Introduction

In early 2011, while browsing the internet, I accidentally came across the online version of a *New York Times* article titled "Is Hysteria Real? Brain Images Say Yes."[1] At that point, I too held the view that continues to dominate the humanities literature. According to this view, hysteria was "written out of current medicine" during the twentieth century.[2] It thus had no "place in the serious reaches of contemporary science."[3] But Erika Kinetz, the author of the article published in September 2006, challenged this widely accepted view, claiming instead that hysteria was still among us. Importantly, Kinetz pointed out a largely neglected fact—since the turn of the twenty-first century, there has been a resurgence of medical studies that use images to investigate hysteria. Yet, interestingly enough, in the humanities, the old image of hysteria, which sees this age-old illness as a mere myth, still holds. For example, writing in 2004, the art historian Amanda du Preez has argued that hysteria "manifests exclusively through visual appearances and images and is reproduced in imitations and representations. Since its aetiology is fantasmatic, hysteria has no anatomical or corporeal basis. As a result, the condition can be described as a simulacrum of symptoms."[4] By contrast, Kinetz offered a different take on hysteria.

Before developing the main point of her article, Kinetz sketched a concise medical history of hysteria. She touched upon hysteria's origins in ancient Egypt and Greece as a female malady attributed to a misplaced womb, a belief that became inscribed into the disorder's very name (i.e., *hystera* in Greek means uterus). She then emphasised the identification of this disorder with demonic possession during the Middle Ages. After that, Kinetz foregrounded the scientific contributions of the nineteenth-century French neurologist Jean-Martin Charcot and his two pupils, Pierre Janet and "the now-unfashionable" Freud.[5] Finally, she mentioned that the apparent disappearance

1 Kinetz, "Is Hysteria Real." According to the comment at the bottom of the online article, the printed version appeared in the New York edition of *The New York Times* under the title "Mind and Body." Kinetz, n.p. My following discussion refers to the online version of the article.

2 Hunter, *Face of Medicine*, 169.

3 Kinetz, "Is Hysteria Real," n.p.

4 Du Preez, "Putting on Appearances," 47.

5 Kinetz, "Is Hysteria Real," n.p.

of hysteria had "been heralded" since the 1960s.[6] Only at this point did Kinetz begin to depart from the dominant narrative on hysteria. First, she quoted Patrik Vuilleumier, a neurologist and neuroscientist at the University of Geneve, who stated that, far from having vanished, hysterical symptoms "are still common in [clinical] practice."[7] Kinetz then reported on contemporary researchers who have started to use novel functional neuroimaging technologies to visualise hysteria patients' brain activity. It is these brain-imaging studies, Kinetz suggested, that have started to identify "the physical evidence of one of the most elusive, controversial and enduring illnesses."[8]

Apart from being about new research into a disorder that most people believe no longer exists, four aspects of Kinetz's article are remarkable. First, until the end of 2019, Kinetz's was one of only a handful of articles in the general press to mention the growing number of functional neuroimaging studies on what present-day researchers claim are the same hysterical symptoms as in the nineteenth century.[9] Searching the internet, I have managed to find only three other articles that dealt with this topic and were addressed to a general audience. These appeared in *The Times* in 2007, *Newsweek* in 2011, and *Bloomberg* in 2014.[10] Perhaps even more surprisingly, not just the general press but also the academic discussion in the humanities and social sciences have disregarded the neuroimaging studies of contemporary manifestations of hysteria.[11] Consequently, the claims and image-based findings of these studies have remained confined to neuroscientific and neurological circles and almost entirely detached from the broader public discourse.

Second, although the brain images are mentioned in the title and thus declared to be the topic of the article, the reader is left in the dark about how these images look. Kinetz provided no description of what exactly can be seen in these images that purportedly "enable[s] scientists to monitor changes in brain activity."[12] Are these static or moving images? Are they black-and-white or in colour? Do they give researchers real-time, near-instantaneous access to what is going on in the patients' brains? Is the visualised brain activity immediately recognisable even to a non-expert, or does working with these images require a special kind of visual expertise? Not only did all these questions remain unaddressed, but the article also did not include a single reproduction of hysteria patients' brain scans. This was all the more surprising since

6 Kinetz, n.p.

7 Kinetz, n.p.

8 Kinetz, n.p.

9 See, e.g., Bègue et al. "Metacognition," 251–52.

10 See Bee, "Calm Down"; Schwartz, "Hysteria"; and Gale, "Freud's Hysteria." My search was limited to English-speaking sources and general-interest newspapers. I have, therefore, disregarded several articles that appeared in popular science magazines, which specifically address a scientifically minded audience.

11 One recent exception is an article authored by the American novelist and essayist Siri Hustvedt. Interestingly, although the article was written from the humanities perspective, it was published in a medical journal. See Hustvedt, "I Wept for Four Years." See also my five recently published articles: Muhr "Epistemic Productivity"; Muhr, "Framing the Hysterical Body"; Muhr, "Hypnotised Brain"; Muhr, "Recent Trajectory"; and Muhr, "Die Unsichtbarkeiten der Hysterie."

12 Kinetz, "Is Hysteria Real," n.p.

Kinetz claimed that brain scans offered physical evidence for the reality of this elusive disorder. Kinetz remained tacit about the omission of brain images from her article, which we can only presume was deliberate. If, for whatever reason, she chose not to illustrate the images she was writing about, why not at least explain her decision to the reader? Could the reason for her decision not to include brain scans in her article be that the evidential status, which she attributed to these images, was not immediately apparent to a non-expert viewer?

