition in 1959 by Pan Books Ltd.

Malor Books paperback edition published in 1997 by ISHK

Sargant, William Walters.
Battle for the mind : a physiology of conversion and brain-washing / by William Sargant : with a preface by Charles Swencionis.
p. cm.
Originally published: New York : Doubleday, 1957.
Includes bibliographical references and index.
ISBN 1-883536-06-5
1. Brainwashing, 2. Conversion–Psychology. 3. Rites and ceremonies.
I. Title
BF633.X3 1997
153.8'53—dc21

97-10363

Contents

Acknowledgements

The sources of all quotations are given as references at the end of this book. The author and publishers of *Battle for the Mind* thank those who granted permission for these quotations to be used.

All photographs and plates are reproduced by courtesy of The British Museum, London, and are copyright © The British Museum.

Preface

by Charles Swencionis

William Sargant asked how the brain could change rapidly to adopt whole new world-views. His interest was neither religious nor antireligious, but rather in how the brain could accommodate such rapid and far-reaching change. In cases like conversion and brain-washing, the meanings of many or most parts of one's world change. For the brain, this is a change not like the world revolving on its axis, but rather of changing its axis and drawing all new lines of latitude and longitude, or of great shifts in tectonic plates, so the parts of the world stand in new relations to each other. The brain has to change its connections and meaning systems. How can it possibly do this quickly?

Forty years after it was written, Sargant's *Battle for the Mind* makes disparate and complicated mental and behavioral phenomena understandable. His research in World War II showed that with enough battle exposure, every soldier eventually shows the symptoms of battle-fatigue, shell-shock, or what we know now as post-traumatic stress disorder (PTSD). He went further to look at similar processes in religious conversion, spirit possession, brain-washing, political conversion, and the consultation of oracles in the ancient world.

His basis was a Pavlovian theory, formulated more than seventy years ago. The theory he used is distinct from

Pavlov's famous theory of classical conditioning. It shares much with modern theories of PTSD, and even now could enlighten them. Sargant extended Pavlov's model to account for experiences that make people change their world-view suddenly. They begin to see themselves as part of a new group, or to become vulnerable to ideas very different from their usual assumptions.

The principles of how to do this were known by the czar's secret policy and others long before Pavlov's time. How the brain might allow this is another matter.

Sargant asked how it could be that people would change long-standing, reasonable beliefs, drop their ordinary perspectives of common sense, and become open to ways of thought quite foreign to their previous lives. He found a pattern common to these situations. First, people were subjected to intense trauma. The trauma continued until people behaved in ways very different from what was usual for them. Their personalities showed signs of breaking down. New ways of thinking, applied intentionally or by accident, could then be easily accepted.

In brain-washing, trauma is applied through sleep deprivation, relentless pressure of an alternative ideology, and physical abuse. In religious conversion the trauma is internal, a conflict between fear of hellfire and damnation versus acceptance of the new religion. In spirit possession, there is no trauma, but pressure of a heightened emotional pitch can come from repetitive drum-beating, chanting, dancing, and drug or alcohol use. The mental set, environmental setting, expectation, and observation of others being possessed suggest to people how they should act. Consulting an oracle in the ancient world was not a rational process. Visiting an

oracle involved sleep deprivation, chanting, drug use, solitary passage through tunnels and down pits and long exhausting sessions that could last over several days. When the oracle then announced a revelation, it could be seen with new eyes and perceived as having great importance.

Pavlov's Model of Brain Changes

Pavlov's dogs were almost drowned in a flood. At the last moment, an assistant rescued them, freed them from their cages, and led them to safety. Afterwards, they forgot or reversed training they had received before the trauma. Keepers they had shown affection to they now showed aggression toward. Keepers they had disliked they now showed affection for. They forgot their recent learning and had to be retrained.

This phenomenon interested Pavlov and he studied it. He theorized that there were three stages to this breaking down of neural organization and a fourth of reassembling the world. First, the animal is overloaded, through excessive exercise, excessive sensory stimulation, surgery, or sleep deprivation. This produces what Pavlov called the "equivalent" phase of brain activity. In the "equivalent" phase all outside stimuli, large or small, produce the same size response. You may see this in people who have been sleep deprived for a day or two. They lose judgment and perspective and react to a slight question or a major challenge with the same degree of irritability.

The second stage Pavlov called "paradoxical inhibition," in which weak stimuli produce strong responses and strong stimuli produce weak responses. Judgment is further impaired. One almost never observes people in this state in normal life. They are responding inappropriately, with four fire engines to a firecracker and no reaction to a real four-alarm fire. This and the further stages are seen in soldiers, in civilians subjected to war, and people in normal societies subjected to rape, or other horrible traumas.

In the third "ultra-paradoxical" stage many positive conditioned responses become negative and vice versa. The dogs showed paradoxical responses to their keepers. They became friendly to keepers they formerly disliked and disliked ones they had been close to. In people, there can be feelings of possession, hypnosis-like states, and new commands and ideas become imperative.

The state of "transmarginal" collapse is even beyond the "ultra-paradoxical" stage. In this stage, and after it, the dog seems to have unlearned recent and longstanding routines. Pavlov described this state as one in which there is inertness, temporary inhibition of most brain function, and isolation of functionally pathological points of the cortex.

A state of breakdown occurs in which the person or dog cannot function and has lost key markers by which they or it understood the world. Basic learning, basic assumptions about the world have been challenged. If the person or dog could change some of these assumptions, they could build a new map of the world, a different world, and function again if the trauma had not been too

great. Parts of the cortex involved in the trauma become isolated from other parts of the brain they used to connect to and fire frequently and in a new manner.

Pavlov believed this overall process was the brain's attempt to avoid complete destruction: that it had to attempt to process trauma so great it called into question all it had ever learned. This is a model quite different from the classical conditioning for which Pavlov is usually remembered.

Implications for Social Processes

Traumatic, emotional events that people share bring them together, make them close. War buddies, school chums, and childhood friends are stock relationships for literature and film. Milder forms of the same techniques appear in hazing in college, which leads to life-long attachment to the alma mater and to friendships. Training exercises in sports activate "team spirit"; indoctrination in boot camp leads to loyalty; and corporate training sessions establish commitment to the company. More extreme versions exist in militant religious and political groups and in urban teenage gangs. These powerful techniques can bring about allegiance for a lifetime.

Walter Freeman suggests that the process of conversion is not an evil manipulation, but a social necessity, and that perhaps the same chemistry provides the mechanisms for transference in psychotherapy. The biological process may be the dissolution of existing neural connections by an electrochemical discharge in a brain, preceded by stress, and followed by a state of malleability. This could open the

way for a new belief structure to facilitate social behavior. Such a mechanism could serve the function of allowing young adults to separate from their parents, form their own social units, and become parents themselves. That this mechanism exists at least in humans and dogs leaves open for investigation whether it evolved performing this social function, or whether it is an epiphenomenon.

Little is known about this mechanism Sargant described. It would be a mistake to wall it off into the corner of being only PTSD: one psychiatric syndrome in a list of many. This mechanism holds the possibility of explaining and understanding much of how people suddenly change direction in life, and some of the strangest religious and spiritual behavior ever described among human beings.

Could this explain the behavior of the snake-handling cults of the American South, flagellant bands offering supplication to God to avert the Black Plague in the fourteenth century, the strength of the Mau Mau movement in Kenya in the 1950's, and the spirit possession in African traditions? Could this be why people believed so powerfully in the revelations of ancient oracles?

