PNU University

Psychology Texts

for M.A Students of Psychology

(Department of Psychology)

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بسم الله الرحمن الرحیم

پیشگفتار ناشر

کتاب‌های دانشگاه پیام نور حسب مورد و با توجه به شرایط مختلف یک درس در یک یا چند رشتهٔ دانشگاهی، به‌صورت کتاب درسی، متن آزمایشگاهی، فرادرسی، و کمک‌درسی چاپ می‌شوند.

کتاب درسی ثمرهٔ کوشش‌های علمی صاحب اثر است که براساس نیازهای درسی دانشجویان و سرفصل‌های مصوب تهیه و پس از داوری علمی، طراحی آموزشی، و ویرایش علمی در گروه‌های علمی و آموزشی، به چاپ می‌رسد. پس از چاپ ویرایش اول اثر، با نظرخواهی‌ها و داوری علمی مجدد و با دریافت نظرهای اصلاحی و متناسب با پیشرفت علوم و فناوری، صاحب اثر در کتاب تجدیدنظر می‌کند و ویرایش جدید کتاب با اعمال ویرایش زبانی و صوری جدید چاپ می‌شود.

متن آزمایشگاهی (م) راهنمایی است که دانشجویان با استفاده از آن و کمک استاد، کارهای عملی و آزمایشگاهی را انجام می‌دهند.

کتاب‌های فرادرسی (ف) و **کمک‌درسی** (ک) به منظور غنی‌تر کردن منابع درسی دانشگاهی تهیه و بر روی لوح فشرده تکثیر می‌شوند و یا در وبگاه دانشگاه قرارمی‌گیرند.

مدیریت تولید محتوا و تجهیزات آموزشی

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Preface

This book is designed to develop reading skills of psychology master students to expand their vocabularies as a step towards reading, understanding, and using other similar English textbooks. This Handbook is developed by its contributors as an overview of the thirteen credible books on psychology and the passages are selected from recent international psychology books. This book is divided into 6 chapters and each chapter reflects important familiar subjects on psychology fields for MA psychology students: **Chapter one** defines the nervous system and neuropschology. **Chapter two** reviews the clinical psychology issues. **Chapter three** is about mental health and treatment for child; child temperament, infant mental health, and psychodynamic. **Chapter four** describes mental health and aging and the way of coping with chronic or terminal illness. In **Chapter five** students will become familiar with cognition, motor cognition and illness of cognition. And finally **in chapter six** contemporary psychology will be described. Each chapter begins with an overview then it is devided to several subdivisions which are related to the topic of the chapter. The purpose of this book is to provide ample food for thought on English for psychology purpose. In addition, it attempts to provide some ideas for researchers and interested students to investigate about related subjects.

As this book is a self-instruction one and is prepared for distance education students, the answers to some questions are provided in Appendix I and students can check their own answers by referring to this part. In addition, the definitions of some key and general expressions of each chapter are provided in glossary part in appendix II.

In this part the author would like to appreciate the colleagues who gave him valuable criticism and suggestions: First of all, Dr. Belghis Rovshan for her helps in English and linguistic editorship of the texts. She was always ready to give him invaluable feedback; secondly, Dr. Kordestani for his guidance and generosity in academic editorship of the text, and finally Mrs. Monir Sadat Hosseini for her assistance in organizing, typewriting, and proofreading of the texts patiently. The author will appreciate critical remarks about the subjects in order to improve the quality of the book.

H. Kamar Zarin (Ph.D.), Tehran, 2011

Introduction

Reviewing history informs us that as long as human beings have had free time to contemplate matters beyond those of basic survival, they have been acutely interested in understanding the nature of their own behavior. Early writers from Greece, for example, were impressed by numerous redundancies among people of the same and different cultures, but they also noted specific abnormalities as well as systematic differences between groups and individuals. In trying to grasp the nature of these similarities, differences, and abnormalities, early personologists (such as Heraclitus, Socrates, Hippocrates, Aristotle and Galen) created theories that explained human behavior as a function of ethereal manipulation, social pressures, personal choices, and physical characteristics such as the quantity of fluids or “humors” in the body. In the late nineteenth and early twentieth centuries, scientific and technological advances helped psychologists develop complex explanations for behavior as stemming from a mixture of evolutionary, biological, social, and personal variables.

