Ivy Roberts

Visions of Electric Media

Television in the Victorian
and Machine Ages

Amsterdam
University
Press

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Televisual Culture

Televisual culture encompasses and crosses all aspects of television – past, current and future – from its experiential dimensions to its aesthetic strategies, from its technological developments to its crossmedial extensions. The 'televisual' names a condition of transformation that is altering the coordinates through which we understand, theorize, intervene, and challenge contemporary media culture. Shifts in production practices, consumption circuits, technologies of distribution and access, and the aesthetic qualities of televisual texts foreground the dynamic place of television in the contemporary media landscape. They demand that we revisit concepts such as liveness, media event, audiences and broadcasting, but also that we theorize new concepts to meet the rapidly changing conditions of the televisual. The series aims at seriously analyzing both the contemporary specificity of the televisual and the challenges uncovered by new developments in technology and theory in an age in which digitization and convergence are redrawing the boundaries of media.

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Introduction: The Lifespan of a Media Technology

Abstract

How do 'new' media become old? What determines the 'newness' of a technology? This introductory chapter engages questions related to history, technology, culture, and communication as well as examines the cultural context in which a new technology informs our understanding of its changing identity. The success and failure of new technologies depends heavily on the cultural expectations of its emergence. This study of early 'speculative era' television begins with a foundation in the history and theory of new media and a call to adopt an historically reflective view of technological development. After laying a foundation for the study of 'new' media and technological change, this chapter provides an overview of the chapters and what to expect.

Keywords: Media history; media theory; cultural studies; media archaeology; new media; television

In its most literal form, 'tele-vision' means 'seeing at a distance' (*tele*=distant, *videre*=to see). Television relates to the uses of technological and electrical apparatuses that make it possible to see into the distance. That is, the viewer is not looking out over the horizon with bare eyes, or even gazing through a telescope. The precise term, 'television', was coined in 1900.[1] Before then, television was known by many names, such as the telectroscope, the telephonoscope, and the diaphote. Nineteenth-century inventors dreamt of 'seeing by electricity'. After 1900, new names emerged, indicating a growing cultural obsession with television: the telephote, the Ikonophone, the

1   Constantin Perskyi, 'Television Using Electricity,' in *Congres International D. Electricite* (*International Congress on Electricity of 1900*) (Paris: Gauthier –Villars, 1901); R.W. Burns, *Television: An International History of the Formative Years* (London: Institutions of Electrical Engineers, 1998), 106; George Shiers, *Early Television: A Bibliographic Guide* (London: Taylor & Francis, 1997), 36.

Ikonoscope. The prospect of visual radio (radiovision) became popular, but people wondered whether it would be a fleeting fad. By the mid twentieth century, television became synonymous with broadcast and programming. By the time television emerged as a mass media in the 1950s, it had become *a fixed idea.*

Over the course of what has been termed its 'speculative era', 'television' evolved from a rough concept into a functional technology, eventually becoming a mass medium.[2] Television's speculative era spans two distinct periods. The Victorian Age, broadly understood as the reign of Queen Victoria of England (1837-1901), more generally applies to late nineteenth-century culture. The Machine Age, a term coined by historian of technology Lewis Mumford, refers to the early 20th-century culture of scientific progress, manufacturing, and industry.[3]

The first printed reference to anything resembling an electronic screen appeared in 1877.[4] On the heels of Alexander Graham Bell's invention and demonstrations of the telephone, speculation began to circulate about a visual adjunct that would make it possible to see the person on the other end of the line. In announcements of new inventions and breakthroughs, journalists bemoaned the death of theatre.[5] Satirists illustrated caricatures of the apocalyptic consequences of new media.[6] Rumours circulated about how the very foundation of society would change irrevocably upon the arrival of a device for 'seeing by electricity'. Electronic capabilities to support

2   R.W. Burns, 'Part I: The Era of Speculation 1877 to c. 1922,' in *Television: An International History of the Formative Years* (London: Institutions of Electrical Engineers, 1998), 3-140; Shiers, *Early Television*; Andreas Fickers, 'Television,' in *The Handbook of Communication History*, ed. Peter Simonson (New York: Routledge, 2013), 239.

3   Lewis Mumford, *Technics and Civilization* (Chicago, IL: University of Chicago Press, 2010), 9; John M. Jordan, *Machine-Age Ideology: Social Engineering and American Liberalism, 1911-1939* (Chapel Hill, NC: University of North Carolina Press, 1994); David F. Noble, *America By Design: Science, Technology, and the Rise of Corporate Capitalism* (Cambridge, UK: Oxford University Press, 1979); J. P. Telotte, *A Distant Technology: Science Fiction Film and the Machine Age* (Middletown, CT: Wesleyan University Press, 1999); David A. Mindell, *Between Human and Machine: Feedback, Control, and Computing Before Cybernetics* (Baltimore, MD: Johns Hopkins University Press, 2002), 1-2; Nicholas Daly, 'The Machine Age,' in *The Oxford Handbook of Modernisms*, ed. Peter Osborne, Peter Brooker, Andrzej Gasiorek, Deborah Longworth, and A. J. Thacker (Cambridge, UK: Oxford University Press, 2010).

4   The Electrician, 'The Electroscope,' letter to the editor, *New York Sun,* 30 March 1877; Louis Figuier, 'Le Telectroscope,' in *L'Annee Scientifique et Industrielle* (1877).

5   'Edison's Last,' *Boston Journal*, 13 May 1889; 'What Edison Claims,' *Chicago Journal*, 13 May 1891.

