

# Something Old, Something New, Something Pseudo, Something True: Pejorative and Deferential References to Phrenology since 1840<sup>1</sup>

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## INTRODUCTION

The old phrenology, as we have seen, was wrong in its theory, wrong in its facts, wrong in its interpretation of mental processes, and never led to the slightest practical result. The new phrenology is scientific in its methods, in its observations, and in its analysis, and is convincing in its conclusions. And who can now set a limit to the benefit it has brought to mankind by its practical application to the saving of human lives?<sup>2</sup>

Since the mid-19th century, the term *new phrenology* has been used as both a tribute and affront to sciences of the brain, mind, or human personality. The inspiration for the expression, (*the old*) *phrenology*, is a cluster of scientific and popular movements that built on the work of Franz J. Gall (1758–1828) and his successors. In the 1790s, Gall, a Swabian physician, was practicing medicine in Vienna when he developed a system that he called *organology*, that is, knowledge of the organs (of the mind).

The organological system rested on four core assumptions. First, that the mind is anchored in the brain; second, that different brain regions are the substrate of specific mental faculties; third, that the size of these brain areas correlates with the strength of the respective mental faculties; and fourth, that the shape of the skull follows the form of the brain. These assumptions prompted Gall to palpate the heads of

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1 I am grateful for comments on an earlier version of this paper from the participants of the “Phrenology, Anthropometry, and Craniology: Historical and Global Perspectives” workshop at Clarkson University in August 2015. Adrianna Link and M. Susan Linde provided further helpful comments, as did four reviewers.

2 Starr, “Old and the New Phrenology,” 748.

hundreds of humans and non-human animals and infer their characters from their skulls' dents and protuberances. Gall and many of his contemporaries celebrated this comparative approach as the first science of the material underpinnings of the mind.<sup>3</sup>

Although Gall went on an extensive lecture tour through Europe, his student Johann G. Spurzheim (1776–1832) set out to popularize Gall's system even further.<sup>4</sup> With few alterations, he promoted and commercialized the doctrine under the name *phrenology*, that is, knowledge of the mind, in Europe and the United States.<sup>5</sup>

With every new iteration of phrenology, the doctrine lost anatomical rigor and acquired more missionary zeal. In Britain, phrenology found many supporters, mostly among relatively underprivileged individuals. The phrenologists soon founded societies and tailored their concepts to popular demand.<sup>6</sup> Most famously, Scottish lawyer George Combe (1788–1858) suggested phrenology-based reforms in education, criminal justice, and other realms of social life.<sup>7</sup>

Phrenology reached the United States later than the European countries. But when Spurzheim and Combe—independently of one another—visited the United States in the 1830s, Orson S. Fowler (1809–1887) and his family had already started to cash in on phrenology. Other popular advocates of phrenology in the United States

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3 On Gall's biography as well as organology in France and German-speaking countries, see Ackerknecht and Vallois, *Franz Joseph Gall*; Hall, "Gall's Phrenology"; Heintel, *Leben und Werk*; Heintel, *Spuren Franz Joseph Galls*; Lesky, *Franz Joseph Gall*; Oehler-Klein, *Die Schädellehre*; Renneville, *Langage des crânes*; Staum, *Labeling People*; Temkin, "Gall and the Phrenological Movement"; van Wyhe, "Authority of Human Nature"; van Wyhe, *Phrenology and the Origins*, 13–19; Wegner, *Franz Joseph Gall*; and Young, *Mind, Brain and Adaptation*, 9–53.

4 On Spurzheim, his falling out with Gall, and his popularization of phrenology, see Bilal et al., "Johann Gaspar Spurzheim"; Tomlinson, *Head Masters*, 77–96; van Wyhe, *Phrenology and the Origins*, 23–51; and Whitaker and Jarema, "Split between Gall and Spurzheim."

5 On the origins of the word *phrenology*, see Noel and Carlson, "Origins of the Word 'Phrenology.'" For accounts of the global history of phrenology, see Bank, "Of 'Native Skulls'"; Poskett, "Phrenology, Correspondence"; Thearle, "Rise and Fall of Phrenology"; and Wagner, "Confessions of a Skull."

6 For an overview of phrenologists and anti-phrenologists in Britain, see Cantor, "Edinburgh Phrenology Debate"; Cooter, *Cultural Meaning of Popular Science*, 22–35, 42–98, 134–198; de Giustino, *Conquest of Mind*; Lyons, *Species, Serpents, Spirits, and Skulls*, 51–86; McLaren, "Phrenology: Medium and Message"; Shapin, "Homo Phrenologicus"; Shapin, "Phrenological Knowledge"; Shapin, "Politics of Observation"; and van Wyhe, *Phrenology and the Origins*, 56–95. For a history of phrenology in Ireland, see Leaney, "Phrenology in Nineteenth-Century Ireland." For a (slightly dated) bibliography on phrenology in Britain, see Cooter, *Phrenology in the British Isles*.

7 On Combe and his followers, see Cooter, *Cultural Meaning of Popular Science*, 101–133, 224–255; Erickson, "Phrenology and Physical Anthropology"; Lucie, "Sinner and the Phrenologist"; and van Wyhe, *Phrenology and the Origins*, 52–56, 96–164.

included physician Charles Caldwell (1772–1853), physician Samuel G. Howe (1801–1876), and politician Horace Mann (1796–1859). Particularly the latter two used phrenological doctrines as a scientific foundation for their reformist ideas in education, health care, and the penal system. According to educationist Stephen Tomlinson, however, phrenological concepts did not have liberating effects on the local society and politics. To the contrary, the “principles [of Combe’s practical physiology] funded a classist, racist, and sexist political agenda” in the mid- to late 19th-century United States.<sup>8</sup>

This paper sheds light on the different strategies that authors have employed to promote, disapprove of, attack, or challenge scientists, their work, and their knowledge by using the designation *new phrenology* between 1840 and 2017. Some of these authors were scientists who applied the term to their own research. Another group were scientists and science critics who labeled their competitors’ work—past or present—a *new phrenology*. A third group consisted of humanities scholars or social scientists who used the term *new phrenology* to describe historical developments within the mind and brain sciences.

Considering this wide range of uses and users of the term, this paper asks: When and how have brain and mind scientists employed the designation *new phrenology* in histories of their fields to promote or discard related endeavors? When did the term *new phrenology* take on predominantly positive or negative meanings? What understanding of “good” or “bad” science did authors communicate by labeling a field a *new phrenology*? And what can phrenology-related praises and assaults teach us about the importance of the history of science for contemporary neuroscientists?

Drawing on sociologist Thomas F. Gieryn’s terminology, I argue that the designation *new phrenology* was (and remains to be) a flexible instrument for “boundary-work” from within and outside the mind and brain sciences.<sup>9</sup> Authors have used the label *new phrenology* to position various disciplines, subfields, methods, or individuals inside or outside the borders of “good science.” The intentions with which authors have used the term *new phrenology* shed light on their understanding of what constituted “bad” or “good” science, and their idea of when the historical shift from the former to the latter occurred. By distinguishing between a good *new* and a bad *old phrenology*, some authors have implied a turning point in the history of science. Before

8 Tomlinson, *Head Masters*, xv. For more detail on phrenology in the United States, see Bakan, “Influence of Phrenology”; Bittel, “Woman, Know Thyself”; Branson, “Phrenology and the Science of Race”; Colbert, *Measure of Perfection*; Cooter, *Phrenology in Europe and America*; Davies, *Phrenology, Fad and Science*; and Stern, *Heads and Headlines*.

9 Gieryn, *Cultural Boundaries of Science*.

this imagined moment, inquiries into the brain and mind were allegedly unscientific, and they presumably became scientific afterward.

The second section of the main part of this paper, “The Localization Debate, ca. 1870–1920,” illustrates most clearly the function of *new phrenology* usage as boundary-work. During the decades of the demise of phrenology around 1900, the term was mostly employed in the context of the controversy surrounding the localization of cerebral functions. Anatomists, physiologists, and neurologists in Europe and the United States disagreed about the extent to which distinct functions could be localized in the brain. I will show that there was no clear ideological distinction between the localizationists and the anti-localizationists. Instead, both sides employed the label *new phrenology* to mark the boundaries between their groups. Some localizationists proclaimed that their research complemented traditional phrenology with therapeutic applications, while their opponents mocked them for having barely advanced beyond Gall’s doctrines.

