
Nudging Toward Neuroethics: Prehistory and Foundations

2

Albert R. Jonsen

Abstract

As neurological science and its medical application in neurology and neurosurgery evolved during the twentieth century, ethical questions began to emerge about the relationship between mind and body. This chapter outlines how some of the earliest questions, although only slightly noted at the time, anticipated the appearance of a new discipline called neuroethics.

2.1 Introduction

The problem posed to any writer of history is where to begin the narrative. An additional problem posed by this assignment is how to write about “neuroethics,” a term and a topic of scholarly interest that appeared only very rarely before the 1990s. I have chosen a starting point and a series of events between the early 1930s and about 2002, the year in which a conference was held at which the word “neuroethics” was coined (Marcus 2002). This choice is somewhat arbitrary but not, I hope, unreasonable. My strategy to reduce arbitrariness is an immodest one: many of these events were ones in which I played a part, sometimes tangential and sometimes substantial. My tactic for writing about “neuroethics” before neuroethics existed accounts for my enigmatic, somewhat silly title, “nudging toward neuroethics.”

All the events I describe concern the field of human neurology as it unrolled during the twentieth century; the events I have chosen pose issues that, had there been a “neuroethics,” would likely have been topics for that field. Since the field did not

A.R. Jonsen
California Pacific Medical Center, San Francisco, CA, USA
e-mail: arjonsen@aol.com

exist formally, these issues, if they were discussed, were given passing notice or were noted as problems without solutions or as problems to be tolerated as the price of medical progress. One by one, these events “nudged” scholars toward formulating a field of academic discourse that merits the name “neuroethics.” This chapter is a “prehistory,” reporting how certain events and ideas converge toward a recognizable field of study.

I distinguish and comment on three such events: first, Mapping the Brain, that is, discerning segments of the cerebral cortex that correspond to mental and physical activities; second, the Silent Brain, as in the clinical implications of when no such activities can be discerned; and third, the Brain in Living Motion, i.e., scanning brain activity using advanced neuroimaging. A final short section, Neuroethics, steps up to the edge of the topics treated in the remaining chapters of this book.

2.2 Mapping the Brain

I met Wilder Penfield at the home of a friend in Montreal in 1965. I did not know that evening that I was meeting a world famous pioneer of neurosurgery. He and our host were both board members of the Vanier Institute, founded by Sir George Vanier, Governor General of Canada, to foster family values. Soon after, my host, a professor of medicine at McGill University, informed me of Dr. Penfield’s preeminence. My brief meeting with him provides my starting point for this chapter.

Penfield (1891–1976) was born an American and later became a Canadian citizen. After graduating from Princeton (1913), he won a Rhodes scholarship and then completed a medical degree at Johns Hopkins University (1918). During his studies, he was mentored by the leading neuroscientists of the era, Sir Charles Sherrington and Dr. Harvey Cushing. Penfield was invited to join the faculty of McGill University and Royal Victoria Hospital in Montreal, where he created the Montreal Neurological Institute in 1934 (Penfield 1977).

Penfield’s primary interest was the treatment of epilepsy: his work centered on finding those segments of the brain that seemed responsible for seizures and surgically excising them. He developed the unique procedure of removing sections of the skull under local anesthesia and probing the cerebral cortex with electrodes to find the offending tissue. Remarkably, he began to discern a wide range of sensorimotor responses to the stimulation. Since the patients were awake, they could report psychological phenomena such as recalled memories, hallucinations, and *déjà vu*. Based on these experimental findings, Penfield created extensive maps of the brain, designating the loci related to psychological and bodily function. Versions of his maps remain in use today (Penfield 1977).

Penfield deserves a place in the prehistory of neuroethics. His pioneering work in associating brain and behavior anticipates the properly ethical questions that will be raised decades later, namely, questions about whether the functions of the brain involved in motivation and intention, and in making prudential and moral decisions, can be directly discerned and controlled. Several authors have recently noted Dr. Penfield’s relevance for neuroethics (Fins 2008; Sedney and Bernstein 2014).