6   'Untitled' (This discovery mania), *New York Tribune,* 14 May 1878; 'Professor Goaheadison's Latest,' *Fun*, 3 July 1889.

a television industry on a practical basis showed signs of maturity by the year 1930. In the intervening 50 years or so, a rich, diverse visual culture of 'television' emerged, creating expectations and myths about new media.

There is no question that, today, television is again undergoing a transition.[7] Some call it the 'death of television'. Others herald the birth of convergence culture.[8] The shift from broadcast to online delivery indicates a change in platform as well as the form of television programming. With such changes, one might ask if watching YouTube or Netflix constitutes a television experience, or if a new term is required altogether. Given the uncertain state of television today, there is no time like the present to ask, 'when was television born'? To understand what television has become in the early 21st century, we need to look back to what television was before it became a mass medium.

Like the death of print, talk has been circulating for over a decade about the death of television. Television superseded radio, and the web and mobile media will supersede television, they say. Television producers and studios bemoan falling Nielsen ratings, declining viewership, and leaks and bootlegs. Fears such as these should be countered by recognizing that the media exist in harmony with culture. The media evolve, responding to cultural needs, economic capabilities, and technological possibilities. We need a new paradigm; we need to replace 'supersession' with 'transition'.

This book engages the question of how new media and technology come into being, and the forces that conspire to bring one possible future into existence over another. Televisual culture in the Victorian and Machine ages created expectations about what television would become: idealistic, maybe; futuristic, certainly. 'Television' coalesced decades before engineers made images appear on screens. Engineers and inventors, journalists and writers, and artists and philosophers contributed to a dense and varied discussion about 'television'. The general public also played an important role in constructing expectations about new technology. Responses to media announcements, letters to the editor, and rumour-laden op-eds document the vast range of speculations, anxieties, and expectations that existed

7   Amanda Lotz, *The Television Will be Revolutionized,* second edition (New York: NYU Press, 2014); Jean Burgess and Joshua Green, *YouTube: Online Video and Participatory Culture* (John Wiley & Sons, 2013); Peele Snickars and Patrick Vonderau, eds, *The YouTube Reader* (Stockholm: National Library of Sweden, 2009).
8   c.f. William Uricchio, 'The Future of a Medium Once Known as Television,' in *The Youtube Reader*, eds. Peele Snickars and Patrick Vonderau (Stockholm: National Library of Sweden, 2009), 24; Henry Jenkins, 'What Happened Before Youtube?' in *YouTube: Online Video and Participatory Culture* by Jean Burgess and Joshua Green (John Wiley & Sons, 2013), 109.

before the rise of mainstream popular science. Television's speculative era constitutes a distinct televisual culture in which agents (audiences, producers, inventors, engineers, critics, etc.) contribute to ways of thinking about 'seeing by electricity'. The visual rhetoric and discourse of television's speculative era provides a baseline for the study of media in transition.

This book promotes a conception of technology as a product of the imagination, sometimes called 'imaginary media'.[9] The possibilities of technology are limited only to what the inventor can dream and what the engineer can make possible. From an historical perspective, there is little difference between the imaginings of a science-fiction author and the inventor's actual functional technology. The visual rhetoric and discourse of television's speculative era highlights the peculiar similarities between science fiction and invention. Science-fiction authors wrote about it. Albert Robida 'invented' FaceTime, in the form of the telephonoscope, in 1882.[10] Hugo Gernsback prophesized modern uses of television in his Telephote (1918).[11] Inventors toiled over designs and filed patents. Journalists speculated on the cultural uses of television. Science-fiction texts, along with news articles, rumours, and satirical illustrations, converge into a discourse that creates expectations about new technologies and media.

A New Approach to Old Media

The early 21st-century media landscape has been labelled a convergence culture and a participatory culture. Futurist thinking identifies ´emerging media´ as if some progress were taking place. But 'new media' is a misnomer. The very term clouds the fact that media are in a state of constant transition. Are we living in a post-cinema or post-television age? In order to address the question of whether or not a change is really taking place, we need to rephrase the question itself. If we move past media form and supersession, the conversation becomes one of historical change and media in transition.

9   Eric Kluitenberg, 'On the Archaeology of Imaginary Media,' in *Media Archaeology: Approaches, Applications, and Implications,* eds. Erkki Huhtamo and Jussi Parikka (Berkeley, CA: University of California Press, 2011), 48-69; 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): 203-218.
10   Albert Robida, *Le Vingtième Siècle* (*The Twentieth Century*), (Paris: Librairie Illustree, 1882; Middletown, CT: Wesleyan University Press, 2004).
11   Hugo Gernsback, 'Television and the Telephot,' *Electrical Experimenter*, May 1918.

A contextual approach to media history acknowledges that every 'old' or obsolete technology was once new, novel, and innovative. Media historians who adopt this approach have examined early photography, telegraphy, and motion pictures in many contexts. In their volume *New Media, Old Media*, editors Wendy Chun and Thomas Keenan suggest an historical approach to 'new media' or 'emerging media'.[12] David Thornburg and Henry Jenkins prefer the designation 'media in transition'.[13] Film historian Rick Altman calls his method 'crisis historiography', referring to media in historical periods of identity crisis and change. 'We find that the technology today confidently called cinema was for over a decade considered quite differently by its contemporaries. In their early years, projected moving images were subjected to multiple contradictory definitions and treatments[...]. New technologies are always born nameless.'[14] In *Silent Film Sound*, Altman reveals that the very name we use today to refer to cinema before the coming of sound establishes an historically contingent designation that gets in the way of understanding how contemporary audiences would have experienced it.