Third, and even more curiously, the illustration placed prominently at the top of the online version of the *New York Times* article was a slightly cropped reproduction of a painting by André Brouillet, titled *Une leçon clinique à la Salpêtrière*. This painting, initially unveiled at the 1887 Salon in Paris, depicts the nineteenth-century French neurologist Jean-Martin Charcot holding a clinical lecture on hysteria at his famous Parisian hospital la Salpêtrière. The medical historian Mark S. Micale fittingly dubbed this image "the most famous icon in the history of hysteria."[13] What undoubtedly further reinforced the iconic status of Brouillet's painting is that a downsized lithographic reproduction of it hung famously in Freud's consulting room, first in Vienna and then in London.[14]

Painted in the tradition of monumental group portraits, *Une leçon clinique à la Salpêtrière* shows Charcot and a swooning female hysteria patient surrounded by a large entourage of medical, artistic, and political luminaries of the time, all of whom were men.[15] The explicit intention behind Brouillet's painting was to create "an eloquent symbol of Charcot's promotion of the Salpêtrière school."[16] At that point, the school's highly publicised research on hysteria, which relied on the extensive use of photography and other novel visualisation methods, reached a level of international fame that turned it into "a medical-cultural phenomenon."[17] *Une leçon clinique* was "a product of hysteria's heyday,"[18] capturing in intentionally heroic visual terms the moment when this disorder reached the apex of its medical and cultural visibility. Yet, in the course of the twentieth century, the intended heroic meaning of this painting gradually eroded and was displaced by a far less flattering one.

In particular, since the 1980s, following the publication of the French art historian Didi-Huberman's influential book *Invention of Hysteria*, a continually growing number of

13 Micale, *Hysterical Men*, 2.

14 For details about this hanging, see Morlock, "Primal Scene," 130–31, 140–44.

15 Apart from the patient, the only other female figures in the painting were two nurses. Although the clinical lesson depicted in the painting was not a reproduction of an actual event, all the individuals represented in this fictional grouping were well-known historical personalities, who were recognisable to the visitors of the 1887 Salon. For the painting's favourable critical reception at the Salon, see Hunter, *Face of Medicine*, 166–67, 177. For the exhaustive list of the individuals depicted in the painting, see Goetz, Bonduelle, and Gelfand, *Charcot*, 92–93. For a succinct account of *Une leçon clinique*'s indebtedness to the genres of portraiture and history painting, see Morlock, "Primal Scene," 134–35. For a more detailed account on this topic, see Hunter, *Face of Medicine*.

16 Goetz, Bonduelle, and Gelfand, *Charcot*, 238.

17 Goetz, Bonduelle, and Gelfand, 239. Interestingly, the painting was neither commissioned nor bought by Charcot. Hunter, *Face of Medicine*, 177.

18 Hunter, *Face of Medicine*, 167.

humanities-based studies have emerged that critically discuss Charcot's image-based hysteria research.[19] The broad consensus is that Charcot unscientifically used images to illustrate his pre-existing, biased views of hysteria, not so much investigating but instead inventing this disorder. In the context of this critical reappraisal of Charcot's work, Brouillet's painting has acquired a new meaning. In present-day publications, this painting is typically used to illustrate the claims that Charcot and his team had fraudulently trained their female patients "how to appear as a hysteric."[20] For example, this view was emphatically expressed by the art historian Sigrid Schade: "Hysteria had the character of an imaginary figurative contract: the doctor's interest in the patient was maintained as long as she performed the expected alphabet of passionate gestures with her body."[21] Hence, Brouillet's depiction of Charcot's clinical lesson has been reinterpreted into a symbol of unscientific use of images in hysteria research.

It is bewildering that, in her article, Kinetz made no mention of the current criticism levelled at Charcot's research. Instead, in the caption accompanying the reproduction of Brouillet's painting, she stated that Charcot had "helped lay the groundwork for contemporary research."[22] Given that she did not further qualify this statement, it remained unclear how exactly she regarded Charcot's highly contested research to be related to the present-day neuroimaging studies of hysteria. What was even less clear is whether Kinetz was oblivious to the current negative connotations of Brouillet's painting and the general dismissal of Charcot's research, or if, for some undisclosed reasons, she chose to ignore them. In each case, her (or her editor's) decision to use the reproduction of Brouillet's painting to illustrate the article that discussed neuroimaging studies of hysterical symptoms in exclusively favourable terms appears to me ill-advised and highly confusing. It is not the linking between Charcot and the contemporary imaging studies that I find problematic, but that Kinetz failed to either contextualise or explain it. As a result, those readers of her article who are familiar with the critical literature on Charcot might dismiss the neuroimaging studies of hysterical symptoms without any further thought.

Fourth, in addition to neither telling nor showing her readers what functional brain images look like, Kinetz also provided almost no information about their exact role in the neuroimaging studies of the present-day hysterical symptoms. In a vague statement that obscured more than it revealed about these images, the reader was merely told that they "allow scientists to see disruptions in brain function."[23] Kinetz simply left it at that. But how exactly is this 'seeing' mediated through brain images? Based on which of the images' visual features can scientists recognise what Kinetz referred to as the disruption in brain function? How much time and work do scientists have to put into the process of producing functional brain images? To what extent is the image production automated and at which points can scientists influence this process through

19 Didi-Huberman, *Invention of Hysteria*. See also, e.g., Borch-Jacobsen, *Making Minds and Madness*; Bronfen, *Knotted Subject*; Gilman, "Image of the Hysteric"; and Showalter, *Female Malady*.

20 Gilman, "Image of the Hysteric," 346.

21 Schade, "Charcot and the Spectacle," 509.

22 Kinetz, "Is Hysteria Real," n.p.

23 Kinetz, n.p.

their decisions? What is the nature of the referential relationship between these images and the actual active brains, based on which scientists can use the images to make judgments about the patients' brain function? Finally, are functional brain images mere illustrations of experimental findings and thus extraneous to them? Or do these images play constitutive roles in generating potential insights into the presumed dysfunction of hysteria patients' brains?