Current Models of PTSD

Current models of PTSD help us understand parts of how Pavlov and Sargant's mechanism works. Models of PTSD fall into roughly four categories: neurochemical; kindling; conditioning; and cognitive.

The neurochemical models suggest that PTSD can be understood as inescapable stress producing learned helplessness. The individual cannot escape repeated trauma and

so learns that nothing he or she does matters. This produces chronic dysregulation in neurotransmitter systems. The neurotransmitter levels are no longer subject to normal checks and balances and may become set at abnormal levels. Some stress hormones are not secreted when they should be and others are in the bloodstream constantly at higher levels than normal. Mechanisms of reacting appropriately to stress have been burnt out. Stress alarms have been activated so frequently or extremely that they will no longer fire when needed and a lurking anxiety never leaves.

The kindling models suggest that trauma sets up a set of foci in the brain that fire frequently, repeatedly, and inappropriately. This reinforces memory of the trauma and interrupts ongoing processing. If memory of the trauma is either stored in certain circuits or foci, or these brain structures form an important part of the memory, trauma memories will be more active than other memories, and intrude on other thoughts and activities.

Conditioning models suggest that biological vulnerability, acted on by social trauma, causes intense fear, distress, or some other basic negative emotion. This leads to ongoing anxious apprehension, or psychological vulnerability. When this is acted on by social support and coping responses, it leads to full-blown PTSD.

Cognitive models suggest that an individual's world view is challenged by a traumatic event to the breaking point. So many assumptions formerly held of human nature and the ways the world should or does function become so untenable that the world-view shatters.

Applications

If we understand how this mechanism works, we could manipulate it consciously. Cynical, tyrannical uses to control human beings are obvious and have been a part of our past and present and will be a part of our future. Brainwashing has been used by cults, governments, advertisers, and professional training institutions. It may be a mainstay of all forms of even legitimate socialization into society.

Beneficial application is also possible. Treatment of PTSD should be possible by using a version of the process to bring victims back, to reintegrate them into society. It would be cruel and unethical to use trauma in such a process, but the use of drumming, chanting, music, and dancing does not seem out of place, if the patient wishes it and the process is under the patient's control.

Seeing Sargant's phenomenon only as PTSD ignores the healing aspect of its resolution. Granted that some traumas are so severe that people never recover, most are not this severe, and most people do recover. Understanding the process yields the possibility of individuals exerting greater control over their own healing process, directing where they want it to go, and which people they wish to strengthen their bonds with. People who are recovering from trauma have impaired understanding and choice, necessitated through Pavlov's process of breaking down existing neural connections. However, enlightened professionals who understand the process should be able to empower victims to a far greater degree than those who

are ignorant of the process. It is quite possible that trauma victims themselves can control their healing to a far greater extent than we now foresee.

In these days of brain imaging, we may even investigate exactly what structures and circuits are involved. Such research could suggest drug treatments for PTSD that are more successful than current ones.

Our society is full of people convinced that they hold the best of all political, social, religious, and other positions. They (and perhaps we) have not a clue that these positions are not the result of rational choice, but some accident of social conditioning. Insight into this process and education that it exists might make people more capable of rational, informed choice in ideology, or even to reject ideology and dogma in favor of dealing with reality.

Perhaps most important, understanding Sargant and Pavlov's mechanism can give us insight into the formation of social bonds, the development of gangs and groups, and allow us to make more informed choices as individuals, as a society, and as a culture, how we want our own groups to develop.

Bibliography

Freeman, Walter J. *Societies of Brains: A Study in the Neuroscience of Love and Hate*. Hillsdale, NJ, Lawrence Erlbaum Associates; 1995.

Giller, Earl L. *Biological Assessment and Treatment of Posttraumatic Stress Disorder*. Washington, American Psychiatric Press; 1990.

Herman, Judith L. *Trauma and Recovery*. New York, Basic Books; 1992.

Jones, Jennifer C., & Barlow, David H. A new model of posttraumatic stress disorder: Implications for the future. In P.A. Saigh (Ed.), *Posttraumatic Stress Disorder*. Boston, Allyn and Bacon; 1992.

Krystal, John H., Kosten, T.R., Perry, B.D. *et al.* Neurobiological aspects of PTSD: Review of clinical and preclinical studies. *Behavior Therapy, 20*:177-178; 1989.

Krystal, John H. Animal models for posttraumatic stress disorder. In Earl L. Giller, (Ed.) *Biological Assessment and Treatment of Posttraumatic Stress Disorder*. Washington, D.C., American Psychiatric Press; 1990.

van der Kolk, B., Greenberg, M., Boyd, H. *et al.* Inescapable shock, neurotransmitters, and addiction to trauma: Toward a psychobiology of post-traumatic stress. *Biological Psychiatry, 20*:314-325: 1985.

Yehuda, Rachel, Southwick, Steven M., Perry, Bruce D., Mason, John M., & Giller, Earl L. Interactions of the Hypothalamic-Pituitary-Adrenal Axis and the Catecholaminergic System in Posttraumatic Stress Disorder. In Earl L. Giller, (Ed.) *Biological Assessment and Treatment of Posttraumatic Stress Disorder*. Washington, D.C., American Psychiatric Press; 1990.

Charles Swencionis, Ph.D.
Ferkauf Graduate School of Psychology
Albert Einstein College of Medicine of
Yeshiva University
Bronx, NY

November, 1996

Foreword

It must be emphasized as strongly as possible that this book is *not* concerned with the truth or falsity of any particular religious or political belief. Its purpose is to examine some of the mechanisms involved in the fixing or destroying of such beliefs in the human brain. Some critics will perhaps doubt whether it is possible to separate two parts of a whole in this way. But if a greater understanding of the problem is ever to be achieved, continued attempts must be made to do so.

Having beliefs of my own, and owing much to a religious upbringing, I am particularly anxious to give as little offence as possible to readers who may hold similar or quite different religious tenets. Yet history records the angry outcry even when Newton tried to disentangle the simple mechanics of gravity from its religious aspects. A deeply religious man himself, he was accused of trying to destroy religious faith in others. He could answer only that his work was concerned not with the ultimate question of why something happens, but with the immediate question of how it happens; and I must make the same plea for this very much humbler enquiry. Many people have pointed out, quite rightly, that the ultimate test of both religious and political values is not definable in terms of *how it happens*, but of *what is achieved*.

My concern here is *not* with the immortal soul, which is the province of the theologian, nor even with the mind

in the broadest sense of the word which is the province of the philosopher, but with the brain and nervous system, which man shares with the dog and other animals. Yet it is through this material brain that emissaries of God or of the Devil—dictators, policemen, politicians, priests, physicians and psychotherapists of various sorts—may all try to work their will on man. It is not surprising therefore that arguments often arise as to who exactly is doing what. This study discusses mechanistic methods influencing the brain which are open to many agencies, some obviously good and some obviously very evil indeed; but it is concerned with brain mechanics, not with the ethical and philosophical aspects of a problem which others are very much more competent to discuss than I am. It must also be remembered that much of what is discussed here is still only a useful working hypothesis; a great deal of further research is needed before final conclusions are reached.