The hope of integrating ideas about the nature of human development, personality functioning, psychopathology, and treatment is pushing through. People from different disciplines and schools of thought are now working toward a comprehensive, biopsychosocial understanding of normal and abnormal behavior that can encompass, or be compatible with the many perspectives that have shown promise in the past, including biological, psychodynamic, sociocultural, and interpersonal. However, just as contemporary personologists have moved away from theoretical, dualistic conceptions of human behavior, they no longer expect a single model of behavior to encompass the vast array of human features, both normal and abnormal. Psychological observers were aware of the similarities between different therapeutic modalities as early as the 1930s, but until proponents of various schools could boast empirical validation during the past several years, there did not seem to be enough common ground for practitioners to admit the obvious. Of course, integrating commonalities at a theoretical level is not as easy as noting conceptual similarities. In the following chapters some of these theories and observable behaviours related to the above issues will be identified.

CHAPTER I

Nervous System

Overview: System of specialized cells that conduct stimuli from a sensory receptor through a neurons network to the site (e.g., a gland or muscle) is named neuron. This chapter will describe neuron as the main part of Nervous System through two subdivisions. The first part deals with Nervous System and the second part concerns Neuropsychology. In addition, the following issues will be discussed in this chapter: Central Nervous System, Peripheral Nervous System, Neuroanatomy, Organization of Behavior, Localization and Lateralization of Language, Electrophysiological Confirmation of Localization, Information Conduction, Connections between Neurons as the Basis of Learning Psychometrics and Statistical Evaluation. At the end of this chapter, students are expected to answer the questions posed based on the passage. In addition, they should be able to explain what neuron and the brain structure is, and about what neuropsychology mainly discusses.

1.1. The Nervous System

Nervous system has traditionally been divided into two parts: The central nervous system (CNS, the brain and spinal cord) and the peripheral nervous system (PNS, all nerve tissue outside the CNS). The PNS can be further divided into the somatic nervous system and the autonomic nervous system.

The somatic nervous system serves as an informant between the body and the CNS, allowing the brain and spinal cord to communicate with the rest of the body via the cranial and spinal nerves. Afferent (incoming) sensory nerves convey external sensory information obtained by the sense organs to the CNS, whereas efferent (outgoing) motor nerves carry motor signals from the CNS to the body’s muscles and glands. Whereas the somatic nervous system provides feedback necessary for an individual to respond to the external environment, the autonomic nervous system is primarily concerned with the control of the body’s internal environment, specifically regulation of the internal organs such as smooth muscle, cardiac muscle, and glands. The autonomic nervous system comprises two anatomically separate systems: the sympathetic nervous system and the parasympathetic nervous system. These two systems exert opposite effects on the internal organs, as the body constantly strives to maintain a homeostatic balance.

The sympathetic division mobilizes energy for arousal by increasing blood flow to skeletal muscles and increasing heart rate and decreases nonessential activities such as gastric motility. The parasympathetic division, in contrast, works to conserve the body’s energy. It is primarily responsible for facilitating vegetative responses by the organs and assisting the body in maintaining a relaxed state. The sympathetic nervous system (SNS) is known as the “fight-or-flight” system, and its function is to mobilize the organism to fight for its life or flee from the enemy.

In terms of evolutionary significance, the SNS is very adaptive in life or- death emergencies and can mobilize us to great bursts of short-term strength and endurance. Everyone has heard of the example of a mother lifting a car off her child when the car was crushing the child. This is the work of the SNS. Most present-day stressors are typically more chronic and less immediately life threatening than the example given previously; yet, our SNS has not yet adapted to chronic lower level stressors of an industrialized society. Unfortunately, our SNS is 90 Biological Influences often working overtime, generating a fight-or-flight response to many non-life-threatening stressors.

Over time, the body's reaction to long-term activation by the SNS is a wearing down or a literal exhaustion of bodily functions. We believe this is the reason for the rise in stress-related disorders as diverse as essential hypertension, chronic pain, and malfunctions associated with the breakdown of the body's immune system, causing cancer and various autoimmune diseases. Psychopathological states are most assuredly influenced by the perception of stress, and the body's long-term reaction to stressors. This may be one reason why disorders with a clear physiological basis (e.g., heart disease) are so often co morbid with mental disorders, such as depression (Mallack & Imperator, 2004).