He had, says Joseph Fins, “a rich ethical sensitivity” (2008). That sensitivity was manifested in his consistent concern for the welfare of his patients. He was an active participant in the first of a series of academic conferences during the 1960s that explored the “great issues of conscience in modern medicine” (Fins 2008; Jonsen 1998). During what Penfield called his “second career,” he reflected on a most profound ethical problem—one that underlies every neuroethical problem today—the relationship between brain and mind. He realized that this was a problem that called for explicit engagement between philosophy and science (Penfield 1963, 1975).

2.2.1 Electroencephalography

Penfield was certainly aware of the technique called electroencephalography. It had been known since the mid-nineteenth century that the brain emitted electrical currents. Physical methods to trace these currents by placing electrodes on the skull were in use; finding the loci of epileptic seizures was one of the earliest applications. Penfield’s clinical explorations went beyond these by directly stimulating the tissue of the open brain. As I shall show in the section entitled *The Silent Brain*, electroencephalography would lead to major ethical problems, namely, the issues associated with therapeutic efforts to eliminate brain waves thought to be noxious and the implications of the finding that these brain waves are sometimes absent.

2.2.2 Electroconvulsive Therapy

Neurologists in the late nineteenth and early twentieth centuries believed that the electrical properties of the brain could be manipulated to treat psychiatric illness. Although application of external electrical current was occasionally attempted, drugs were more commonly used to induce seizures for depression, schizophrenia, mania, and other conditions. In the 1930s, technology made possible the application of strong electrical currents, and “electroconvulsive therapy” (ECT) became a widely used tool to treat intractable psychiatric disorders. It appeared to have considerable benefit and few side effects (one of these, amnesia, was considered a benefit, since patients could not remember the violence of the treatment). However, as ECT became more widely used, criticism arose.

The debate anticipated a broad ethical problem about informed consent to treatment. ECT was used without consent (indeed, many of the patients were incapable of consent). Also, its violent physical effects frightened psychiatric patients and could be used as “instruments of terror” to control difficult patients. This aspect of ECT was dramatized in Ken Kesey’s novel *One Flew Over the Cuckoo’s Nest* (1962) and the subsequent film (1975). (The menacing “Big Nurse Ratchet” was played by the charming actress Louise Fletcher, whom I met at the home of her brother, my bioethics colleague John Fletcher.) Many reports were produced by health organizations (e.g., American Psychiatric Association 1990), and many states passed legislation limiting its use. Today, ECT remains in use in restricted situations; in those

situations, its therapeutic benefits are acknowledged. (My close friend, Yale surgeon Sherwin Nuland, was cured of paralyzing depression by ECT as he reports in his TED talk ([2001](#)).)

2.3 The Silent Brain

The electrical activities of the brain “speak” to those who can read the fluctuations of voltage; what does the silence of those signals mean medically and philosophically? Two historical episodes respond to this question: the first involving a technique to “therapeutically” silence a part of the brain and the second, the implications of a “dead brain,” whose signals have “turned off” temporarily or permanently.

2.3.1 Frontal Lobotomy

In the mid-1900s, neurophysiology located major brain functions in distinct segments of the organ. It was hypothesized that treatment for certain dysfunctions might be provided by locating their source in the brain and, in some manner, surgically modifying them. This had, as Penfield demonstrated, been true of epilepsy. Occasional experiments in surgical modulation of brain tissue to treat psychiatric illness had been attempted with little success. Then, in the mid-1930s, a Portuguese neurologist, Egas Moniz (1874–1955), proposed that depression, anxiety, and other debilitating psychological conditions could be addressed by severing the frontal lobes of sufferers from the rest of the brain. This could be done by severing the fibers that connected the two which would leave the patient unharmed except in affect.

Moniz’s work (he directed but did not perform the surgery, since he was not a neurosurgeon) quickly caught on; it was replicated and modified around the world; it became known as “ice pick surgery,” since fibers were severed by inserting an instrument like an ice pick through the nose into the brain. However, scientific studies to demonstrate efficacy were sketchy and inadequate. The degree of impairment to affect was much more severe than anticipated; many patients (like Rosemary Kennedy, sister of President Kennedy ([Larson 2015](#))) who were “cured” remained for life in institutions.

