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Chapter 1

Amazon Can Read Your Mind: A Media Archaeology of the Algorithmic Imaginary

Simone Natale

“Google works for us because it seems to read our minds - and, in a way, it does”
(Siva Vaidhyanathan).¹

A sensational statement appears in an article from the popular American blog Gawker: “Amazon Can Read Your Mind.”² But what do these words mean? Much to the disappointment of parapsychologists and science fiction writers, the author does not intend to suggest that Amazon has supernatural powers. She refers, instead, to a system patented by Amazon, called “anticipatory shipping.” This technology employs algorithms that analyse previous behaviours of customers in order to forecast how many items will be shipped to particular locations in a particular period – for instance, how many packages will be sent to the city of Oxford in the week preceding Christmas. The system provides a competitive

advantage to Amazon: it enables the company to prepare in advance, deploying the right numbers of vehicles and under-paid workers to deliver last-minute Christmas presents to over-worked Oxford professors. Like other algorithm-based technologies, it also provides tech companies with a quasi-magical aura. Their capacity to anticipate behaviours suggests that Google, Apple, Amazon or Facebook not only embody the future, but they can see it – the modern clairvoyants of the digital age.

In parapsychology, mind reading is defined as the ability to gain information about others' thoughts through extrasensory perception. Yet, the same concept is employed to characterize the functioning of digital technologies that anticipate human behaviors and mental states through the elaboration of physiological indexes, background information, and records of previous behaviors. In the field of computer science, technologies programmed to understand and react to people's emotions and mental states are thus described as “mind reading computers.”³ Likewise, algorithms that allow one to anticipate the behavior of users and consumers, providing them with tailored offers and services — such as Amazon's “anticipatory shipping,” or Google ads — are referred to as mind reading.⁴ How did mind reading, a concept associated to parapsychology and the occult, become a way to illustrate the functioning of computing technologies? By addressing this question, this essay examines mind reading as a keyword whose definition and meaning wavered between different forms of knowledge, from parapsychology to cybernetics, and computer science.

Excavating the media archaeology of mind reading computers, moreover, this chapter aims more broadly to interrogate how notions and concepts of occult and supernatural meanings are applied to describing different technologies, such as digital media. Media archaeology, which posits that the contemporary figuration of digital media is only understandable through

an excavation into media history, provides a useful framework to achieve this goal.⁵ Concepts, words and phrases such as “mind reading” have a complex history that goes beyond their mere etymology or the history of their uses. They are embedded within social and cultural encounters where their meanings and assonances are negotiated through a complex interplay of events, social actors, bodies of knowledge, and controversies.⁶ As search engines, databases, and Siri interfaces increasingly function in the language of their users,⁷ looking at the history of these concepts may help unveil how different bodies of knowledge, including beliefs in the occult and the supernatural, contribute to the construction of the complex imaginary through which we domesticate new technologies and make them more familiar to us. Because “mind reading computers” is more than a metaphor: it is a mode of perceiving and imagining computing technologies and, consequently, integrates them within our experience.⁸

As I will show, it was in the 1950s that research on Artificial Intelligence (AI) and cybernetics first introduced the concept of mind reading in reference to computation. Yet, our archaeological excavation into the history of mind reading should begin earlier than this, at the end of the nineteenth century, when the newly born and already controversial field of psychical research – what we call today parapsychology – developed two competing yet coexisting frameworks to approach and define this phenomenon. Examining the early controversies that established these discourses will help explain why the notion of mind reading currently describes phenomena and events that are apparently so different from each other.

Inventing mind reading, or, the interpretative flexibility of a concept

At the end of the nineteenth century, mind reading was an established genre of stage performance. Hypnotizers and mind readers demonstrated their skills before paying audiences in several European countries, interacting with the tradition of modern magic and stage spiritualism.⁹ These stage performances attracted the interest of researchers in fields such as psychology and psychical research, who tackled mind reading as a major subject of investigation. The UK-based Society for Psychical Research, for instance, set up several committees in the 1880s and 1890s to study phenomena of mind reading and thought transference.¹⁰

While explanations for the success of the mind readers' performances were manifold, two competing interpretative frameworks emerged to address this phenomenon. According to the first paradigm, which we might describe as *extrasensorial*, mind reading was performed through channels distinct from our five senses, such as electromagnetic waves that were produced and perceived by the human brain, enabling sensitive subject to "read" others' minds.¹¹ For supporters of the second paradigm, based on the *sensorial* explanation, mind readers were instead able to recognize indexical traces such as posture, body language, visual expressions in order to make inferences about someone's thoughts and feelings (Fig. 1).¹²