'Media in transition' acknowledges that technologies are always in a state of flux. This is certainly true today, as the meaning of television and film are adapting to new systems for production and delivery. In a post-broadcast age, media industries are struggling with ways to identify film ('digital cinema'?) and television ('digital video content'?). Perhaps instead of focussing on the form, we can redirect our attention to the way these new configurations change and adapt to social and cultural conditions. Just because Netflix makes it easier for viewers to binge on television programmes does not mean that it was impossible to do so before digital content delivery. The habit became more pronounced, but it is not an entirely new behaviour.

Because media technologies are in a process of constant flux, reacting and adjusting to cultural and technological conditions, I adopt an interdisciplinary framework that accommodates a variety of perspectives. I approach production, practice, representation, and reception as various forms of discourse. Along the way, I acknowledge historical context and the many uses of media. Like media in transition, interdisciplinarity is always unsettled. Never satisfied with a single interpretive lens, interdisciplinarity aims to

12   Wendy Chun, 'Introduction: Did Somebody Say New Media?', in *New Media, Old Media: A History and Theory Reader,* eds. Wendy Chun and Thomas Keenan (New York: Routledge, 2006), 1-2. See also Benjamin Peters, 'And Lead Us Not Into Thinking the New is New: a Bibliographic Case for New Media History,' *New Media & Society* 11, no. 1-2 (2009): 13-30.
13   David Thornburn and Henry Jenkins, eds. *Rethinking Media Change: The Aesthetics of Transition* (Cambridge, MA: MIT Press, 2003).
14   Rick Altman, *Silent Film Sound* (New York: Columbia University Press, 2007), 19.

account for the multidimensionality and complexity of its objects of study. This book conceptualizes the products and events of late nineteenth- and early 20th-century cultural history, the history of technology and science, and media history as examples of an ongoing *visual rhetoric and discourse* of 'tele-vision'.

The visual rhetoric and discourse of speculative-era televisual culture comprises:

−   Satirical illustrations published in magazines and newspapers;
−   Illustrations of inventions published in technical journals and popular literature;
−   Perspectives of journalists published in newspapers, magazines, and books, which comment upon and document the negative, positive, and conflicted views about this new invention of 'seeing by electricity';
−   Commentary published in newspaper and magazine editorials and letters to the editor;
−   So-called 'ego-documents' published in newspapers, magazines, and books by inventors and their supporters.

In identifying these resources as a *discourse*, this book draws on Foucauldian-inspired cultural history.[15] French philosopher and historian Michel Foucault developed two methods for the study of history throughout his career: archaeology and genealogy. I use a mixture of both, as they have been incorporated into current methods in the study of cultural history.

Whereas Foucault proposes archaeology as a method for the 'history of the present', his genealogy has been adopted more earnestly. But historians generally consider archaeology to be deterministic, a way of telling the story of the past teleologically. In comparison to archaeology, genealogy conveys a greater appreciation for the similarities and differences between historical periods, for cultural forces and agencies.

Additionally, art historians have adapted the method of semiotics for the study of images.[16] From this perspective, images as well as words constitute a discourse: communicating and contributing to an ongoing conversation.

15   Michel Foucault, *The Archaeology of Knowledge* (New York: Pantheon, 1972); Aletta Biersack and Lynn Avery Hunt, *The New Cultural History* (Berkeley, CA: University of California Press, 1989); Victoria Bonnell, Lynn Avery Hunt, and Richard Biernacki, *Beyond the Cultural Turn: New Directions in the Study of Society and Culture* (Berkeley, CA: University of California Press, 1999); John Neubauer, ed. *Cultural History after Foucault* (Piscataway, NJ: Transaction Publishers, 1999).
16   Lynda Nead, *Myths of Sexuality: Representations of Women in Victorian Britain* (Oxford, UK: Blackwell, 1988). See also Roland Barthes, *Image-Music-Text* (New York, 1977); Michael Baxandall, *Patterns of intention: On the historical explanation of pictures* (Yale University Press,

Figure 1. George Du Maurier, 'Edison's Telephonoscope,' Punch, 9 December 1878.

Notably, Lynda Hunt's *Myths of Sexuality* extends a method for the semiotic reading of images in art and history. The emerging fields of visual studies, visual culture studies, and visual studies in science address the visual rhetoric and discourse of images in culture, science, and history.[17]

The Birth of a New Medium

In 1878, *Punch* illustrator and humorist George du Maurier drew a picture of 'Edison's Telephonoscope' (Figure 1). Imagining it as a marvelous new invention that could connect two remote places, the satire attributed the telephonoscope to American inventor Thomas Edison. Edison had recently made a name for himself with the phonograph and the carbon telephone. In 1878, Edison also unveiled several new devices that seemed to push the limits of what was possible. The megaphone was said to allow the deaf to

1985); Mieke Bal and Norman Bryson, 'Semiotics and Art History,' *The Art Bulletin* 73, No. 2 (June 1991), 174-208.

17   James Elkins, *Visual Studies: A Skeptical Introduction* (New York: Routledge, 2003); W. J. T. Mitchell, *What Do Pictures Want?: The Lives and Loves of Images* (Chicago, IL: University of Chicago Press, 2005); Oliver Grau and Thomas Veigl, *Imagery in the 21st Century* (Cambridge, MA: MIT Press, 2011).

hear. The electric light would revolutionize power and energy, bringing a source of clean and safe illumination to the home. Du Maurier's illustration suggested the next new thing: visual telephony. The telephonoscope would supersede the telephone before it even reached the market.