The analysis of the localization debate through references to *new phrenology* reiterates sociologist Susan Leigh Star’s argument that the history of brain localization was entangled with complex social disputes.<sup>10</sup> My account, however, goes beyond Star’s work in exploring the conceptual ambiguities in the debate in the United States, which lasted well into the 20th century. I posit that the opposition between diffusionism and localizationism can be written as a transatlantic history.

Moreover, this paper demonstrates that a significant number of physicians and scientists respected organology and phrenology as authoritative sciences until well into the 20th century. This becomes obvious in instances where *new phrenology* carried a positive meaning and expressed pride in traditionalism. Numerous phrenologists claimed to pursue a (good) *new phrenology* in the Gallian tradition. By contrast, opponents of organology-phrenology emphasized the innovative nature of their allegedly very non-Gallian (good) *new phrenologies*.

Following a period of relatively few references to *new phrenology* in the mid-20th century, *phrenology* took on an almost exclusively derogatory meaning in the late 20th and early 21st centuries. On the one hand, scientists and historians have suggested that contemporary neuroscience owes a debt to Gall. Various scholars have agreed that Gall’s comparative organology gave rise to modern materialistic investigations of the mind.<sup>11</sup> On the other hand, when scholars employ the

10 Star, *Regions of the Mind*, 97.

11 See, e.g., Brown and Chobor, “Phrenological Studies of Aphasia”; Clarke and Jacyna, *Nineteenth-Century Origins*; Critchley, “Neurology’s Debt to F. J. Gall”; Rawlings and Rossitch, “Franz Josef Gall”; and Simpson, “Phrenology and the Neurosciences.”

term *new phrenology* today, it is mostly with the intention of denigrating a neuroscientific subfield for having innovated only their methods but not their concepts. The designation also can imply that scientists have advanced underdetermined theories.

Furthermore, the analysis of recent references to *new phrenology* shows that the label has often appeared without any historical background or explanation for the use of the term. Current-day authors seem to find it obvious that the term *phrenology* indicates a pseudoscientific pursuit. This judgment is rather anachronistic, because of the aforementioned scientific appeal of organology-phrenology in the 19th century. Still, the label *new phrenology* has become one of the worst publishable insults for scholars working in the sciences of the mind and brain.

The following analysis draws on published monographs, journal articles, newspaper articles, transcribed lectures, and pamphlets from the United States, Britain, and continental Europe. The texts were identified by full-text searches in English, German, and French in several databases: Google Scholar returned the largest number of results; and Google Books, Medline, PsychNET, HathiTrust, Internet Archive, and Gallica provided fewer hits. The most successful search term was *new phrenology*, followed by *neue phrenologie* and *nouvelle phrénologie*.<sup>12</sup> Some results were also returned for *new organology*, *neo phrenology*, *neophrenologie*, and *neo phrenologie*.<sup>13</sup>

Only around 6 percent of the over 1,200 hits for *new phrenology* on Google Scholar date earlier than the 1980s.<sup>14</sup> In the late 20th century, computerized tools for structural and functional neuroimaging were introduced to the neurosciences with increasing momentum.<sup>15</sup> The overwhelming majority of references to *new phrenology* targeted

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12 It is remarkable that French search terms returned significantly fewer results than English keywords. One would expect a significant number of references to *new phrenology* in connection with French anatomist and anthropologist P. Paul Broca's (1824–1880) work on speech localization in late 19th-century France. Based on the research carried out for the present paper, it is unclear whether the small number of references to *phrenology* in digitized French sources reflects a significant difference in scientific rhetoric between French- and English-speaking authors, or if the discrepancy is only due to the English-language bias of contemporary databases and search engines.

13 Related search terms, which led to overlapping text corpora, are *modern phrenology*, *scientific phrenology*, *moderne phrenologie*, *phrénologie moderne*, and *phrénologie scientifique*. These designations did not provide much insight into the perceived differences between the “modern” and the “unmodern” or the “scientific” and the “unscientific” phrenology. Hence, I do not systematically trace their usage.

14 Data as of 21 November 2017.

15 The excess of recent references to *new phrenology* derives in part from the general increase in publications, and in part from the slow digitization of older sources as compared to more recent ones. In addition to that, the circumspection with which the term *new phrenology* is used seems to have diminished over the years; the label is now used excessively.

the allegedly flawed methodology of functional neuroimaging and originated mainly from the social sciences, humanities, or popular science literature. Due to the sheer amount of recent uses of the term *new phrenology*, my selection of post-1980 publications is exemplary. My treatment of sources from the 19th century and early 20th century is more exhaustive. I have omitted fictional publications and references to fields other than the brain and mind sciences.

#### THE MEANINGS OF *NEW PHRENOLOGY*

##### *Early Usage, ca. 1840–1920: Phrenology's Lasting Authority*

In this section, I trace the earliest instances of labeling a research field a *new phrenology*. For publications from the early 19th century, the keyword searches did not return historically oriented uses of the designation, that is, references that compare a *new* with an *old phrenology*. However, the term appeared in publications that introduce Gall's and/or Spurzheim's organological-phrenological systems. The novelty that merited the label *new phrenology*, as these sources suggested, was organology-phrenology itself. The idea that mental characteristics could be inferred from the brain and skull was unprecedented.<sup>16</sup>

Starting in the 1840s, references to *new phrenology* took on a judgmental tone. One of the first identified sources, published in 1842, resembled the pre-1840 sources in the sense that it called organology-phrenology itself a *new phrenology*. But the term transported something other than an aura of novelty. In a review of a philosophical work, English Reverend William H. Stowell (1800–1858) raged against the European organological-phrenological movements. He argued that *phrenology*, in the truest sense of the word, should encompass “mental philosophy,” whereas Gall's, Spurzheim's, and their followers' systems only provided materialistic-reductionist knowledge about the skull and brain.<sup>17</sup> Over the course of the following decades, phrenologists were reproached many more times for their alleged attempts to reduce an immaterial soul to areas of the brain or, more accurately, bumps on the skull.

Another example of a negative connotation of *new phrenology* in the early 1840s was published in an analysis of phreno-magnetism (or phreno-mesmerism), a fusion of organological-phrenological doctrines and mesmerist practices.<sup>18</sup> The anonymous author bemoaned both the

16 See, e.g., “Craniology,” 160; and Forster, “Sketch of the New Anatomy,” 222.

17 Stowell, “*Philosophy of Necessity*,” 420–22, quote on page 420.

18 On phreno-magnetism, see Chapter 11 in Davies, *Phrenology, Fad and Science*; and Chapters 3 and 5 in de Giustino, *Conquest of Mind*. On the history of mesmerism more

continuously increasing number of brain faculties in popular phrenological practices and the allegedly unfortunate integration of mesmerism into phrenology. Such modifications to the original systems of Gall and Spurzheim, the author argued, were unnecessary and prone to flaws.<sup>19</sup>

Other early sources debated controversies and possible improvements within organology-phrenology.<sup>20</sup> In the mid-1840s, Combe, for example, defended his doctrine against theories published by English physiologist William B. Carpenter (1813–1885), German physiologist Carl G. Carus (1789–1869), and Scottish physician David Skae (1814–1873). In his publications, Combe declared that his competitors' principles were poor copies of Gall's system, an inferior "new phrenology." Although Combe's own concepts deviated substantially from the original Gallian system, Combe emphasized that none of his colleagues' modifications of Gall's original work had been proven and, thus, should be rejected.<sup>21</sup>

Combe's argument that empiric rigor and formal proof are necessary to prevent a theory's drift toward a questionable *new phrenology* was unprecedented in the reviewed literature. Nonetheless, all three examples from this decade share one feature: the author's belief that the identified new phrenology is not as good as a preferred traditional understanding of phrenology—be it philosophy of mind (according to Stowell) or Gall's and Spurzheim's original system (according to Combe and the anonymous author).