As mentioned, the CNS is composed of the brain and the spinal cord. The brain has multiple subdivisions, but is generally broadly divided into the forebrain, the midbrain, and the hindbrain. Both the brain and the spinal cord are the most protected organs in the body, providing evidence of their valuable role in life sustaining functions. The spinal cord is protected by the vertebral column, and the brain is encased in the tough, bony skull. Further protection is provided by the meanings (three layers of tough connective tissue), the ventricular system (a series of hollow, interconnected chambers filled with cerebrospinal fluid that cushions the brain from shock and sudden changes of pressure), and the blood brain barrier. Although the brain makes up less than 2 percent of the body, it uses 25 percent of the body’s oxygen supply and more than 70 percent of the body’s glucose supply. The brain receives its fuel supply of glucose and oxygen from the blood. Because the brain is unable to store glucose or oxygen, blood vessels must continually supply nutrients to the brain.

Without immediate and continuous access to glucose and oxygen, the delicate neuron rapidly dies. This is precisely the process by which brain damage occurs following a stroke (also known as a CerebroVascular Accident, or CVA). A blockage in one or more of the cerebral arteries may prevent the flow of oxygen and glucose to a particular brain region, thus killing the tissue. Alternatively, a rupture in a blood vessel within the brain can occur, which disrupts the transmission of oxygen and glucose, as well as contaminating the fragile neural tissue with blood. Depending on the location of the CVA, an individual experiencing a stroke can experience a variety of cognitive, behavioral, or emotional squeal (Brown, Baird, & Shatz, 1986).

Neurodevelopment in recent years has been mounting evidence of a link between neurodevelopment alterations and the occurrence of specific psychiatric syndromes. Neurodevelopment abnormalities can occur based on genetic heritability of a predisposition to a mental disorder. Although there is strong genetic evidence for many psychiatric disorders, heritability estimates are certainly not 100 percent, and often less than 50 percent. Thus, genetic inheritance is only part of the story, and highlights the ongoing dynamic interplay between genetic, biological, environmental, cognitive, and psychosocial factors. An understanding of the development of the nervous system can help to make sense of its adult configuration. It can also provide an appreciation for the processes involved in normal development and how abnormal development can lead to susceptibility toward psychological disorders later in life.

Historically, the prenatal period of neural development was thought to be of little relevance to the occurrence of psychological disorders later in life. However, recent research indicates that what happens during the early stages of neural development may give us clues about the etiology of certain psychological processes. For example, Hirschfield-Becker et al. (2004) found that prenatal stressors such as pregnancy and delivery complications increased a child's risk for anxiety disorders beyond that accounted for by parental psychopathology alone. Similarly, Allen, Levisohn, and Seeley (1998) reported a relationship between the number of negative prenatal and prenatal factors and risk for later psychopathology, and Wilcox and Nasrallah (1987) found prenatal distress to be a risk factor for chronic no paranoid schizophrenia, independent of the genetic risk for the disorder.

Obviously, the effect of gross trauma on neural development is easily understood, as illustrated by the occurrence of hydrocephalus during infancy. Hydrocephalus occurs when there is an excessive accumulation of cerebrospinal fluid (CSF) in the brain secondary to a structural brain abnormality. The overabundance of CSF causes the ventricles of the brain to expand, thereby compressing the brain tissue. If not immediately corrected, hydrocephalus can have a devastating impact on the developing brain, and can lead to significant cognitive deficits (Willis, 1993). The effect of more subtle interruptions in the timing or occurrence of developmental processes is less well understood and more difficult to research. To continue with the example of schizophrenia, recall that in individuals with schizophrenia there is evidence of an initial shortage of dopamine and subsequent dopamine receptor up-regulation (Kestrel et al., 2001; Soars & Innis, 1999). It appears that during neural development the frontal cortex of people who may be predisposed to schizophrenia does not develop properly (a phenomenon called hypofrontality). As a result, the Nervous System 91 neuronal tract going from the underdeveloped frontal cortex and traveling to an area near the limbic system, called the nucleus acumens, is also stunted. The ultimate effect at the level of the nucleus acumens is a lowered supply of dopamine. Because the brain has the ability to change structurally as well as functionally, it makes more dopamine receptors at the level of the nucleus acumens in an effort to compensate for the shortage.

The apparent neurodevelopment defect in the frontal lobe triggers the manufacture of additional dopamine receptors in the nucleus acumens, which does not become a problem until the individual with a predisposition toward schizophrenia experiences emotional stress. At that point, a surge of dopamine release activates the available (and overabundant) dopamine receptors, causing the positive symptoms of schizophrenia. Thus, subtle neurodevelopment alterations in the emergence of cortical circuitry can play a large role in the later development of psychiatric syndromes, such as schizophrenia. Although such developmental abnormalities can certainly predispose someone to developing a psychiatric syndrome, it will likely take the interaction of this biological predisposition with a certain set of environmental influences to actually trigger the onset of the disorder.

