

**COMMUNICATING MODERNITY:
DESIGN, REPRESENTATION, AND THE MAKING OF THE TELEPHONE**

by

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ABSTRACT

This dissertation is a cultural history of the telephone. It explores how the telephone came to be imagined, developed, promoted, and ultimately integrated into everyday life in the United States in the late nineteenth and twentieth centuries.

By drawing on a wide-range of archival materials—including artifacts, design documents, corporate correspondence, trade journals, consumer advertisements, and popular texts—the dissertation reveals how the design of the telephone acted as a site of negotiation for competing concepts of modernity and reflected the shifting power relations between inventors, managers, manufacturers, subscribers, engineers, designers, and advertising experts. It considers the earliest conceptions of the telephone system and shows how these visions—along with the material expansions of the telephone network—were profoundly bound up with the transformations of economic forces and social conditions which marked the shift from market to modern capitalism.

Finally, the dissertation examines the role of telephone advertising in shaping and advancing new, 'modern' ways of thinking about time, space, and identity. Evidence is presented to suggest that ongoing negotiations over the appearance, uses, and meanings of the telephone played a significant role both in shaping the social and political identity of America's emerging middle class and in defining popular understanding about what it meant to be 'modern.'

DEDICATION

A.G.H. and E.H.

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INTRODUCTION

The telephone is a communication technology that most people use frequently but think about very rarely, if at all. For telephone users and for those who work in the telephone industry, this is a sign of the telephone's success. For the media historian, it raises questions about why the telephone has escaped the scrutiny that other communications media provoke, when and how the public adopted the idea of the telephone as a mundane and essentially *neutral* technology, and how it came to be imagined as a necessity in everyday life.

This dissertation is first and foremost a historical investigation of these questions. It takes as its starting point the assertion that the telephone is a medium of modernity. By this, I mean two things. The first and most obvious meaning is that the telephone was a modern communications medium. Its invention in 1876 was part and parcel of the modern era's fascination with science, with the desire to bring natural forces to the service of man, with the ambition to improve life and make it somehow better than it was before. The telephone was a product of modern knowledge and modern sensibilities.

Secondly, the telephone was a medium that communicated modernity, a medium that played a key role in the transmission of American society's understanding of modernity itself. Perhaps more than any other modern technology, the telephone provoked the public to imagine new ways of thinking about and being in the world. The invention of the telephone in the late nineteenth-century and its subsequent installation in offices and homes through the early years of the twentieth-century was accompanied by a proliferation of images and texts which made expansive and often contradictory claims for its role in transforming modern life. The telephone was presented not simply as a new way to communicate; it was simultaneously credited with the ability to bring together "all races in all climes," and blamed for the collapse of community and familial relationships. The telephone was identified, at one and the same time, as ameliorating and intensifying the sense of alienation that was becoming so much a part of modern life. It was implicated along with the telegraph, railroads, and electricity, in the rise of pathologies related to life's increasing tempo even as it was being heralded for enabling businesses to expand with security and efficiency. In the household, the introduction of the telephone was believed to lead to the breakdown of domestic autonomy and parental authority, even as it was approved as the source of innocent pleasure and sociability.¹

These contradictory views of the telephone and telephony were reflective of and imbricated with larger debates about modern life. Ideas about the telephone—what it should look like, to what uses it should be put, and by whom—were grounded in the real social conditions and concerns of the day. Historian Ida Tarbell noted that by 1878, the year that the first commercial telephone exchanges opened, "the American people were feeling the full impact of

¹ On the topic of sociability, see Claude S. Fischer, "'Touch Someone': The Telephone Industry Discovers Sociability," *Technology and Culture* 29, no. 1 (1988).