References to *new phrenology* from the 1850s and beyond often indicated that Gall's and Spurzheim's systems were inadequate. Some authors believed that the *old* and the *new phrenology*, that is, Gall's organological doctrine and the subsequent phrenological systems, were equally wrong.<sup>22</sup> Others, however, praised modifications to the organological-phrenological system.<sup>23</sup> Several publications called alleged purifications or potential extensions of Gall's system "new phrenolog[ies]."<sup>24</sup>

Similarly, American physiologist Joseph R. Buchanan (1814–1899) developed psychometry, a method intended to measure the soul.

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generally, see Darnton, *Mesmerism and the End*; and Winter, *Mesmerized*.

19 "Phreno-Magnetism."

20 See, e.g., Bischoff, "Bericht über die Fortschritte," CIV–CV; "Carus's New Craniocopy," 77–78; and Masius, *Die Thierwelt*, 23.

21 Combe, "On Criticisms upon Phrenology," 663; and Combe, "Phrenology: Mr. Combe's Rejoinder," 196.

22 See, e.g., Hatzfeld, *Du Discernement*, 4.

23 See, e.g., Masius, *Die Thierwelt*, 23; and Ullrich, *Die Phrenologie*, 4–6.

24 See, e.g., Dallenbach, "History and Derivation," 477; H., "Geschichtsphilosophische und socialistische Systeme"; Jentsch, "Die neue Phrenologie"; Noyes, "What They Say," 378; Rieger, *Die Castration in rechtlicher*, V–XXX; Rist, "Phrénologie," 441–43; and Williams, *A Vindication of Phrenology*, 245.

Buchanan called his system a “new phrenology” and claimed its superiority over organology-phrenology.<sup>25</sup> In contrast to Gall’s organology and popular phrenology, Buchanan suggested, his “new phrenology” entailed “practical” therapeutic applications.<sup>26</sup> As is common for scholarly communities, not everybody agreed on the merit of this new theory and similar frameworks. Several writers found Buchanan’s and his colleagues’ claims exaggerated or criticized the new systems on religious grounds.<sup>27</sup>

In the late 19th century, despite the significant developments in neurology and brain anatomy, authors rarely applied the label *new phrenology* to the modern brain sciences. The term was still widely used in reference to developments within organology and phrenology. In numerous publications up to the early 1920s, authors were often appreciative of organology-phrenology. Although many employed the term *new phrenology* to express their discontent with a lack of empiric rigor and the meager therapeutic promises of Gall’s and Spurzheim’s systems, these sources indicate that the authority of organology-phrenology extended well into the 20th century.

*The Localization Debate, ca. 1870–1920: Exemplary Boundary-Work*

In this section, I analyze the status of references to *new phrenology* in the controversy surrounding the localization of cerebral and mental functions during the late 19th and early 20th centuries in Europe and the United States. I show that proponents (localizationists) and adversaries (diffusionists) of brain localization alike used the term *new phrenology* to their advantage. This episode illustrates most clearly of all examples in this paper that the boundaries between scientific subfields as well as between science and non-science were oftentimes blurred. Late 19th-century scientists invested significant labor in demarcating their field of study from their opponents’ related endeavors. The ways in which researchers and writers used the label *new phrenology* allowed for a more clear-cut distinction between opposing scholarly groups than the respective scientific principles that they put forward.

As mentioned in the previous section, organology-phrenology persisted as a target in the *new phrenology* discourse of the early 20th century. Nevertheless, localizationism superseded organology-phrenology as the major reference point for the term toward the end of the

<sup>25</sup> Buchanan, “The New Phrenology,” 31.

<sup>26</sup> Buchanan, “Insanity—an Unsolved Problem,” 93; see also Buchanan, “Cerebral Science,” 984–85.

<sup>27</sup> See, e.g., H., “Geschichtsphilosophische und socialistische Systeme,” 92; and Wheeler, “Objections to the New Phrenology,” 71–73.



19th century. A diverse set of turn-of-the-century scholars were seen—or regarded themselves—as proponents of a new phrenology. The archetypes of new phrenology scholars were German neurologist Eduard Hitzig (1838–1907), German anatomist Gustav T. Fritsch (1838–1927), and Scottish neurologist David Ferrier (1843–1928). I provide a short historical overview of their work in the following paragraphs;<sup>28</sup> subsequently, I trace the controversies surrounding the novel work in (electro)physiology through references to *new phrenology*.

Debates between localizationists, who believed in the localizability of brain function in certain morphological structures in the brain, and diffusionists, who believed in the (more or less) equal distribution of functions across brain matter, have fueled research since Aristotle's time.<sup>29</sup> Up until approximately 1830, organology-phrenology was *the* localizationist endeavor of its time. Over the course of the following decades, French physiologist M. J. Pierre Flourens (1794–1867) devoted his experiments to disproving organology. Based on the results of ablations in pigeons and rabbits, Flourens argued that each cerebral hemisphere was equipotential (that is, neither of the two halves of the brain contain specialized areas), and that memory and cognition are distributed all over the brain.

By the late 19th century, subfields of the mind and brain sciences pushed toward professionalization. The methodologies of the subdisciplines, including neurology, physiology, and anatomy, increasingly diverged.<sup>30</sup> Localizationism found adherents from researchers across these disciplines; many came from England, but scientists performed similar work in the United States as well as in Italy, Germany, and France.

Localizationists generally aimed at developing a map of brain functions, providing evidence for the causes of mental diseases, and inquiring more deeply into the relationship between the brain and mind. French anatomist and anthropologist P. Paul Broca (1824–1880), for example, described a localized speech area in the left frontal lobe.

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28 This overview draws from Breidbach, *Die Materialisierung des Ichs*; Clarke and Jacyna, *Nineteenth-Century Origins*; de Varigny, "Cerebral Localization," 256; Hagner, *Homo cerebrialis*; Mundale, "Concepts of Localization"; Oeser, *Geschichte der Hirnforschung*; and Star, *Regions of the Mind*. For an overview of the history of functional localization from a then-contemporary perspective, see Bastian, *Das Gehirn als Organ*, 183–220; Franz, "New Phrenology," 322–23; Ranke, *Der Mensch*, 531–34; and Starr, "Old and the New Phrenology," 730–31.

29 Whenever I refer to *localizationism* or *diffusionism* in the remainder of this paper, I reference the late 19th- and early 20th-century debate around (electro)physiological brain localization, even though organology-phrenology, for instance, is also a localizationist doctrine. It is furthermore noteworthy that none of the selected sources used the term *diffusionism*, but it is a common term in the secondary literature.

30 Star, *Regions of the Mind*, 10–15. See also footnote 28.

This postulate caused major controversies in its contradiction of Flourens's diffusionist studies.<sup>31</sup> English neurologist John Hughlings Jackson (1835–1911) took physiological localization even farther. He worked with patients at the National Hospital for the Paralyzed and Epileptic, Queen Square, London, where he observed correlations between epileptic symptoms and localized brain damage.

The year 1870, through the work of Hitzig and Fritsch, marked “a turning point” in the history of localization research.<sup>32</sup> Hitzig and his assistant Fritsch applied an electric current to specific areas on the cortex of a dog. Depending on the location to which they applied the electric current, they elicited distinct muscle contractions in the animal. Many similar electrophysiological inquiries were based on clinical work with aphasic and epileptic patients. Ferrier was one of the major figures to apply Hitzig and Fritsch's research paradigm to humans at the hospital at Queen Square.

Despite numerous successful experiments, many mind and brain scientists resisted the idea that the functions of the brain could be distinctly localized. Throughout the late 19th century, diffusionists published critiques of localizationism, many of which drew on experimental evidence that contradicted the findings of Hitzig, Fritsch, Ferrier, and others. Mauritian-French physiologist Charles-Édouard Brown-Séquard (1817–1894), also based at the hospital at Queen Square, was an outspoken critic of localizationism. He publicized case studies of anomalies in the correlation of brain structure and function that should not occur in the case of an absolute localization of cerebral function.

Notwithstanding serious challenges for the localizationist doctrine, its supporters held on to their view and crafted explanations that unified reported irregularities with a localizationist framework. In response to contradictory findings, for instance, localizationists introduced the concept of distributed centers of localization (that is, clusters that are distributed across the brain that work together in executing a particular brain function) and turned away from the doctrine of unique locations of mental and cerebral functions.<sup>33</sup> I return to this ambiguity after surveying references to *new phrenology* in the context of the localization debate.