While Du Maurier's illustration looks to us like a television screen, a nineteenth-century observer would not have seen it that way. With no concept of 'television', a reader of *Punch* might have noticed a resemblance between the telephonoscope and a mirror or an enormous photograph-come-to-life. Alexander Graham Bell had only recently begun demonstrating his *talking telegraph* to a popular audience. It would be decades before the telephone reached that audience. This period of discovery mania sometimes called the technological revolution sparked discussion in scientific communities about the possibility of extending the range of vision as well as hearing. The sky was the limit. Popular rumour also contributed to these discussions, fuelling speculation and helping to construct expectations about new technology.

A contemporary reader would have drawn associations between Du Maurier's 'Telephonoscope' and current rumours about new technologies. They might have recognized that Edison had in fact announced the invention of a telephonoscope to the public earlier that year. Since the initial neologism *telephonoscope* attracted so much ridicule, Edison settled on calling his 'ear telescope' a megaphone (Figure 2).[18] A contemporary reader could not have failed to recognize in Du Maurier's 'Telephonoscope' a hint of satire and commentary on Edison's current enterprise, electric light. In October 1878, Edison's announcement of the invention of electric light sparked furious debate and speculation. Discussion ranged from exaggerated promotion to denial and rejection. *Punch*'s December 1878 issue reflected and contributed to the ongoing discussion of new technology and its effects on everyday life.

To a 21st-century observer, however, 'Edison's Telephonoscope' is nothing but a television. The goal of media history scholarship should be to address the discrepancy between these two perspectives. In this book, I propose to examine speculative-era moving-image media technologies with the goal of uncovering trends, shifts, and continuities. By acknowledging historical, contextual, technological, and cultural perspectives, media-history scholars can become aware of the many uses of old technology. Such a perspective reconfigures the 'Telephonoscope' from a television into a satire of electric light.

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18   'Edison's 'Ear Telescope,' *New York Sun*, 8 June 1878.
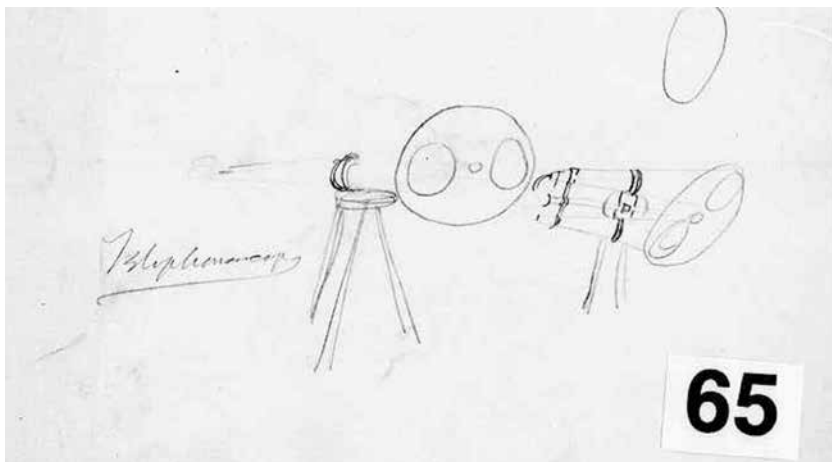
Figure 2a. Thomas Alva Edison, Sketch of the Telephonoscope, Laboratory Notebooks, 2 April 1878.
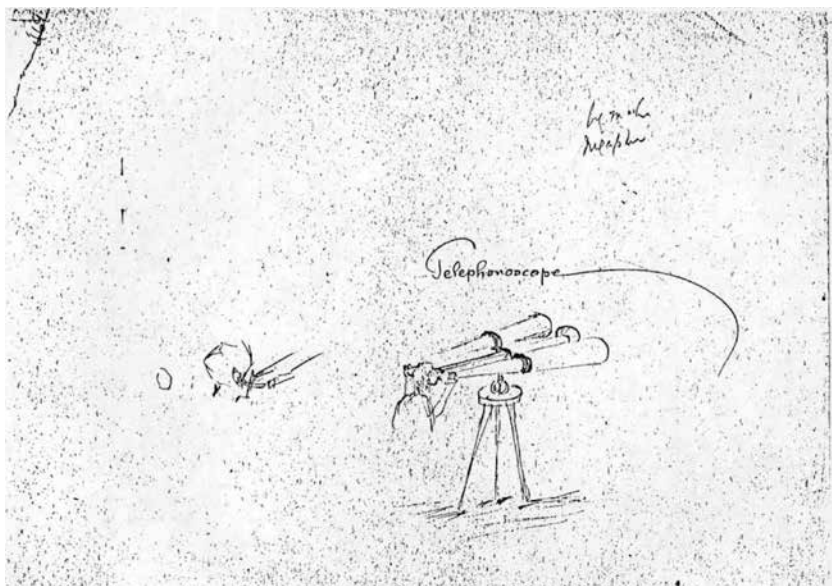
Figure 2b. James E. Kelly, Sketch of the Telephonoscope, Laboratory Notebooks, 17 May 1878.

Chapter Outline

By defining 'tele-vision' as 'seeing at a distance' (*tele*=distant, *videre*=to see), *Visions of Electric Media* adopts a view of media technology in a constant state of transition. Any given cultural moment assigns an identity to a media form that supports, encourages, and facilitates the needs of audiences and inventors alike. Media identity is intertwined with its culture of origin. By looking at the late nineteenth- and early 20th-century expectations of television, it is the goal of this book to defamiliarize the concept of television (presumably an immutable form), in order to speculate on the cultural uses, connections, and intersections of media in transition. Each chapter examines the relation of media technologies to conceptions of the body, the evolution of systems and networks, relationships between humans and machines, and enduring themes of control, communication, and ocularcentrism.