Neuroanatomy: The brain is the most amazing organ in the body. It is in essence of what defines us as unique human beings. Through its capacity to engage in higher cortical thought, such as complex decision-making, the human brain distinguishes us from other animals. The human brain is also the fundamental core of our distinct individual characteristics, such as personality traits and habits, and thus allows us to be uniquely different from one another. Therefore, when things go away in the development or functioning of the brain, various mental disorders can result. At birth, the human brain weighs approximately 350 grams and nearly triples in size to a weight of more than 1,000 grams within the first year of life. The fully developed adult brain weighs approximately 1,400 grams (or 3 pounds), and it is estimated that the adult human brain houses between 10 billion and 100 billion neurons. This organ, which can be held in one hand, is responsible for integrating complex information and coordinating the body's actions, enabling us to move, think, remember, communicate, plan, and create. It is remarkable that the brain is able to function in as complex and precise a way as it does, and may be no surprise that the mounting evidence implicating CNS involvement in psychopathology has become much more explicit and convincing.

The human brain is primarily composed of two types of tissue: gray matter and white matter. Gray matter consists of areas where cell bodies of neurons (which are gray in color) predominate. The individual structures of the brain are primarily composed of gray matter. White matter consists of areas rich in axons covered in myelin (which is white in color). Myelinated axons connect cell bodies to one another and thus provide a means for the individual gray matter structures of the brain to communicate through white matter tracts or fiber pathways. When white matter is destroyed, as in the demyelinating disorder of multiple sclerosis, communication between individual structures of the brain is slowed or blocked. If the process of myelination is interrupted at some point in development, this could also cause faulty communication in the brain, and thus affect behavior. For example, disrupted myelination during neurodevelopment could result in slowed speed of response, reduced attention, and generally impaired information processing capacity, all of which have been implicated in various disorders, such as intellectual disabilities and developmental delays (Van der Knapp, Valk, Bakker, Schoonfeld, & Faberm, 1991).

As mentioned, the human brain is generally divided into three major divisions: the hindbrain, the midbrain, and the forebrain. The hindbrain consists of two major divisions: the met encephalon and the myelencephalon. The cerebellum and the pons are the two structures that make up the met encephalon. The cerebellum is primarily responsible for coordinating motor movements, and the pons serves to relay information from the rest of the brain to the cerebellum. The myelencephalon contains the medulla oblongata, which plays a major role in sustaining life functions such as respiration, blood pressure, and heart rate. The midbrain (also referred to as theme encephalon) consists of two structures, the tegmentum, both of which play a large role in integrating sensory and motor information.

The forebrain is the largest area of the brain and is further divided into the diencephalons and the epencephalon. The diencephalons contain two important structures, the thalamus and the hypothalamus. The thalamus is a gray matter structure that is connected extensively with most other parts of the CNS through an intricate series of white matter tracts or nuclei. These tracts allow the thalamus to serve as a central relay station for the brain. The hypothalamus controls the autonomic nervous system and the endocrine system, controlling behaviors that are central to survival, such as the “fight-or-flight” system, eating, drinking, and mating. The telencephalon is the area of the brain that is primarily responsible for the cognitive and behavioral functions unique to humans, and it is the area of the brain that is most implicated in the pathogenesis of certain psychological disorders. Thus, the remainder of the discussion in this section will focus on this area of the brain.

The telencephalon consists of the 92 Biological Influences cerebral cortex (also called neocortex or cerebrum), the basal ganglia, and the limbic system. The basal ganglia are a collection of gray-matter structures, including the caudate nucleus, the putamen, the globus pallidus, and the substantial Ingra.

