

The Historical Origins of the Vegetative State: Received Wisdom and the Utility of the Text

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Abstract:

The persistent vegetative state (PVS) is one of the most iconic and misunderstood phrases in clinical neuroscience. Coined as a diagnostic category by Scottish neurosurgeon Bryan Jennett and American neurologist Fred Plum in 1972, the phrase “vegetative” first appeared in Aristotle’s treatise *On the Soul*. Aristotle influenced neuroscientists of the 19th and early 20th centuries, Xavier Bichat and Walter Timme, and informed their conceptions of the vegetative nervous system. Plum credits Bichat and Timme in his use of the phrase, thus putting the ancient and modern in dialogue. In addition to exploring Aristotle’s definition of the “vegetative” in the original Greek, we put Aristotle in conversation with his contemporaries—Plato and the Hippocratics—to better apprehend theories of mind and consciousness in antiquity. Utilizing the emerging discipline of *reception studies* in classics scholarship, we demonstrate the importance of etymology and historical origin when considering modern medical nosology.

Key words: persistent vegetative state (PVS), traumatic brain injury (TBI), minimally conscious state (MCS), antiquity, Aristotle, Plato, Hippocrates, reception studies

The name for the syndrome should not imply more than is known – Bryan Jennett and Fred Plum, 1972

Since its inception as a diagnostic category in 1972, the persistent vegetative state has become one of the most iconic phrases in medicine, bioethics, and the law. In their seminal 1972 paper in the *Lancet*, Jennett and Plum described the vegetative state as a “syndrome without a name.” In this paper, we tell the story behind that name, perhaps one of the most important in modern medicine, tracing an etymological lineage back to Aristotle.

Jennett and Plum characterized the persistent vegetative state as a state of wakeful unresponsiveness where the sleep-wake cycle and autonomic functions remain intact, but awareness of self, others, the external environment and ultimately one’s personhood, is lost (Jennett and Plum, 1972, see Fig. 1). This definition was timely, antedating the landmark right-to-die case of Karen Ann Quinlan in 1976, in which Plum served as a court-appointed expert witness. His testimony led to a decision to allow the withdrawal of life-sustaining therapy, helping to establish the right-to-die in American jurisprudence and clinical practice.

Since *Quinlan*, the vegetative state has figured prominently in national debates at the intersection of law and medicine, such as *Cruzan v Director Missouri Department of Health* heard before the United States Supreme Court in 1990 and the controversy over the fate of Terri Schiavo in 2005.

Given the centrality of the vegetative state to the evolution of jurisprudence and clinical practice, it is important to understand its etymological provenance. To this end, we will employ *reception studies*, a methodology in classical scholarship that critically examines the ways “Greek and Roman material has been transmitted, translated, excerpted, interpreted, re-written, re-imaged and represented” over time (Hardwick & Stray, 2011, p.1). In our invocation of reception studies, we would like to emphasize that ancient and modern notions of the vegetative state are *not interchangeable*. There is not a one-to-one correspondence, and we do not wish to equate Aristotle’s definition with the one employed in Jennett and Plum’s writings. Instead, we intend to highlight that there is an intellectual and etymological lineage that begins with the ancient conception in the original Greek and runs through the modern usage of the word.

The field of reception studies challenges us to view classical texts as being in a constant dialogue with modernity, which we believe is useful when we consider the historic influence of the vegetative state on medicine, bioethics and the law.

Starting with Jennett and Plum's use of the vegetative state, we will trace its appearance, and their intellectual debt, back to the writings of the French physician Xavier Bichat (1771-1802) and the American neurologist and endocrinologist Walter Timme (1874-1956), both of whom invoke Aristotle's treatise *De Anima* [On the Soul], a work published circa mid-fourth century B.C.E. Drawing upon the original Greek, we will offer a detailed etymological and linguistic analysis of Aristotle's "vegetative faculty" of the soul as depicted in *De Anima*, and conclude our analysis by contextualizing Aristotle's conception of mind and consciousness with his teacher, Plato and the contemporaneous Hippocratics.

Embracing an ancient lineage

In a rare autobiographical moment, Plum addressed the origins of the vegetative state in a 1998 paper. He observed:

How did the vegetative state get its name? Not as the reader might think. Patients' families sometimes challenge us, implying that we have regarded the sufferer as a vegetable. Not so! The conception of a vegetative nervous system goes a long way back (Plum, 1998, p. 1929).