My choice of Wesley for special study in the technique of religious conversion was prompted by my own Methodist upbringing. I became convinced of the tremendous power latent in his methods, though these have now been abandoned by the Church which he built and strengthened by their use; and most people will agree with social historians who insist that his conversion of large areas of the British Isles helped to stave off political revolution at a time when Western Europe and North America were in a ferment, or in actual revolt, largely because of the anti-religious, materialistic philosophy with which Tom Paine, among others, was associated. John Wesley, and his methods, demand particular study at the present time from politician and priest alike, even if the hellfire doctrine he preached may

seem outmoded. I have had to go outside my own field of medicine for some of the material used in this book and apologize in advance for any inaccuracies due to this. But if progress and synthesis are ever to be achieved, in this age of increasingly departmentalized knowledge, someone has to risk leaping over walls into other people's territory. And it must not be held against me that I do not discuss some types of purely intellectual conversion, but only those physical or psychological stimuli, rather than intellectual arguments, which seem to help to produce conversion by causing alterations in the subject's brain function. Hence the term "physiology" in the title.

I have to acknowledge the advice and help of more people than can be mentioned by name, who have visited or worked with me either at home or in the U.S.A. They are bound to find some of their viewpoints incorporated in my thinking, and I hope they would not wish it to be otherwise. In particular I have to thank Drs. Eliot Slater and H. J. Shorvon; some of our work done together in England during and after the war is reported in the earlier chapters of this book and has been already published in joint papers by scientific journals. All the material on war neuroses here quoted has appeared in such journals, and references are appended.

The Rockefeller Foundation made it possible for me to spend a valuable year at Harvard University and to see psychoanalytic teaching and treatment at close quarters. Let me emphasize that my discussion of psychoanalysis when illustrating some aspects of modern conversion and brainwashing techniques implies no denial of its very real value in the treatment of carefully selected patients. Another year

spent, by invitation, at Duke University allowed me to study methods of religious revival, including the Christian snake-handling cults that flourish in the Southern States. I also owe much to Drs. Howard Fabing and George Sutherland with whom, while in the U.S.A., I frequently discussed the relation of Pavlov's work to problems of human behaviour.

My thanks are also due to Robert Graves. It was he who persuaded me, whilst on a visit to Majorca, to continue with this book, helped me to prepare the final manuscript, and also supplied Chapter 8 and some of the other historical references in support of my arguments.

And without the help of my wife, and my secretary, Miss M. English, this book could never have been written at all.

W. S.

Introduction

Politicians, priests and psychiatrists often face the same problem: how to find the most rapid and permanent means of changing a man's beliefs. When, towards the end of World War II, I first became interested in the similarity of the methods which have, from time to time, been used by the political, religious and psychiatric disciplines, I failed to foresee the enormous importance now attaching to the problem—because of an ideological struggle that seems fated to decide the course of civilization for centuries to come. The problem of the doctor and his nervously ill patient, and that of the religious leader who sets out to gain and hold new converts, has now become the problem of whole groups of nations, who wish not only to confirm certain political beliefs within their boundaries, but to proselytize the outside world.[1]

Great Britain and the U.S.A. therefore find themselves at last obliged to study seriously those specialized forms of neuro-physiological research which have been cultivated with such intensity by the Russians since the Revolution, and have helped them to perfect the methods now popularly known as "brain-washing" or "thought control". In August, 1954, the United States Secretary of Defence announced the appointment of a special committee to study how prisoners of war could be trained to resist brain-washing. He admitted the desirability of reviewing the existing laws, government agreements, and policies of military

departments, with regard to prisoners captured by nations in the Soviet orbit. This committee reported back to the President in August, 1955.[2]

In Great Britain, too, the necessity for more vigorous research into the techniques of rapid political conversion has also been widely recognized. Several years ago, for instance, Mrs. Charlotte Haldane pleaded that research should be undertaken into the psychological mechanism of the process by which she, the wife of a famous British scientist, had been converted to a belief in the official Russian interpretations of Marxian dialectics; and into that of her sudden reconversion to the Western point of view, after failing to detect the falsity of the Russian system for so many years. Koestler and many others have described very much the same experience in their own lives.[3]

Many people are also bewildered at the spectacle of an intelligent and hitherto mentally stable person who has been brought up for trial behind the Iron Curtain, and prevailed upon not only to believe but to proclaim sincerely that all his past actions and ideas were criminally wrong. "How is it done?" they ask.

It is not always realized that this can be the political equivalent of that kind of religious conversion after which ordinary decent people suddenly come to believe that their lives have not only been useless but merit eternal damnation, because some religious particular has been neglected. The same psychological process may also be seen at work in a patient undergoing psychoanalysis: he can be persuaded that anomalies in his behaviour have been caused by an intense hatred of his father—even though he

has always acted in a devoted and affectionate manner towards him. How can people be induced to believe in what may contradict obvious fact?[1]

A general distinction should be made between the more gradual changes of outlook and behaviour due to increasing age, experience and reason and the abrupt total re-orientations of viewpoint, often brought about by others, which involve the surrender of strongly held beliefs and the adoption of new beliefs often diametrically opposed to them.

This book will discuss some of the more important mechanistic and physiological aspects of this problem, and of how new ideas may be implanted and firmly fixed in the minds even of those unwilling at first to receive them. Interest in it was stimulated by chance circumstances eleven years ago. World War II provided medicine with rare opportunities for studying the breakdown of normal persons subjected to intense stresses. In England at the time of the Normandy invasion in June, 1944, special arrangements had been made to deal with a new crop of acute military and civilian neuroses resulting from this operation. One day while travelling to an emergency neurosis-centre, soon after the start of the invasion, I stopped at an American neuro-psychiatric hospital to visit a colleague, Dr. Howard Fabing. He had just been reading a book by the famous Russian neuro-physiologist I. P. Pavlov, called *Conditioned Reflexes and Psychiatry,*[4] and strongly advised me to do the same at once. This book consisted of a series of lectures given by Pavlov not long before his death in 1936 at the age of eighty-six; but they had not become available in English until 1941. Stocks of the translation

had been destroyed in the London Blitz that same year, but Dr. Fabing had managed to secure a copy. Like several other neuro-psychiatrists of World War II, he had found Pavlov's observations on animals extremely useful for the better understanding of certain behaviour patterns observed when human beings break down under abnormal stress.[5]

Pavlov's clinical descriptions of the "experimental neuroses" which he could induce in dogs proved, in fact, to have a close correspondence with those war-neuroses which we were investigating at the time. Also, many of the physical treatments that had gradually been developed by trial and error during the war to relieve acute nervous symptoms, had obviously been anticipated by Pavlov as a result of his prolonged research on dogs.[4] It was now clear that what was needed was a much more careful study of certain of these findings, in their possible relation to human psychiatry, than had recently been given them either in England or in America.

So close were some of the similarities between these and canine neuroses that it seemed more improbable than ever that many current psychological theories about the origin of human neuroses and other abnormalities of behaviour were correct; unless it be conceded that Pavlov's dogs had subconscious minds, and also super-egos, egos and ids. And the part played by alterations in the function of the human brain itself had, it also seemed, been too summarily dismissed by some in their attempts to explain the reasons not only for neurotic and criminal behaviour but for all the constant mental turns, reconsiderations and adjustments which produce so-called "normal" behaviour in any given person, as he reacts to his environment.