One might be tempted to posit a rigid distinction between these two frameworks: the former being irrational and pseudoscientific and the latter being rationalistic and scientific-based. However, looking at scientific attempts to study mind reading, as well as at stage performances and at the many popular texts on the topic that circulated in periodicals and books during the late Victorian age, it becomes clear that such rigid distinctions are not adequate to describe the actual debate on the topic.¹³ First, supporters of the extrasensorial

explanation often professed to refuse the concept of supernatural, pointing out that brain waves were all-but natural phenomena yet to be discovered, and that their inquiry was as rational as any other scientific investigation.¹⁴ Second, and most importantly, the two frameworks were often presented alongside each other, leaving a substantial openness regarding the interpretation of these phenomena. In stage performances, mind readers profited from the fascination of inexplicable and supernatural phenomena, but tended to tolerate different interpretations of the phenomena, inviting scientists to attend their shows and allowing spectators to decide if to believe in supernatural or extrasensorial powers, or to adopt a more skeptical viewpoint.¹⁵ Likewise, scientific and popular texts discussing mind reading often mentioned and discussed both the sensorial and the extrasensorial interpretation.¹⁶ The Society for Psychical Research, for example, had been funded with the mission of examining “the nature and extent of any influence which may be exerted by one mind upon another, apart from any recognized mode of perception”; yet participants in the Society’s studies often pointed to and actively experimented with the possibility of sensorial explanations for mind reading phenomena.¹⁷

Thus, as the notion of mind reading was gaining ground in psychical research and in public performances at the end of the nineteenth century, the popularization of this concept was underpinned by the coexistence and often by the merging of sensorial and extrasensorial interpretations.¹⁸ The existence of different frameworks and meanings of understanding mind reading continued in the following decades, as mind reading was studied in the emerging field of parapsychology as the extrasensory faculty that penetrates the minds of others. Influential experiments on alleged psychic phenomena, including mind reading, were conducted in the 1930s by American psychologists William McDougall and Joseph B. Rhine at Duke University. These experiments posited the identification of the boundaries between

sensory and extra-sensory perception as the main goal of parapsychology, and were instrumental in the establishment of a new framework for the study of mind reading within the paradigm of ESP (Extrasensory Perception) phenomena.¹⁹ At the same time, however, the concept of mind reading was also used more broadly to describe a body of techniques that create knowledge about a subject's mental state. Rather than being narrowed within the boundaries of parapsychology and psychological research, the notion became available to describe technologies that predict human behaviours or interpret physiological data to produce knowledge about mental states, including lie detectors.²⁰

To explain how the concept of mind reading is capable of describing things that are apparently so distant from each other, such as psychological powers and the functioning of lie detectors, it may be useful to employ a concept familiar to historians of technology: interpretative flexibility. According to the Social Construction of Technology (SCOT) model, the development of a technology is a process through which technical innovations are adapted to social uses in ways that are not linear and that are extremely difficult to predict. In this sense, the social use of a technology is never a given but instead is constantly open to negotiation. Technologies – especially those that have been recently introduced – are therefore available to diverse interpretations, and ideas developed by different groups about what a technology is and how it can be employed become imaginative possibilities that concur to establish its potential meaning and applications.²¹ For instance, as the phonograph was invented in the late nineteenth century, it was imagined that it could be used in very different ways, such as dictating notes, remembering the voices of loved ones after their death, and (at first, only secondarily) playing music.²² Such flexibility of interpretations characterized the early history of this technology, as alternative meanings and visions emerged to envision what sound recording was and how it could be used.

What is interesting about this model is that it does not regard different interpretations as forcefully competing with each other, but instead as contributing to creating an interpretational framework for the new technology. It is easy to see how this applies in the case of mind reading, in which apparently divergent discourses co-existed, interacted, and even mingled with each other. The concept of mind reading was in fact used to describe not one but many things at the same time: 1) the ability to make inferences about mental states based on physiological traces; 2) a body of technologies performing this task; 3) an extrasensorial power, studied and theorized by psychical researchers, enabling gifted human subjects to access others' minds. Thus, the concept of mind reading could have, in different contexts, very different interpretations and meanings.