He turns to the history of medicine and invokes Bichat and Timme, who were among the first modern physicians to characterize a "vegetative" nervous system. Bichat and Timme's vegetative nervous system was thought to be responsible for "autonomic adrenergic and cholinergic systems that regulated cardiovascular, respiratory and visceral organ systems" (Plum, 1998, p. 1930). Jennett and Plum appropriated, to use Plum's words, this "convenient term," from Bichat and Timme in their *Lancet* paper (Plum, 1998, p. 1930).

Before we discuss Bichat's and Timme's writings, it is important to explain how the vegetative conception from Aristotle to Bichat and Timme won out over similar and related constructs in the

neurological literature. Jennett himself, in his book entitled, *The Vegetative State: Medical Facts, Ethical, and Legal Dilemmas* (2002), explains how he and Plum chose the vegetative state as a name against other related diagnostic conceptions from French and German literature that had been previously employed to describe similar neurological states.

In Jennett's introductory chapter, "A syndrome in search of a name," he describes these diagnostic categories in order to highlight that they did not adequately represent the syndrome that he and Plum had concretely categorized in their 1972 *Lancet* paper. For example, Jennett mentions the German psychiatrist Kretschmer, who in 1940 coined the term, "the apallic syndrome," in order to characterize patients who were "awake but unresponsive" (Jennett, 2002, p. 1). Jennett notes that while European authors have used this term, it did not have an enduring legacy in English speaking countries (Jennett, 2002, p. 1), though he does not elaborate why. Jennett also includes a definition of a state known as "coma vigile," a phrase found in the French literature from the late 1950s. However, "coma vigile" was most often used to refer to patients who had typhus or typhoid fever, thus limiting it to an infectious disease provenance. Moreover, Jennett comments that while this phrase "neatly described *one aspect* of the vegetative state," it failed to denote other important considerations that were integral the 1972 formulation (Jennett, 2002, p. 3, my italics). Unfortunately, Jennett does not more fully explain the conceptual limitations of "coma vigile."

From this review, Jennett concludes that these antecedent descriptors were not the proper appellation for the syndrome without a name, and he and Plum argued for the need for more precise diagnostic nomenclature. The persistent vegetative state, as outlined in the 1972 paper, was born of this thinking. It would eventually, as Jennett notes in his 2002 volume, become "preferable to all previous names" (Jennett, 2002, p. 3). He cites as evidence the phrase's appearance in the 1993 report of the American Neurological Association and the 1994 statement of the Multi-Society Task Force (American Neurological Association Committee on Ethical Affairs, 1993; The Multi-Society Task Force on PVS, 1994).

Plum credits Bichat's manuscript *Recherches Physiologiques sur la vie et la Mort* [Physiological Researches Upon Life and Death], published in 1800. This manuscript is the first medical text—in the modern sense of the word—that divides the nervous system into two parts: *vie de relation* [the animalic] and *vie de nutrition* [the vegetative] (Bichat, 1800/2015, p. 3; Plum et al., 1998, p. 1929-1930).

In this work, Bichat acknowledges that Aristotle influenced his conceptualization. He states, “those, however, who have read Aristotle, Buffon...and others who have written upon this subject, will see that those authors have furnished me with some hints” (Bichat, 1800/2015, p. ix). In a section entitled “The General Division of Life,” Bichat describes the two parts of the vegetative nervous system in a manner that is analogous to Aristotle's famous divisions of the soul's faculties. Bichat notes that the vegetative, or organic, part of the nervous system “exists only within itself, having no other relation to what surrounds it...the vegetable is the rough sketch, the *canvas* of the animal” (Bichat, 1800/2015, p. 2).

When Bichat describes the differences of the two nervous systems with respect to the major organ systems with which they are associated, he calls the organs of the vegetative life “irregular” in comparison to the animalic life, which contains organs that are perfectly symmetric (Bichat, 1800/2015, p. 9 and p. 13). The organ systems that comprise the vegetative life are the digestive, circulatory, respiratory, and exhalation/absorption systems (Bichat, 1800/2015, p. 9). Although Bichat does not explicitly mention the brain or nervous system in relation to his schema, higher-order thinking and interacting with one's environment lies entirely *outside* of what would be considered vegetative.

In contrast, the animalic life, in addition to having an “*internal life*” also possesses an “*external life*” which establishes numerous relations between it and surrounding objects, that its existence is entwined with that of every other being...” (Bichat, 1800/2015, p. 2) The animalic, which stood in direct opposition to the vegetative, “linked the person to his/her environment and was expressed by the muscles of voluntary locomotion and the organs of external senses” (Plum, 1998, p. 1930).