Organology and phrenology remained closely associated with *new phrenology* designations throughout the localization debate. Although very distinct in the present historical imagination (phrenology as a pseudoscience versus anatomy/physiology/neurology as science proper),

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31 On this debate, see Harrington, *Medicine, Mind and the Double Brain*, 35–135.

32 Star, *Regions of the Mind*, 5.

33 *Ibid.*, 5–7.

these fields of reference overlapped in 19th-century usage. That the lines between organology-phrenology and (electro)physiological localization were not clear-cut becomes obvious in the critical usage of the term *new phrenology*, which was oftentimes inspired by organology-phrenology and not (only) by the more recent localizationism.

In *A Vindication of Phrenology*, for instance, the English writer William M. Williams (1820–1892) set out to prove that the locations of brain function, which had been identified by animal vivisections or galvanization, corresponded with organological-phrenological faculties. Williams interpreted Ferrier's research as support for Gall's claims. He proposed that a union between organology-phrenology and the "new phrenology" of brain localization could bring about a holistic science of "scientific and philosophical value[,] which, standing alone, the[se two fields] do not possess."<sup>34</sup> Consequently, to Williams, a rigid dissociation between organology-phrenology and the new phrenology was neither possible nor desirable.

Other sources were less explicit about the positive potential of merging "old" and "new" subfields, but they avoided a clear distinction between organology-phrenology, psychology, and (electro)physiology. French philosopher I. M. Auguste F. X. Comte's (1798–1857) followers, for instance, displayed Comte's speculative phrenological doctrines as central contributions to late 19th-century brain physiology, which they called a "new phrenology."<sup>35</sup> French biologist Henry C. de Varigny (1855–1934) expanded on the already familiar trope that the new phrenology was more empirical than the old one. He hoped that the (electro)physiologists would add "new facts" and "precise" evidence to strengthen the old phrenological framework.<sup>36</sup>

The fact that organology-phrenology had "not yet acknowledge[d] its defeat" in the late 19th century also becomes obvious in Frederick Peterson's (1859–1938) work.<sup>37</sup> Peterson was convinced that "[n]early everything of this old phrenology must be thrown away in the light of the most recent researches in the anatomy, physiology, and pathology of the brain."<sup>38</sup> Nonetheless, he acknowledged that the absence of therapeutic applications of localizationism remained an obstacle for this good "new phrenology."<sup>39</sup> In his publication, Peterson clearly favored the *new phrenology* over the *old phrenology*, and he distinguished between "the empirical phrenologist [that is, the organologist-phrenologist]

34 Williams, *A Vindication of Phrenology*, 191, see also 154–79.

35 Ward, *Dynamic Sociology*, 121–24.

36 de Varigny, "Cerebral Localization," 262.

37 Mosso, *Psychic Processes and Muscular Exercise*, 7.

38 Peterson, "The New Phrenology," 1417.

39 Ibid.

and the scientific phrenologist [that is, the physiologist].”<sup>40</sup> In the absence of convincing proof for localizationism, Peterson compared phrenology and physiology cautiously, although sometimes sarcastically, instead of ridiculing the old system and unreservedly embracing the new one.

The *old phrenology*, as implicated in most of the above-mentioned sources, referred to a system of “rigidly defined” localization of complex functions, akin to Gall’s organology and modifications to his system by subsequent organologist-phrenologists.<sup>41</sup> Several late 19th- and early 20th-century scholars considered the “old” doctrine useless for therapeutic purposes and declared it to be “practically obsolete among physiologists and scientific men at large.”<sup>42</sup> As the previous examples show, some scholars (including Peterson) attributed this to the circumstance that the *old phrenology* was purely “empirical,” undertheorized, and that it disregarded contemporaneous anatomy and physiology.<sup>43</sup> But other voices (including de Varigny’s) claimed that the system was *not* empirical and *not* based on hands-on studies of the brain.<sup>44</sup> Thus, in any case, the *old phrenology* presumably was not “a science of mind at all,”<sup>45</sup> and only led to “absolutely incorrect, not to say absurd” conclusions.<sup>46</sup> This allegedly unscientific and too-much-or-too-little empirical approach of phrenologists to the skull, brain, or mind increasingly became a source of ridicule.<sup>47</sup>

Despite this agreement on the questionable integrity of the *old phrenology*, the surveyed sources illustrate a multidimensional indistinctiveness of the *old* and the *new phrenology*. German physiologist Wilhelm M. Wundt (1832–1920), for example, lamented the difficulty of distinguishing between organology-phrenology and the (electro-)physiological new phrenology. He regarded them as equally bad in the sense that they highlighted anatomical parallelism instead of physiological connections.<sup>48</sup>

In addition to Wundt’s theoretical critique, several publications shed light on practical confusions between possible meanings of *new phrenology*. Williams’s reference to a *new phrenology*, for instance, was severely misunderstood. Apparently, his readers wrongly assumed

40 Ibid., 1416–20.

41 Wilson, “Old Phrenology,” 71.

42 Ibid., 68.

43 Peterson, “The New Phrenology,” 1416.

44 See also Wilson, “Old Phrenology,” 70.

45 Ibid., 77.

46 Ibid., 81.

47 See, e.g., Peterson, “The New Phrenology,” 1416.

48 Wundt, *Vorlesungen ueber die Menschen*, 487–89.

that he intended to promote “some ‘New Phrenology’—some system of cerebral physiology and psychological philosophy based on the muscular convulsions of galvanised monkeys.”<sup>49</sup> In reality, Williams aimed at sustaining and improving Gall’s organology.

Not only Williams’s readers were confused. The American inventor Elmer R. Gates’s (1859–1923) reference to a *new phrenology* was misunderstood in the opposite way. Gates explained that he had intended to discredit the “‘old’ phrenology” and not the new physiological localization in a previous publication.<sup>50</sup> Similarly to Williams, however, Gates did not regard the *old* and the *new phrenology* as necessarily separate. In his view, the new localizationism should be used to provide a more secure foundation for “the art of character-reading . . . [and] raise it to the level of a scientific art.”<sup>51</sup> Once again, it becomes clear that neither the meanings of *new phrenology* nor the research efforts around the turn of the 20th century were pure organology-phrenology or pure (electro)physiology of the brain.

A sharp distinction between the *old* and the *new phrenology* is as problematic as the one between diffusionism and localizationism. In the context of the localization controversy, the theoretical demarcation between the two new research fields was unclear as well. As Star has argued, English physiologist Charles S. Sherrington (1857–1952), for instance, published a localizationist model of brain function that “was theoretically indistinguishable in most significant ways” from Brown-Séquard’s diffusionist model. The two opposing groups could not be distinguished based on their doctrines alone, but only through the “scientific work” they invested in propagating either localizationism or diffusionism.<sup>52</sup> The localizationists eventually triumphed in this battle, partly because the diffusionists had fewer monetary resources and institutional power at their disposal.<sup>53</sup>

While Star traced the localization debate among British scientists, the ambiguity of diffusionist and localizationist doctrines can be clearly seen in non-British sources as well. In fact, the controversy lasted longer in Germany and in the United States than in Britain. Even American psychologist Shepherd I. Franz (1874–1933) found it noteworthy that the debate was still raging in his country in the 1910s, whereas it had been settled in Britain by the turn of the century.<sup>54</sup>

49 Williams, *A Vindication of Phrenology*, 2.

50 Gates, “Old and New Phrenology,” 35–37.

51 *Ibid.*, 37.

52 Star, *Regions of the Mind*, 7. Nonetheless, Star composed a list of core features of the localizationist doctrine on page 9 of her monograph.

53 *Ibid.*, 118–54.

54 Franz, “New Phrenology,” 326.

Let us take a closer look at the specifics of the localization debate in the United States. Franz positioned himself against the localizationist view; when describing Gall's and Spurzheim's systems, he denied the existence of "definite brain centers [that] are associated with(,) or . . . produce . . . different mental processes."<sup>55</sup> Clearly, *definite* was the crucial word here, which Franz used again soon after when he distanced himself from all doctrines that could be described as a "definite conception of centers in the brain for particular mental acts."<sup>56</sup> Even if a theory only postulated *correlations* and no *causal* relationships between a brain area and a thought process, Franz sensed a *new phrenology*.