When, late in life, Pavlov began comparing the results of disturbances of brain function noted in his animals with those noted in human beings, this phase of his work was little studied outside Russia, and many British and American psychiatrists still neglect it, although the relevant books have now been long available in both countries. The fact is that Pavlov continues to be known principally for his laboratory experiments on animals, for which he was awarded the Nobel Prize; and most psychiatrists prefer a broader basis to their work than his simple mechanistic and physiological approach. Moreover, there is a certain repugnance in the Western world to Pavlov's investigations. Cultural beliefs give man, in addition to his brain and nervous system, an independently acting metaphysical soul, which it is assumed helps to control his ethical behaviour and dictate his spiritual values. In this strongly and widely held view, animals have brains but no souls; which makes odious any comparison between the behaviour patterns of man and animals. And though studies of how animals' bodily systems function have admittedly been of great value in throwing light on the workings of the human machine, this view persists, even among some scientists, almost as a test of moral respectability.

In the United Kingdom, this prejudice against Pavlov has allowed many scientists to neglect his work; and in the United States the wave of Freudian psychoanalytic fervour which has swept the country, many years after its introduction and use in Europe, has had the same effect. Too many psychiatrists and psychologists in both countries have, in fact, blinded their eyes to Pavlov's thesis, though his viewpoint was irreproachably scientific. For Pavlov always insist-

ed that experimental facts, however limited in their range, which can be repeatedly tested and checked, should take precedence over broader and vaguer psychological speculations.

Psychiatric research in Great Britain has, however, become far more realistic since World War II. Drugs and other physical methods of treatment gave such undeniable results, in the treatment of acute civilian and military war neuroses, that physiological aids to psychiatry were given a high research priority, and this policy has persisted. Indeed, it was the use of drugs in psychotherapy that first prompted the present study of Pavlov's experimental methods of changing the behaviour patterns in animals, and the mechanics behind historical techniques of human indoctrination, religious conversion, brain-washing, and the like.[6]

Early in the war, during treatment of the acute neuroses resulting from the Dunkirk evacuation, the Battle of Britain and the London Blitz, the value of certain drugs had become obvious in helping patients to discharge their pent-up emotions about the terrifying experiences which had caused their mental breakdown. This method had been used on a more limited scale in peacetime practice by Stephen Horsley and others.[7] As the war progressed, and after it was over, experiments with a wide range of such drugs were continued and a good deal was learned about their properties.[8]

A drug would be administered to a carefully chosen patient—by injection into a vein, or inhalation—and as it started to take effect, an endeavour would be made to make him re-live the episode that had caused his breakdown.

Sometimes the episode, or episodes, had been mentally suppressed, and the memory would have to be brought to the surface again. At other times it was fully remembered, but the strong emotions originally attached to it had since been suppressed. The marked improvement in the patient's nervous condition was attributed to the releasing of these original emotions. It was also found that the emotions which were most profitably released—or "abreacted", as the psychiatric term is—were those of fear or anger; little could be done by making, say, a melancholic patient weep and become more depressed.

Our first reading of Pavlov's book, in 1944, coincided with the learning of some more facts about these drug treatments. It was found that a patient could sometimes be restored to mental health not by his re-living a particular traumatic experience, but by stirring up in him, and helping him to discharge strong emotions not directly concerned with it. Thus, in some of the acute Normandy battle-neuroses, and those caused by V-bomb explosions, quite imaginary situations to abreact the emotions of fear or anger could be suggested to a patient under drugs; though as a rule these were in some way related to the experiences which he had undergone. Much better results could often, indeed, be obtained by stirring up emotions about such imaginary happenings than by making the patient re-live actual happenings in detail. For example, it might be suggested, under drugs, to a patient who had broken down as the result of a tank battle, that he was now trapped in a burning tank and must fight his way out. Though this situation had really never occurred, the fear that it might

happen was perhaps a contributory cause of his eventual collapse.

Outbursts of fear or anger thus deliberately induced and stimulated to a crescendo by the therapist, would frequently be followed by a sudden emotional collapse. The patient would fall back inert on the couch—as a result of this exhausting emotional discharge, not of the drug—but he would soon come round. It then often happened that he reported a dramatic disappearance of many nervous symptoms. If, however, little emotion had been released, and he had only had his intellectual memory of some horrible episode refreshed, little benefit could be expected. But a falsely implanted memory might create a larger emotional discharge than the real and induce the physiological effects needed for psychological relief. A technique of deliberately stimulating anger or fear under drugs, until the patient collapses in temporary emotional exhaustion, was finally perfected with the help of Pavlov's findings. Especially important to this were some observations he made on the behaviour of his dogs after they had been almost drowned in the Leningrad flood of 1924; these will be discussed in later chapters.

One afternoon when this technique was being applied to the more normal victims of severe battle or bombing stress—it was less helpful in the treatment of chronic neurotics—I happened to visit my father's house, and picked up one of his books at random. It was John Wesley's *Journal* of 1739-40. My eye was caught by Wesley's detailed reports of the occurrence, two hundred years before, of almost identical states of emotional excitement, often leading to temporary emotional collapse, which he induced by a par-

ticular sort of preaching. These phenomena often appeared when he had persuaded his hearers that they must make an immediate choice between certain damnation and the acceptance of his own soul-saving religious views. The fear of burning in hell induced by his graphic preaching could be compared to the suggestion we might force on a returned soldier, during treatment, that he was in danger of being burned alive in his tank and must fight his way out. The two techniques seemed startlingly similar.

Modern Methodists are often confused when they read Wesley's detailed accounts of these successes; they do not consider that the reason for their preaching being ineffective, by comparison, may simply be because the present fashion is to address the intellect rather than stir up strong emotion in a congregation.

It now seemed possible, in fact, that many of the results which were being achieved by abreaction under drugs were essentially the same as those obtained, not only by Wesley and other religious leaders, but by modern "brain-washers", though different explanations would doubtless be given in every case. Also, it seemed as if Pavlov provided experimental evidence in his changing of animal behaviour, which helped to explain why certain methods of bringing about similar changes in man were successful. Without these experiences in a wartime neurosis centre there would have been no thought of connecting the physiological mechanics used by Pavlov in his experiments on animals with Wesley's mass conversion of the common people in eighteenth-century England and of going on to the present study.[6]

In the autumn of 1944, a period of illness enabled several weeks to be spent in following up these clues, studying case-histories of sudden conversion, and the means of inducing belief in divine possession used by various religious bodies throughout the world. Part of 1947-48 was spent in the United States, where an opportunity occurred of studying at first hand some of the revival techniques still practised in many parts of the country. These seemed relevant to this investigation because they are still extremely effective when used by skilful practitioners; in England they have practically died out.[9]

After ten years of intermittent study, the fruit of which was several articles, most of them published in scientific journals, a second period of illness enabled these to be rearranged and consolidated for the present book. The crude mechanics of the techniques studied form only part of the picture; but because their importance is so often overlooked by those who believe in reasoned argument as far more effective than all other methods of indoctrination, it seems important that the Western world should be given some understanding of them.

To watch such methods in action and observe their devastating effect on the mind of ordinary people, is such a bewildering and horrible experience that one is tempted to turn one's back on what is a matter of fundamental importance for our cultural future, and shout defiantly: "Men are not dogs!"—as indeed they are not. Dogs, at least, have not yet conducted experiments on man. Meanwhile, however, a large part of the world's population is not only being reindoctrinated, but has had the whole medical system reorien-

tated along Pavlovian lines—partly because the mechanistic and physiological approach to what is more commonly regarded in the West as the province of philosophy and religion has achieved such politically convenient results.