1.2. Neuropsychology

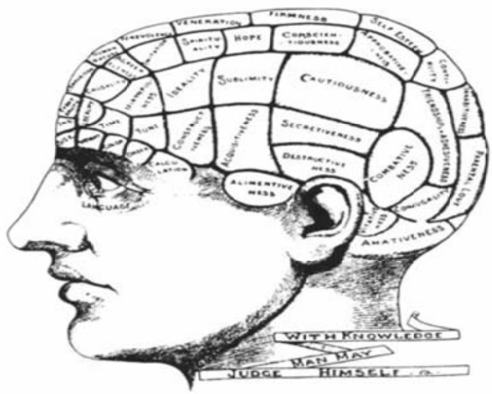
In Sophocles' (496–406 B.C.) play *Oedipus the King*, Oedipus finds his way blocked by the Sphinx, who threatens to kill him unless he can answer this riddle: "What walks on four legs in the morning, two legs at noon, and three legs in the evening?" Oedipus replies, "A human," and is allowed to pass, because a person crawls as an infant, walks as an adult, and uses a cane when old. The Sphinx's riddle is the riddle of human nature, and as time passes Oedipus comes to understand that it has a deeper meaning: "What is a human?" The deeper question in the riddle confounds Oedipus and remains unanswered to this day. The object of this section is to pursue the answer in the place where it should be logically found: the brain. The term neuropsychology in its English version originated quite recently, in part because it represented a new approach to studying the brain. First one used by Canadian physician William Osler in his early-twentieth-century textbook, which was a standard medical reference of the time. It later appeared as a subtitle to Canadian psychologist Donald O. Hebb's 1949 treatise on brain function. The Organization of Behavior: A Neuropsychological Theory. Although Hebb neither defined nor used the word in the text itself, he probably intended it to represent a multidisciplinary focus of scientists who believed that an understanding of human brain function was central to understanding human behavior. By 1957, the term had become a recognized designation for a subfield of the neurosciences.

Heinrich Kluver, an American investigator into the neural basis of vision, wrote in the preface to his Behavior Mechanism in Monkeys that the book would be of interest to neuropsychologists and others (Kluver had not used the term in the 1933 preface to the same book). In 1960, it appeared in the title of a widely read collection of writings by American psychologist Karl S. Lashley—The Neuropsychology of Lashley—most of which described rat and monkey studies directed toward understanding memory, perception, and motor behavior. Again, neuropsychology was neither used nor defined in the text. To the extent that they did use the term, however, these writers, who specialized in the study of basic brain function in animals, were recognizing the emergence of a sub discipline of investigators who specialized in human research and would find the animal research relevant to understanding human brain function.

Today, we define neuropsychology as the study of the relation between human brain function and behavior. Although neuropsychology draws information from many disciplines—for example, anatomy, biology, biophysics, etiology, pharmacology, physiology, physiological psychology, and philosophy— its central focus is the development of a science of human behavior based on the function of the human brain. As such, it is distinct from neurology, which is the diagnosis of nervous system injury by physicians who are specialists in nervous system diseases, from neuroscience, which is the study of the molecular basis of nervous system function by scientists who mainly use nonhuman animals, and from psychology, which is the study of behavior more generally. Neuropsychology is strongly influenced by two traditional foci of experimental and theoretical investigations into brain function: the brain hypothesis, the idea that the brain is the source of behavior; and the neuron hypothesis, the idea that the unit of brain structure and function is the neuron. This chapter traces the development of these two ideas.

1.2.1. What Is the Brain?

Brain is an Old English word for the tissue that is found within the skull human. The brain has two relatively symmetrical halves called hemispheres, one on the left side of the body and one on the right. Just as your body is symmetrical, having two arms and two legs, so is the brain. If you make your right hand into a fist and hold it up with the thumb pointing toward the front, the fist can represent the position of the brain's left hemisphere within the skull. Taken as a whole, the basic plan of the brain is that of a tube filled with fluid, called cerebrospinal fluid (CSF). Parts of the covering of the tube have bulged outward and folded, forming the more complicated looking surface structures that initially catch the eye.



The most conspicuous outer feature of the brain consists of a crinkled tissue that has expanded from the front of the tube to such an extent that it folds over and covers much of the rest of the brain. This outer layer is known as the cerebral cortex (usually referred to as just the cortex). The word cortex, which means "bark" in Latin, is aptly chosen because both the cortex's folded appearance resembles the bark of a tree and because its tissue covers most of the rest of the brain, just as bark covers a tree. The folds of the cortex are called gyri, and the creases between them are called sulci (gyrus is Greek for "circle" and sulcus is Greek for "trench"). Some large sulci are called fissures, such as the longitudinal fissure that divides the two hemispheres and the lateral fissure that divides each hemisphere into halves (in our fist analogy, the lateral fissure is the crease separating the thumb from the other fingers). The cortex of each hemisphere is divided into four lobes, named after the skull bones beneath which they lie. The temporal lobe is located at approximately the same place as the thumb on your upraised fist. The lobe lying immediately above the temporal lobe is called the frontal lobe because it is located at the front of the brain. The parietal lobe is located behind the frontal lobe, and the occipital lobe constitutes the area at the back of each hemisphere. The cerebral cortex comprises most of the forebrain, so named because it develops from the front part of the tube that makes up the embryo's primitive brain. The remaining "tube" underlying the cortex is referred to as the brainstem.