the new forces which had been remaking their economic life since the Civil War."² Technology, industrialization, mass production, urbanization, and immigration were challenging traditional social conventions and expectations. In an era when 'calling on' friends and business acquaintances was the accepted mode of social communication, worries over the telephone's invasive quality likely derived less from an unfamiliarity with interruption than from more profound fears linked to the telephone's ability to circumvent traditional protocols and mask class membership. The excesses of late nineteenth century capitalism—the chaos of unrestrained competition, the depressions of the 1870s, the violent labor unrest of 1877, and the unscrupulous tactics of big business—shook the public's faith in the legitimacy of big business. As Tarbell pointed out, "a strangely different America had taken form: an America which Lincoln would hardly have recognized and of which he could scarcely have approved."³ The democratic ideals on which the rhetoric of technological progress was founded were very often threatened by the business elite's use of modern technologies to secure their advantage and control markets. There was very real disagreement over the values that would guide this new, modern America, and more often than not technology acted as a site on which these negotiations played out. Perhaps even more than other modern technologies, dreams of unbounded economic and personal power, anxieties about social instability, and utopian longings for democratic communication were projected onto the telephone by electrical experts, the business community, the media, and the public alike, and in this way, came to have an impact on how the telephone was imagined and accommodated in daily life.

² Ida M. Tarbell, *The Nationalizing of Business 1878-1898*, vol. IX, *A History of American Life* (New York: The MacMillan Company, 1936), 1.

³ *Ibid.*

This dissertation is a history of “the making of the telephone,” a history of how the telephone came to be imagined, developed, promoted, and ultimately integrated into American life and consciousness in the late nineteenth and early twentieth centuries. Drawing on a comprehensive body of archival materials—including telephone advertisements, design documents, and corporate correspondence—it locates the design and representation of the telephone in the context of the transformation of social practices, relations, and conceptions that marked the century’s turn. My use of these materials as evidence is grounded in theories of representation put forward by French sociologist and philosopher Henri Lefebvre, and advanced by critical theorist Fredric Jameson and historical geographer David Harvey. Lefebvre argued that each historical stage of capitalism has produced its own distinctive space, one that “permits fresh actions to occur, while suggesting some and prohibiting others.”⁴ For Lefebvre, ‘social space’ encompasses the practices, representations, and symbolism of a given era and poses the conditions of possibility by which that era can be distinguished and defined. Jameson contends that representation—which he defines as “all forms of aesthetic production”—functions as an ‘allegory’ or symbolic expression that offers a nuanced, if somewhat imperfect, rendering of social and economic relations at a given political-economic moment and as such representation itself sets the necessary terms for political and economic analysis.⁵ It is for this reason, Harvey argues, that the study of representation should not be seen as simply incidental to historical

⁴ Henri Lefebvre, *The Production of Space*, trans. Donald Nicholson-Smith (Oxford and Cambridge: Blackwell, 1991), 73. See also Henri Lefebvre, *Everyday Life in the Modern World*, trans. Sacha Rabinovitch (London: Transaction Publishers, 1971).

⁵ Fredric Jameson, “Cognitive Mapping,” in *Marxism and the Interpretation of Form*, ed. Larry Grossberg et al. (Urbana and Chicago: University of Illinois Press, 1988), 348. See also Fredric Jameson, *The Political Unconscious* (Ithaca, NY: Cornell University Press, 1981); Fredric Jameson, “Postmodernism, or, the Cultural Logic of Late Capitalism,” *New Left Review* 146 (1984).

analysis, but rather that “the production of images and discourses is an important facet of [social] activity that has to be analyzed as part and parcel of the reproduction and transformation of any social order.”⁶ It is in light of these arguments, and in the context of the more nuanced notion of representation they inform, that I propose that negotiations over the representation of the telephone—its design, its advertising, and conceptions of its uses—were not trivial or superficial but rather a part of broader debates over social values and vitally linked to the economic and political developments that accompanied the transformation of market to modern monopoly capitalism.⁷

My research into the history of the representation of the telephone was spurred by the discovery of how little critical work had been done on the telephone given its relative importance in both economic and social life. There are a number of historical accounts on the invention (and the inventors) of the telephone, and much has been (and continues to be) written on technical developments in telephony. There are many business histories and case studies that look at the telephone industry and AT&T specifically, but in spite of—or perhaps because of—its ubiquitous presence in our everyday lives, the telephone has not provoked the same degree of critical scholarly attention as other communications technologies, such as the telegraph, film, and especially television, and more recently, computers and the internet.