Kinetz's article, to my knowledge, was the first to draw the general public's attention to the arguably important yet largely neglected functional neuroimaging studies of present-day hysterical symptoms. Yet it raised more questions than it answers. Taking the cue from Kinetz's article, my enquiry in this book sets out to answer the questions I have listed above. More specifically, this book examines how different types of images were used in concrete, historically situated research practices in order to produce new medical insights into hysteria. Throughout, I will analyse what kinds of insights into hysteria were produced using particular images, under which epistemic conditions, and with which epistemic consequences for the broader medical discourse on this elusive disorder. Consequently, the focus of my enquiry will not be limited to functional neuroimaging studies but will also entail a detailed re-examination of Charcot's image-based research into this disorder.

My goal thereby is twofold. On the one hand, I aim to draw attention to the epistemic importance, complexity and innovativeness of the current neuroimaging research on hysteria, which has thus far been unjustifiably neglected in the humanities context. I will argue that although this research is still relatively new, it has nevertheless already generated new insights that are gradually starting to reshape the current medical understanding of contemporary manifestations of hysteria. As such, neuroimaging research on hysteria deserves to be taken seriously, and its epistemic implications need to be analysed in detail. On the other hand, I intend to challenge the exceedingly negative image of Charcot's hysteria research that has emerged from the continually growing humanities scholarship on this topic over the last four decades.[24] The majority of the most critical accounts have focused explicitly on deconstructing what has been summarily designated as Charcot's unscientific use of images in his hysteria research.[25] As opposed to the dominant view, I will argue that far from enticing his patients to enact his prefabricated vision of hysteria, Charcot

24 See, e.g., Baer, *Spectral Evidence*; Bronfen, *Knotted Subject*; Didi-Huberman, *Invention of Hysteria*; du Preez, "Putting on Appearances"; Gilman, "Image of the Hysteric"; Gilman, *Seeing the Insane*; Gunning, "In Your Face"; Harrington, *Cure Within*; Holl, *Cinema, Trance, Cybernetics*; Hunter, *Face of Medicine*; Lamott, *Die vermessene Frau*; Marshall, *Performing Neurology*; McCarren, "Symptomatic Act"; Rose, *Field of Vision*; Schade, "Charcot and the Spectacle"; Scull, *Hysteria*; Shorter, *From Paralysis to Fatigue*; and Showalter, *Female Malady*.

25 Very few analyses of Charcot's hysteria research lack overtly dismissive overtones. See, e.g., Gauchet and Swain, *Le vrai Charcot*; Goetz, Bonduelle, and Gelfand, *Charcot*; Micale "Hysteria Male/Hysteria Female"; and Micale, *Hysterical Men*. Interestingly, on the whole, the less critical accounts have remained conspicuously tacit about Charcot's use of images. Some authors, such as Micale and Gunthert, have even argued that photography and other visualisation methods had a far less significant function in Charcot's hysteria research than suggested by more critical studies. See Micale, "Hysteria Male/Hysteria Female," 229n16; and Gunthert, "Klinik des Sehens," 27–31.

used images as investigation tools with which he generated new insights into the neurological basis of this disorder. Moreover, I will show that some of Charcot's insights, which were considered erroneous for more than a century, are currently receiving partial confirmation through neuroimaging studies. Both my analysis of Charcot's and the present-day neuroimaging research into hysteria will draw on the burgeoning humanities scholarship that highlights the constitutive roles of images in producing new scientific knowledge.[26] This book is, therefore, conceived as an interdisciplinary enquiry situated at the intersection of science and technology studies (STS), historical epistemology, visual studies, media studies, and history of science and medicine.

Due to the specific focus of my enquiry, those periods in hysteria's long medical history in which images were of no significance in the research context will be mostly disregarded in my enquiry.[27] For example, despite its undeniable prominence in the general history of hysteria, Freud, whose research was decisively informed by the use of spoken language, will only be marginally addressed in this book and with a particular purpose. Specifically, I will argue that by challenging Charcot's views on the neurological nature of hysterical symptoms, Freud directly contributed to the purging of images from hysteria research and, later and more indirectly, to the apparent disappearance of this disorder as a medical category. Hence, only those aspects of Freud's engagement with hysteria that will help me make this argument will be discussed in this book.

This brings us to a highly contested point regarding hysteria's present-day existence as an actual medical condition. Addressing this point is crucial for my enquiry. This is because I am not dealing here with hysteria in the colloquial sense of the word, as a pejorative designation for emotionally excessive behaviour, still predominantly attributed to women. I am also not focusing here on hysteria as a broader sociocultural phenomenon that, as some feminist scholars have suggested, should be understood as a symbolically encoded enactment of personal discontent.[28] Instead, I am enquiring into how images have been used as productive epistemic tools in the context of systematic and sustained medical research on hysteria within the last three decades of the nineteenth and the first two decades of the twenty-first centuries. An attentive reader might ask at this point how such an enquiry is even possible if hysteria ceased to exist as a medical entity before the beginning of the twenty-first century.

Admittedly, as I will discuss in chapter 2, the term 'hysteria' was indeed expunged from the official medical nosology in the 1980s and replaced by multiple new labels that have been changing ever since. Yet, notwithstanding these still ongoing fluctuations in terminology, what has remained constant since the nineteenth century are the physical characteristics of the patients' symptoms. This, at least, is what a considerable number

---

26 See, e.g., Alac, *Digital Brains*; Beaulieu, "Not the (Only) Truth"; Daston and Galison, *Objectivity*; Dumit, *Picturing Personhood*; Krämer, "Operative Bildlichkeit"; Latour, "More Manipulation"; Latour, "Visualization and Cognition"; Lynch, "Representation in Formation"; Mersch, "Pictorial Thinking"; and Rheinberger, *History of Epistemic Things*.