Frontal lobotomy had fallen into disrepute by the 1960s; there was an unsuccessful movement to recall the Nobel Prize which had been awarded to Moniz in 1949. However, many other forms of brain surgery continued to attempt to treat psychiatric disease. In 1974, when the US Congress established the National Commission for the Protection of Human Subjects of Biomedical and Behavioral Research, one of its mandates was to examine the conditions, if any, under which those procedures could be supported with federal funds. This particular mandate arose from the concerns of African-American congressman Louis Stokes that persons of color were improperly subjected to such procedures.

The Commission did not find this to be the case, but did find that almost all psychosurgery lacked scientific merit; only one procedure, amygdalotomy, seemed useful for intractable obsessive-compulsive disorders. The Commission's report, *Psychosurgery* (1977), was informed by the work of a leading neurosurgeon, Elliot Valenstein, whose book *Brain Control: A Critical Examination of Brain Stimulation and Psychosurgery* (1974) had concluded that contemporary psychosurgery was nothing more than the discredited lobotomy of the previous decades.

I was a member of this National Commission. We commissioners considered our *Psychosurgery* report an almost total discrediting of the practice. However, for some, it was not total enough. The Commission presented its report at a meeting held in San Francisco. A local group of psychiatric patients entitled Network Against Psychiatric Assault (NAPA, an acronym based on the location of a large mental hospital in Napa, California) mounted a demonstration during the meeting and forced its adjournment. As a resident of San Francisco, I was advised to have a police watch at my home for the duration of the Commission meeting, which was moved to the safer confines of the federal building. The episode nudges toward neuroethics because it revealed how many of the issues in neuroscience involve psychiatric disease and that psychiatric disease raises profound questions about human freedom and constraint (National Commission for the Protection of Human Subjects of Biomedical and Behavioral Research 1977).

2.3.2 Persistent Coma: Henry Beecher and Pope Pius XII

I met Dr. Henry Beecher at a meeting of the Institute for Society, Ethics and the Life Sciences in, I believe, 1975. Unlike my meeting with Dr. Penfield several years before, I certainly knew who Dr. Beecher was; everyone working in bioethics knew who he was. In title, he was the Dorr Professor of Anesthesia at Harvard University School of Medicine. He was also a leading research scientist in his field, and when in 1966 he published a paper entitled "Ethics and clinical research" in the *New England Journal of Medicine* (Beecher 1966), he sent shockwaves through the world of medical science. He excoriated a score of prominent researchers for unethical research, primarily for conducting experimental procedures without the consent of the subjects, or for subjecting them to unjustifiable risks. Beecher became infamous among his colleagues and famous in the burgeoning field of bioethics. Dan Callahan, founder of the Institute for Society, Ethics and the Life Sciences, invited him to be a board member. Several years later, I was elected a fellow of the Institute; it was at my first meeting that I encountered Dr. Beecher.

The Institute for Society, Ethics and the Life Sciences (later renamed The Hastings Center) is a major mark in the history of bioethics. In "nudging toward neuroethics," it is helpful to explain what "bioethics" means. Dan Callahan, a newly minted Harvard Ph.D. in philosophy, hoped to stimulate critical examination of developments in biological and medical science. In 1969, he collected a small group of eager young scholars in a small office in Hastings on Hudson, New York, and convinced a larger group of famous scientists and philosophers to serve on an

advisory board. Henry Beecher was one of these. This nascent organization began to select issues such as genetics, death and dying, behavior control, and population control. Scholars from around the country were invited to participate in systematic analyses of the ethical problems entailed by scientific progress in these areas. The Institute's journal, *The Hastings Center Report*, began to appear in 1971.

Callahan explained what he meant by the neologism "bioethics" (a word coined but only vaguely defined by the biologist Van Rensselaer Potter (1970)). Callahan noted the widespread interest in moral issues raised by the biomedical sciences; these concerns had been voiced in general, diffuse terms at many conferences (Jonsen 1998). He then proposed that to become a discipline, bioethics must use the traditional modes of philosophical analysis—logic, consistency, careful use of terms, rational justification of argument—supplemented by sensitivity to feelings and emotions, as well as to the political and social influences on behavior (Callahan 1973). Bioethics should move from a random expression of concerns over advances in the life sciences to a structured analysis of its issues. In other words, bioethics should become a discipline. Neuroethics similarly will move in this direction, as other essays in this volume show.