The “interpretative flexibility” of mind reading, however, also resulted in the concept having multiple connotations that continued to be relevant even when a particular meaning was privileged. The aura of mystery surrounding supernatural and parapsychological phenomena did not cease to play a role even when the extrasensorial interpretation was explicitly refused. It was for this reason that mind readers who performed on the stage in the late Victorian age hinted to the mysteries of the unknown in their shows even when they were publicly admitting the sensorial origins of their “powers.” No matter if rationalistic explanations were given, the performance of mind reading continued to stimulate the audience's fascination for the occult and the unknown, thereby attracting audiences to their shows.²³

A similar dynamic characterizes cases when technologies that allegedly or factually provided information about feelings and mental states were described as mind reading machines: the notion of mind reading, even if defined in sensorial terms, added a mysterious aura to

technical artefacts. This is apparent, for instance, if one looks at patents registered during the first half of the twentieth century featuring technologies aimed at interpreting mind states or at detecting lies, such as a “Camera for recording eye movements” or an “Apparatus for obtaining criminal confessions and photographically recording them.”²⁴ In the latter, for instance, illusory effects were included in the attempt to “impress the subject’s with their being of a supernatural character and to so work upon his imagination to enable an inquisitor operating in conjunction with the recording system to obtain confessions and graphically record them.”²⁵ While on the technical level a sensorial interpretation of mind reading was given, there was also a clear awareness of the aura of mystery, fear and fascination surrounding supernatural phenomena – and how this could inform the reception of new technologies (fig. 2).

It was in this context that researchers in novel fields such as cybernetics and Artificial Intelligence came up with the idea that computer’s read minds. The use of the concept of mind reading contributed to the construction of an imaginary of computers as quasi-magical machines that has been shaping representations of digital media up to the present day.

Enter computers, the thinking machine

Originating in the middle twentieth century at the intersection of cybernetics and the new-born computer science, Artificial Intelligence (AI) research aims at devising technical means and especially computer technologies that replicate or simulate human intelligence, in general or through specific applications to domains such as language, vision, and problem solving.²⁶ In the 1950s, the interest surrounding the possibility of producing AI gained momentum among computer scientists and researchers in cybernetics.²⁷ This interest was associated with the perception that a close link existed between computing and the human mind.²⁸ While computer scientists borrowed terms from psychology to describe the operations of computers, psychology also borrowed notions and terms from computer science to describe the functioning of the human brain.²⁹ The analogy between computers and minds also spread in popular literature and culture, with computers being represented as “thinking machines” in science fiction as well as in journalistic reports.³⁰

It was in this context that operations performed by computers started to be associated to parapsychological phenomena such as mind reading. The first to talk about “mind reading computers” was most probably Claude Shannon, an American mathematician who is widely considered among the founders of both computer science and AI research. In the early 1950s Shannon’s colleague at Bell Labs, David Hagelbarger, created a game-playing machine called SEER (acronym for SEquence Extrapolating Robot) that learned how to recognize and predict patterns of behaviors to outdo human opponents. In the paper presenting his creation, he pointed out that developing such capacities could benefit systems that needed to react to the changing needs and desires of large masses of users, such as the telephone industry.³¹ While the acronym SEER already pointed to the ostensibly clairvoyant faculty of the machine, in 1952 Shannon challenged Hagelbarger by creating what he called a “mind

reading machine” to compete against SEER. By unmasking the predictability of human behaviour, Shannon’s mind reading machine presented the computer as a technology that was potentially capable of tricking and outperforming the human mind – a project that another mathematician and pioneer of computer science, Alan Turing, explored two years earlier through the idea of the Turing test.³²

As suggested by historian of AI Hamid R. Ekbia, “what makes AI distinct from other disciplines is that its practitioners ‘translate’ terms and concepts from one domain into another in a systematic way” – something that can explain, for instance, the persistent use of the mind as a metaphor for the computer.³³ As AI pioneers developed computing programming since the 1950s, they found that concepts such as “mind reading” or “seers” were adequate to describe a technological project and to popularize computers as quasi-magical machines. In fact, as Bernard Geoghegan aptly notes, the use of the mind reading metaphor by Shannon underpinned his and Hagelbarger’s attempt to make computers the centre of a spectacular performance – a sport-like duel between the machines they had created. The struggle between SEER and the mind reading machine aimed first and foremost at the public’s imagination, rather than at scientific advancements in the field. The battle between the two machines was planned and performed to stimulate the imagination of vast audiences that were seeking to follow and comprehend the functioning and significance of computing technologies.³⁴ In such context, mind reading emerged as a metaphor capable of conveying computer’s capacity to predict human behaviours but also, and perhaps more importantly, to confer the new medium the magical, ineffable aura of supernatural phenomena.