In succeeding chapters evidence will be provided for the general observations made above. It must be emphasized that this book is not primarily concerned with any ethical or political system; its object is only to show how beliefs, whether good or bad, false or truer can be forcibly implanted in the human brain; and how people can be switched to arbitrary beliefs altogether opposed to those previously held. Too technical a style has been avoided, because if politicians priests, psychiatrists and police forces in various parts of the world continue to use these methods, ordinary people must know what to expect and what the best means are of preserving their former habits of thought and behaviour, when subjected to unwelcome indoctrination.

No claim is made that this book contains any facts that are basically new. Every subject discussed is available for further detailed study in specialist journals and books, to which references are given. But the net has been flung wider than by most previous writers on the subject, in an attempt to connect and correlate observations from many apparently unrelated and unconnected sources. The conclusion reached is that simple physiological mechanisms of conversion do exist, and that we therefore have much still to learn from a study of brain function about matters that have hitherto been claimed as the province of psychology or metaphysics. The politico-religious struggle for the mind of man may well be won by whoever becomes most conversant with the

normal and abnormal functions of the brain, and is readiest to make use of the knowledge gained.

Chapter 1

Experiments in Animals

In the course of over thirty years of research Pavlov accumulated a mass of observations on various methods of building up behaviour patterns in dogs and then breaking them down again. He interpreted his findings in mechanistic terms which have since been frequently disputed by psychologists and psychiatrists. Yet the findings themselves have been confirmed again and again. Horsley Gantt attributed the absence of any important errors in Pavlov's work to his "painstaking methods, his adequate controls, his habit of giving the same problem to several collaborators working in separate laboratories or institutes, with whom he checked results and supervised experiments . . ."[4]

Pavlov had won the Nobel Prize, in 1903, for research on the physiology of digestion before turning to study what he called the "higher nervous activity" in animals. What changed his line of enquiry was a sense that he could learn little more about digestive functions until he had investigated the workings of the brain and nervous system, which often seemed to influence digestion. He then became so deeply absorbed in the implications of this new study that he concentrated on it until his death in 1936, at the age of eighty-six.

Pavlov was one of the Russian scientists of the old régime whose work Lenin thought valuable enough to encourage after the Revolution; and even though extremely critical of the

Soviet régime, Pavlov continued to receive generous support from the government. Both inside and outside Russia he was admired for the courageous attitude he adopted, and only at the very end of his life did he become reconciled to living under a dictatorship. Ironically, he is now regarded as a hero of the Revolution, and no mention is made in recent Soviet publications of his persistent opposition to the régime. Horsley Gantt, revisiting him in 1933, asked why his political attitude was now more conciliatory; and Pavlov, he says, replied half jokingly that at the age of eighty-three his heart could no longer stand the strain of infuriated outbursts against the authorities who were sponsoring him.[4] About this time, also, the Nazis had begun to threaten Russia, and Pavlov's great mistrust of Germany inclined him to abate his hostility to the Russian Government. But though he was now relating his discoveries about animals to problems of human behaviour, it is extremely doubtful whether he ever foresaw that his work could be used as an instrument of Soviet policy. Since he always demanded and obtained freedom of thought for himself, it is unlikely that he would have wished to curtail freedom of thought for others. He insisted on travelling abroad to maintain contact with his scientific colleagues, and won a great ovation when lecturing in England just before his death.

Pavlov cannot therefore be considered a typical scientist of the Soviet régime; even if much of his finest work had not been done before the Revolution. Yet the Communists must have found his mechanistic approach to the physiological study of behaviour in dogs and men most helpful while pursuing their policy of indoctrination. In July, 1950,

a medical directive was issued in Russia for a re-orientation of all Soviet medicine along Pavlovian lines[10]—probably partly because of the impressive results obtained by applying Pavlov's research to political ends. Yet outside Russia its implications still sometimes tend to be ignored.

As soon as Pavlov expressed a desire to apply his experimental findings on animal behaviour to problems of morbid psychology in human beings, the Soviet Government placed a near-by psychiatric clinic at his disposal. His first public lecture on this topic was delivered in 1930: he called it "The Trial Excursion of a Physiologist in the Field of Psychiatry". It may be that these new interests date from an operation for gall-stones which he underwent in 1927; because he then published his significant *A Post-operative Cardiac Neurosis Analyzed by the Patient: Ivan Petrov Pavlov*.[4]

Pavlov's work seems to have influenced the techniques used in Russia and China for the eliciting of confessions, for brain-washing and for inducing sudden political conversions. His findings, applicable to these, should be easily understood even by the non-technical reader, without the need of spending too much time on the details of his actual experiments. Most of these findings are well reported in a series of Pavlov's later lectures translated by Horsley Gantt, and published in Great Britain and the United States in 1941 under the title *Conditioned Reflexes and Psychiatry*,[4] Professor Y. P. Frolov's enlightening book on these experiments, *Pavlov and his School* (1938), has also been translated and published in English.[11] Professor Babkin's more recent *Life of Pavlov*, however, makes little reference to some of his most important findings from the point of view of

our study.[12] And though Dr. Joseph Wortis in his *Soviet Psychiatry*, published in the United States,[13] emphasizes the importance in modern Russian medicine of Pavlov's experimental approach to psychiatric problems, few details are given of the last important phase of Pavlov's work. An official *Life of Pavlov*, published in Moscow in 1949, written by E. A. Asratyan,[14] also contains many details of Pavlov's early experimental work on conditioned reflexes in animals, but very few details of his later work relevant to conversion and brain-washing techniques. At all events, no publication in English has hitherto explained these for the benefit of ordinary readers but recently a good new translation of Pavlov's selected works has become available in English.[15]

Thirty years of research convinced Pavlov that the four basic temperaments of his dogs approximated closely to those differentiated in man by the ancient Greek physician Hippocrates. Though various blends of basic temperamental patterns appeared in Pavlov's dogs, they could be distinguished as such, rather than as new temperamental categories.

The first of these four corresponded with Hippocrates's "choleric" type, which Pavlov named the "strong excitatory". The second corresponded with Hippocrates's "sanguine temperament"; Pavlov named it "lively", the dogs of this type being of a more balanced temperament. The normal response to imposed stresses or conflict situations by both these types was increased excitement and more aggressive behaviour. But whereas the "choleric", or "strong excitatory", dog would often turn so wild as to be completely out of

hand, the "sanguine" or "lively" dog's reactions to identical stresses were purposeful and controlled.

In the other two main temperamental types of dog imposed stresses and conflict situations were met with more passivity, or "inhibition", rather than aggressive responses. The more stable of these two inhibitory temperaments was described by Pavlov as the "calm imperturbable type, or phlegmatic type of Hippocrates". The remaining temperament identified by Pavlov corresponds with Hippocrates's "melancholic" classification. Pavlov named it the "weak inhibitory" type. He found that a dog of this type shows a constitutional tendency to meet anxieties and conflicts by passivity and avoidance of tension. Any strong experimental stress imposed on its nervous system reduces it to a state of brain inhibition and "fear paralysis".

Yet Pavlov found that the other three types, too, when subjected to more stress than they could cope with by usual means, responded in the end with states of brain inhibition. He regarded this as a protective mechanism normally employed by the brain as a last resort when pressed beyond endurance. But the "weak inhibitory" type of dog was an exception: "protective inhibition" occurred more rapidly, and in response to lighter stresses—a difference of the utmost significance to this study.

Pavlov fully recognized the great importance of environment, as well as of constitution, in deciding the final behaviour patterns of his dogs. He found that certain fundamental instincts, such as sex or the need for food, were constantly adapted to changes of environment by the formation of appropriate behaviour patterns. A dog without a brain cortex

(which contains some of the more complicated connections between the main brain centres) might still swallow food placed within its mouth; but it needed a brain cortex and means of forming complicated conditioned responses, if it were to learn that food would be given only after an electric shock of a certain definite strength, or after a metronome had been heard beating at one particular rate and no other.