Importantly, Bichat's animalic life is the nervous system turned outward; it is responsible for acts that are “either purely intellectual and relative only to understanding” (Bichat, 1800/2015, p. 42). Bichat's strict division of the two different “lives”—one that exists internally and involuntarily and another that

exists externally and purposefully—parallels Aristotle’s vegetative (τὸ θρεπτικὸν) versus sensing (τὸ αἰσθητικόν) faculties of the soul, as we will see in the next section.

Plum also invokes Timme, author of a volume entitled, “The vegetative nervous system; an investigation of the most recent answers,” published in the *Ninth Annual Proceedings of the Association of Nervous and Mental Disease* (1928). While Timme’s historical retrospect on the vegetative nervous system neglects to mention Aristotle explicitly, he describes Bichat’s vegetative “life” as a foundational concept that influenced the more research-based theories on the vegetative nervous system developed since the publication of Bichat’s manuscript in 1800 (Timme et al., 1928, p. 3). These newer theories set forth in the late 1880s and early 1900s used more rigorous science to further substantiate the idea that the vegetative nervous system was responsible for autonomic responses that could not be consciously modulated (Timme et al., 1928, p. 3-11).

In Plum’s 1998 article, he states that the history of the phrase “goes a long way back” (Plum, 1998, p. 1929). However, in this particular instance, Plum does not go far back enough. While both Bichat and Timme find inspiration in Aristotle, Plum does not explicitly mention the ancient philosopher in his 1998 article, although his debt can be inferred by his citation of his two predecessors. Commenting on the exchange of ideas between Bichat and Timme, Plum observes, “taken in total, the results [of Timme et al.’s 1928 volume] were described within Bichat’s concept of the vegetative nervous system” (Plum, 1998, p. 1930). We agree, since Bichat invokes Aristotle in his preface, and Timme heavily cites Bichat, all three authors must be put in conversation in order to better understand the continuities or iterations of the concept of the “vegetative” since antiquity.

Thus framed, let us now turn towards Aristotle’s *De Anima*, the text that birthed the notion of what it means to exist as a “vegetative” being.

The vegetative faculty in Aristotle’s De Anima

De Anima is Aristotle’s key treatise that identifies the parts and functions of the Greek notion of the soul, or *psyche* [ψυχή]. There, he introduces the concept of the “vegetative faculty,” a description

found in Book II, sections 414a 29-415a 13. Employing his background in animal physiology and taxonomy, Aristotle explores the ways in which the soul, or *psyche*, is “responsible for a variety of things living creatures (especially humans) do and experience” (Lorenz, Stanford Encyclopedia of Philosophy, “Ancient Theories of the Soul”). Aristotle’s strictly defined parts of the soul allow him to characterize and differentiate between plants, animals, and humans.

The first faculty of Aristotle’s soul is the nutritive, or vegetative faculty [τὸ θρεπτικὸν]. This word comes from the Greek verb τρέφω, which means to grow, nourish, reproduce, or support. Thus, etymologically speaking, Aristotle’s vegetative faculty of the soul is embedded in notions of simplicity; it can be construed as a foundational, even autonomic, faculty rather than a sophisticated one. Aristotle’s model system for describing the nutritive faculty is the vegetable plant, perhaps because plant systems best represent linear growth and basic physiological function; they lack the defining behavioral complexities associated with animals. Aristotle definitively states that plants possess *only* the nutritive faculty, whereas animals and/or humans have the nutritive faculty in addition to the other three—sensation [τὸ αἰσθητικόν], movement in space [κινητικὸν κατὰ τόπον], and thought [διανοητικόν] (Aristotle, *De Anima*, 414a 34-414b 2). The nutritive faculty is the least sophisticated faculty of the soul; it is introduced first in the ascending hierarchy of the faculties and is thought to be entirely separate from the sensation/perception faculty [τὸ αἰσθητικόν]. Aristotle emphasizes this boundary, and states that, “the vegetative faculty [τὸ θρεπτικὸν] can lie outside of the sense of touch [τῆς ἀφῆς] and [outside of] *all* sensation [πάσης αἰσθήσεως]” (Aristotle, *De Anima*, 413b 6-7, translation my own). However, in order to have any of the other faculties, one must first possess that of the nutritive; the faculty of sensation cannot exist independent from that of the nutritive.

From a neuroscientific point of view, the nutritive faculty is analogous to the brain stem—it is the autonomic precursor, or required ticket, to higher-level cortical processing. Aristotle is strict in his categorical thinking: the two faculties are non-overlapping, and if one being possesses only the nutritive, it can *in no way* experience the activities associated with the sensing faculty. Later in Book II, Aristotle

repeats a similar iteration, and states that, in plants specifically, “the nutritive faculty is *divorced from* the sensitive faculty” (Aristotle, *De Anima*, 415a 3).