According to historian of religion Egil Asprem, the popularization of scientific concepts can be understood as a process of “cognitive optimization” attracting inferentially-rich representations with the capacity to grab the attention of the public.³⁵ Cognitive optimisation makes concepts salient and memorable in ways comparable to popular religious concepts, “rendering concepts linguistically effective through metaphor, allegory, and conceptual adjustments.”³⁶ With the development of computer-based technologies that predict and analyse human behaviours and states of mind, the notion of mind reading has become a form of conceptual adjustment to describe different tools. We have seen how mind reading enters into representations of the power of Google or Amazon algorithms; but the idea of mind reading computer is employed also in contexts such as affective computing, an area within computer sciences encompassing the study and development of devices that recognize and interpret human feelings.³⁷ Similarly, the application of computing to the analysis of data produced through diagnostic devices has been presented through the idea of mind reading, as scanning techniques such as Magnetic Resonance Imaging (MRI) are used to provide information about feelings and states of mind – with the prospect of MRI-enhanced “nonconsensual mind reading” presented as threatening for privacy and civil rights.³⁸

Taina Bucher recently proposed the notion of “algorithmic imaginary” to describe how people experience and make sense of their interactions with algorithms in their everyday life.³⁹ Algorithms are problem-solving devices in software and code, but as David Beer aptly points out, they also “need to be understood as a part of the social world in order to understand the power they have to shape everyday life.”⁴⁰ In fact, algorithms shape all kinds of cultural encounters, from the books we choose to buy to the films we decide to stream on Netflix, and the experience to have a website “predict” our interests or consuming patterns is familiar to many.⁴¹ In this context, the concept of mind reading makes the idea of computer

algorithms insinuated into our thoughts more powerful and menacing. It introduced into the algorithmic imaginary, or in other words into the way we perceive and understand our daily interactions with present-day computing technologies, an element that defies technical explanation by hinting at supernatural and magical worlds.

Technology's opacity has always been one of the key conditions reinforcing its association with the supernatural and the fantastic. Our wonder before the shows of a stage magician is intrinsically connected to our failure in understanding the technical means by which the magician performs her or his feats. No matter if we know that there is a trick; its technical opacity, with the aid of the *mise-en-scène* on the theatrical stage, opens up to the possibility for a thrilling experience grounded in our fascination for the supernatural and unknown.⁴² Similarly, the fact that the projector was hidden from the audience's view in early film shows provided an opportunity for supernatural and magical interpretations of cinema's illusory powers.⁴³

Computing technologies bring the opacity of technology to a different level. In fact, as mentioned in the introduction, even computer scientists and programmers are unable to follow up the stratifications of software and code that lead up to the actual functioning of the machine. This is even more pronounced in the case of machine learning technologies that employ neural networks, which are widely used in contemporary AI applications devised by companies such as Amazon, Facebook, Google and Apple: neural networks, in fact, function through complex statistical patterns whose internal functioning is often opaque. It is also for this reason that there is, as many have noted, an element of creepiness and wonder in how algorithms inform our everyday life.⁴⁴

Asprem underlines that a common form of cognitive optimization is the substitution of complex micro-level causal explanations with individual agents whose role is characterized through the language of intentionality. For instance, popular works on molecular biology presents genes as agents in the work of evolution, translating complex theories on the mechanical interplay of regions of genomic sequence into the language of intuitive psychology. In a similar way, the idea that computers are reading minds posits computers as an intentional agency, disregarding the complex technicality through which algorithms function and preserving the opacity of computing technology.⁴⁵

The use of concepts taken from the supernatural or the occult, such as mind reading, represents in this regard a pattern through which particular imaginative experiences of algorithms are created, moving from their intrinsic opacity to the opening of spheres of imagination that seem at a first glance to have little to do with computers. Crucially, such patterns are embedded within our experience of digital technologies, and therefore should be considered integral to the social nature of these technologies. As Siva Vaidhyanathan puts it in the quote appended at the opening of this essay, “Google works for us because it seems to read our minds – *and, in a way, it does.*”⁴⁶

Conclusion

Employing a media archaeology approach, which posits that the contemporary figuration of digital media is only understandable through an excavation into media history, this essay has delved into the history of conceptualizations of mind reading since the late nineteenth century to illuminate the circumstances by which this notion became available for describing and representing the functioning of computing technologies. I have argued that looking at such history helps realize why mind reading is a notion able to describe such different phenomena and to adapt to such diverse contexts, from parapsychology to computer science. The interpretative flexibility of this concept, as sensorial and extrasensorial explanations coexisted and in certain cases even mingled with each other, allowed mind reading to define a broad range of events and technologies. Importantly, even when the idea of mind reading was employed to describe techniques and technologies that had apparently nothing to do with extrasensorial or supernatural faculties, the magical connotation was still present, informing the representation and the imaginary of “mind reading technologies” such as computers.