Visions of Electric Media investigates the many fluxing identities of 'television' before the invention of a functional apparatus in the late 1920s. The book consists of five chapters, organized into two parts. Part One examines late nineteenth-century speculative-era television, focussing on the cultures and technologies of 'seeing by electricity'. Part Two investigates the 20th-century transitions from mechanical to electronic engineering, focussing on the work performed at Bell Laboratories. By looking at the evolving discourse of television across the Victorian and Machine ages, I identify continuities and discontinuities between televisual culture in each age.

The telephonoscope emerged in the context of late nineteenth-century 'discovery mania'. Victorian engineers began the project of designing television as a means to 'annihilate space'. They pictured mirror-like screens and devices modelled after electrical telegraphs. The faith in the inevitability of technological progress drove inventors and audiences alike. Even though 'seeing by electricity' went down in history as a pipe dream, it continued to provide the impetus for engineers to develop televisual systems into the next century.

The assumptions underlying 'seeing by electricity' shaped the expectations and reception of television in later periods. A major transformation occurred at the turn of the century when engineers began to adopt a new way of thinking about distance communications. Engineers discarded the simple notion that a standalone device could do the work of bridging a gap between two places. While the analogy between the mechanical screen and the human eye persisted, designs matured into the reality of large technical systems. Machine-Age engineers adopted a new way of thinking about television that encompassed the wide expanse between viewers at either end of the circuit as part of a technological system.

When engineers finally achieved success with television systems in the 1920s, it became apparent that electronic screens were not going to live up to the Victorian ideal of the magic mirror. These technological systems constructed a new relationship between viewer and screen, displacing the Victorian expectation of the 'annihilation of space' with a modern communications paradigm. The cognitive dissonance between the knowledge of a person on the other end of the line and the picture one saw on the screen was a challenging perception to overcome.

The Machine-Age press documented these first impressions, from newspaper announcements and magazine editorials to lectures, textbooks, and popular science. But while journalists and readers continued to imagine 'seeing by electricity' as a sign of the 'annihilation of space', engineers struggled to explain the processes in which electrical signals travelled along telephone cables and over radio waves. Engineers took on the job of making the presence of the person depicted on the screen seem as real as possible. While they recognized that there was nothing natural about such a relationship, their goal became to make the act of using television as effortless as possible. Television's speculative era marks the shift from a culture of face-to-face presence to one of simulated presence. The modern, designed world grew up into artificial spaces engineered to seem natural.

If it has not already become apparent, the interdisciplinary study of speculative-era television history involves a diverse library of literature and methodology. As such, I have introduced the foundational works that support a contextual media history informed by cultural history and the history of technology. No single method accounts for both the technological development and the cultural construction of speculative-era television history. Therefore, I take advantage of different methods in each chapter.

Chapters One and Two investigate late nineteenth-century cultures and inventions for 'seeing by electricity': telephonoscopes, telectroscopes, telegraphic photography, and the Kinetograph and Kinetoscope. Inventors, engineers, and journalists alike identified 'seeing by electricity' as a tool for connecting people across vast distances, principally a form of visual telephony. I begin by investigating the circumstances surrounding George Du Maurier's illustration of 'Edison's Telephonoscope' published in *Punch* in December 1878. Media coverage on both sides of the Atlantic met Edison's inventions with a mixture of zeal and scepticism. Contemporary readers would have been acutely aware of Edison's invention of the telephonoscope (ear telescope or megaphone) and his claims to the invention of electric light that fall. I introduce the concept of 'technological folklore' to account for the rumours, hearsay, and journalist commentary that contributed to the

construction of cultural representations of the telephonoscope and electric light.[19] Building on works from print history such as Lisa Gitelman's *Scripts and Grooves*, Altick's *Punch*, and Secord's *Victorian Sensation*, I argue that 'Edison's Telephonoscope' represents 'discovery mania' by negotiating between the exaggerated claims of invention and the satirical rejection of new technology for its own sake.[20] This chapter encourages media historians to weigh the presentist perspective, which associates 'Edison's Telephonoscope' with a television or electronic screen, with the view of the contemporary reader, who would have made sense of the depiction not as a prophecy, but as a speculation and critique of technology.

Chapter Two leaps ahead ten years in order to address the aftermath. In 1889, Edison announced his invention of a 'Far-Sight Machine' in the lead-up to the Columbian Exposition (1893). When he unveiled his Kinetograph and Kinetoscope to the public in 1891, the subsequent confusion fuelled speculation of a hybrid electric-photography instrument that could transmit live images (like a television) as well as reproduce scenes (like the cinema). This discussion dovetailed into early cinema mythology that bolstered its identity as a spectacular attraction.