27 For a pertinent and succinct overview of hysteria's medical history, see Micale, *Approaching Hysteria*, 19–29.

28 See Bronfen, *Knotted Subject*, xii–xiii, 40–42. Similarly, Juliet Mitchell has argued that hysteria "is no longer a disease, it is a mode of behaviour and a life story," "a particular response to aspects of the human condition." Mitchell, *Mad Men and Medusas*, 17, 19.

of contemporary neurologists argue, many of whom have authored the functional neuroimaging studies I will analyse in detail in chapters 3 and 4.[29] In chapter 2, I will discuss the evidence put forth by these neurologists to support their argument that hysterical symptoms have remained unchanged since the nineteenth century. Yet already at this point, it is important to emphasise that I have no intention to challenge this view. First of all, from the perspective of my enquiry, it is not significant if this claim is valid or not. Moreover, strictly speaking, due to the lack of medical expertise and access to actual patients, I have no way of directly testing the validity of this claim. What matters, however, is that the claim of hysteria's continued existence is explicitly and repeatedly invoked in the present-day medical context, particularly in the neuroimaging studies I will discuss in the course of this enquiry. Hence, in this book, the view that hysteria still exists will be treated as an axiomatic claim that substantially informs current neuroimaging studies of these symptoms.

Another crucial point is that I have chosen to retain the term hysteria when referring not only to Charcot's research but also to the present-day studies. On the one hand, I have done this to emphasise the neuroimaging studies' underlying idea of the historical continuity of hysterical symptoms. On the other hand, in retaining the term 'hysteria,' I aim to avoid the terminological confusion that has dominated the current research into this disorder due to the continually shifting nomenclature over the past two decades.[30] My intention is not to naively imply the existence of a single, homogeneous, or historically unchanging disease entity. Instead, I use the term hysteria as a descriptive, summary designation for a set of highly heterogeneous symptoms that were once the focus of Charcot's image-based research and have now once again become the object of functional neuroimaging studies. These symptoms include limb paralysis, convulsive fits, contractures, anaesthesia (i.e., loss of sensitivity), pain, mutism, and disturbances of vision. While my use of the term foregrounds the assumed constancy of the symptoms' physical features across centuries, it nevertheless acknowledges the undeniable historical contingency and instability of hysteria as a nosological category. This instability is reflected in hysteria's shifting definitions, diagnostic criteria, and presumed aetiology, which I will discuss in chapter 2. To put it more explicitly, the view that will underpin my analysis in this book is that while the clinical features of the symptoms may have remained the same, their medical perception has varied considerably across the specific historical periods we will discuss here.

Importantly, I should also add that I am well aware that my decision to continue to use the term hysteria when discussing contemporary studies might raise a few eyebrows. Admittedly, this term is currently viewed by many as having pejorative connotations, mainly due to its etymological association with the female reproductive organ. By no means do I wish to offend any of the sufferers. Yet, I am unconvinced that

29 See, e.g., Bègue et al. "Metacognition," 251–52; Vuilleumier et al., "Sensorimotor Loss," 1077–78; and Wegrzyk et al., "Functional Connectivity," 163.

30 For example, during this period, the same symptom has been designated across different functional neuroimaging studies as hysterical, conversion, or functional paralysis. Compare, e.g., Marshall et al., "Hysterical Paralysis," B1; de Lange, Roelofs, and Toni, "Self-Monitoring," 2051; and Diez et al., "Fast-Tracking," 929.

it would bring much to revert to alternative terms currently used in the medical context, such as conversion, psychogenic, functional, somatoform, or medically unexplained symptoms.[31] First, as I will discuss in chapter 2, none of these alternative labels is neutral. Second, all these alternative labels tend to obscure and disown hysteria's winding history as an enduring medical mystery that has more often than not been more or less explicitly viewed as either an exclusively or, at least, predominantly female disorder.[32] Ignoring this history does not change it.

Having said this, however, my enquiry will have very little to add to the rich scholarship that has examined the undoubtedly significant role of gender in medical research on hysteria.[33] The reason for this is that my focus lies elsewhere. When I examine Charcot's research and the present-day neuroimaging studies, I am primarily concerned with discussing the roles of images in the medical investigation of hysteria as a neurological, or more precisely, brain-based disorder. This means that I am analysing how particular kinds of images are produced, used, and interpreted in the medical context with a distinct aim of directly or indirectly linking hysteria to a potential brain dysfunction. Simply put, my enquiry focuses on the medium-specific and epistemic aspects of image-based hysteria research. From this particular perspective, gender issues neither had any priority for Charcot's hysteria research nor have they been of any explicit interest to the authors of the functional neuroimaging studies at the centre of my enquiry. Admittedly, just as during Charcot's time, also today, hysterical symptoms continue to be diagnosed more often in female than male patients.[34] Yet, this diagnostic prevalence, which may be an inadvertent consequence of implicit gender bias, remains without any aetiological explanation and is not a topic addressed by the functional neuroimaging studies analysed here. Instead, as I will show in chapter 3, the functional neuroimaging research into hysteria within the first two decades of the twenty-first century has been informed by a tacit assumption that shared neural mechanisms underpin hysterical symptoms in both men and women. The very same assumption explicitly informed Charcot's image-based hysteria research more than a century earlier.[35] For these reasons, this enquiry will largely ignore gender issues.[36]

---

31 I am concerned with here how to designate the symptoms when discussing them in the humanities-based context. I do not presume to possess the authority to influence how these symptoms should be named in the medical context.

32 For feminist accounts of hysteria, see, e.g., Bronfen, *Knotted Subject*; Evans, *Fits and Starts*; Mitchell, *Mad Men and Medusas*; Showalter, *Female Malady*; Showalter, "Hysteria, Feminism, and Gender"; and Smith-Rosenberg, "Hysterical Woman."