There are of course very notable exceptions to this statement. Stephen Kern’s *Culture of Time and Space* makes ample references to the very real tangible role the

⁶ David Harvey, *The Condition of Postmodernity: An Enquiry into the Origins of Cultural Change*. (Oxford: Basil Blackwell, 1989), 355. See also David Harvey, *The Urbanization of Capital* (Baltimore: Johns Hopkins University Press, 1985).

⁷ My use of the terms ‘market’ and ‘monopoly’ capital follows from Jameson, who in turn has drawn them from the work of Ernest Mandel. See Ernest Mandel, *Late Capitalism*, trans. Joris De Bres (London: Verso, 1972).

telephone played in altering temporal and spatial relations and perceptions, and his study was extremely influential in helping to form some of the first questions I posed about the telephone.⁸ Carolyn Marvin's cultural history of the telephone and electricity—*When the Old Technologies Were New*—also played a significant role in shaping my ideas on the telephone, especially in the way that her research challenged many of the unquestioned assumptions we have about the telephone, most notably the conception of the telephone as a democratic and democratizing technology.⁹ Daniel Schiller's rigorous work on telecommunications policy and the political economy of the telephone industry was also an important source for information about the telephone and the telephone system which challenged and enriched more mainstream accounts of telephone history.¹⁰

While I have not found any critical studies of telephone advertising *per se*, Roland Marchand's *Advertising the American Dream* and *Creating the Corporate Soul* both have sections which look at and analyze AT&T advertising. His discussion of the prevalent use of the telephone and the window-with-a-view as props in advertisements depicting the "American man at work" during the 1920s inspired my earliest research into the tropes that organized telephone advertising's texts at the beginning of the twentieth century.¹¹ While Pamela Walker Laird's comprehensive

⁸ Stephen Kern, *The Culture of Time and Space, 1880-1918* (Cambridge: Harvard University Press, 1983).

⁹ Carolyn Marvin, *When the Old Technologies Were New* (Oxford University Press, 1988).

¹⁰ See especially Dan Schiller, "Social Movement in Telecommunications: Rethinking the Public Service History of Us Telecommunications," *Telecommunications Policy* 22, no. 4/5 (1998). Also see Dan Schiller, *Telematics and Government* (Norwood, NJ: Ablex Publishing Corporation, 1982); Dan Schiller, *Theorizing Communication: A History* (New York: Oxford University Press, 1996).

¹¹ Roland Marchand, *Advertising the American Dream: Making Way for Modernity* (Berkeley: University of California Press, 1985); Roland Marchand, *Creating the Corporate Soul: The Rise of Public Relations and Corporate Imagery in American Big Business* (Berkeley: The University of California Press, 1998).

history of the advertising industry in America between 1870 and 1920 does not discuss Bell Telephone advertisements specifically, its account of the business and creative strategies of N.W. Ayer & Son, Bell's advertising agency-of-record for almost a century, was an invaluable source of insight and information.¹² On the topic of advertising more broadly, cultural historian Jackson Lears' arguments on the role of advertising plays in creating social knowledge are both convincing and compelling and have informed many of the positions I take in this dissertation.¹³

There is a wealth of excellent studies on gender and the telephone—its uses and meanings to women as well as women's work in the telephone industry—which have informed my thinking, even though I do not specifically address these topics in this study. Michèle Martin's analysis of the early Canadian telephone system in "*Hello Central?*" shows how the uses to which women put the telephone forced Bell Telephone to change its vision of the telephone as simply a tool for businessmen.¹⁴ Within their own respective areas of interest, both Lana Rakow's and Ann Moyal's

¹² Pamela Walker Laird, *Advertising Progress: American Business and the Rise of the Consumer Market* (Baltimore: John Hopkins University Press, 1998).