Film historians place this moment within the context of early cinema: the demonstration of the Kinetograph and the initial press surrounding the success of creating the first filmstrips like *Fred Ott's Sneeze* and the

19   Lisa Gitelman, *Scripts, Grooves and Writing Machines: Representing technology in the Edison era* (Stanford, CA: Stanford University Press, 1999); Trevor Blank, ed., *Folk Culture in the Digital Age: The Emergent Dynamics of Human Interaction* (Boulder, CO: University Press of Colorado, 2012); Mary Jo Hatch and Michael Owen Jones, 'Photocopylore at Work: Aesthetics, Collective Creativity and the Social Construction of Organizations,' *Studies in Cultures, Organizations and Societies* 3, no. 2 (1997): 263-287; Robert Darnton, 'The Symbolic Element in History,' *The Journal of Modern History* 58, no. 1 (1986): 218-234; Richard Dorson, ed., *Folklore and Folklife* (Chicago, IL: University of Chicago Press, 1972); Lois Monteiro, 'The Electronic Pocket Calculator: Joke 1,' *Western Folklore* 35, no. 1 (1976): 75; Michael Preston, 'Xerox-lore,' *Keystone Folklore* 19, no. 1 (1974): 11-26; Michael Preston, 'Traditional Humor from the Fax Machine: All of a Kind,' *Western Folklore* 53, no. 2 (1994): 147-169.

20   Altick, *Punch*; Gerry Beegan, *The Mass Image: A Social History of Photomechanical Reproduction in Victorian London* (London: Palgrave Macmillan UK, 2008); Bernard Carlson and Michael E. Gorman, 'Understanding Invention as a Cognitive Process: The Case of Thomas Edison and Early Motion Pictures, 1888-91,' *Social Studies of Science* 20, no. 3 (1990): 387-430; Theresa Collins, Lisa Gitelman, and Gregory Jankunis, *Thomas Edison and Modern America: A Brief History with Documents* (New York: Palgrave Macmillan, 2002); Leary, *The Punch Brotherhood*; Lightman, *Victorian Popularizers of Science;* Mussel, *Science, Time and Space*; Noakes, '*Punch* and Comic Journalism'; Noakes, 'Science in Mid-Victorian *Punch*'; Secord, *Victorian Sensation;* Thomas, *Pictorial Victorians;* Andrekos Varnava, 'Punch and the British Occupation of Cyprus in 1878,' *Byzantine and Modern Greek Studies* 29, no. 2 (2005): 167-186.

Serpentine Dance.[21] Looking at the reactions to Edison's announcement in the popular press reveals a different picture. Journalists attacked Edison's proposed invention as a potential surveillance device, expressing the fears that the machine would make it possible for men to watch women undressing, for husbands cheat on their wives, and for strangers to eavesdrop on private conversations. The critical public rejection of the 'Far-sight machine' compounded fears of social and technological change. The press pictured Edison's 'Far-sight machine' as the missing link between the telephonoscope and the Kinetograph. It would be able to transmit living scenes like a visual telegraph as well as project the dramas of an opera performance. The 'Far-Sight Machine' destabilizes assumptions about the distinctions between cinema and television, transmission and recording. It shows how the identities of cinema and television are deeply entangled with the social circumstances of their emergence. By focussing on the way the 'Far-sight machine' transformed into the Kinetograph, this chapter emphasizes the distinction between the electric telescope and the production of recorded moving pictures.

Chapter Three investigates the emergence of systems thinking in the historical development of television around the turn of the 20th century. By placing the two periods side by side, this chapter fills in the gaps between the Victorian conception of 'seeing by electricity' and the Machine-Age construction of electronic screens. The scientific developments that facilitated electronic technology and the sociopolitical philosophy of efficiency contributed to a new conception of television. I examine the systems approach that emerged in engineering and the associated philosophy of technology that came with it. While the rhetoric of the annihilation of space that had propelled nineteenth-century progress never completely went away, it was displaced by a belief that human beings should adapt to the new, artificial environments made possible by the giant leaps forward in science and technology. This chapter builds on the history and philosophy of technology, including works by Mitcham, Morus, Hughes, Stielger, Hansen,

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21   Tom Gunning, 'The Cinema of Attraction,' *Wide Angle* 3, no. 4 (1986); Tom Gunning, 'An Aesthetic of Astonishment'; Gordon Hendricks, *The Edison Motion Picture Myth* (Berkeley, CA: University of California Press, 1961); Gordon Hendricks, *The Kinetoscope: America's First Commercially Successful Motion Picture Exhibitor* (New York: Beginnings of the American Film, 1966); Charles Musser, *Before the Nickelodeon: Edwin S. Porter and the Edison Manufacturing Company* (Berkeley, CA: University of California Press, 1991); Paul Spehr, *The Man Who Made Movies: W.K.L. Dickson* (New Barnet, UK: John Libbey Publishing, 2008).

and Haraway.[22] Comparing and contrasting extension theory and systems thinking shows how this new philosophy of technology contributed to a new way of thinking about 'distant electric vision'.[23]

Part Two examines the changes that television underwent in the Machine Age. Chapter Four seeks to uncover the practices and ideas that drove the development of mechanical television. Since most histories of television consider electronic versions to be the first, earlier mechanical-optical systems are largely ignored.[24] From within the context of Machine-Age culture, however, radio, telephone, and movie industries vied for control over the new market for television, each with their own conception of what the new technology might become. Bell Laboratories advocated their mechanical Ikonophone; RCA backed the all-electronic system; General Electric worked to engineer a hybrid model called tele-cinema.

22   Carl Mitcham, *Thinking Through Technology: The Path Between Engineering and Philosophy* (Chicago, IL: University of Chicago Press, 1994); Iwan Rhys Morus, '"The Nervous System of Britain": Space, Time and the Electric Telegraph in the Victorian Age,' *The British Journal for the History of Science* 33, no. 4 (2000): 455-475; Bernard Stiegler, *Technics and Time: The Fault of Epimetheus* (Stanford, CA: Stanford University Press, 1998); Mark B.N. Hansen, 'Media Theory,' *Theory, Culture & Society* 23, no. 2-3 (2006): 297-306; Donna Haraway, *Simians, Cyborgs and Women: The Reinvention of Nature* (New York: Routledge, 1991); Philip Brey, 'Technology as Extension of Human Faculties,' in *Metaphysics, Epistemology and Technology,* ed. Carl Mitcham (London: Elsevier/JAI Press, 2000), 59-78.