In discussing the "weak inhibitory" type, Pavlov pronounced that though the basic temperamental pattern is inherited, every dog has been conditioned since birth by varied environmental influences which may produce long-lasting inhibitory patterns of behaviour under certain stresses. The final pattern of behaviour in any given dog will therefore reflect both its own constitutional temperament and specific patterns of behaviour induced by environmental stresses.

Pavlov's experiments led him to pay increasing care to the need for classifying dogs according to their inherited constitutional temperaments before he subjected them to any of his more detailed experiments in conditioning. This was because different responses to the same experimental stress or conflict situation came from dogs of different temperaments. When a dog broke down and exhibited some abnormal pattern of behaviour, its treatment would also depend primarily on its constitutional type. Pavlov confirmed, for instance, that bromides are of great assistance in restoring nervous stability to dogs who have broken down, but that the doses of sedative required by a dog of the "strong excitatory" type *five to eight times greater* than that required by a "weak inhibitory" dog of exactly the same body weight. In World War

II the same general rule applied to human subjects who had temporarily broken down under battle and bombing stress and needed "front line sedation". The required doses varied greatly according to their temperamental types.

Towards the end of his life, when he was experimentally applying his discoveries about dogs to research in human psychology, Pavlov gave increasing attention to what happened when the higher nervous system of his dogs was strained beyond the limits of normal response; and compared the results with clinical reports on various types of acute and chronic mental breakdown in human beings. He found that severer and more prolonged stresses could be applied to normal dogs of the "lively" or "calm imperturbable" type without causing a breakdown, than to those of the "strong excitatory" and "weak inhibitory" types.

Pavlov came to believe that this "transmarginal" (it has also been termed "ultraboundary" or "ultramaximal") inhibition which eventually overcame even the two former types—changing their whole behaviour dramatically—could be essentially protective. When it occurred, the brain might have no other means left of avoiding damage due to fatigue and nervous stress. He found a means of examining the degree of protective "transmarginal" inhibition in any dog at any given time: by using his salivary gland conditioned reflex technique. Though the dog's general behaviour might seem normal, at first sight, the amount of saliva being secreted would tell him what was beginning to happen in its brain.

In these tests, the dog would be given a definite signal, such as the beating of a metronome at a certain rate, or the passing of a weak electric current into its leg, before being

given food. After a time the signal would provoke an anticipatory flow of saliva, without the need of letting the dog see or smell the food. A conditioned reflex having thus been established in the brain between a signal and the expectation of food, the amount of saliva secreted could be precisely measured in drops, and any changes in the response of the brain conditioned reflexes and induced patterns, could be plainly registered.

Here let me digress by emphasizing the relevance of Pavlov's experiments on conditioned reflexes to the ordinary happenings of everyday human life. Much human behaviour is the result of the conditioned behaviour patterns implanted in the brain, especially during childhood. These may persist almost unmodified, but more often become gradually adapted to changes of environment. But the older the person, the less easily can he improvise new conditioned responses to such changes; the tendency then is to make the environment fit his, or her, increasingly predictable responses. Much of our human life consists also in the unconscious following of conditioned behaviour patterns originally acquired by hard study. A clear example is the way a car-driver builds up numerous and varied conditioned responses before being able to negotiate a crowded city street without paying much conscious attention to the process—this is often called "driving automatically". If the driver then gets into the open country, he will change to a new pattern of automatic behaviour. The human brain is, in fact, constantly adapting itself reflexly to changes of environment; although, as with car-driving, the first lessons in any given process may demand difficult, and even tedious, efforts of concentration.

Human and canine brains are obliged to build up a series of both positive and negative conditioned responses and behaviour patterns. Most people in business and the Armed Forces learn by experience to behave negatively in the presence of their superiors; and positively, even perhaps aggressively, in that of their juniors. Pavlov showed that the nervous system of dogs develops extraordinary powers of discrimination in building up these positive and negative responses. He showed that a dog can be made to salivate when a tone of 500 vibrations a minute is sounded, if this is a food signal; but not if the rate is only 490, and no food can therefore be expected.

Negative conditioned responses are no less important than the positive ones, since members of civilized societies must learn how to control normal aggressive responses almost automatically, though sometimes obliged to release them in a split second when a vital emergency arises. Emotional attitudes also become both positively and negatively conditioned: one learns an almost automatic revulsion from certain classes of people, and an automatic attraction to others. Even such words as Catholic and Protestant, Worker and Employer, Socialist and Conservative, Republican and Democrat, evoke very strong conditioned responses.

One of Pavlov's most important findings was exactly what happens to conditioned behaviour patterns when the brain of a dog is "transmarginally" stimulated by stresses and conflict beyond its capacity for habitual response. He could bring about what he called a "rupture in higher nervous activity" by employing four main types of imposed stresses.

The first was, simply, an increased intensity of the signal to which the dog was conditioned; thus he would gradually

increase the voltage of the electric current applied to its leg as a food signal. When the electric shock became a little too strong for its system, the dog began to break down.

A second powerful way of achieving the same result was to increase the time between the giving of the signal and the arrival of food. A hungry dog might be conditioned to receive food, say, five seconds after the warning signal. Pavlov would then greatly prolong the period between a signal and the giving of food. Signs of unrest and abnormal behaviour might become immediately evident in the less stable of his dogs. He found, in fact, that the dogs' brains revolted against any abnormal prolongation of waiting under stress; breakdown occurred when a dog had to exert very strong or very protracted inhibition. (Human beings, too, often find prolonged periods of anxious waiting for an event more trying than when it finally comes.)

Pavlov's third way of producing a breakdown was to confuse them by anomalies in the conditioning signals given—continued positive and negative signals being given one after the other. The hungry dog became uncertain what would happen next, and how to face these confused circumstances. This could disrupt its normal nervous stability—just as happens with human beings.

A fourth way of producing a breakdown was to tamper with a dog's physical condition by subjecting it to long periods of work, gastro-intestinal disorders, fevers, or by disturbing its glandular balance. Though the three other means listed above had failed to produce a breakdown in a particular dog, this might be engineered later by using the same sort of stresses immediately after the removal of

its sexual glands, or during an intestinal disorder. The advantage taken of debilitation and other changes of bodily function in human beings for their political and religious conversion will be discussed later. In some cases, Pavlov's findings may have been exploited; in others, anticipated.

Pavlov found not only that after castration or intestinal disorders a breakdown might occur even in temperamentally stable dogs; but also that the new behaviour pattern occurring afterwards might become a fixed element in the dog's way of life, though it had long recovered from the debilitating experience.

In the "weak inhibitory" type of dog new neurotic patterns thus implanted could often be readily removed again: doses of bromide might be enough to achieve this—though they did not alter the dog's fundamental weakness of temperament. But in "calm imperturbable" or "lively" dogs who needed castration, for instance, before they could be nervously disrupted, Pavlov found that the newly implanted pattern was more often ineradicable once the dog had recovered its normal physical health. He suggested that this was due to the natural toughness of the nervous systems in such dogs. The new patterns of behaviour had been difficult to implant without a temporarily induced debilitation; now they might be held with as much tenacity as the old.