The brainstem is in turn connected to the spinal cord, which descends the back in the vertebral column. To visualize the relations between these parts of the brain, again imagine your upraised fist: the folded fingers represent the cortex, the hand represents the brainstem, and the arm represents the spinal cord. This three-part division of the brain is conceptually useful evolutionarily, anatomically, and functionally. Evolutionarily, animals with only spinal cords preceded those with brainstems, which preceded those with forebrains. Likewise, in prenatal development, the spinal cord forms before the brainstem, which forms before the forebrain.

Functionally, the forebrain mediates cognitive functions; the brainstem mediates regulatory functions such as eating, drinking, and moving and the spinal cord is responsible for sending commands to the muscles. Neuropsychologists commonly refer to functions of the forebrain as being higher functions because they include thinking, perception, and planning. The regulatory and movement-producing functions of the brainstem and spinal cord are thus sometimes referred to as lower-level functions.

Descartes: The Mind–Body Problem Simply knowing that the brain controls behavior is not enough; the formulation of a complete hypothesis of brain function requires knowing how the brain controls behavior. Modern thinking about this question began with René Descartes (1596–1650), a French anatomist and philosopher. Descartes replaced the Platonic concept of a tripartite soul with a single soul that he called the mind. Described as nonmaterial and without spatial extent, the mind, as Descartes saw it, was different from the body. The body operated on principles similar to those of a machine, but the mind decided what movements the machine should make. Descartes was impressed by machines made in his time, such as those of certain statues that were on display for public amusement in the water gardens of Paris. When a passerby stopped in front of one particular statue, for example, his or her weight would depress a lever under the sidewalk, causing the statue to move and spray water at the person's face. Descartes proposed that the body is like these machines. It is material and thus clearly has spatial extent, and it responds mechanically and reflexively to events that impinge upon to indicate that two things cause behavior. Descartes's dualism originated what came to be known as the mind–body problem: for Descartes, a person is capable of being conscious and rational only because of having a mind, but how can a nonmaterial mind produce movements in a material body?

To understand the problem, consider that, in order for the mind to affect the body, it would have to expend energy, adding new energy to the material world. The creation of new energy would violate a fundamental law of physics. Thus, dualists who argue that the two interact causally cannot explain how. Other dualists avoid this problem by reasoning either that the mind and body function in parallel without interacting or that the body can affect the mind but the mind cannot affect the body. These dualist positions allow for both a body and a mind by sidestepping the problem of violating the laws of physics. Other philosophers called monists avoid the mind–body problem by postulating that the mind and body are simply two words for the same thing and both are either material or nonmaterial. Most neuropsychologists are materialists and hold that the terms mind and brain are two different ways of describing the same object. Clearly, it would be difficult to be a neuropsychologist who is a nonmaterialist; because such a person would believe that, there are no physical things to study. In addition to being a dualist, Descartes ascribed functions to different parts of the brain. He located the site of action of the mind in the pineal body, a small structure in the brainstem. His choice of this structure was based on the logic that the pineal body is the only structure in the nervous system not composed of two bilaterally symmetrical halves and that it is located close to the ventricles. His idea was that the mind in the pineal body controlled valves that allowed cerebral spinal fluid to flow from the ventricles through nerves to muscles, filling them and making them move. For Descartes, the cortex was not functioning neural tissue but merely a covering for the pineal body.

People later argued against Descartes's hypothesis by pointing out that, when the pineal body was found to be damaged, there were no obvious changes in behavior. Today the pineal body is thought to take part in controlling seasonal rhythms. In proposing his dualistic theory of brain function, Descartes also proposed that animals did not have minds and so were only machinelike. The inhumane treatment of animals, children, and the mentally ill was justified because they did not have minds by some followers of Descartes. For them, an animal did not have a mind, a child developed a mind only when about 7 years of age and able to talk and reason, and the mentally ill had "lost their minds." Misunderstanding Descartes's position, some people still argue that the study of animals cannot be a source of useful insight into human neuropsychology. Descartes himself, however, was not so dogmatic. Although he proposed the idea that animals and humans are different with respect to having a mind, he also suggested that the idea could be tested experimentally. He proposed that the