Franz's concept of a *mental act* is also worth considering in more detail. In another place, Franz expressed his belief in the localizability of certain sensory and motor functions. For example, he was convinced that aphasia and similar diseases are caused by specific brain lesions, and yet he arrived at a diffusionist interpretation of functional restoration experiments.<sup>57</sup> What is more, Franz partially supported German neurologist Korbinian Brodmann's (1868–1918) theories, although Brodmann was a localizationist. Instead of tearing apart Brodmann's entire research agenda, Franz welcomed Brodmann's theory of mind and only complained about Brodmann's postulate of "a special mental process for special cerebral areas or for special cerebral cell groups."<sup>58</sup>

Consequently, Franz's contempt for localization was *not* unconditional. First, he opposed mainly histological postulates of *definite* and *special* associations with the *mind* and the *mental*, but he found associations between less sharply outlined brain areas and sensory or motor functions permissible. Moreover, Franz was willing to tolerate moderately localizationist concepts "for practical purposes," including research on "mental abnormalities."<sup>59</sup> Overall, Franz's argument was that *some* circumscribed functions can be localized, just not the complex mental ones.

American physiologist Frank H. Pike (1876–1953) also published summaries and critiques of localizationist principles in response to Franz's work. Pike and Franz both derived evidence from Russian-Swiss neurologist Constantin von Monakow's (1853–1930) animal experiments and similar investigations. But while Franz interpreted these studies as evidence for diffusionism, Pike provided a more localizationist interpretation of the same experiments.<sup>60</sup>

55 Ibid., 322.

56 Ibid.

57 Ibid., 326.

58 Ibid., 328.

59 Ibid., 326–27.

60 Pike, "Defence of the 'New Phrenology,'" 620–21.

As Franz's and Pike's diverging interpretations of Monakow's work suggested, Pike's localizationism was as soft as Franz's diffusionism. Pike believed in a functional interplay of localized brain areas and not in a rigid parallelism of individually located independent functions. The definiteness and specificity in the relation between brain structures and mental functions that Franz denied were integral pillars to Pike's principles. And, yet, Pike made room for diffusionist-holistic elements in his theory of the brain and mind. In his own words, "in any one individual . . . a certain *rather constant* morphological mechanism [of various constituent parts] integrates certain *rather constant* relations in time and space to a *fairly constant* result" (italics added).<sup>61</sup>

In attempting to clarify his position to Pike and other readers, Franz blurred the line between localizationism and diffusionism even more. Still writing against what he called "new phrenology" in 1912, but referring to it as "cerebral organology" in 1913, Franz concluded that localization "[i]n its proper form . . . is acceptable."<sup>62</sup> In the latter publication, Franz focused his critique on "[t]he histological localization of function,"<sup>63</sup> that is, the association of particular clusters of nervous tissue with distinct functions of the mind.<sup>64</sup> Accordingly, Franz's diffusionism allowed for the localization of not-too-complex brain functions in not-too-small brain areas. Pike's localizationism, conversely, suggested a dynamic interplay of diverse functions, which were based on morphological structures according to somewhat consistent procedural mechanisms.

Dissolving the ambiguity around the principles of localizationism and diffusionism was impossible for historical actors, and it may be undesirable for the historian of science as well. Even historical mind and brain scientists themselves embraced this vagueness. For example, Pike stated in 1912, "I am not quite sure, from reading Professor Franz's paper, of his position in regard to localization."<sup>65</sup> In the end, the notion that Pike's understanding of Franz's position may result from "misreading(s)" of Franz's work seemed to be a satisfactory agreement between the two gentlemen.<sup>66</sup> What historian would violate such a truce?

Despite the blurred line between the concepts of localizationism and diffusionism, most judgments transported by the term *new phrenology* in the context of the debate lack any ambiguity. Supporters

61 Ibid., 620.

62 Franz, "Functions of the Cerebrum," 125.

63 Franz, "Cerebral Adaptation," 140.

64 Franz, "New Phrenology," 326.

65 Pike, "Defence of the 'New Phrenology,'" 622.

66 Franz, "Functions of the Cerebrum," 125.

from both camps used the term to erect a border between the two fields. From the 1870s through the 1910s, the label expressed a clear positioning for or against localizationism and could thus specify an author's stakes in the debate. Using the term in an either positive or derogatory way helped position the turn-of-the-century scholar in the localization debate, and the references therefore allow the contemporary historian to survey the fronts in the controversy.

Gieryn has coined the term *boundary-work* for such rhetoric of demarcation and related actions. In his monograph *Cultural Boundaries of Science*, Gieryn compared disputes over scientific authority with contestations of the validity of geographical maps. In his own words, “[a]s knowledge makers seek to present their claims or practices as legitimate (credible, trustworthy, reliable) by locating them within ‘science’, they discursively construct for it an ever changing arrangement of boundaries and territories and landmarks, always contingent upon immediate circumstances.”<sup>67</sup> In other words, what counts as good science is a matter of negotiation instead of an objective fact. When researchers seek authority, they stretch the boundaries of “good science” such that their own endeavor qualifies as scientific. When they want to discredit competitors, they erect a border between their own and their competitors’ allegedly inferior endeavors. Gieryn suggested that these efforts are in fact “means of social control” rather than concerns about how to accurately describe natural phenomena.<sup>68</sup>

By applying the label *new phrenology* to (electro)physiology in a pejorative way, authors expressed that they regarded localizationism to be as materialistic or reductionist as Gall’s and Spurzheim’s systems.<sup>69</sup> Others argued that the doctrine was as flawed, speculative, and ridiculous as organology-phrenology.<sup>70</sup> A third way of using the term indicated that the localizationist claims were too far-reaching, but that they contained a kernel of truth like the earlier phrenological systems.<sup>71</sup>

The most pervasive meaning of *new phrenology* around 1900, however, was a positive one. Many publications praised localizationism for its scientific rigidity, its convincing experimental evidence, and the absence of spiritual implications.<sup>72</sup> The message was clear: the *new*

67 Gieryn, *Cultural Boundaries of Science*, xi.

68 Ibid., 16.

69 See, e.g., Michelis, *Antidarwinismus*, 24; and Wundt, *Lectures on Human and Animal Psychology*, 447–48.

70 See, e.g., Fisher, “Recent Progress,” 493; Pérez, “Revue des périodiques étrangers,” 115; and Rieger, *Die Castration in rechtlicher*, VII–VIII.

71 See, e.g., Rieger, *Die Castration in rechtlicher*.

72 See, e.g., Beddoe, “Report on the Bradford,” 184; Bordier, “Des localisations cérébrales,” 267; Casanova, “Le matérialisme,” 131; “Ce qu’il faut savoir,” 22; de Varigny, “Cerebral Localization,” 256–62; Hément, *De l’instinct*, 152; Lewins, “Obscurium facere per



*phrenology* was not as flawed as the *old* one, and comparable only in the sense that both fields prioritized *some* form of localization.<sup>73</sup> The *new phrenology*, thus, signified the better research field, scientific progress, and true knowledge.<sup>74</sup> Most importantly, the *new phrenology* bore a pervasive therapeutic potential and promised to guide brain surgery, a medical usefulness that organology-phrenology never provided.<sup>75</sup> Still, complexity remained. The very principles of what was called a *new phrenology* were not easily separable from opposing doctrines. Altogether, tracing the designation *new phrenology* is thus a powerful window into the blurred boundaries between organology-phrenology, localizationism, and diffusionism around 1900 in Europe and the United States.

*Relative Silence in the Scientific Press and Uptake in Social History, ca. 1920–1980*

The number of searchable references to *new phrenology* in the above-mentioned databases notably increased between 1870 and 1919. As shown above, these decades also saw a multiplication of meanings of *new phrenology*. After the victory of localizationist over diffusionist paradigms around 1920, the term *new phrenology* seems to have become relatively unpopular for more than half a century. It is almost certain that significantly more references to *new phrenology* were published than are searchable in the above-mentioned databases. Publications from the early to mid-20th century might be too young to be included in historical digitization projects, and they might be too old to be digitally available in scientific databases.