23   John Mingers, *Realising Systems Thinking: Knowledge and Action in Management Science* (New York: Springer, 2006); Peter Checkland, *Systems Thinking, Systems Practices* (New York: John Wiley, 1981); Darrel Arnold, ed. *Traditions of Systems Theory: Major Figures and Contemporary Developments* (New York: Routledge, 2014); Thomas Hughes, *Networks of power: electrification in Western society, 1880-1930* (Baltimore, MD: Johns Hopkins University Press, 1993); Thomas Hughes, 'The Evolution of Large Technological Systems,' in *The Social Construction of Technological Systems: New Directions in the Sociology and History of Technology,* eds. Trevor Pinch, Thomas Hughes, and Wiebe Bijker (Cambridge, MA: MIT Press, 1987); Erik Van der Vleuten, 'Large Technical Systems,' in *A Companion to the Philosophy of Technology,* eds. Jan Olsen, Stig Andur Pedersen, and Vincent F. Hendricks (Malden, MA: John Wiley & Sons, 2012), 218-222.

24   Albert Abramson, *The History of Television, 1880-1941* (Jefferson, NC: McFarland & Company, 1987); R.W. Burns, 'The Contributions of the Bell Telephone Laboratories to the Early Development of Television,' *History of Technology* 13 (1991): 181-213; Charles Rubinstein, 'Optics at Bell Laboratories – General Optics, Television, and Vision,' *Applied Optics* 11, no. 11 (1972): 2401-2411; George Shiers, 'The Rise of Mechanical Television, 1901–1930,' *SMPTE Journal* 90, no. 6 (1981): 508-521; Jan Van den Ende, Wim Ravesteijn, and Dirk De Wit, 'Shaping the early Development of Television,' *Technology and Society Magazine, IEEE* 16, no. 4 (1997): 13-26; Antonio Perez Yuste, 'La Televisión Mecánica' (The Mechanical Television), in *Detrás de la Cámara. Historia de la Televisión y de sus Cincuenta Años en España* (*Behind the Scenes: History of Television and its Fifty Years in Spain*) (Madrid: Colegio Oficial de Ingenieros de Telecomunicación, 2008), 65-82; Tina Zeise, *Geschichte und Technik des Analogen Fernsehens* (*History and Technology of Analogue Television*) (Munich: GRIN Verlag, 2006).

The future of television was decided in a battle over formats and standards. Though the all-electronic models eventually won out, the outcome was far from clear in the 1920s. I aim to reveal a situation in which mechanical television can be understood as an achievement and an innovation rather than a dead-end technology. The genesis of mechanical television was closely tied with advancements in electrical engineering under the rubric of what came to be known as illuminating engineering. Little has been written about the new practice of illuminating engineering that emerged in the early 20th century.[25]

Alongside Machine-Age fields of human engineering and scientific management, illuminating engineering brought together practitioners with expertise in electrical engineering, design, and the psychology of vision.[26] This intensely interdisciplinary art and practice trained engineers in designing and implementing interior lighting environments to make them seem effortless and natural. Illuminating engineers adopted the Machine-Age philosophy of efficiency, struggling with standards and definitions that would establish a foundation for thinking about how the human, sometimes called a 'human seeing-machine', would adapt to life under electric light.[27] Photoelectric cells were the key component for making mechanical television work. These cells were popularly known as electric eyes, and they took on a symbolic function in demonstrating the correspondence between the 'human seeing-machine' and the television system. I aim to show how a Machine-Age conception of the human-machine relationship developed according to a new vision of dynamic systems, and how a pervasive attitude of control and efficiency governed and guided the further development of television technology. As such, I rely on Jordan and Noble's political history of the Machine Age and

25   Chris Otter, *The Victorian Eye: A Political History of Light and Vision in Britain, 1800-1910* (Chicago, IL: University of Chicago Press, 2008); Sean Johnston, *A History of Light and Colour Measurement: Science in the Shadows* (Bristol, UK: Institute of Physics Publishing, 2001).

26   Jennifer Alexander, 'Efficiencies of Balance Technical Efficiency, Popular Efficiency, and Arbitrary Standards in the Late Progressive Era USA,' *Social Studies of Science* 38, no. 3 (2008): 323-349; Jennifer Alexander, *The Mantra of Efficiency: From Waterwheel to Social Control* (Baltimore, MD: Johns Hopkins University Press, 2008); Sharon Corwin, 'Picturing Efficiency: Precisionism, Scientific Management, and the Effacement of Labor,' *Representations* 84, no. 1 (2003): 139-165; Graeme Gooday, *The Morals of Measurement: Accuracy, Irony, and Trust in Late Victorian Electrical Practice* (Cambridge, UK: Cambridge University Press, 2004); Toma Sorin-George, Ana-Maria Grigore, and Paul Marinescu, 'The Emergence of Scientific Management in America,' *Manager* 19 (2014): 128-131; Kenneth Thompson, introduction to *Scientific Management*, by Frederick Taylor (New York: Routledge, 2003).