We return to Henry Beecher's place in the prehistory of neuroethics; it has two acts. In the first, Dr. Beecher is listening to Pope Pius XII addressing a World Conference of Anesthesiologists in Rome in 1957 (Kopp 1997). A photo shows him standing next to the Pope who had been invited to cast light on a significant moral issue facing those specialists who directed care in the newly created intensive care units (Pope Pius XII 1959). Advances in respiratory support technology had not only brought great benefits, it had also produced a moral paradox: what was the moral course of action when a patient was highly unlikely to recover from deep coma, yet whose breathing was supported by a respirator? The Pope drew on traditional moral theology to answer this modern question: there was no moral obligation to sustain life by "extraordinary means," that is, means that impose great burdens on self or others without compensating benefit (Pope Pius XII 1958).

The Pope was asked a second question: has death already occurred after deep trauma of the brain, or did death occur only after complete arrest of circulation (the traditional criterion of death)? The Pope declined to answer, saying that this was not a question for moral theology but for medical science. To the dismay—or delight—of his audience, he invited them to invent a clear and precise definition of death. Apparently, Dr. Beecher was delighted, because several years later, he gathered an ad hoc committee of Harvard medical school faculty to do just what the Pope requested. This was the second act in his role as a precursor of neuroethics.

The product of the Harvard ad hoc committee, commonly called The Harvard Report, appeared in the *Journal of the American Medical Association* in 1968 (Harvard Ad Hoc Committee 1968). Considerable debate over the issue had marked the years since organ transplant—particularly heart transplant—had begun. The Harvard Report proposed to settle the debates with a papistic "clear and precise definition." However, it complicated rather than clarified. This was suggested in the very title "A definition of irreversible coma: report of the ad hoc committee of Harvard medical school to examine the definition of brain death." Was irreversible

coma equivalent to brain death? Was “brain death” equivalent to the death of the person? In fact, the Harvard Report did not offer any definition of death; it provided only operational criteria for recognizing a presumably irreversible coma.

The phrase in the title, “Brain death,” had come into use to designate a neurological fact, namely, the silence of brain waves detected by electroencephalography. The Harvard Report lists “a flat electroencephalogram ... as of great confirmatory value” in diagnosing irreversible coma and devotes a long paragraph to its clinical features. This technique, while certainly of “confirmatory value,” was of little clinical relevance, since electroencephalography detects a silent cortex but does not reach the lower brain stem, which is crucial in determination of death, as we note in the following section.

The Harvard Report quickly achieved standing as the accepted definition of death in law and in medical practice. But its failure to distinguish firmly between “brain death” and “irreversible coma” caused confusion in the widely publicized case of Karen Ann Quinlan (1975). Karen, a 21-year-old woman, was found in a coma due, apparently, to alcohol and drug ingestion; she was put on a respirator but failed to recover consciousness. After some months, her father requested that the ventilator be turned off and that Karen be allowed to die. The hospital and doctors refused; Mr. Quinlan sought relief from the New Jersey courts. This was granted by the Supreme Court of New Jersey. The judicial ruling reviewed in some detail the contemporary neurological science but in the end relied on precedent: a person has the right to reject medical care and Karen, herself incompetent to do so, could exercise refusal through her father/guardian. Karen’s respirator was turned off; however, remarkably, she began to breathe on her own, living another 10 years without any sign of recovery from coma (New Jersey Supreme Court 1975).

2.3.3 The President’s Commission: Defining Death

In 1980, the US Congress renewed the National Commission under a new title, The President’s Commission for the Study of Ethical Problems in Medicine. The first of its mandates was to “study the ethical and legal implications of the matter of defining death, including the advisability of developing a uniform definition of death” (1981). At this point, the Harvard Report, and a variety of conflicting state laws, had sown confusion. I was one of two bridge commissioners between the National and the President’s Commission. After extensive review and consultation, the Commission framed a draft statute called the Uniform Declaration of Death Act in its report, *Defining Death*: “an individual who has sustained either (1) irreversible cessation of circulatory and respiratory functions, or (2) irreversible cessation of all functions of the entire brain, including the brain stem, is dead” (1981). The Commission recommended that this proposed statute be legally enacted in all states; for all practical purposes, it was.