Even so, it is also conceivable that the number of scientific publications on cerebral localization, and hence the frequency of comparisons with organology and phrenology, genuinely decreased after 1920. In *Medicine, Mind, and the Double Brain*, historian of science and medicine Anne Harrington suggested that interest in the asymmetry of the

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obscurius,” 94; M., “Article XX: Cerebral Localization,” 182; Patterson, *Conflict in Nature*, 128–30; Pike, “Defence of the ‘New Phrenology,’” 622; Ranke, *Der Mensch*, 530–34; Starr, “Old and the New Phrenology,” 730–31; and Wilson, “Old Phrenology,” 68–85.

73 See, e.g., Bastian, *Das Gehirn als Organ*, 183–220; Browning, “Correspondence: Science vs Phrenology,” 50–51; Hirth, *Die Lokalisationstheorie angewandt*, 43–45; Neubert, *Deutsches Zeitgenossenlexikon*, 368; Reuschler, “Phrenologie,” 93–95; and Wright, “Editorial: The New Phrenology,” 242.

74 See, e.g., Dearborn, “*Elements of Physiological Psychology*,” 148; de Varigny, “Cerebral Localization,” 262; Dolbear, “On the Increased Importance,” 546; “General Meeting of 1892”; and Wilson, “Old Phrenology,” 85.

75 See, e.g., “Editorial Comment,” 672; “New Phrenology: New York,” 469–70; Osler, “The Leaven of Science,” 580–81; Starr, “Old and the New Phrenology,” 747–48; and Wright, “Editorial: The New Phrenology,” 242.

cerebral hemispheres diminished after World War I. Harrington attributed this shift partially to a “resurrection of Cartesianism in the clinic,” which manifested itself in a growing rift between psychiatry and neurology.<sup>76</sup> For decades to come, psychiatrists—influenced by psychoanalysis—emphasized the mind over the brain. Neurologists, for their part, underwent two seemingly contradictory developments. First, a turn toward systemic explanations and holistic considerations of the brain and behavior, and, second, a “more piecemeal and more focused” approach to specific conditions rather than to large-scale brain function.<sup>77</sup>

The few references to *new phrenology* during these seemingly quiet decades were in line with the usage before the closure of the localization controversy. Although disapproving remarks continued to be published, most of the publications discussed localization in a favorable way.<sup>78</sup> These references typically occurred in conjunction with historical accounts of why the term *new phrenology* could be applied to localization, and how the localizationist framework became acknowledged as a scientific truth.<sup>79</sup>

Shortly before the broad introduction of computerized brain imaging technologies in the 1980s and 1990s—or before the slightly delayed storm of *new phrenology* reproaches against those methods—references to *new phrenology* premiered in genuinely historical publications.<sup>80</sup> In some cases, the designation has served as a reference point for sociological analyses of research fields.<sup>81</sup> Others scholars have used the term with reference to the authoritative rhetoric of organologists and phrenologists.<sup>82</sup>

Furthermore, publications from the late 20th and early 21st centuries offered a range of references to *new phrenology* with regard to diverse subfields in the human sciences. Criminology, objective testing, comparative methods, cognitive psychology, bio-psychiatry, and sex-difference research, to name a few, have been deemed “new

76 Harrington, *Medicine, Mind and the Double Brain*, 248–86, quote on page 257.

77 *Ibid.*, 272. See also Casper, *The Neurologists*; and Guenther, *Localization and Its Discontents*.

78 See, e.g., Hollander, *In Search of the Soul*, 422–35; Johnson, “Are Psychophysical Problems Genuine,” 198; and Stone, “Reviews: Conditions and Consequences,” 439–40.

79 See, e.g., Dallenbach, “Phrenology versus Psychoanalysis,” 519; Fröbes, *Lehrbuch der experimentellen Psychologie* 2, 20; Meyer, Lechner, and Reivich, *Cerebral Vascular Disease*, 58; and Osler, *Aequanimitas*, 91–92.

80 The surge of historical publications on phrenology and its sociological dimensions focused on Britain; see footnote 6.

81 See, e.g., Critchley, “Neurology’s Debt to F.J. Gall,” 778.

82 See, e.g., Star, *Regions of the Mind*, 4.

phrenolog[ies].”<sup>83</sup> Very much unlike the diverse meanings in earlier decades, neither of these references was even close to deferential. Moreover, virtually none of the respective authors defined the term (*new*) *phrenology*; apparently, 20th-century writers increasingly presumed that phrenology was a despicable pseudoscience. This trend intensified even more around the turn of the millennium.

*Critiques of Neuroimaging, ca. 1980–2017: The Pseudoscience Accusation*

[W]e must be cautious and question whether or not what we are witnessing here . . . may be the birth of a “new phrenology” movement. Though phrenology has long been dismissed as a pseudo-science, it is crucial for neuroethicists to examine possible links between the motivations that were behind the development of phrenology and the more current research agendas involving new neuroimaging technologies such as fMRI.<sup>84</sup>

The above quote is an exemplar for more recent uses of the term *new phrenology*. Late 20th- and early 21st-century functional neuroimaging methods were the most prevalent targets for this label, including positron emission tomography (PET) and functional magnetic resonance imaging (fMRI). Since the 1980s and 1990s, these technologies have significantly affected the methodology and epistemology of clinical as well as cognitive neuroscience.<sup>85</sup>

Both PET and fMRI rest on a fundamentally localizationist framework.<sup>86</sup> They indirectly measure activity in certain cerebral centers by collecting data about blood flow and oxygen content in circumscribed brain regions. PET rose to prominence in neuroscientific laboratories in the 1980s. After a radioactive tracer is injected into a test subject, a PET scanner measures the emissions of the radioactive molecules. If the emission profile suggests a large concentration of the radioactive tracer in a certain brain area, researchers assume that the blood flow in this region is particularly strong. A heightened cerebral blood flow, in turn, is linked to increased brain activity in the same region, because the metabolism relies on oxygen in the blood. Clearly, PET is an indirect

83 See, e.g., Coleman, “Perspectives on the Medical,” 675, 681–82; Gardiner, “Primate Communication,” 13; Gladue, “Biopsychology of Sexual Orientation,” 117; Hynd and Cohen, *Dyslexia*, 7; Osenburg, “Objective Testing,” 106; Rafter, “Murderous Dutch Fiddler,” 65; Riccio, “Medicating Patients,” 349; and Ticknor, “Phrenology,” 711.

84 Roy, “Neuroethics, Gender,” 223.

85 For a history of neuroimaging, see Tovino, “Imaging Body Structure.”

86 For an overview of the history and use of PET and fMRI, see Cabeza and Kingstone, *Handbook of Functional Neuroimaging*. For a description of a wider range of neuroimaging technologies, see Chapter 2 in Uttal, *The New Phrenology*.

measure: emissions from a radioactive tracer are a proxy for blood flow, and cerebral blood flow is a proxy for brain activity.

Soon after the introduction of PET scanning in the neurosciences, researchers started using fMRI. The latter technology is based on magnetic resonance imaging, a method used to acquire anatomical pictures. As the name suggests, magnetic resonance imaging scanners create magnetic fields to which a subject is exposed. As these magnetic fields change, various tissues in the body can be distinguished because they exhibit distinct magnetic properties. Researchers acquire information about functional changes by measuring the magnetic properties of hydrogen nuclei in the cerebral blood flow. Oxygenated blood reacts differently to changes in the magnetic environment than deoxygenated blood. Depending on the magnetic properties of blood in a certain brain area, researchers can infer if and when this region is supplied with oxygen. A high concentration of oxygen-rich blood indicates strong metabolism and hence brain activity in this area. FMRI, to an even larger degree than PET, is also an indirect measure: the magnetic properties of hydrogen nuclei are a proxy for the amount of oxygen in the blood, the degree of oxygenation is a proxy for brain metabolism, and metabolism is a proxy for brain activity.