33 For a succinct overview of feminist analyses of hysteria, see Micale, *Approaching Hysteria*, 66–88. On the role of the female gender, see, e.g., Bronfen, *Knotted Subject*; Showalter, *Female Malady*; and Showalter, "Hysteria, Feminism, and Gender." For a discussion of the construction and treatment of the male gender in Charcot's hysteria research, see, in particular, Micale, *Hysterical Men*; and Micale, "Hysteria in the Male." For comparative analyses of the female and male genders in Charcot's research, see Gilman, "Image of the Hysteric"; Holschbach, "K(l)eine Differenzen"; and Micale "Hysteria Male/Hysteria Female."

34 See, e.g., APA, *DSM-5*, 312.

35 See, e.g., Charcot, "Lecture 18: Six Cases," 220.

36 However, there are indications that, in the near future, gender might become a topic of concern in functional neuroimaging research on hysteria. This shift is reflected in two perspective articles

Specifically, this book aims to show that both in Charcot's research and the current functional neuroimaging studies, images, though admittedly of very different kinds, were constitutive of producing new medical insights into hysteria. Whether or not these insights withstood—or in the case of current studies, will withstand—the test of time regarding their scientific validity is beside the point for my enquiry. What matters is that these insights, as I will claim, effectuated shifts in the medical understanding of hysteria at the given historical moments and, in Charcot's case, also had a direct impact on how the symptoms were diagnosed and treated. My aim is not limited to merely outlining the respective changes in the understanding of hysteria in the late nineteenth and early twenty-first centuries. Instead, I am mainly interested in uncovering how these shifts were facilitated through the use of images. I will thereby argue that in neither of these contexts were images deployed as mere illustrations of scientific findings. Rather, images were and are being deployed as active tools for exploring hysteria patients' bodies and brains, searching for the assumed neurophysiological basis of hysterical symptoms. Moreover, I will also claim that by producing, manipulating, interacting with, making sense of, and interpreting images, both Charcot and the authors of contemporary neuroimaging studies have managed to, at least tentatively, link the elusive hysterical symptoms to a visualisable and thus analysable dysfunction of the brain.

In the course of this enquiry, we will encounter a wide range of different kinds of images. For example, when analysing Charcot's image-based hysteria research, we will discuss his use of photographs, sketches, schematic drawings, synoptic tables, self-inscribing curves, line graphs, and body maps. We will also examine contemporary neuroimaging studies and see that so-called functional brain maps comprise an essential part of each published article. Such maps are typically visualised as colourful blobs superimposed either upon grey-scale brain sections or 3D brain renderings. But I will also show that, in addition to brain maps, present-day scientists produce and work with a host of different intermediary images. For reasons I will discuss in chapter 3, such intermediary images remain confined to laboratory spaces and specialist circles and are thus unfamiliar to non-expert audiences. Nevertheless, I will argue that working with such intermediary images crucially shapes the research process, both fostering and limiting the kinds of insights that scientists can produce about hysterical symptoms when using functional neuroimaging technologies.

Strictly speaking, my analysis will be limited to images in the sense of purpose-made visual artefacts or, to use Bruno Latour's term, inscriptions.[37] Such inscriptions

published in late 2020 and early 2021, which have proposed a new research agenda for the neuroimaging investigation of hysteria. The authors of both articles have recommended that despite the shared neural mechanisms across genders, potential neurophysiological differences between male and female patients—and how such differences might be influenced by genetic, hormonal, social and cultural factors—should be explored by future studies. See Drane et al., "Framework," 6; and Perez et al., "State of the Field," 11, article 102623. When studies informed by this new research agenda start appearing in medical journals, it will be the task of humanities scholars to examine how gender is being framed in the ongoing functional neuroimaging research on hysteria.

37 Latour, "More Manipulation," 347; and Latour, *Pandora's Hope*, 306–7.

are produced through the process of visualisation that "includes the arrangements of materials, instruments, and their outputs."[38] Despite the diversity of kinds of images that I will discuss here—some analogue and others digital—my intention is not to clarify the concept of the 'image.' Although in the current visual studies discourse there are a plurality of coexisting definitions regarding the nature of images, my enquiry does not aim to participate in this particular discourse.[39] To be more specific, the question I am addressing here is not what an image is in general. Instead, my focus is on how different kinds of images were and are being used operatively, i.e., as "instruments of reflection" and exploration, in concrete, historically situated scientific practices whose goal was to elucidate the neurophysiological basis of hysteria.[40] Thus, my enquiry is aligned with and aims to expand the practice-oriented approaches outlined in the contributions recently published in the volume *Representation in Scientific Practice Revisited*.[41]

Methodologically, my analysis is informed by Sybille Krämer's concept of operative iconicity ("*operative Bildlichkeit*").[42] According to Krämer, epistemically productive images can be understood as spaces for action ("*Operationsraum*").[43] Put differently, their

38 Lynch, "Representation in Formation," 325.

39 How to define the 'image' remains a matter of intense debate. For a succinct overview, see Eder and Klonk, "Introduction," 9–11. One pertinent definition that is not mentioned in this overview but deserves to be pointed out is Nelson Goodman's. Writing in the 1970s, Goodman broadly defined images as pictorial signs whose visual properties have a distinctly referential relation to the objects they visualise. Goodman, *Languages of Art*, 9. He insisted that no degree of resemblance between the image and the object was required to establish the referential relation. This is because the process of producing an image, instead of passively copying a pre-existing reality, actively "participates in making what is to be" visualised. Goodman, 32. For recent accounts that attempted to define the concept of the image, see, e.g., Mersch, "Pictorial Thinking"; and Purgar, "What Is Not an Image." More radically, Ingrid Hoelzl has argued that the "concept of 'image' [is] dissolving under the assault of neuroscientific modelling and advances in machine vision." Hoelzl, "Postimage," 361. According to Hoelzl, the image could no longer be defined as a fixed representational form but instead as an infinitely malleable algorithmic configuration. Hoelzl thus proposes a "very large definition of the image as the relation of data and of algorithms that are engaged in an operation, which involves visual data or data visualization." Hoelzl, 361. At first glance, it might appear that many of the distinctly non-mimetic digital images I will discuss in chapters 3 and 4 defy more classical notions of images, such as Goodman's, and fit more closely the redefinition of the image proposed by Hoelzl. However, my detailed analysis in chapter 3 will show that far from being entirely arbitrary and unstable algorithmic configurations, various digital images with which scientists work in the course of a functional neuroimaging study have a distinctly referential relation to actual subjects' active brains. Despite their technological novelty, from the perspective of their concrete use in the scientific context, these images are more closely aligned with Goodman's than with Hoelzl's definition of images.