While this essay focuses on the case of mind reading, a similar dynamic characterises the way other concepts with supernatural or religious connotations are employed to describe digital media. Hagelbarger’s choice to name his game-playing machine “SEER,” in this sense, suggests that an archaeological excavation of the idea of clairvoyance and prophecy could be as revealing – perhaps even more revealing – than the archaeological excavation of mind reading computers conducted here.⁴⁷ In fact, we constantly use religious and supernatural concepts to describe digital as well as non-digital technologies; looking at how concepts wavered between different meanings helps unveil the origin and implications of such uses.

Scholars in media history have approached the topic of the technological imaginary through a variety of theoretical and critical approaches. Whether called the “imaginaire,”⁴⁸ “media fantasies,”⁴⁹ or “technological visions,”⁵⁰ this issue raises an array of problems and questions whose answers are complex and often problematic.⁵¹ How do particular forms of imaginary become entangled with specific technologies and techniques? What is the impact of the imagination in everyday interactions and experiences with technologies? Literature on the supernatural and the occult might provide a useful clue to approach such questions.

Discussing the status of beliefs about extraordinary phenomena, Peter Lamont recently argued that these are regulated by a system of flexible choices between different interpretations. In other words, when we observe or experience something that defies explanation, such as the performance of a stage magician or a spiritualist séance, we oscillate between a range of potential interpretative frameworks to make sense of the event.⁵²

Crucially, Lamont points out – thereby following the thread of explorations conducted by classical authors such as Goffman and Bateson⁵³ – that different and competing frameworks are not strictly alternative to each other, but may interact or coexist in complex and meaningful ways.⁵⁴ This is something that can easily be observed also in many everyday acts, such as reading a newspaper. Readers can interpret a prediction about the future introduction of flying cars published in a newspaper as a potentially truthful forecast about future trends, a product of fiction, or perhaps even an ironical allusion to current political issues; they might also be uncertain between two or more of these explanations.

Lamont’s approach to extraordinary phenomena is a useful tool for investigating the formation and the impact of technological imaginaries. Not unlike extraordinary phenomena, technologies are objects characterised by a substantial openness to different interpretations. Such openness provides the conditions for the emergence of forms of imagination and

representation that inform in many ways our relationship with technology. As the case of mind reading shows, the same idea may not only describe different things, but also conjure different imaginative possibilities. It might provide us a way to comprehend intuitively the functioning of a technology, and at the same time enable a play of imagination that posits technology's magical, supernatural character. It is in this sense that we should consider the somehow disconcerting claim according to which "Amazon can read your mind."

Illustration captions

Fig. 1. A sensorial interpretation of mind reading. From George M. Beard, *The Study of Muscle-Reading and Allied Nervous Phenomena in Europe and America* (New York: The New Sydenham Society, 1882), frontispiece.

Fig. 2. “Apparatus for obtaining criminal confessions and photographically recording them,” US Patent 1,749,090, issued 3 March 1933.

Endnotes

¹ Siva Vaidhyanathan, *The Googlization of Everything (and Why We Should Worry)* (Berkeley: University of California Press), p. 52.

² Hazel Cills, 'Amazon Can Read Your Mind', Gawker blog, 19 January 2014, <http://gawker.com/amazon-can-read-your-mind-1504642063>

³ Charles Day, 'Mind-Reading Computers', *Computing in Science & Engineering* 14, no. 4 (2012): p. 104.

⁴ Vaidhyanathan, *The Googlization of Everything*, p. 52.

⁵ For an overview on media archaeology, see Jussi Parikka, *What Is Media Archaeology?* (Cambridge: Polity Press, 2012); Erkki Huhtamo & Jussi Parikka, eds., *Media archaeology: Approaches, Applications, and Implications* (Berkeley, Calif.: University of California Press, 2011); Simone Natale, 'Understanding Media Archaeology', *Canadian Journal of Communication* 37, no. 3 (2012): pp. 523–527.