With the popularization of brain imaging, the term *new phrenology* has taken on virtually exclusively derogatory meanings. Authors have cautioned both scientists and the public to not waste enormous resources on the unreflective usage of neuroimaging technologies. Many writers argued that most neuroimaging studies are primarily reductionist and empty of explanatory power or therapeutic gain, an accusation that is reminiscent of critiques of organology-phrenology.<sup>87</sup> Other authors were more polemic in their assessment. They explicitly called contemporary neuroimaging a (or “the”) “new phrenology” and depicted it as a venue into deterministically materialistic and methodologically flawed “pseudoscience.”<sup>88</sup>

The accusation of being a pseudoscience is a recurring trope in the surveyed literature. It spans the decades from at least 1895 until very recently in the 21st century, but the question of whether phrenology is a pseudoscience is rather anachronistic. Gall’s organology was a

87 See, e.g., Cohen and Tong, “The Face of Controversy,” 2407; De Vos, “The Iconographic Brain,” 9; Fuster, “The Cognit,” 125–26; Georgiadis and Kringelbach, “Human Sexual Response Cycle,” 54; Kovas and Plomin, “Genetics and Genomics,” 166; Okon-Singer et al., “Neurobiology of Emotion-Cognition Interactions,” 7; Seung, *Connectome*, 21; and Tallis, *In Defence of Wonder*, 45.

88 See, e.g., Bolles, *Babel’s Dawn*, 107; Osenburg, “Objective Testing,” 106; Peterson, “The New Phrenology,” 1415; Rafter, “Murderous Dutch Fiddler,” 65; and Roy, “Neuroethics, Gender,” 223.

well-respected science in its day, but it does not comply with the standards of present-day scientific investigations. Phrenologists after Gall have often been perceived as quacks by contemporaries. Hence, it might be slightly more appropriate to call popular phrenology a pseudoscience. Be that as it may, “simple distinctions between ‘science’ and ‘pseudo-science’” are generally not productive, because they do not shed light on the historical processes that allow some fields of inquiry, but not others, to acquire *scientific* authority.<sup>89</sup>

The use of the term *pseudoscience* is a particular instance of boundary-work. Roger J. Cooter remarked in 1982 that this designation has an exclusively derogatory meaning.<sup>90</sup> In the same paper, Cooter explained that “the label ‘pseudoscience’ . . . has played an ideologically conservative and morally prescriptive social role in the interests of th[e capitalist] order.”<sup>91</sup> Since the 17th century, Cooter argued, the designation has been used by privileged groups to question the legitimacy of adversaries and reinforce their own authority.

What exactly did Cooter mean by the *conservative* power of the pseudoscience label? When a group of young phrenologists challenged the existing social order in 19th-century Britain, the political, scientific, and religious authorities tried to discredit the movement by denigrating it as a pseudoscience. Truth claims were (and remain to this day) at the core of these debates. Only *real* science, the authorities claimed, can unveil accurate knowledge about the world, whereas pseudoscientists mimic *real* scientists and trick the public into believing false schemes. But this alleged quest for *the* truth was a rhetorical strategy to “conserve” the authorities’ power and preserve the existing social order, Cooter suggested.<sup>92</sup>

In many of the recent texts (and in this way, the introductory quote to the present section is *not* exemplary), authors did not make the pseudoscience accusation explicit. Recent references to *new phrenology* only *implied* that there is a consensus about the pseudoscientific nature of phrenology. Most denigrating instances of *new phrenology* in the recent literature were disconnected from the main argument of the publication; they were throw-away lines that lacked any historical contextualization or explanation. If expanded upon at all, the texts usually mentioned Gall, rarely Spurzheim, and the fact that phrenology was a 19th-century research field. This explanation took up one

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89 Rafter, “Murderous Dutch Fiddler,” 65. On the history and philosophy of the distinction between pseudoscience and establishment science, see Gordin, *The Pseudoscience Wars*; Grim, *Philosophy of Science*.

90 Cooter, “The Conservatism of ‘Pseudoscience,’” 131.

91 *Ibid.*, 130.

92 *Ibid.*, 137.

sentence or less on average, and the idea that organology-phrenology was a pseudoscience seemed to be taken for granted.

Numerous critics of neuroimaging pointed to parallels between the indirect measurements in brain imaging and the organological-phrenological assessment of the brain through palpating the skull.<sup>93</sup> In most cases, however, critics of neuroimaging used the label *new phrenology* to draw attention to the emphasis on localization that unites neuroimaging and organology-phrenology.<sup>94</sup> Many authors did not directly attack neuroimaging but mentioned (often without providing references) that other scholars have called these methods a *new phrenology*.<sup>95</sup> Might this be the politically correct 21st-century way of accusing a field of a lack of scientific rigor?

It is worth noting that not only science critics but also scientists themselves called neuroimaging a *new phrenology*. It is likely that the ways in which a scientific (sub)field tells its own history at a certain point in time is correlated with the pervasiveness of an innovative culture in the field and the pressure to either make groundbreaking new discoveries or to position oneself in a longer tradition of scholars. Gieryn's concept of boundary-work can explain the former case.<sup>96</sup> Belittling another (sub)field as a *new phrenology* is an act of demarcation between one's own endeavors and others' purportedly inferior pursuits. This strategy was evident in the case of the allegedly self-explanatory designation of neuroimaging as a *new phrenology*.

A longing for traditionalism and stability might explain positive references to *new phrenology*. Historian of science and medicine Stephen T. Casper has recently suggested that 20th-century neurologists dated the roots of contemporaneous concepts to much earlier developments, in fact, even back to Gall. Claiming a longer history might endow a field with an aura of authority and homogeneity, or, in Casper's words, it lets the development of a discipline appear "as

93 See, e.g., Vidal, "Brainhood, Anthropological Figure"; and Waddle, "Brain Imaging."

94 Fitsch, "(A)e(s)th(et)ics of Brain Imaging"; Prigatano, "Challenging Dogma in Neuropsychology"; and Rowe, "Multiple Representation."

95 See, e.g., Baddeley, *Working Memory*, 234; Bolles, *Babel's Dawn*, 107; Cacioppo and Decety, "Social Neuroscience," 170; Fehr, "A Hybrid Model," 90; Friston, "Beyond Phrenology," 221; Friston, Moran, and Seth, "Analysing Connectivity," 176; Fuster, "The Cognit," 125–26; Georgiadis and Kringelbach, "Human Sexual Response Cycle," 54; Gladue, "Biopsychology of Sexual Orientation," 117; Newman, "Functional Magnetic Resonance Imaging (fMRI)," 20; Op de Beeck et al., "Combinatorial Brain Decoding," 1; Poldrack, "Mapping Mental Function," 755; Suzuki, "Brain Imaging Studies," 89; Tallis, *Reflections of a Metaphysical Flâneur*, 70; and Wermter, Austin, and Willshaw, *Emergent Neural Computational Architectures*, 569. The few authors who provided citations mostly referred to William R. Uttal's assessment of the limitations to the localization of brain functions via neuroimaging; see Uttal, *The New Phrenology*.

96 Gieryn, *Cultural Boundaries of Science*.

inevitable, self-evident, and trans-historical.”<sup>97</sup> Similarly, scientists who label their own work a *new phrenology* imply that their work continues and extends much older endeavors. Such teleological claims promote the idea of linear scientific progress and of a steady increase of true knowledge about the world from the founders of science to contemporary research.<sup>98</sup>

One of the most vocal and most widely cited adapters of the term *new phrenology* was American psychologist William R. Uttal (1931–2017). In his monograph *The New Phrenology*, Uttal argued that neuroimaging bears a false promise. Even if our imaging methods were flawless, which Uttal maintained they are not, they could not localize mental functions in the brain. Despite his belief in the anatomical heterogeneity of different brain regions, Uttal argued that the mind cannot be subdivided into “mental modules or components,” which makes the localization of mental functions conceptually impossible.<sup>99</sup>

Uttal’s acknowledgement of the anatomical heterogeneity of the brain in conjunction with his refusal to accept the localization of complex mental functions was a remarkable parallel to Franz’s objections to localizationism in the 1910s. As mentioned above, Franz conceded that some simple functions (for example, particular sensory or motor functions) could possibly be traced back to moderately circumscribed brain areas, but he rejected the idea of a clear relationship between mental functions and specific brain centers. Uttal and Franz despised strong localizationism, and both adhered to vague diffusionism. Because of this similarity, we could call Uttal a *new diffusionist*, but we do not. Uttal’s use of the term *new phrenology*, however, resonated greatly with contemporary neuroscience critics. The question is: Why are scientists and historians so keen to refer to phrenology, but not diffusionism? In other words, why does *phrenology* carry so much more weight than *diffusionism*?