40 Krämer, "Operative Bildlichkeit," 104 (my translation).

41 See Coopmans et al., *Representation Revisited*. See also Hinterwaldner and Buschhaus, *Picture's Image*; and Pauwels, *Visual Cultures of Science*.

42 Krämer, "Operative Bildlichkeit," 104.

43 Krämer, "Diagrammatische Inskriptionen," 236. It should be noted that while analysing the functions of images across different contexts, other scholars have introduced alternative concepts of image operativity. For instance, Harun Farocki developed his influential concept of operative images while discussing how images are used as instruments in the contexts of warfare with

ability to both show and tell something of interest about the phenomena they refer to depends on how their users interact with them.[44] It is through such interactions that images fulfil their functions as investigation tools in the scientific context. Generally speaking, my analysis will focus on two key types of interactions with images that can be identified both in Charcot's research and in the contemporary functional neuroimaging studies of hysteria—how researchers work *on* images and *with* images.

First, I will focus on how researchers work *on* images, in the sense of intentionally producing them in targeted ways through long "cascades of transformations."[45] We will see that the trajectories of such cascades of transformations are in part determined by the particular visualisation technology (i.e., the medium) researchers had chosen to deploy. As pointed out by Bruno Latour, in scientific practice, the referential quality of the resulting images, i.e., their "ability to reach the objects inaccessible otherwise," is inextricably linked to a series of targeted manipulations that went into the production of the images.[46] To understand the roles of images in generating new medical insights, both in Charcot's research and the contemporary neuroimaging studies of hysteria, we have to pay close attention to the medium-specific processes through which these images were purposefully constructed. It may be fair to warn my readers that in chapter 3, when discussing functional neuroimaging studies, I will go into considerable technical and mathematical detail regarding the underlying processes of image production. Yet, I kindly ask those of my readers who are less interested

intelligent weapons. Hence, in Farocki's definition, operative images are "made neither to entertain nor to inform" but "to monitor a process." Farocki, "Phantom Images," 17, 18. Moreover, Farocki has underscored the non-representational character of such images, arguing that they are made by machines and for machines, thus largely bypassing the human user. Farocki, 17. More recently, while discussing the functions of images in the dynamics of contemporary political conflicts, Jens Eder and Charlotte Klonk have introduced the concept of 'image operations' to designate the ability of images "to augment and create significant events." Eder and Klonk, "Introduction," 3. Aiming to examine various political image operations, Eder and Klonk primarily focus on the uncontrollable events that images trigger "both in the virtual and the physical world, [and] that often go beyond the intentions of their producers and sometimes even against them." Eder and Klonk, 4. For a discussion of additional approaches to image operativity, see Hoel, "Operative Images." Due to my focus on examining epistemic functions of images in scientific research, I draw on Krämer's concept of operative iconicity, which she developed by explicitly foregrounding the knowledge-producing potential of images. See Krämer, "Operative Bildlichkeit," 94–96, 98, 104.

44 See Krämer, "Operative Bildlichkeit," 116–17; and Krämer, "Mind's Eye," 277, 286. Admittedly, Krämer introduced the concept of operative iconicity in the context of what she referred to as diagrammatic inscriptions, such as graphs, tables, and maps. According to Krämer, the "lowest common denominator" of such diagrammatic artefacts "is the inscribed plane that emerges from the interaction of point, line and plane," a feature that she designates as graphism. Krämer, "Mind's Eye," 276. Some images that I will analyse here (e.g., photographs) do not possess the feature of graphism. Nevertheless, I hope to show that the concept of operative iconicity can be fruitfully applied to characterise their use as epistemic tools in hysteria research. In other words, I will expand the concept of operative iconicity by arguing that it is not determined by the visual features of the images, such as graphism, but instead constituted primarily through their particular use as epistemic tools.

45 Latour, "More Manipulation," 347.

46 Latour, 347.

in technical aspects of functional neuroimaging to nevertheless bear with me. In my analysis, I will never go beyond the level of detail necessary to allow me to make claims about the epistemic functions of the resulting images in hysteria research.

Second, the other key type of interaction of interest to this enquiry is how researchers work *with* images as outputs of the process of visualisation. Two crucial aspects of working with images are of primary concern, both in regard to Charcot's research and to the present-day functional neuroimaging studies. On the one hand, I will analyse how researchers make sense of images in terms of how they extract information of interest from them. On the other hand, I will delineate how researchers use the information they extracted from the images to make judgments about the hysteria patients' physical bodies (in Charcot's research) and about the patients' active brains (in neuroimaging studies). Although these two aspects of working with images are closely interlinked in actual practice, my analysis will pry them apart to clarify their distinct roles in the process of producing new medical insights into hysteria.