He goes on to outline the faculty of sensation [τὸ αἰσθητικόν], and emphasizes how it differs from what the vegetative faculty has the power to impart. The sensing faculty [τὸ αἰσθητικόν] comes from the verb αἰσθάνομαι, which means to perceive by the mind, understand, learn, or most simply, feel. If a being possesses the sensing faculty, Aristotle states that they are able to feel pleasure [ἡδονή] and pain [λύπη], distinguish between these dichotomous sensations, and thus, achieve the feeling of intentionality (Aristotle, *De Anima*, 414b 5-7).

Aristotle’s breakdown of the soul’s separate faculties is intuitive given his methodology. As one of the Western world’s first taxonomists, Aristotle possesses a pervasive need to bin, categorize, and rank the functions that distinguish plants from animals, animals from humans, and species from species. Aristotle operates in a world of biological binaries—he is averse to describing forms of life or states of being as existing on a continuum. In the sections describing the faculties of the soul in *De Anima*, he does not offer any exceptions to his stringent rules, and the often limiting ‘if...then’ approach of argument construction is the governing logic that bolsters many of his claims.¹ Thus, when Aristotle declares that those who possess only the vegetative faculty of the soul cannot perceive the world around them, the essentializing potential of this formulation becomes clear. It is both an interesting and necessary exercise to reexamine Aristotle’s original formulation in order to illuminate why the diagnostic criteria for the “vegetative state” have become prone to misconstrual in modern clinical practice. If to possess the vegetative faculty is to entirely lack the *sensing* part of the “soul,” it is easy to see how one may extrapolate the wrongful conclusion that all patients who are in vegetative states cannot progress beyond that state, i.e., transition to a minimally conscious state (MCS). Once patients who were previously in a vegetative state move into a minimally conscious state, they are then able to intermittently interact with

¹ Aristotle conceptualizes the faculties of the soul as a strict hierarchy; one faculty informs the presence of the next. He writes, “the earlier type [of faculty] always exists potentially in that which follows” (Aristotle, *De Anima*, 414b 30-31).

their environment, thus breaching Aristotle's fixed barriers, and in a modern context able to engage with others. This potential for relationality with recovery further violates the fixity of the Aristotelean taxonomy.

The problematic aspect of Aristotle's definition is not that some patients in a vegetative state can ever perceive their surroundings, but that there is an evolutionary or temporal aspect to this idea of progression that a categorical "bin" would seem to preclude. Until the vegetative state has been deemed permanent, a patient has the potentiality of movement to a higher state of consciousness (The Multi-Society Task Force on PVS, 1994; Fins, 2008; Fins, 2015). In Aristotle's hierarchical delineations of the parts of the soul, he chooses to emphasize cut-off points rather than notions of transitivity, perhaps leading to perceptions of brain injury that favor prognostic nihilism and clinical narrow-mindedness. That is the exact misconstrual, further exacerbated by the medical community's confusion of the *permanent* vegetative state with that of the *persistent* vegetative state. The originators of the persistent vegetative state emphasize the importance of accurate word choice. Jennett and Plum, in their original description of the criteria for the PVS, write:

Certainly we are concerned to identify an irrecoverable state, although the criteria needed to establish that prediction reliably have still to be confirmed. Until then "persistent" is safer than "*permanent*" or "irreversible"; but *prolonged* is not strong enough, and unless it is quantified it is meaningless (Jennett & Plum, 1972, p. 735).

As this quote illustrates, Jennett and Plum were nuanced in their use of terminology. Despite Jennett and Plum's careful parsing, the medical community often confuses "persistent" with "permanent," thus disseminating an account of brain injury that is static and not subject to progression (Fins, 2015)².

Plato and Aristotle

In order to more fully contextualize Aristotle and his writings, we must explore his perspective on the brain alongside the viewpoints of his contemporaries: his teacher, Plato, (427-347 B.C.E.) and the

² See Fins (2015) for an extended discussion on the distinction between the persistent and permanent vegetative states.

Hippocratic physicians (c. 400 B.C.E.). Plato's *Timaeus*, a rather nontraditional dialogue that offers an explanation of the formation of the universe, includes sections on human biology and organ function. While Plato did not produce extensive writings on biology, his philosophical musings on the human body within the *Timaeus* clearly communicate how he understood the brain in relation to other organs. Unlike Aristotle whose methods were highly inductive, Plato engaged in deductive reasoning; his previous theoretical frameworks informed his new ideas, and not the other way around. Plato argued from first principles, and any new theory that he set forth was influenced by other theories that came before it; his realm was not Aristotle's granular reality but that of the Forms.