27   Matthew Luckiesh, 'The Human Seeing-Machine,' *Transactions of the Illuminating Engineering Society* 27 (1932): 699-722.

histories of technology that focus on the evolution of cybernetics and control theory, including works by Beniger, Mindell, Mayer, Rabinbach, and Hayles.[28]

In stark contrast to the cathode ray tube that became the standard component in electronic television screens, mechanical television engineering took stock of the visual perception of brightness and colour. Illuminating engineers constructed an image of the average observer, which served as the standard on which all models for interior electric lighting and television were measured. Chapter Four explores the genesis of illuminating engineering in the early 20th century, its role in the efficiency movement, and the consequences it entails for the conception of the average viewer.

Chapter Five presents a case study of Bell Labs's two-way television project, also called the 'Ikonophone'. I explore archival documents charting the system's development, the role illuminating engineering played in the Ikonophone's design, the way engineers and Bell spokespeople explained the machine in newspaper and magazine media, and the reception based on eyewitness user accounts. Looking closely at press coverage of the Ikonophone project and the language journalists, writers of popular science, and engineers used to describe their experiences interacting with the screen, this chapter examines the reception and construction of television in the 1920s. Engineers described the method of designing an environment in which the users were made to feel as if they were face-to-face with the distant party. Witnesses responded to what they saw on the screen with a confused combination of metaphors, mingling expressions of a feeling of closeness with reactions to its uncanny artificiality. In stark contrast to the expectations of seeing by electricity, which supported the sense that television would provide a kind of window, distant electric vision introduced the screen as a representation of the real thing. Once the viewer beheld the screen and experienced firsthand the distinction between the onscreen and far-off presence, great transformations occurred in the conception of

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28   John Jordan, *Machine-Age Ideology: Social Engineering and American Liberalism, 1911-1939* (Chapel Hill, NC: University of North Carolina Press, 1994); David Noble, *America by Design: Science, Technology, and the Rise of Corporate Capitalism* (Cambridge, UK: Oxford University Press, 1979); James Beniger, *The Control Revolution: Technological and Economic Origins of the Information Society* (Cambridge, MA: Harvard University Press, 2009); David Mindell, *Between Human and Machine: Feedback, Control, and Computing Before Cybernetics* (Baltimore, MD: Johns Hopkins University Press, 2002); Anson Rabinbach, *The Human Motor: Energy, Fatigue, and the Origins of Modernity* (Berkeley, CA: University of California Press, 1992); N. Katherine Hayles, *How We Became Posthuman: Virtual Bodies in Cybernetics, Literature, and Informatics* (Chicago, IL: University of Chicago Press, 1999).

television as a technology as well as a visual medium. The Ikonophone marks the moment of television's transition from a technology into a visual medium.

This final chapter aims to draw parallels and identify changes that occurred since the Edison age of the telephonoscope. For all intents and purposes, the Ikonophone was conceived in the image of the telephonoscope. Engineers and journalists consistently appealed to the Victorian prophecy of 'seeing by electricity'. But, as it had been reimagined through the Machine-Age conception of 'distant electric vision', the Ikonophone grew into something quite different from what anyone could have expected. Television takes on a different shape once it becomes possible to see pictures flickering on a screen.

Continuities and discontinuities are immediately perceptible in the areas of communications and media. The popular American fascination with engineering and electrical technology mirrors the late nineteenth-century discovery manias. Where satirical magazines and newspaper journalists were mouthpieces for late nineteenth-century technological folklore, Machine-Age trade publications gave popular science a new twist. While American culture sustained an idealistic image for the amateur inventor, by the early 20th century, the broadcasting and cinema industries gained a stranglehold over the direction of new technology. This chapter also draws connections between Machine-Age engineering practices and broader 20th-century approaches to screen-mediated communication and design, including the field known as presence research and studies in digital subjectivity.[29]

Throughout the five chapters of this study, I foreground issues of cultural and technological change in the interest of moving past the limitations of discourse specific to individual disciplines. More than a study in the history of television, it might be just as appropriate to describe this book as an exploration of interdisciplinary methodologies for the study of 'media in transition'. The study of 'media in transition' aims to uncover the meaning of cultural representations in context and analyse trends in the development of new technologies. Instead of focussing on a single invention, I endeavour to locate conceptions of 'television', broadly defined. In what circumstances did the idea emerge? Which factors contributed to its popularity? And how did social groups adapt to new relationships established by technological

29   Sherry Turkle, *Alone Together: Why We Expect More from Technology and Less from Each Other* (New York: Basic Books, 2011); Nancy Baym, *Personal Connections in the Digital Age* (Malden, MA: Polity, 2010); Mark Poster, 'The Digital Subject and Cultural Theory,' in *What's the Matter with the Internet* (Minneapolis, MN: University of Minnesota Press, 2001); N. Katherine Hayles, 'Virtual Bodies and Flickering Signifiers,' *October* 66 (1993): 69-91.

systems? In asking questions such as these, both continuities and discontinuities become apparent. Between the 1880s and the 1920s, social groups reacted with a mixture of adulation and scepticism to forces of technological progress. The role of satire and commentary in print media both reflected and contributed to expectations about new technology.

Moreover, the importance of face-to-face interaction in the nineteenth century gave way to a 20th-century construction of a modern viewer. Analysing this shift, as represented in cultural representations of television — satirical illustrations, technical diagrams, newspaper announcements, and popular science — brings to light changing historical attitudes concerning communication. While it may not be possible to discover the value placed on face-to-face interaction in previous eras, the transition to an age of screen-mediated communication bears relevance to an historical perception of the changing relationships between humans and nature.

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