The first aspect of working with images, I will argue, requires a highly specific kind of visual expertise that allows members of a particular research community to identify in a purposefully construed image something which is not necessarily evident to a non-expert. I will insist that this applies even to images whose visual content may otherwise appear straightforward or self-evident, such as the well-known photographs of Charcot's hysteria patients. What is at stake is not what these images appear to depict to an untrained non-specialist eye, but how scientists interact with them to obtain new information about the phenomenon under investigation. I will show that to identify the information of interest in the images, researchers do not view them as visual depictions, as non-experts would. Instead, researchers engage with images in a distinctive way that is best described by what Sybille Krämer termed 'reading.'[47] Krämer's designation of reading is pertinent because it emphasises that to make them yield the information of interest, researchers approach images akin to visual texts. Or, to use Dieter Mersch's term, researchers treat images as "iconic textures,"[48] which they need to decipher. In doing so, researchers must make expert decisions which of the images' visual features should be overlooked as irrelevant for their purposes and which are salient and should, therefore, receive a great deal of attention.[49] In such targeted reading of the image, knowing which visual details to ignore is just as important as being able to recognise those that carry the information of interest.[50]

---

47 Krämer, "Operative Bildlichkeit," 101–3.

48 Mersch, "Pictorial Thinking," 162. Similarly to Krämer, Mersch argues that various 'iconic textures' that are used in the context of science and technology "cannot simply be subsumed under the category of the pictorial, as they are much closer to writings which have to be 'read' than to images which have to be viewed." Ibid.

49 Mersch, 162. For a related account, which posits that scientific images are not merely viewed but must be actively read because they are often accompanied by additional contextual information and also require certain background knowledge on the user's part, see Merz, "Designed for Travel."

50 Importantly, drawing on the concept of reading, in chapter 3, I will additionally argue that some of the intermediary images with which authors of functional neuroimaging studies work remain illegible even to these experts. We will see that this illegibility is due to the fact that although the information of interest is encoded into these images, it is nevertheless not directly accessible.

Crucially, the selective seeing that underlies the process of reading images in the scientific context is not arbitrary. Instead, as I will show, it is grounded in the set of assumptions and conventions that are shared by a particular community of researchers at a given moment. Put differently, there are rules among researchers about which aspects of the images they work with are salient and which are accidental. However, such rules and conventions are not necessarily explicitly formulated. Hence, knowing how to read particular images in order to obtain from them the information of interest entails what Michael Polanyi has termed tacit knowledge, i.e., the kind of knowledge "that cannot be put into words."[51] Members of the research community, therefore, have to acquire this tacit knowledge through the practice of working with images. Just as importantly, we will also see that some of the implicit rules which govern how a particular community of researchers reads certain images are historically contingent and thus subject to change. This is all the more reason why, when discussing the epistemic roles of images in Charcot's research and in contemporary neuroimaging studies of hysteria, we must unpack the assumptions that have determined how different kinds of images were and are being read in these specific historical contexts.

Finally, it is not only vital for us to understand what scientists see in the images when deploying them in hysteria research to obtain new information about the functioning of patients' bodies and brains. It is equally important for our discussion how, in the next step, scientists attribute symbolic meanings to the information thus obtained. In other words, we need to analytically differentiate between, on the one hand, what I have defined above as the operation of 'reading' images and, on the other hand, the subsequent operation through which the images' meanings are constituted and which I will call 'interpretation.'

I do not mean to imply that the operation of reading the images (in the sense of obtaining the information of interest) is semantically neutral.[52] I merely want to emphasise that 'reading' is distinct from the process of interpretation, which, in turn, is understood here as an active ascription of medical meaning. In fact, I will argue that it is ultimately this latter process that, in the end, enables researchers to use images operatively in the medical context. For instance, it enables them to more or less reliably differentiate between actual patients and simulators, or to make claims about the hysterical symptoms' underlying neural mechanisms. To uncover how particular

---

Hence, I will use the term illegible to denote images that are impossible to read (in the sense of accessing the information of interest) even for an expert because these images are not clear enough. Simply put, in my terminology, illegible images are visually opaque. Conversely, I will claim that images legible to an expert are nevertheless potentially unreadable to an untrained viewer, who lacks the background knowledge required to read such images in an informed way. Such differentiation in terms may appear fastidious, but it will enable me to delineate which users under which conditions and from what kinds of images can extract the information of interest. The specific way I apply the terms 'illegible' and 'unreadable' to images in the context of this enquiry is derived from the semantically distinct ways in which these two adjectives are used to refer to written or printed texts. See, e.g., University of Chicago Press, *Chicago Manual of Style*, 335.

51 Polanyi, *Tacit Dimension*, 4.

52 See my claim above that the process of reading is informed by a research community's shared conventions and requires to be learnt.

medically operative meanings of images have been generated in hysteria research at the given historical moments, it is necessary to go beyond the images themselves and to analyse the broader conceptual frameworks within which the respective interpretations are embedded. This aspect of my analysis will be informed by Ludwig Jäger's concept of 'transcriptivity.'[53] Jäger introduced this term to denote the "semiological procedures of inter- and intramedial references" that "organize the production and transformation of meaning" across all communicative media (i.e., speech, writing, analogue, and digital images).[54]

I draw on Jäger for two specific reasons. First, his concept of transcriptivity will allow me to zoom in on the procedural aspects of how meaning is generated in image-based hysteria research through symbolic operations of relating images to other images and texts, and through them to more abstract concepts, such as will, agency, or intention. Second, by introducing the concept of transcriptivity, Jäger has defined meaning in dynamic terms, as a temporary and intrinsically unstable effect of the relations established among different media systems under particular discursive conditions. Crucially, according to Jäger, the validity of the semantic effects thus generated can always be called into question by subsequent, alternative interpretations that establish a different set of intermedial and intramedial references.[55] Hence, Jäger's concept of transciptivity will enable me to foreground the historical situatedness, contingency, and fragility of the attribution of operative meanings to images both in Charcot's research and in the functional neuroimaging studies of hysteria. Moreover, it will permit me to examine the epistemic conditions that made using images as investigation tools in hysteria research possible at the given historical moments. Finally, it will allow me to analyse how these images then induced shifts in the broader conceptual frameworks that had initially enabled their implementation.