¹³ Jackson Lears, *Fables of Abundance: A Cultural History of Advertising in America* (New York: Basic Books, 1994); Jackson Lears, "A Matter of Taste: Corporate Cultural Hegemony in a Mass-Consumption Society," in *Recasting America: Culture and Politics in the Age of the Cold War*, ed. Lary May (Chicago: University of Chicago, 1989); T.J. Jackson Lears, "From Salvation to Self-Realization: Advertising and the Therapeutic Roots of the Consumer Culture, 1880-1930," in *The Culture of Consumption: Critical Essays in American History 1880-1980*, ed. Wightman Fox and T.J. Jackson Lears (New York: Pantheon Books, 1983); T.J. Jackson Lears, "Some Versions of Fantasy: Toward a Cultural History of American Advertising," *Prospects: An Annual of American Cultural Studies* 9 (1984).

¹⁴ Michèle Martin, *"Hello Central?" Gender, Technology, and Culture and the Formation of Telephone Systems* (Montreal: McGill-Queens University Press, 1991). See also Michèle Martin, "Communication and Social Forms: The Development of the Telephone, 1876-1920," *Antipode* 23, no. 3 (1991).

work has documented how women use and think about the telephone.¹⁵ Perhaps most valuable from my perspective have been Venus Green's articles and her recent book, *Race on Line*, which examine roles played by gender and race in the organization of labor in the telephone industry and the development of the telephone system.¹⁶

The telephone has been studied by business historians, and while there are numerous case studies of telephone use and telephone industry initiatives, few offer a critical perspective. Noteworthy for their painstaking research and thoughtful analysis are Sally Clarke's account of the development of the French telephone in 1928, Louis Galambos' and Lillian Hoddeson's studies of the emergence of research at Bell Labs, and Milton Mueller's research on switchboard development and organizational change in the Bell System.¹⁷ The large majority of telephone histories tend to be corporate histories, along the lines of Herbert Casson's 1910 account, or *Telephone: The First Hundred Years*, John Brooks' commissioned history of AT&T.¹⁸

¹⁵ Lana F. Rakow, "Women and the Telephone: The Gendering of a Communications Technology," in *Technology and Women's Voices: Keeping in Touch* (New York: Routledge and Kegan Paul, 1988); Lana F. Rakow and Vija Navarro, "Remote Mothering and the Parallel Shift: Women Meet the Cellular Telephone," *Critical Studies in Mass Communication* 10 (1993). Ann Moyal, "The Gendered Use of the Telephone: An Australian Case Study," *Media Culture and Society* 14, no. 1 (1992).

¹⁶ See especially, Venus Green, "Goodbye Central: Automation and the Decline of 'Personal Service' in the Bell System," *Technology and Culture* 36, no. 4 (1995); Venus Green, *Race on the Line: Gender, Labor, and Technology in the Bell System, 1880-1980* (Durham: Duke University Press, 2001).

¹⁷ Louis Galambos, "Theodore N. Vail and the Role of Innovation in the Modern Bell System," *Business History Review* 66, no. 1 (1992); Lillian Hoddeson, "The Emergence of Basic Research in the Bell Telephone System, 1875-1915," *Technology and Culture* 21 (1981); Milton Mueller, "The Switchboard Problem: Scale, Signaling, and Organization in Manual Telephone Switching, 1877-1897," *Technology and Culture* 30 (1989).

¹⁸ Herbert N. Casson, *The History of the Telephone* (Chicago: A.C. McClurg & Co., 1910). Despite the fact that Brook's history was commissioned by AT&T, it is notable for being both well-researched and well-written. John Brooks, *Telephone: The First Hundred Years* (New York: Harper & Row, 1975). An example of a case study as telephone history would be Anthony Sampson, *The Sovereign State: The Secret History of ITT* (London: Hodder and Stoughton, 1973).