The relevance of this last experiment to similar changes of behaviour in humans hardly needs to be emphasized: towards the end of a long period of physical illness, or after a period of severe debilitation (sometimes produced by enforced fasting), people of "strong character" are often known to make a dramatic change in their beliefs and

convictions. If they then recover strength, they may remain true to the new orientation for the rest of their lives. Case-histories of people "converted" in times of famine or war, or in prison, or after harrowing adventures at sea, or in the jungle, or when brought to destitution by their own self-will, are frequent. The same phenomenon is often observed in both psychotic and neurotic patients who have suffered from glandular operations, fevers, loss of weight and the like, and only then developed their abnormal patterns of behaviour: if they had strong previous personalities, these new patterns may persist long after physical recovery.

Pavlov established that the ability of a dog to resist heavy stress would fluctuate according to the state of its nervous system and its general health. But once protective "trans-marginal" inhibition had been induced, some very strange changes in the functioning of the dog's brain took place. And these changes could not only be measured with some precision by the amounts of saliva secreted in response to conditioned food stimuli, but were not liable, as when human beings have analogous experiences, to subjective distortions: there was no question, that is to say, of the dogs trying to explain away or rationalize their behaviour after having been subjected to these tests.

Three distinct and progressive stages of "transmarginal" inhibition were identified by Pavlov in the course of his experiments. The first he called the "equivalent" phase of cortical brain activity. In this phase, all stimuli, of whatever strength, resulted only in the same amounts of saliva being produced. The observation is comparable to the frequent reports by normal people in periods of intense fatigue, that

there is very little difference between their emotional reactions to important or trivial experiences. And though the feelings of a normal, healthy person will vary greatly, according to the strength of the stimuli experienced, nervously ill people often complain that they become unable to feel sorrow and joy as acutely as before. As the result of fatigue and debilitation, in fact, a man may find to his chagrin that the excitement at receiving a legacy of ten thousand pounds is no higher than if it were one of sixpence; his condition then probably approximates to the "equivalent" phase of exhausted cortical activity identified by Pavlov in his dogs.

When even stronger stresses are applied to the brain, the "equivalent" phase of "transmarginal inhibition" may be succeeded by a "paradoxical" phase, in which weak stimuli produce livelier responses than stronger stimuli have done. The reason for this is not far to seek: the stronger stimuli are now only increasing the "protective inhibition"; but the weaker ones still produce positive responses. Thus the dog refuses food accompanied by a strong stimulus, but accepts it if the stimulus is weak enough. This "paradoxical" phase can also occur in human behaviour where the emotional stress is heavy, as will be shown in a later chapter. On such occasions, the individual's normal behaviour has been reversed to a degree that seems quite irrational not only to a detached observer, but to the patient himself—unless either of them happens to have studied Pavlov's experiments on dogs.

In the third stage of "protective" inhibition, which Pavlov called the "ultra-paradoxical", positive conditioned responses suddenly switch to negative ones; and negative ones to positive. The dog may then, for instance, attach itself to

a laboratory attendant whom it has previously disliked, and try to attack the master whom it has previously loved. Its behaviour, in fact, becomes exactly opposed to all its previous conditioning.

The possible relevance of these experiments to sudden religious and political conversion should be obvious even to the most sceptical: Pavlov has shown by repeated and repeatable experiment just how a dog, like a man, can be conditioned to hate what it previously loved, and love what it previously hated. Similarly, one set of behaviour patterns in man can be temporarily replaced by another that altogether contradicts it; not by persuasive indoctrination alone, but also by imposing intolerable strains on a normally functioning brain.

Pavlov also showed that when "transmarginal inhibition" began to supervene in a dog, a state of brain activity similar to that seen in human hysteria might result. This can cause an abnormal suggestibility to the influences of the environment. His case-histories frequently include reports on hypnoidal or hypnotic states in dogs. Clinical reports on the behaviour of human beings under hypnosis, as well as in various conditions of hysteria, abound in description of abnormalities corresponding with those noted in Pavlov's "equivalent", "paradoxical" and "ultra-paradoxical" phases of breakdown in dogs. In states of human fear and excitement the most wildly improbable suggestions can be accepted by apparently sensible people; as in August, 1914, a rumour that Russian soldiers were travelling through England "with snow still on their boots" swept the country, and was so circumstantial that for a while it affected German strategy; or as in the earlier stages of the Second World War, rumour

continually reported the English renegade William Joyce ("Lord Haw-Haw") as having mentioned in a broadcast that the church clock of a particular village—the name of which always varied with the telling—was three minutes slow.

Summary of Above Findings

1. Dogs, like human beings, respond to imposed stresses or conflict situations according to their different types of inherited temperament. The four basic types correspond with those described as humours by the ancient Greek physician Hippocrates.

2. A dog's reactions to normal stress depend not only on its inherited constitution, but also on environmental influences to which it has been exposed. These alter the details of its behaviour, but do not change the basic temperamental pattern.

3. Dogs, like human beings, break down when stresses or conflicts become too great for their nervous system to master.

4. At the point of breakdown, their behaviour begins to vary from that normally characteristic of their inherited temperamental type and previous conditioning.

5. The amount of stress or conflict that a dog can master without breaking down varies with its physical condition. A lowering of resistance can be brought about by such things as fatigue, fevers, drugs, and glandular changes.

6. When the nervous system has been stimulated "transmarginally" (that is to say, beyond its capacity to respond normally) for long periods, a dog's responses eventually be-

come inhibited, whatever its temperamental type may be. In the two less stable types, the "weak inhibitory" and the "strong excitatory", breakdown will also occur sooner than in the two stronger types, the "lively" and the "calm imperturbable".

7. This "transmarginal" inhibition is protective and results in altered behaviour. Three distinguishable phases of increasingly abnormal behaviour occur:

a. The so-called "equivalent" phase, in which the brain gives the same response to both strong and weak stimuli.
b. The so-called "paradoxical" phase, in which the brain responds more actively to weak stimuli than to strong.
c. The so-called "ultra-paradoxical" phase in which conditioned responses and behaviour patterns turn from positive to negative; or from negative to positive.

8. When stresses imposed on the nervous system of dogs result in "transmarginal protective inhibition", a state of brain activity can also occur resembling hysteria in man.

* * *

Pavlov learned a great deal by observing the effect on his dogs of accidental occurrences, as well as of planned experiments. A crucial occasion was the Leningrad flood in 1924. We have already reported how in the "equivalent", "paradoxical" and "ultra-paradoxical" phases conditioned reflexes can be disorganized and reversed. It was the Leningrad flood that gave him the clue as to how the brain might also be wiped almost clean, at least temporarily, of all the conditioned behaviour patterns recently implanted in it. Just

before his death, Pavlov told an American physiologist that the observations made on this occasion had also convinced him that every dog had its "breaking point"—provided that the appropriate stress was found and properly applied to its brain and nervous system.[16]

Pavlov had implanted a whole set of various conditioned behaviour patterns in a group of dogs—before these were one day accidentally trapped by flood water, which flowed in under the laboratory door and rose gradually until they were swimming around in terror with heads at the tops of their cages. At the last moment a laboratory attendant rushed in, pulled them down through the water, and out of their cage doors to safety. This terrifying experience made some of the dogs switch from a state of acute excitement to one of severe "transmarginal protective inhibition", as described earlier in this chapter. On re-testing them afterwards, it was found that the recently implanted conditioned reflexes had also now all disappeared. However, other dogs which had faced the same ordeal merely by registering increased excitement were not similarly affected and the implanted behaviour patterns had persisted.