Significantly, my analysis will strictly focus on the dynamic processes of meaning attribution within the medical contexts. I will thereby disregard the semantic potential of these images to provoke uncontrollable effects when circulating among non-experts. Because they lack the visual competence necessary to read the images in the intended ways, non-experts might interact with them in a less informed manner than the scientists who use them as investigation tools. In the process, non-expert users can thus generate unforeseen semantic effects.[56] However significant the resulting broader sociocultural effects of these images might have been or, in the case of functional brain scans, could turn out to be, they are not the object of my enquiry. And although my thematic focus is limited to the medical investigation of hysteria, my analytical approach and the conclusions I draw about the epistemic functions of images in the research practice can be applied to other subject areas. It is conceivable that a

53 See Jäger, "Transcriptivity Matters," 49.

54 Jäger, "Epistemology of Disruptions," 72.

55 Jäger, 82–84.

56 For an incisive account, which uses the examples taken from various areas of political conflict to delineate the unforeseen and unintended sociocultural effects that images can develop once they start circulating among the general public, see Eder and Klonk, "Introduction," 1–7.

comparable approach could be fruitful when analysing neuroimaging in general, as well as other areas of natural sciences that use images as epistemic tools.

This book's central question of how researchers worked and are working on and with different kinds of images to produce new medical insights into hysteria at the end of the nineteenth and beginning of the twenty-first centuries is addressed systematically across four chapters, followed by a short conclusion. Chapter 1 examines in detail the epistemic uses of a wide variety of images across two decades of medical research into hysteria that Charcot and his team conducted at the Salpêtrière. Doing so will shift the focus from the (in)famous photographs of female patients in the throes of hysterical attacks, which have been at the centre of the majority of humanities-based accounts that have dismissed Charcot's hysteria research as non-scientific.[57] Although I will also discuss these photographs, I will consider them in conjunction with the other types of images that featured prominently in Charcot's research. Moreover, I will also examine the relations between the images and the broader conceptual frameworks in which the production, reading, and interpretation of these images were embedded. I will thereby argue that images were constitutive of producing new insights into a range of hysterical symptoms. They enabled Charcot to develop novel diagnostic tools and treatments, as well as to conceptualise hysteria as a brain disorder by positing its underlying neurophysiological mechanism.

Whereas chapter 1 takes a close look at how images were used in a particular historically situated research practice, chapter 2 introduces a change of perspective. It offers a diachronic view of the epistemological shifts that took place from the mid-1880s to the present day. I hope to show that these shifts played a crucial role, first, in the dismissal of images as epistemic tools in hysteria research; second, in the subsequent apparent disappearance of hysteria itself; and third, in the re-emergence of an image-based investigation of this elusive disorder. As we will see, the emergence of new medical research on hysteria has been closely tied to the use of novel neuroimaging technologies, such as functional magnetic resonance imaging (fMRI). Having charted these developments, the chapter then delineates how, both directly and indirectly, the current fMRI-based research has begun to reshape the medical understanding of hysteria by contributing to its renewed conceptualisation as a brain disorder. Chapter 2 thus lays the groundwork for the subsequent two chapters, each of which examines from a different perspective how the currently ongoing medical reconceptualisation of hysterical symptoms is effectuated through the use of functional brain images.

Chapter 3 offers a detailed analysis of how present-day researchers work with fMRI to produce new insights into the pathological functioning of the hysteria patients' brains, which is presumed to underpin the disorder's baffling symptoms. Using the example of two mutually related fMRI studies, the chapter examines the operations researchers perform and the judgments they make while producing, reading, and interpreting functional brain images.[58] I have chosen the two particular case studies because of the precision with which their authors formulated the research questions

57 See, e.g., Didi-Huberman, *Invention of Hysteria*; Scull, *Hysteria*; and Showalter, *Female Malady*.

58 See de Lange, Roelofs, and Toni, "Self-Monitoring"; and de Lange, Toni, and Roelofs, "Altered Connectivity."

and the complexity of their experimental designs. These two aspects, as I intend to show, are representative of the gradually increasing refinement of the current fMRI-based investigation of hysteria. Moreover, following Latour and Jäger, in this chapter, I develop a new methodological approach to analysing the epistemic functions of digital scientific images that visualise previously inaccessible and essentially invisible neurophysiological phenomena. I do so by introducing the key analytical distinction between '(il)legible' and '(un)readable' images. This approach allows me to analyse the medium-specific step-by-step operations through which fMRI-based findings and their medical meanings are constructed in the current hysteria research.

Drawing on this analysis, chapter 4 then expands the focus to offer an overview of the kinds of insights that the functional neuroimaging studies of hysteria, on the whole, have generated in the first two decades of the twenty-first century. On the one hand, the chapter delineates and examines a set of empirical and theoretical "action-guiding concepts" that have informed fMRI studies during this period.[59] On the other hand, the chapter charts how the image-based findings of the fMRI studies have facilitated the gradual articulation and, in some cases, a revision of the preliminary concepts that informed these findings. In the process, I argue, the fMRI studies have generated new, though still tentative, insights into hysterical symptoms' underlying neurophysiological mechanisms. Chapter 4 is structured around a series of case studies specifically chosen to help delineate this process.

The conclusion summarises the epistemic import of the fMRI studies of hysteria from the first two decades of the twenty-first century, examines their relation to Charcot's research, and considers possible future developments. Finally, it provides an overview of the various epistemic functions of images in the medical research on hysteria discussed in this book and suggests the implications for a broader understanding of image-based knowledge production in historically situated scientific research.

59 Steinle, *Exploratory Experiments*, 321.