⁶ On the methods and theory of conceptual history, see Reinhart Koselleck, *The Practice of Conceptual History: Timing History, Spacing Concepts* (Stanford: Stanford University Press, 2002).

⁷ Benjamin Peters, *Digital keywords* (Princeton: Princeton University Press, 2016), p. xiv.

⁸ On the domestication of new technologies and its relationship with narrative, imagination and discourse see Simone Natale, 'Unveiling the Biographies of Media: On the Role of Narratives, Anecdotes and Storytelling in the Construction of New Media's Histories', *Communication Theory* 26, no. 4 (2016): pp. 431–449, doi:10.1111/comt.12099.

⁹ Susan Zieger, 'Miss X, Telepathy, and affect at fin de siècle', *Victorian Literature and Culture* 46, no. 2 (2018): pp. 347–364, doi:10.1017/S1060150318000049. On supernatural beliefs and spectacular entertainments see also Simone Natale, *Supernatural Entertainments:*

Victorian Spiritualism and the Rise of Modern Media Culture (University Park, PA: Pennsylvania State University Press, 2016).

¹⁰ Roger Luckhurst, *The Invention of Telepathy: 1870-1901* (Oxford: Oxford University Press, 2002); Janet Oppenheim, *The Other World: Spiritualism and Psychical Research in England, 1850-1914* (Cambridge: Cambridge University Press, 1985).

¹¹ This was, for instance, the “working hypothesis” initially reached by a committed set up in the 1880s by the American Society for Psychical Research (SPR) to investigate the phenomenon of “thought transference.” According to their initial report, it might have been thought that “impressions from the mind of those about us are continually reaching our own minds by channels distinct from those of the senses, but that the forms of cerebral activity thus set up are so very feeble in comparison with those which depend, directly or indirectly, upon influences reaching us through the ordinary sensory mechanism.” Henry Pickering Bowditch (Chairman) et al., ‘Report of the Committee on Thought-Transference’, in *Proceedings of the American Society for Psychical Research* 1 (1885-89): p. 111.

¹² See, for example, Joseph Jastrow, *Fact and fable in psychology* (Boston: Houghton Mifflin, 1900), pp. 308-309; George M. Beard, *The Study of Muscle-Reading and Allied Nervous Phenomena in Europe and America* (New York: The New Sydenham Society, 1882); W. F. Barrett, ‘Mind-reading versus muscle-reading’, *Nature* 24, no. 610 (1881): p. 212.

¹³ On the dynamics of popularization for this debate, see Ilana Kushan, ‘Mind Reading: Literature in the Discourse of Early Victorian Phrenology and Mesmerism’, in *Victorian Literary Mesmerism*, edited by Martin Willis & Catherine Wynne (Amsterdam: Rodopi, 2006), pp. 1–37.

¹⁴ “Admitting mind-reading to have been proved to exist as a phenomenon, there is nothing marvelous, mystical, or occult about this. It is simply a natural process going on under a natural law of which as yet we know but little.” William A. Hovey, *Mind-Reading and Beyond* (Boston: Lee and Shepard Publishers, 1885), p. 191.

¹⁵ Roger Luckhurst, ‘Passages in the Invention of the Psyche: Mind-Reading in London, 1881-84’, in *Transactions and Encounters: Science and Culture in the Nineteenth Century*, edited by Roger Luckhurst and Josephine McDonagh (Manchester: Manchester University Press, 2002), pp. 117-50. A similar openness towards different and also contrasting interpretations of events was typical of the stage performance of mesmerists and spiritualist mediums; see, on this, Natale, *Supernatural Entertainments*, pp. 11, 65-81.

¹⁶ Douglas Blackburn, *Thought-Reading or Modern Mysteries Explained* (London: Field and Tuer, 1884).

¹⁷ Hovey, *Mind-Reading and Beyond*, p. 1.

¹⁸ Peter Lamont has argued that the fluctuation between different interpretative frames is characteristic of the ways through which extraordinary phenomena are understood and interpreted. Peter Lamont, *Extraordinary beliefs: A historical approach to a psychological problem* (Cambridge: Cambridge University Press, 2013).

¹⁹ Joseph Banks Rhine, *Extra-Sensory Perception* (Boston: Bruce Humphries, 1935).