In the *Timaeus*, Plato uses the idea of a tripartite soul to help explain human behavior (Fig. 2). The tripartite soul also appears in Book 4 of Plato's *Republic*, however, it is most thoroughly explained in his *Timaeus*. The first part of Plato's soul concept is known as the "immortal" soul, or *logos* [λόγος]. Plato states that *logos* resides in the brain [ἐγκέφαλος] and is responsible for rational thinking and intelligence (Crivellato & Ribatti, 2007). There is a particular ineffability to the *logos* part of the soul—it is invisible and divinely omnipotent. Plato writes, "having taken the immortal origin of the soul, they [the gods] proceeded next to encase it [the *logos* part of the soul] within a round mortal body [i.e., the head], and give it the entire body as its vehicle" (Plato, *Timaeus*, 69c 5-7). The two other parts of the soul are deemed "perishable" rather than immortal: the *thymos* [θυμός], which is localized to the heart or chest and responsible for impassioned emotions, and the *epithymetikon* [ἐπιθυμητικόν], which is found near the diaphragm and controls the body's nourishment (Crivellato & Ribatti, 2007, p. 331).

Aristotle echoes Plato's description of the *epithymetikon* in his *De Anima*. Similarly to Plato, Aristotle labels the nutritive faculty of the soul as the most primal or autonomic; the need for food and the desire to reproduce must come before the ability to intellectualize. Yet, there is an important distinction between Plato and Aristotle's characterizations of this faculty of the soul. Plato writes, "it [the *epithymetikon*] is totally devoid of opinion, reasoning, or understanding, though it does share in sensation, pleasant and painful, desires" (Plato, *Timaeus*, 77b 6-8, my italics). Curiously, Plato gives more autonomy and power to the *epithymetikon* than does Aristotle. The vegetative part of Plato's tripartite soul

has sensing power—it is capable of interacting with the external environment. As stated above, Aristotle’s analog, the nutritive or vegetative faculty of the soul, *lacks* any ability to sense its surroundings in the way that other animals do (Fig. 2).

Furthermore, in comparing Plato’s theory to Aristotle’s, it seems that the different parts of the soul in Plato’s tripartite theory [*epithymetikon*, *thymos*, *logos*] are more subject to modulation and are less hierarchical. The famous chariot example in sections 246a-254e of Plato’s *Phaedrus* uses the chariot as a metaphor for the parts of the soul. He explains how the three parts of the soul can work in tandem or how one part may overpower the other two like “the natural union of a team of winged horses and their charioteer” (Plato, *Phaedrus*, 246 a6–7, as cited in Reeve).

The charioteer represents the *logos* part of the soul; it steers the other two horses, which are emblematic of the *epithymetikon* and *thymos* parts of the soul. To achieve balance in one’s life, reason [*logos*] must reign in the pulls of the other two parts of the soul—that of the appetitive [*epithymetikon*] and that of the spirited [*thymos*]. For example, in a particular context, the spirited may become more powerful and increasingly difficult to control. This imbalance could release rash or inappropriate emotions. The dynamic nature of these three parts of the soul allows us to interpret Plato’s theory as more situational and continuum-based than Aristotle’s.

In contrast, in Aristotle’s theory, the four functions of the soul have fixed definitions; a particular species cannot utilize one function more than any other in a given situation. Plato’s theory offers a greater sense of progression—a human can rely almost exclusively on the appetitive part of the soul in one context, but can be “steered” by the power of reason, and thus achieve balance, in another.

Aristotle’s “most egregious scientific error”

The most salient distinction between Plato and Aristotle lies in their differing views not of the soul but of the role of the brain and the heart. From the fifth century B.C.E. onwards, Greek philosophers and scientists were divided into two camps in regards to brain function: the *encephalographic* and the *cardiocentric* (Crivellato & Ribatti, 2007). Those who supported the encephalographic standpoint

proposed that the brain was the gateway to consciousness, sensation, and reasoning, whereas the cardiocentric perspective attributed these functions to the heart. While anatomical correlates cannot be directly equated with the location of the soul, these world views about the primacy of an encephalographic versus cardiocentric perspective lie at the heart of thought, emotion and experience, if not more transcendent notions about the soul.