The words “including the brain stem” are an unusual bit of anatomy in a legal statute, yet they are vitally important. They represent the Commission’s election of a “whole brain” view of death. If the brain stem no longer functions, the controlling

centers for respiration are lost and the integration between all other bodily functions deteriorates. Death occurs then when either the signs of circulation/respiration are gone or when the signs of cerebral and brain stem function disappear: these clinical signs are two sides of the same reality, loss of physical integrity. An appendix, prepared by a group of leading neurologists, stated the clinical tests for determining whether the uniform definition was met: either way, the individual is dead (A Collaborative Study 1977).

This formulation resolves any standing questions about the eventual applicability of the Harvard formulation to Quinlan's case. Quinlan was in a form of "prolonged" or "persistent" coma," which can erase consciousness but leave vegetative function and should not be called death or irreversible coma (Jennett 2002). As the Quinlan court rightly concluded, Karen was not dead: she was a living person with a "silent brain"; the ethical question was whether to allow her to die. This question ignited the burning ethical debate of the next decade and the topic of another Commission report, *Deciding to Forego Life-Sustaining Treatment* (1983).

Behind the definition of death, then, lay the deep ethical question—perhaps the deepest of all ethical questions—what is a person? Should a being who can no longer process the information that allows for communication and collaboration between humans be considered a person, with dignity and rights? A flurry of philosophical opinion attended the Commission's report, but left this deep question, expressed in neurological terms as the "higher brain" formulation of death, open.

2.4 The Brain in Living Motion

Neuroscience is a rapidly evolving field of science in which anatomy, physiology, chemistry, genetics, neurology, psychology, and psychiatry unite to explore the structure and function of nerve cells, singly and woven into the cables and sheets that carry internal and external information throughout the organism. This field of science, in which physical structures and processes are so intertwined with psychological states, touches human experience at almost every point, from emotion to intellection, from sexual attraction to religious meditation, from personality to culture.

2.4.1 Brain Imaging

The rather silly nineteenth-century pseudoscience called phrenology "mapped" the parts of the brain where certain human behaviors were supposed to sit. Bumps on the skull over those brain areas supposedly revealed the skull owner's personality. Antique shops still display plaster busts with sections marked on the skull: combativeness, amiability, amorousness, mirthfulness, etc. The idea that a single spot in the brain performed a single function persisted until it was possible to visualize dynamic activity. Then it became obvious that, although certain large parts of the brain are

dominantly associated with certain sorts of activities, every sensation and action and thought sets off intricate connections across the organ.

These advances have been propelled by the techniques of brain imaging. The functioning human brain, encased in a bony citadel, has resisted invasion until recently. Although the occasional bold explorer, such as Wilder Penfield, probed the living brain during surgery, only since the development of imaging technology such as computerized axial tomography (CAT), positron emission tomography (PET), magnetic resonance imaging (MRI), and the more advanced functional MRI (fMRI) have investigators been able to see in intricate detail and vivid color the brain at work. This latter technique, introduced in 1990, is particularly useful; it captures changes in blood oxygen levels, a measure correlated with increased neuronal activity. Neuroscience can chart the intricate cellular changes that affect and reflect behavior. They can go further to pinpoint where and how thought, affection, and action arise and respond to environment and external stimuli.

As research subjects (some healthy, some with neurological conditions) recline in PET and MRI scanners, they perform various simple tasks. For example, subjects may be directed to move a particular finger. When they do, those parts of the brain that recognize the words of the command and those that govern physical movement are activated. When subjects are invited to move fingers at will, quite different parts of the brain, those presumably having to do with choice, jump into sight. These technologies have made possible extensive mapping of the enormously complex geography of the human brain, revealing brain activity associated with sensation, movement, memory, emotion, choice, and thought. “Mapping” may not be the right metaphor, since these studies reveal a constantly moving flow of energy that represents information. They show not a static geography of the brain but a field of vital tissue that resculpts itself as it responds to experience. It is more like a movie than a map.

2.4.2 Phineas Gage and Brain Damage

A story frequently cited in neuroscience literature provides a striking example of the way in which physical brain and psychic life are associated. In 1861, a derelict man, Phineas Gage, died in San Francisco. Thirteen years before, Gage had been the victim of a freak accident. While supervising railroad construction, an accidental explosion blasted an iron bar into his left cheek, through the front of his brain and out the top of his skull. Gage lived, his physical capacities intact and his cognitive facilities unimpaired with one gaping exception: he became incapable of making moral and prudential decisions. Neuroscientist Antonio Damasio and his wife Hanna, a neuroanatomist, obtained Gage’s skull and precisely mapped the path of the bar; it ripped through the ventromedial region of his frontal lobe.