Although social histories of the telephone are far fewer in number, Claude Fischer's *America Calling*, and de Sola Pool's *The Social Impact of the Telephone* provided useful background for my research and suggested fruitful ways to think about the interaction of people and technology.¹⁹ This line of inquiry was augmented by social and cultural histories of other technologies, such as James Carey's cultural history of the telegraph in *Culture as Communication*; Daniel Czitrom's *Media and the American Mind*, an intellectual history of the social impact of the telegraph, film, radio and television; Susan Douglas's *Inventing American Broadcasting 1899-1922* on the social construction of radio; and most significantly in the case of this dissertation, Lynn Spigel's *Make Room for TV* which looks at the formative years of television and the roles played by both televisual representations and representations of the television in advertising and popular discourses in making TV an integral part of American life.²⁰

In the end, the fact that the telephone has provoked comparatively less critical interest by media historians and communications scholars than other media struck me as both important and instructive—even more so because it was consistent with the contemporary view of the telephone as a commonplace and unproblematic technology. It led me to ask why we have come to see the telephone in this way, and to question how much the design of the telephone-object contributed to creating the idea of the telephone as simply functional and

¹⁹ Claude Fischer, *America Calling: A Social History of the Telephone to 1940* (Berkeley: University of California Press, 1992). See also Fischer, "'Touch Someone': The Telephone Industry Discovers Sociability." Ithiel de Sola Pool, ed., *The Social Impact of the Telephone* (Cambridge MA: MIT Press, 1977).

²⁰ James W. Carey, *Communication as Culture: Essays on Media and Society* (Boston: Unwin Hyman, 1989); Daniel J. Czitrom, *Media and the American Mind: From Morse to Mc Luhan* (Chapel Hill: University of North Carolina Press, 1982); Susan Douglas, *Inventing American Broadcasting, 1899-1922* (Baltimore: John Hopkins University Press, 1987); Lynn Spigel, *Make Room for TV: Television and the Family Ideal in Postwar America* (Chicago: University of Chicago Press, 1992).

ideologically neutral. On the topic of the telephone's design, I found almost nothing at all, save for Kenneth Haltman's material history of the 1923 Candlestick telephone and, perhaps not insignificantly, an article written by Michael Sorkin in 1983—the year of the divestiture of the Bell System—calling for a design history of the telephone.²¹

These questions ultimately shaped the form of my dissertation. It is arranged in three sections—Object, System, and Image—each of which explores what I came to perceive as an important element in “the making of the telephone” and advancing the ideals and practices of modern life. I begin by looking at the history of the telephone-object because telling this story forces us to set aside the often advanced proposition that function alone determined the appearance of the telephone and allows us to see how its appearance was inextricably linked to transformations in the nature of capitalism, including changes to the practices and principles associated with production and consumption, and their mediation by modern business strategies, advertising, and marketing. Recognizing that the shape of the telephone was negotiated amidst shifting power relations between inventors, managers, manufacturers, subscribers, engineers, and designers serves to disrupt the idea of the telephone as some kind of ‘neutral’ technology and challenges related myths about the telephone, such as the naturalness of its patterns of diffusion, its inherently democratic character, its universality, and so on.

Beginning with the object also reflects the fact that it was the way that people engaged the telephone system, and that from the perspective of the subscriber the telephone-object represented the telephone system. Media and cultural critic Dick

²¹ Kenneth Haltman, "Reaching out to Touch Someone? Reflections on a 1923 Candlestick Telephone," in *American Artifacts: Essays in Material Culture*, ed. J.D. Prown and K. Haltman (East Lansing: Michigan State University Press, 2000); Michael Sorkin, "Just a Phone Call Away," *Industrial Design* (1983).

Hebdige has written that, ironically, even in 'materialist' approaches to the study of culture, the object is seen as a basically untrustworthy unit of analysis. He cautions that neglecting the object "carries its own price."²² It overlooks that the object is the end goal, the 'ideal' of both the manufacturing process and design practice, and as such is the logical starting point of an investigation. The object drives the moments of production, mediation, and consumption, and provides their motivation both conceptually and practically. Since the object is the focus of this circuit, I suggest that it is also the most rewarding point of entry for this study.