Uttal’s monograph illustrated that phrenology has come to epitomize hundreds of years of research into brain function like no other movement. Because of its historical unwieldiness and numerous reiterations, the concept of *phrenology* is malleable enough to substantiate most of the claims that scientists or science critics might need to employ for their boundary-work. In *The New Phrenology*, Uttal provided historical overviews of attempts to localize cerebral functions in

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97 Casper, “Currency of Consciousness,” 352.

98 This view is dangerously naive in light of our knowledge about the ways in which political and social concerns influence scientific theories. Ludwik Fleck’s theory of thought styles, originally published in 1935, explained this thoroughly; Fleck, *Genesis and Development*.

99 Uttal, *The New Phrenology*, 146.

particular areas of the brain. He also summarized philosophical and psychological efforts to break down the mind into discrete parts. Gall, whom Uttal called “one of the most notorious(,) proto-psychologists of the last three centuries,” only appeared in the latter summary.<sup>100</sup> Although Uttal’s historical overviews started in antiquity and traced the ideas of localization and mental modularity until long past Gall, Uttal decided that phrenology was the most appropriate comparison to discredit 21st-century neuroimaging. While some of Uttal’s colleagues opposed his critiques of neuroimaging, they did not demand an explanation for why he used the term *new phrenology* despite the wide range of other related research fields.<sup>101</sup>

In opposition to Uttal’s and others’ disparaging remarks about neuroimaging, fewer authors concluded that the accusations are unjustified despite some resemblance between the *old* and the *new phrenology*. German historian of science and medicine Cornelius Borck, for instance, argued that critics “underestimate the productivity of [neuroimaging].”<sup>102</sup> In a similar vein, a considerable number of publications suggested that the days of neuroscientific “new phrenology” are (soon to be) over, because the techniques are more refined and the inferences more careful than in the early days of computerized neuroimaging.<sup>103</sup> Only very few sources went as far as to use *neo-phrenology* as a positive label, depicting computerized neuroimaging as an improvement of phrenological ideas of localization.<sup>104</sup> Apart from these few positive uses of the term, *new phrenology* has become an overwhelmingly undesirable label over the course of the past decades.

The recently published sources bear one vital commonality, independently of whether they mention Gall and organology-phrenology explicitly, whether or not they cite other authors using the term *new phrenology*, and whether they believe that we are still living in an era of the new phrenology. What it means to be a (*new*) *phrenology*, in theory or in practice, was not spelled out in these texts. The designation *new phrenology* seemed to be self-explanatory. Historical,

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100 Ibid., 102.

101 See, e.g., Landreth and Richardson, “Localization and the New Phrenology”; and Rees, “The New Phrenology.”

102 Borck, “Through the Looking Glass,” 335–36.

103 Network modeling and multivariate analysis are two of the new and allegedly un-phrenological avenues mentioned; see, e.g., Cacioppo and Decety, “Social Neuroscience,” 170; Fitch, “Prolegomena to a Future Science,” 284; Friston, Moran, and Seth, “Analysing Connectivity,” 176; Newman, “Functional Magnetic Resonance Imaging (fMRI),” 20; Op de Beeck et al., “Combinatorial Brain Decoding,” 1; Poldrack, “Mapping Mental Function,” 755; and Stone and Kötter, “Making Connections about Brain Connectivity,” 328.

104 See, e.g., Koenigs, Tranel, and Damasio, “Lesion Method in Cognitive Neuroscience,” 140; and Strack and Schwarz, “Nobel Prize for Daniel Kahneman,” 11.



philosophical, and sociological expositions of the characteristics of phrenology and comparisons between the *old* and the *new phrenology* were hardly ever delivered in the recent discourse. Most likely because of its unwieldy history, which is still open to reinterpretation, phrenology has become a presumably self-explanatory (but malleable and context-dependent) marker of the boundaries between science and pseudoscience, good science and bad science, outdated science and cutting-edge science.

## CONCLUSION

[The movement from the old phrenology to the new] shows the displacement of erroneous ideas by new and higher thoughts founded on accurate observation of the facts of life: whilst in a very direct fashion such higher knowledge may affect suffering humanity; since an educated medical science, furnished with secure data regarding the causes of mental affections, may successfully “minister to minds diseased,” and even in due time raze out the troubles which perplex many a weary soul.<sup>105</sup>

Let me repeat that organology-phrenology was a respected science in the early 19th century, and some scientists adhered to it until well into the 20th century. In summary of this survey of references to *new phrenology*, the huge variability of meanings of the term is most striking. The label could be praise or affront, and both scientists and non-scientists used it, sometimes for their own research and sometimes for the work of others. Postulating the advent of a *new phrenology* could be an announcement of a superior modification of a traditional research field; in this case, the authors claimed that the flaws of the *old phrenology* had been eliminated either through a radical break or through careful improvements. Other types of references were much less favorable. A *new phrenology* could describe an allegedly unscientific, speculative, and popular endeavor that was either as bad as the *old phrenology*, or, in fewer cases, an unnecessarily modern and defective version of the original organology.

The organologists' and phrenologists' numerous critics predominantly reproached them for reducing the allegedly immaterial, immortal soul to brain matter. This concern slightly shifted during the localization debate around 1900. The diffusionists mostly took issue with the localizationists' attempt to break down complex mental abilities into distinct functions that were ostensibly individually localized. In the late 20th and early 21st centuries, materialistic beliefs had become firmly

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105 Wilson, “Old Phrenology,” 85.

ingrained in the sciences of the mind and brain. Consequently, references to *new phrenology* from within the neurosciences rarely targeted materialism per se. Some recent critics from the humanities and social sciences have drawn parallels between palpating skulls and brain imaging. Additionally, scientists and non-scientists have often questioned the underlying psychological concept of distinct localizable functions, akin to the concerns during the localization debate.

In the context of the localization debate around 1900, the *new phrenology* search led me to a reiteration of Star's objection to assuming a "steady, unproblematic progress" in the history of brain localization.<sup>106</sup> The theoretical demarcations between localizationism and diffusionism were blurred and the meanings of *new phrenology* in this debate ambivalent. The various instances of judgmental uses of the term *new phrenology* exemplify the concept of boundary-work. The flexibility of the label echoes Gieryn's argument that scientific authority does not derive from objective facts but from social negotiation. What phrenology was, and if it is good or bad to stand in this tradition, was a matter of scientists' subjective interpretation of the history of their own field.

For the reader with historiographical interest, this account of scientists' ambiguous references to the history of their own field begets one final question: How should the history of neuroscience be interpreted?<sup>107</sup> Historian of science Helge Kragh advised against the widespread tendency to read or write history "backwards."<sup>108</sup> As mentioned before, some scientists have used the term *new phrenology* to suggest a teleological development of the neurosciences, which begins with Gall and ends in the present or near future, the point of alleged objective truth. Implied in this understanding of history is the idea of a point in time when pseudo-knowledge ended and scientific truths began to be propagated. Because of this tendency to interpret the past in the light of present conditions, Kragh cautioned scientists to write the history of their own field. He was positive that "[s]cientists may well learn the necessary historiographical skills and become highly accomplished and sophisticated historians," but he emphasized that this learning process is inevitable to writing reflexive, contextualized histories of science.<sup>109</sup>

Be that as it may, it is important to conclude with historian Hayden White that "there are no apodictically certain theoretical grounds on

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106 Ibid.

107 For an overview of the ways in which the history of phrenology, as a subsection of the history of the neurosciences, has been written, see Cooter, *Cultural Meaning of Popular Science*, 16–22.

108 Kragh, "Problems and Challenges," 57.

109 Ibid., 61.

which one can legitimately claim an authority for any one [version of history] as being more ‘realistic’” than another version. Furthermore, he asserted, “the best grounds for choosing one perspective on history rather than another are ultimately aesthetic or moral rather than epistemological.”<sup>110</sup> Consequently, there is as little objectivity in history as there is in science. Scientists and historians of science might come to opposing interpretations of what (*new*) *phrenology* means. But the ambiguity of references to *new phrenology* invites both groups to reflect on the social and cultural preconceptions that lead them to take their stance. All scholars, each in their own field, can expose flawed epistemologies or deeply-rooted prejudices, as long as they remember that their authority is not rooted in objective knowledge about the world but in contingent social processes.

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110 White, *Metahistory*, 12.

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