As outlined in Table 1 of C.G. Gross' article *Aristotle on the Brain*, Aristotle believed the heart controlled sensation and movement for the following reasons: the heart was 1) "affected by emotion, 2) "an organ which all animals possessed," 3) "located in a central position," 4) "formed first and was the last to stop working," and 5) "connected with all the sense organs and muscles via the blood vessels" (Gross, 1995, p. 248). Curiously, in Aristotle's classification of the parts of animals, the brain did *not* present itself as the organ that was responsible for thought, sensation, and movement. Despite the already formulated encephalographic theories of brain function set forth by Plato and the Hippocratics, Aristotle was adamant in his conclusion, even calling the views of others "fallacious" (Aristotle, *Parts of Animals*, 656a,b, as cited in Gross, 1995, p. 247). So much for the categorizer...

Somewhat ironically, given Jennett and Plum's appropriations from *De Anima*, Aristotle was in the cardiocentric camp, whereas Plato espoused the belief that the brain controlled thought (the *logos* part of the soul) as well as possessed a "hierarchical primacy...over each other part of the body" (Crivellato & Ribatti, 2007, p. 330-331). As a proponent of inductive reasoning, it seems paradoxical that Aristotle adopted a cardiocentric viewpoint of neurological function. In his treatise *Parts of Animals*, Aristotle states that, "the brain is not responsible for any of the sensations at all. The correct view [is] that the seat and source of sensation is the region of the heart" (Aristotle, *Parts of Animals*, as cited in Gross, 1995, p. 247).

Considered his "most egregious scientific error," Aristotle mistakes the function of the brain for that of the heart (Gross, 1995, p. 245). Why did he stand in such stark opposition to Plato—his own teacher—and the Hippocratics? C.G. Gross proposes that the reason why Aristotle made this perplexing

error was because he was not a practicing physician, but an animal biologist; he did not conduct studies on “the brain-injured human,” and thus lacked “the clinical approach” (Gross, 1995, p. 248).

The Hippocratic use of empiricism

In contrast to Aristotle, the Hippocratic physicians (c. 400 B.C.E.) were of the encephalographic school, but even so it would be wrong to conflate the teachings of Hippocrates with those of Plato. While they both arrived at the same conclusion—that the brain was responsible for sensation, thought, and consciousness—their methods in arriving to that conclusion vastly differ. Plato and the Hippocratics were roughly contemporaneous and of the same encephalographic school of thought, yet their varying methodologies make it such that they cannot be conflated.

As we have seen, Plato employed deductive reasoning and first principles to construct his theory of the tripartite soul. He did not formulate theories based on empiricism. In contrast, the Hippocratics published a series of treatises, known today as the *Hippocratic Corpus*, which featured inductive writings on novel clinical disorders (e.g., diabetes, epilepsy, preeclampsia) as well as theories of health. The works within the Hippocratic Corpus were based almost exclusively on clinical encounters and dyadic observation—the Hippocratics understood disease as people experienced it. The Hippocratics were one of the first schools in medicine to denounce the claim that disease had a basis in the divine (Hippocrates, *The Sacred Disease*). The Hippocratic treatise *Epidemics* (c. fifth or fourth century B.C.E.) mainly features case histories that include patient narratives and theories of disease, which serve to interpret patients’ symptoms. The case histories, often used as teaching tools, are wide in scope, including patients from a variety of social classes and environments (Mattern, 2008). The Hippocratic physicians employed their unique form of inductive reasoning, using patient narratives of illness to inform biological theory and novel diagnostic frameworks.

Importantly, thorough examination of Aristotelian, Platonic, and Hippocratic views of the soul and brain reveals that a particular intellectual methodology (e.g., deductive versus inductive reasoning) does not necessarily guarantee accuracy and vice versa. Like the Hippocratics, Aristotle was also an

empiricist, but he arrived at an erroneous conclusion. Aristotle's subjects could not speak, and thus, his method of induction was inherently limited—there was no possibility of reportage or patient-physician exchange. The methodologies that contributed to each ancient theorist's view of the brain and consciousness are often overlooked, despite the fact that many of these frameworks have influenced Western medicine and neurology.

This type of interrogation highlights the processes by which ancient theories come to fruition, inform diagnostic frameworks, and retain a particular legacy in the scientific tradition. The way one arrives at a conclusion is in many ways just as, if not more, important than the conclusion that emerges through this process of inquiry.