²⁰ See Michael Pettit, *The Science of Deception: Psychology and Commerce in America* (Chicago: University of Chicago Press, 2013). Psychologist Joseph Jastrow employs the example of the automatograph, a recording device employed to detect involuntary movements, to illustrate how “sensorial” mind read operates: see Jastrow, *Facts and Fable in Psychology*, pp. 310-312.

²¹ Wiebe E. Bijker, *Of Bicycles, Bakelites, and Bulbs: Toward a Theory of Sociotechnical Change* (Cambridge, Mass.: MIT Press, 1995); Trevor J. Pinch & Wiebe E. Bijker, 'The Social Construction of Facts and Artifacts: Or How the Sociology of Science and the Sociology of Technology Might Benefit from Each Other', in *The Social Construction of Technological Systems: New Directions in the Sociology and History of Technology*, edited by Wiebe E. Bijker, Thomas Parke Hughes & Trevor J. Pinch (Cambridge, Mass.: MIT Press), pp. 17–50.

²² Jonathan Sterne, *The Audible Past: Cultural Origins of Sound Reproduction* (Durham: Duke University Press, 2003).

²³ Stuart Cumberland, a mind reader who raised to celebrity in late-nineteenth-century London with his spectacular performances, publicly refused, for instance, supernaturalist accounts of his phenomena. Luckhurst, 'Passages in the Invention of the Psyche', p. 125.

²⁴ 'Camera for recording eye movements', U.S. Patent 2,229,721, issued January 28, 1941; 'Apparatus for obtaining criminal confessions and photographically recording them', US Patent 1,749,090, issued March 3, 1933.

²⁵ 'Apparatus for obtaining criminal confessions'.

²⁶ For a history of AI research, see Daniel Crevier, *AI: The Tumultuous History of the Search for Artificial Intelligence* (New York, NY: Basic Books, 1993).

²⁷ Hamid R. Ekbia, *Artificial Dreams: The Quest for Non-Biological Intelligence* (Cambridge: Cambridge University Press, 2008).

²⁸ Gerd Gigerenzer and Daniel G. Goldstein, 'Mind as computer: Birth of a metaphor', *Creativity Research Journal* 9, no. 2-3 (1996): pp. 131-144, doi: 10.1080/10400419.1996.9651168

²⁹ Sherry Turkle, *The Second Self: Computers and the Human Spirit* (Cambridge, Mass.: MIT Press, 2005), p. 2.

³⁰ C. Dianne Martin, 'The Myth of the Awesome Thinking Machine', *Communications of the ACM* 36, no. 4 (1993): pp. 120–33, doi: 10.1145/255950.153587. On the imaginary of AI see Simone Natale and Andrea Ballatore, 'Imagining the Thinking Machine: Technological Myths and the Rise of Artificial Intelligence', *Convergence: The International Journal of Research into New Media Technologies*, published online before print (2017): pp. 1-16, doi: 10.1177/1354856517715164; Stefano Bory and Paolo Bory, 'I nuovi immaginari dell'intelligenza artificiale', *Im@go: A Journal of the Social Imaginary* 4, no. 6 (2016): pp. 66–85, doi: 10.7413/22818138047.

³¹ David W. Hagelbarger, 'SEER, a sequence extrapolating robot', *IRE Transactions on Electronic Computers* 1 (1956): pp. 1-7, doi: 10.1109/TEC.1956.5219783.

³² Bernard Dionysius Geoghegan, 'Agents of History: Autonomous Agents and Crypto-Intelligence', *Interaction Studies* 9, no. 3 (2008): pp. 403–14, doi: 10.1075/is.9.3.03geo. Interestingly, in the paper *Computer Machinery and Intelligence* where he outlined the idea of the Turing Test, Turing is concerned by the possibility that humans may communicate telepathically, and suggests that everybody should be located in "telepathy-proof" rooms. Chris Bernhardt, *Turing's Vision: The Birth of Computer Science* (Cambridge, Mass: MIT Press, 2016), p. 157. For a reader of discussions of the Turing Test, including key writings by Alan Turing on the topic, see Stuart Schieber, ed., *The Turing Test: Verbal Behavior as the Hallmark of Intelligence* (Cambridge, Mass.: MIT Press, 2003).

³³ Ekbia, *Artificial Dreams*, p. 5. For a closer examination of discursive shifts and analogies in AI research, see Natale and Ballatore, 'Imagining the Thinking Machine', pp. 6-7.

³⁴ Geoghegan, 'Agents of History'.

³⁵ Egil Asprem, 'How Schrödinger's Cat Became a Zombie', *Method & Theory in the Study of Religion* 28, no. 2 (2016), pp.113–140, doi: 10.1163/15700682-12341373.