Pavlov eagerly followed up the clue. In addition to the abnormalities induced, in the "equivalent", "paradoxical" and "ultra-paradoxical" phases by lesser degrees of "protective inhibition", lay a further degree of inhibitory activity on which he had accidentally stumbled, capable, it seemed, of disrupting for the time being all recently implanted conditioned reflexes. Most dogs which had reached this stage could later have their old conditioned behaviour patterns restored, but it might need months of patient work. Then Pavlov let a

trickle of water run in under the door of the laboratory. All the dogs, and especially those who had had their recent patterns abolished, were so sensitive to the sight that they could always be affected again by this means, although apparently normal again in other respects.[11] That some of the still sensitized dogs had resisted total breakdown did not shake Pavlov's conviction that appropriate stresses, properly applied, could have profound effects on all of them.

Application of these findings about dogs to the mechanics of many types of religious and political conversion in human beings suggests that for conversion to be effective, the subject may first have to have his emotions worked upon until he reaches an abnormal condition of anger, fear or exaltation. If this condition is maintained or intensified by one means or another, hysteria may supervene, whereupon the subject can become more open to suggestions which in normal circumstances he would have summarily rejected. Alternatively, the "equivalent" or the "paradoxical" and "ultra-paradoxical" phases may occur. Or a sudden complete inhibitory collapse may bring about a suppression of previously held beliefs. All these happenings could be of help in bringing about new beliefs and behaviour patterns. The same phenomena will be noted in many of the more successful modern psychiatric treatments, discovered independently of one another. All the different phases of brain activity, from an increased excitement to emotional exhaustion and collapse in a terminal stupor, can be induced either by psychological means; or by drugs, or by shock treatments, produced electrically; or by simply lowering the sugar content of the patient's blood with insulin

injections. And some of the best results in the psychiatric treatment of neuroses and psychoses occur from the inducing of states of "protective inhibition". This is often done by continuing artificially imposed stresses on the brain until a terminal stage of temporary emotional collapse and stupor is reached, after which, it seems that some of the new abnormal patterns may disperse, and the healthier ones can return or be implanted afresh in the brain.

* * *

So far, the results of acute strain and breakdown in the nervous system have been discussed, rather than its day-to-day functioning. Now, Pavlov believed that the higher centres of the canine and human brain were in a constant flux between excitation and inhibition. Just as one has to inhibit intellectual activity by sleeping perhaps for eight hours, in order to maintain it at adequate strength for the remaining sixteen of the twenty-four, so smaller areas of the brain cannot be kept functioning normally except by a frequent switching on and off. Pavlov wrote:

> If we could look through the skull into the brain of a consciously thinking person, and if the place of optimal excitability were luminous, then we should see playing over the cerebral surface a bright spot with fantastic, waving borders, constantly fluctuating in size and form, and surrounded by a darkness, more or less deep, covering the rest of the hemispheres.[4]

Pavlov was here speaking only figuratively. Things are not so simple as that, and recent research suggests that the picture seen would be far more complex, but he was em-

phasizing that when one area of the brain is in a state of excitation, other areas can become inhibited as a result. It is impossible to concentrate consciously and deliberately on two different lines of thought at the same time. Attention switches quickly between one and the other, as often as required. Shakespeare wrote that no man "can hold a fire in his hand by thinking on the frosty Caucasus". Pavlov challenged this dictum by showing, as it were, that if one's nervous system can become sufficiently aroused by concentrated and ecstatic visions of the Caucasus, the pain stimuli of the burned hand may be inhibited. Sherrington, the great English physiologist, is said to have remarked that Pavlov's findings on this had helped to explain how the Christian martyrs could die happily at the stake.[11]

Pavlov was able to show that focal areas of inhibition in the brain—perhaps producing, for example, a temporary hysterical loss of memory, of eyesight, or the use of limbs in man—may be complemented by large areas of excitation in other parts of the brain. This provides a physiological basis for Freud's observations that repressed emotional memories often lead to a condition of chronic anxiety about apparently unconnected matters. The pathological condition may also disappear when the repressed memory is restored to consciousness, so that the local inhibition disappears and so does the complementary excitation elsewhere.

Pavlov noted that when one small cortical area in a dog's brain reached what he called "a state of pathological inertia and excitation" which became fixed, repeated "stereotypy" of certain movements would follow. He concluded that if this cerebral condition could affect movement, it might

also affect thought, stereotypically; and that a study of such small cortical areas in the brains of dogs might account for certain obsessions in human thinking. As a simple example: it might explain why many people are plagued by tunes persistently running in the head, and others by distressingly lascivious thoughts that neither prayer nor the exercise of will-power seem able to dispel—though they may suddenly disappear for no ascertainable reason.

In the last years of his life, Pavlov made another important observation about these areas of "pathological inertia and excitation": he found that these small areas were subject to the "equivalent", "paradoxical" and "ultra-paradoxical" phases of abnormal activity under stress which he had thought applicable only to much larger areas of the brain. This discovery caused him a pardonable exhilaration: it might well explain physiologically, for the first time, certain phenomena also observed in human beings when they begin to act abnormally. It is a well-known characteristic of mentally unhinged people to include others in their obsessions. Thus, if a man who has always been sensitive to criticism loses control of his senses, he is likely to complain that, wherever he goes, everyone slanders and talks against him. And women who have always been nervous of sexual attack will often be convinced by internal sensations that some known or unknown person has actually interfered with them. Pavlov thought, in fact, that what psychiatrists call the phenomenon of "projection" and "introjection"—when a persistent fear or desire is suddenly projected outwards or inwards into seeming actuality—might be given a physiological explanation in terms of local cerebral inhibition.

Pavlov found that some dogs of stable temperaments were more than usually prone to develop these "limited pathological points" in the cortex when at the point of breaking down under stress. New behaviour patterns resulted from them: it might be a compulsive and repetitive pawing at the experimental stand—such as also follows interference with glandular function or some form of physical debilitation. Once acquired by a dog of stable temperament, patterns of this sort are, he found, very difficult to eradicate. Which may help to explain why when human beings of strong character suddenly "find God", or take up vegetarianism, or become Marxists, they often tend to become confirmed fanatics with one-track minds: a small cortical point has, perhaps, reached a state of permanent pathological inertia.

Two years before his death Pavlov wrote prophetically:

> I am no clinician. I have been, and remain, a physiologist and, of course, at present so late in life would have neither the time nor the possibility to become one. . . . But I shall certainly not be erring now if I say that clinicians, neurologists and psychiatrists, in their respective domains, will inevitably have to reckon with the following fundamental patho-physiological fact: the complete isolation of functionally pathological (at the aetiological moment) points of the cortex, the pathological inertness of the excitatory process, and the ultra-paradoxical phase. [4]

He was right. Not only clinicians, neurologists and psychiatrist, but the ordinary people the world over have felt the impact of his simple type of mechanistic research—some of them to their cost. Further work may modify some of the conclusions: but he has provided simple and some-

times convincing physiological explanations of much that the Western world still tends to shroud in vaguer psychological theory.

It is admittedly unpleasant to think of animals being subjected to painful stress for the sake of scientific research. Even though Pavlov was no sadist and as interested in curing his dogs' nervous breakdowns as causing them, some of his experiments would hardly be tolerated in England today. But, as the work has been done carefully, and reported accurately, we should not let any legitimate feelings blind our eyes to its value in human psychiatry or to its possible significance in the political and religious fields.