Exploring the etymology of “consciousness”

In addition to refuting the idea that epilepsy was sacred in origin, the Hippocratic treatise *The Sacred Disease* speaks more broadly about brain function and introduces the idea of “consciousness,” or σύνεσις (Hippocrates, *The Sacred Disease*, trans. Jones). While we cannot be sure how the Hippocratics defined consciousness, there are many questions that arise when we explore the etymology of “consciousness” [σύνεσις], especially in discussions regarding patients who occupy liminal states of consciousness. In Greek, σύνεσις, defined as “comprehension, sagacity, or mother-wit,” comes from the verb συνήμι (συν = with, ἴμι = send forth, set in motion). The verb συνήμι can mean “to bring, set, or come together,” or “to perceive, hear or understand.” The second definition is the one employed in Jones' translation of the Hippocratic text. Looking back even further to the Homeric definition of συνήμι (c. 8th century B.C.E.), we find that the verb means “to hear, to hearken to, to give ear to” (Cunliffe, p. 370). The Homeric roots of the word suggest that perception or understanding may have been construed as coming from listening to or engaging with others. Were manifestations of consciousness understood as bidirectional, and perhaps, less focused on the notion of the individual?

While it is impossible for us to determine if the Hippocratics conceptualized consciousness in this manner (the Homeric epics predate Hippocratic writings by approximately three centuries), we can think

about how these etymological interpretations of consciousness [σύνεσις] may illuminate novel frameworks that could alter the way the medical community understands recovery in MCS patients. In the medical community, the act of “attaining” consciousness is rarely construed as a neurological milestone that requires integration with others or communal facilitation. It is perceived as something happening within and not through engagement without. Thus, it may be useful for us to invoke the metaphors that ancient notions of σύνεσις conjure up—that of integration and reciprocity—to emphasize that MCS patients demonstrate their consciousness through the proxy of communication.

This idea of relationality has been captured in the Academy Award winning film *Talk to Her* by Pedro Almodovar, which depicts two women with severe brain injury (Fins, 2009, 2015). The notion of being with the other is evident in the original Spanish title *Hable con Ella*—mistranslated into English as “Talk to Her” rather than “Talk *with* Her” (Fins, 2009, p. 143). The *con* preposition in Spanish means “with” and thus, “conveys reciprocity of communication and with that, community and the social context of the self” (Fins, 2007, p. 79). Interestingly, the Spanish *con* is etymologically linked to the Greek prefix συν (“with,” see συνίημι definition above) through the Latin prefix *cum*, which also means “with.” When these patients are isolated from others, or ignored by society, they are denied the opportunity to manifest higher levels of consciousness—and lose the potential to be reintegrated into their communities.

Though they are centuries apart, we can think of the Hippocratics and Almodovar as sharing similar views on consciousness, which hinge on how communication makes connection with others possible and thus, manifests consciousness. Identifying threads of continuity between ancient and modern alike through reception studies can be a speculative exercise, yet these comparisons allow us to interpret formulations of consciousness more creatively. While the Hippocratics may not have explicitly defined consciousness in this way, an exploration of the word’s etymology offers another way of viewing consciousness, suggesting that personhood is interactive, a point especially relevant to recovery after severe brain injury.³

³ Another parallel in reception studies between ancient and modern worlds lies in the analogy we can draw between Freud’s invocation of the Oedipal Complex and our interpretation of the Hippocratic

Ancient texts in modern neuroscience

In a recent interview, Albert R. Jonsen, author of *The Birth of Bioethics*, spoke to why he considers history to be so integral to the study of bioethics:

It seems to me intellectually quite impossible to formulate an argument without knowing where the various terms of the argument come from, under what circumstances they were evolved...And so I think to put almost any ethical question in any format that will make sense means that you know where the argument originated...Why did that argument appear? Where did it first appear?" (Translated from Fins & Gracia, 2015, p. 80-81).

In this excerpt, Jonsen invokes the ethos of reception studies, and demands that one must investigate the birth of a term, or the way it operated in its original formulation, before one can understand how this same term or idea functions in the present.

The analysis of Aristotelian, Platonic, Hippocratic, as well as more modern nineteenth and early 20th century understandings of the brain enables us to answer the questions Jonsen poses above: "Why did that argument appear? Where did it first appear?" We are the inheritors of this etymological and conceptual legacy, an inheritance we fail to apprehend at our own peril. To achieve understanding, Jonsen advocates for the scrutiny of the "circumstances" that facilitate an argument's construction. A discussion of an argument will only be thorough if one takes into account *how* that argument came to be—what forces led to its construction? What was the governing methodology? Could the argument's original formulation be influencing the way it is understood in the present? There are many ancient diagnostic and prognostic terms, often used to describe especially vulnerable patient populations, that seem to exist in a vacuum of modern medicine, unexamined by those who employ them on a daily basis.

formulation of consciousness [σύνεσις]. In his *Interpretation of Dreams*, Freud declares that he "attempted to interpret the deepest layer of impulses of the creative writer," or in other words, discovered what the poet (Sophocles, author of *Oedipus Tyrannus*) already knew (Freud, 1965, p. 283; Fins, 2015). Restoring functional communication in patients with disorders of consciousness is one of our ultimate scientific goals. To the Hippocratics, notions of relationality may have informed understandings of consciousness and perception. Similarly to Freud, we, as modern scientists, have interpreted, and are hoping to operationalize, what the ancient physician-scientists may have already known.