³⁶ Asprem, 'How Schrödinger's Cat Became a Zombie', p. 118. For a similar perspective, see also Richard Dawkins' concept of the meme: Richard Dawkins, *The Selfish Gene* (Oxford: Oxford University Press, 1976).

³⁷ See, for instance, El Kaliouby, Rana, and Peter Robinson. 'Mind Reading Machines: Automated Inference of Cognitive Mental States from Video', *2004 IEEE International Conference on Systems, Man and Cybernetics* 1 (2004), pp. 682-688, doi: 10.1109/ICSMC.2004.1398380; Michael Kai Petersen, Carsten Stahlhut, Arkadiusz Stopczynski, Jakob Eg Larsen, and Lars Kai Hansen, 'Smartphones Get Emotional: Mind Reading Images and Reconstructing the Neural Sources', *International Conference on Affective Computing and Intelligent Interaction* (2011), pp. 578-587, doi: 10.1007/978-3-642-24571-8_72. On affective computing, see Rosalind W. Picard, *Affective Computing* (Cambridge, Mass.: MIT Press, 2000).

³⁸ See, for instance, Jan Stanley, 'High-Tech "Mind Readers" Are Latest Effort to Detect Lies', ACLU, 29 August 2012, <https://www.aclu.org/blog/high-tech-mind-readers-are-latest-effort-detect-lies>

³⁹ Taina Bucher, 'The Algorithmic Imaginary: Exploring the Ordinary Affects of Facebook Algorithms', *Information, Communication & Society* 20, no. 1 (2016): pp. 30-44, doi: 10.1080/1369118X.2016.1154086.

⁴⁰ David Beer, *Popular Culture and New Media: The Politics of Circulation* (Houndmills, Basingstoke: Palgrave Macmillan, 2013), p. 65.

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- ⁴¹ Blake Hallinan and Ted Striphas, 'Recommended for You: The Netflix Prize and the Production of Algorithmic Culture', *New Media & Society* 18, no. 1 (2016): pp. 117–137, doi: 10.1177/1461444814538646.
- ⁴² During, *Modern Enchantments*.
- ⁴³ Murray Leeder, *The Modern Supernatural and the Beginnings of Cinema* (Houndmills, Basingstoke: Palgrave Macmillan, 2017); Simone Natale, 'The Cinema of Exposure: Spiritualist Exposés, Technology, and the Dispositif of Early Cinema', *Recherches sémiotiques/Semiotic Inquiry* 31, no. 1 (2011): pp. 101–117, doi: 10.7202/1027444ar.
- ⁴⁴ See, among others, Wendy Hui Kyong Chun, *Updating to Remain the Same: Habitual New Media*, Cambridge, Mass.: MIT Press, 2016.
- ⁴⁵ Aspren, 'How Schrödinger's Cat Became a Zombie', p. 119-121.
- ⁴⁶ Siva Vaidhyanathan, *The Googlization of Everything*, p. 52. Emphasis mine.
- ⁴⁷ Hagelbarger, 'SEER, a Sequence Extrapolating Robot'.
- ⁴⁸ Patrice Flichy, *The Internet Imaginaire* (Cambridge, Mass.: MIT Press, 2007).
- ⁴⁹ Paul Young, *The Cinema Dreams Its Rivals: Media Fantasy Films from Radio to the Internet* (Minneapolis: University of Minnesota Press, 2006).
- ⁵⁰ Marita Sturken, Douglas Thomas, and Sandra Ball-Rokeach, eds., *Technological Visions: The Hopes and Fears That Shape New Technologies* (Philadelphia: Temple University Press 2004).
- ⁵¹ See, on this, Simone Natale and Gabriele Balbi, 'Media and the imaginary in history: The role of the fantastic in different stages of media change', *Media History* 20, no. 2 (2014): pp. 203–218, doi: 10.1080/13688804.2014.898904.
- ⁵² Peter Lamont, *Extraordinary Beliefs: A Historical Approach to a Psychological Problem* (Cambridge: Cambridge University Press, 2013).

⁵³ See Erving Goffman, *Frame Analysis: An Essay on the Organization of Experience* (Cambridge: Harvard University Press 1974); Gregory Bateson, 'A Theory of Play and Fantasy', *Psychiatric Research Reports* 2 (1955): pp. 39–51.

⁵⁴ Peter Lamont, *Extraordinary Beliefs*.