Damasio opens his book, *Descartes’ Error: Emotion, Reason and the Human Brain*, with Gage’s history. He writes,

Gage had once known all he needed to know about making choices conducive to his betterment. He had a sense of personal and social responsibility ... He was well adapted in terms of social convention and appears to have been ethical in his dealings. After the accident, he no longer showed respect for social convention; ethics ... were violated, the decisions he made did not take into account his best interest ... there was no evidence of concern about his future, no sign of forethought ... Intriguing as these questions are, they may not be as important as those which surround Gage's status as a human being. May he be described as having free will? Did he have a sense of right and wrong or was he the victim of his new brain design, such that his decisions were imposed upon him and inevitable. Was he responsible for his acts? ... Gage had lost something uniquely human: the ability to plan his future as a social being (Damasio 1994).

After the accident, Gage became irresponsible, disorganized, reckless, although still manifesting intelligence and comprehension. He could not generate the power to move from understanding a moral situation to making a moral choice. It was clear that by ripping through the ventromedial region of his frontal lobes, the bar had not only destroyed tissue but an essential feature of his personality, his moral consciousness, the ability to guide himself through the complex world of right and wrong.

After describing Gage's lesion and subsequent behavior (as well as several of his own patients with similar conditions), Damasio makes a remark that can serve as a theme for neuroethics: "the fact that acting according to an ethical principle requires the participation of simple circuitry in the brain core does not cheapen the ethical principle. The edifice of ethics does not collapse, morality is not threatened and in a normal individual the will remains the will" (1994). This is a bold affirmation. What are we to say about that elemental concept of ethics, free will, in the light of the neurosciences? What do the profound claims, made by philosophers and theologians and humanists about human dignity, and the assumptions of lawyers and judges about culpability and responsibility, mean in the light of comparative and evolutionary neuroscience? How should the ethicist look at daily problems of affirmation or dereliction of moral duty in the light of neuroscience?

2.5 Neuroethics

With the sciences of brain scanning opening up the moral questions of brain behavior, the leaders of the Dana Foundation of New York decided to host a conference exploring these issues. The conference was held in San Francisco in May 2002. The University of California San Francisco was a cosponsor; I was invited to serve as cochairman. Prominent neuroscientists and philosophers (including Antonio and Hanna Damasio) were invited to present papers that would "nudge" the question from somewhat ill-defined moral issues into more precisely formulated ethical arguments that might deserve the name "neuroethics."

The other co-chair was the chairman of the Dana Foundation's Board, journalist William Safire. Known for his popular newspaper column about words, Safire opened the San Francisco conference with the comment, "We need a new word to

identify this field. I suggest ‘neuroethics’.” He ventured a definition: “neuroethics is an explanation of what is right or wrong, good or bad about the treatment of, perfection of, or unwelcome invasion of and worrisome manipulation of the human brain” (Safire 2002). Safire was not an ethicist, and his definition calls for ethicists to provide cogent arguments around his broad invocation of “right and wrong,” “good or bad,” “unwelcome,” and “worrisome.”

Several years before the Dana Conference, another journalist produced an excellent layperson’s guide to this emerging field. Rita Carter wrote in the introduction of her book, *Mapping the Mind* “The personal, social and political implications of (brain mapping) are awesome, and one of the most serious ethical questions we will face in the new century is deciding how this powerful new tool should be deployed” (Carter and Frith 1998).

2.5.1 Whither Now?

Carter asks a speculative question about the awesome future. But the awesome turns “worrisome” or “unwelcome” in Safire’s terms, when someone actually does something that changes the world in which we live (e.g., Einstein’s equations informing the atomic bomb). On the very day that I finished writing this chapter, *The New York Times* (Taylow 2016) reported that a Chinese surgeon was planning to perform a “full-body transplant.” A paraplegic patient is waiting; he would be decapitated and have his head attached to a different healthy decapitated body. The article was filled with quotations from ethicists in the United States and in China. If the stupendous technical obstacles can be overcome, should it be done? One Chinese commentator said, “ethically, it’s impossible.” Rita Carter’s “new century” is here and so is neuroethics, as the subsequent chapters of the volume will show.