The exploration of the historical and etymological contexts of this diagnostic category is essential. Tracing the intellectual lineage of Aristotle's strict categories of the soul in *De Anima* allows us to develop a nuanced account of how brain injury has been conceptualized over the centuries. While physicians and researchers must advance diagnostic criteria as they learn more about disease, we advocate for the investigation of the *history* behind clinical phraseology: where did the diagnostic category known as "the vegetative state" come from? What did it originally mean to *be* vegetative, to possess a vegetative element of one's being? An examination of the "then"—the original usages of words and their cultural corollaries—reveals the ways in which these terms operate in our present. We do not suggest that clinicians dig deep into the etymological and historical roots of every disease, but instead hope to illustrate how classical research and reception studies may have relevance for those seeking a deeper understanding of the context of medical terminology.

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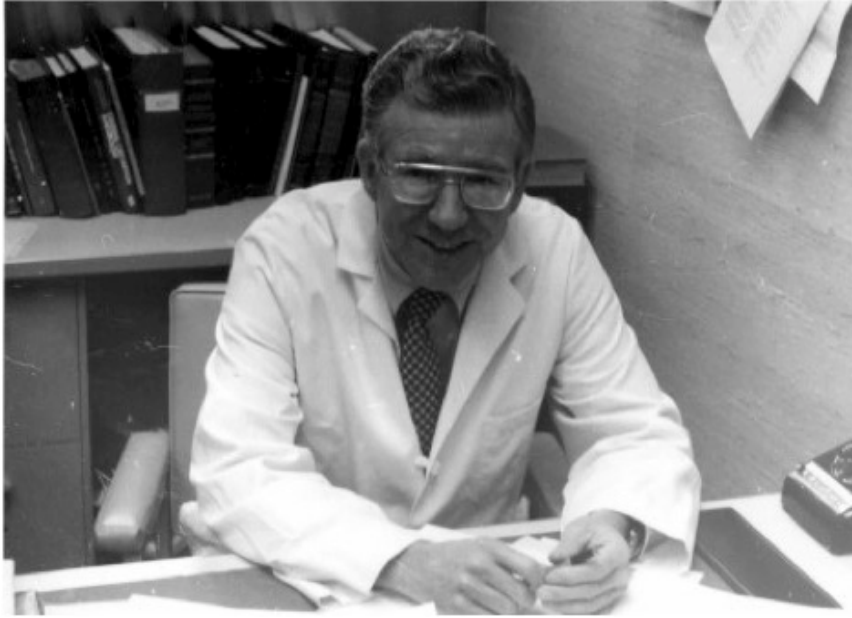
Figure Captions

Figure 1. Dr. Fred Plum and Dr. Bryan Jennett, who established the diagnostic criteria for the persistent vegetative state (PVS). Top: Fred Plum. Bottom: Bryan Jennett. Top photo: Taken c. 1976. Courtesy of the Weill Cornell Medical College Library. Bottom photo: See Watts (2008).

Figure 2. Table comparing Plato and Aristotle's divisions of the soul. Light green boxes represent the parts of the soul that are analogous in each theory. It is important to note that Plato's appetitive faculty (number 1, left) has the power of sensation, whereas Aristotle's vegetative faculty does not (number 1, right).

Note: Figure captions included after References section.

Figure 1.



Plato's Tripartite Theory of the Soul

1. Appetite (ἐπιθυμητικόν)
located near the diaphragm, controls the body's
appetite, yet has sensing power

2. Spirit (θυμοειδής)
located near the heart or chest, responsible for
intense emotions (e.g., courage, passion)

3. Reason (λογιστικόν)
located in the brain, responsible for rational
thought, intelligence

Aristotle's Faculties of the Soul

1. Nutritive (vegetative) (τὸ θρεπτικόν)
model system is the vegetable plant, responsible
for growth and nourishment, lacks sensing power

2. Sensing (τὸ αἰσθητικόν)
perceive surroundings, differentiate between
pleasure and pain

3. Movement in Space (κινητικὸν κατὰ τόπον)
specific to nonhuman animals and humans, the
ability to walk or fly

4. Thinking (διανοητικόν)
a power unique to humankind, responsible for
rational thought, intelligence