References

- A Collaborative Study (1977) An appraisal of the criteria of cerebral death. A summary statement. *JAMA* 237(10):982–986
- American Psychiatric Association (1990) The practice of ECT: recommendations for treatment, training and privileging. *Convuls Ther* 6(2):85–120
- Beecher H (1966) Ethics and clinical research. *N Engl J Med* 274:1354–1360
- Callahan D (1973) Bioethics as a discipline. *Hastings Cent Stud* 1(1):66–73
- Carter R, Frith CD (1998) *Mapping the mind*. University of California Press, Berkeley
- Damasio AR (1994) *Descartes’ error: emotion, reason, and the human brain*. Putnam Publishing, New York
- Fins JJ (2008) A leg to stand on: Sir William Osler and Wilder Penfield’s “neuroethics”. *Am J Bioeth* 8(1):37–46.
- Harvard Ad Hoc Committee (1968) A definition of irreversible coma. Report of the Ad Hoc Committee of the Harvard Medical School to examine the definition of brain death. *JAMA* 205(6):337–340
- Jennett B (2002) *The vegetative state: medical facts, ethical and legal dilemmas*. Cambridge University Press, Cambridge

- Jonsen AR (1998) *The birth of bioethics*. Oxford University Press, New York
- Kesey K (1962) *One flew over the Cuckoo's nest*. Penguin, New York
- Kopp V (1997) Henry Knowles Beecher and the redefinition of death. *Bull Anesth Hist* 15:6–8
- Larson KC (2015) *Rosemary: the hidden Kennedy daughter*. Houghton Mifflin Harcourt, Boston
- Marcus SJ (ed) (2002) *Neuroethics: mapping the field*. Dana Foundation Press, New York
- National Commission for the Protection of Human Subjects of Biomedical and Behavioral Research (1977) *Psychosurgery*. US Government Printing Office, Washington
- New Jersey Supreme Court (1975) *In the matter of Karen Quinlan: the complete legal briefs, courts proceedings, and decision in the superior court of New Jersey*. University Publications of America, Arlington
- Nuland S (2001) How electroshock therapy changed me. TED. http://www.ted.com/talks/sherwin_nuland_on_electroshock_therapy?language=en. Accessed 28 Jul 2016
- Penfield W (1963) *The second career: with other essays and addresses*. Little, Brown and Company, New York
- Penfield W (1975) *The mystery of the mind*. Princeton University Press, Princeton
- Penfield W (1977) *No man alone: a neurosurgeon's life*. Little, Brown and Company, New York
- Pope Pius XII (1958) The prolongation of life: an address of Pope Pius XII to an international congress of anesthesiologists. *The Pope Speaks* 4:393–398
- Pope Pius XII (1959) In: Angelini F (ed) *Discorsi ai Medici*. Orizzante, Rome
- Potter VR (1970) Bioethics, the science of survival. *Perspect Biol Med* 14(1):127–153
- President's Commission for the Study of Ethical Problems in Medicine and Biomedical and Behavioral Research (1981) *Defining death: a report on the medical, legal and ethical issues in the determination of death*. US Government Printing Office, Washington
- President's Commission for the Study of Ethical Problems in Medicine and Biomedical and Behavioral Research (1983) *Deciding to forego life-sustaining treatment: a report on the ethical, medical and legal issues in treatment decisions*. US Government Printing Office, Washington
- Safire W (2002) Visions for a new field of neuroethics. In: Marcus SJ (ed) *Neuroethics: mapping the field*. Dana Foundation Press, New York
- Sedney CL, Bernstein M (2014) Wilder Penfield—bioethicist. *Can J Neurol Sci* 41(2):177–181
- Taylor D (2016) Doctor's plans for full-body transplant raises anxiety even in daring China. *New York Times*
- Valenstein ES (1974) *Brain control: a critical examination of brain stimulation and psychosurgery*. Wiley, New York

Debates About Neuroethics

Perspectives on Its Development, Focus, and Future

Racine, E.; Aspler, J. (Eds.)

2017, XIII, 263 p., Hardcover

ISBN: 978-3-319-54650-6