But of course, the telephone is not simply an object. One telephone presupposes another, hence the development of a "system" through which the telephone as a medium of communication became purposeful and useful. But the usefulness of the telephone system could only be developed in the context of a broader social, political, and economic system. In the second section, I describe the public's optimism about the democratic possibilities of the telephone and show how this goal was subsumed and transformed under the goals of competition. I suggest that with the emergence of the Bell monopoly, it was the *idea* of the telephone system even more than the actual capabilities or possibilities of the telephone network that drove research and defined the engineering process, and ultimately affected all aspects of telephony including how the telephone came to be designed and represented.

In the third section, I look at the role played by telephone advertising in shaping and advancing new, 'modern' ways of thinking about time, space, and identity. Here I am not interested in how telephone advertising sold the telephone but rather how it sold Americans on the values associated with the new era which

²² Dick Hebdige, "Object as Image: The Italian Scooter Cycle," in *Hiding in the Light* (London: Routledge, 1988), 80.

the telephone precipitated and in which it was formed. Writing in 1915, Earnest Elmo Calkins, sometimes called the “father of advertising,” observed that more than “any other one force, the school, the church and the press excepted,” advertising “modifies the course of people’s daily thoughts, gives them new words, new phrases, new ideas, new fashions, new prejudices and new customs.”²³ It is this function of advertising that informs my study’s analysis of telephone advertisements.

This dissertation makes extensive use of archival telephone advertisements from the Ayer Archive at the National Museum of American History as well as the Bell Canada Historical Collection. Research material on telephone design—and design more generally—was drawn from the Dreyfuss Archive at the Cooper-Hewitt National Design Museum as well as from the AT&T Archive, which was also the source for documents relating to Bell System business strategies. In addition, I have examined popular magazines such as the *Saturday Evening Post*, *Scribner’s*, *Harper’s*, *Collier’s* and *Judge* as well as specialist journals, such as *Telephony* and *Printer’s Ink* as a way of contextualizing these primary sources of evidence.

A critical history of the telephone’s place in emerging modern America could be pursued in a variety of ways: for example, by taking a consumer-oriented perspective that traces subscribers’ responses to new developments in telephony, or by employing a “history from below” approach that examines popular texts and personal documents, and uses oral interviews to tell us how ordinary people used, viewed, and understood the telephone. Instead—like the telephone-object and its advertising—this study is positioned at the intersection of production and consumption and focuses on the processes and practices of mediation. Although it concentrates largely on what the telephone industry has produced—telephones,

²³ Cited in Laird, *Advertising Progress*, 355.

advertisements, concepts and interpretations—it does not seek to document corporate history, in fact this is furthest from its intention. Rather, the purpose of this approach and my dissertation is to critically interrogate texts that were produced in corporate environments in order to understand how the meaning, uses, and appearance of the telephone have been shaped and aligned with the criteria and requirements of modern monopoly capitalism.

I

OBJECT

EARLY TELEPHONE MANUFACTURING:
FROM A CRAFTS AESTHETIC TO A TECHNOLOGICAL AESTHETIC

On June 2 1933, a fascinating memo was sent from Mr. P. Norton, assistant to Frank B. Jewett, then president of Bell Laboratories to Mr. William Fondiller, assistant director of apparatus development. The memo concerned a request made by Mr. Legge, a stonemason who had supervised the marble work on the recently completed AT&T headquarters at 195 Broadway in New York City. According to the memo, Legge had approached Dr. Jewett about attempting to make a marble telephone set in the hopes that he could develop a business selling the one-of-a-kind objects to AT&T's more discerning (and necessarily, well-to-do) subscribers. The memo goes on to list the materials Legge would need to "make a layout," addresses some questions related to ownership and marketing, and concludes by noting that Dr. Jewett and Mr. Page, vice president of public relations, "have agreed that Mr. Legge should be given a chance to build the set he proposes."¹

¹ P. Norton to William Fondiller, memorandum dated 12 March 1933. Box 73, F.B. Jewett Collection, AT&T Archives.

Given the iconic images that come to mind at the mention of the telephone, it is difficult to imagine that a transaction such as the one described above could have taken place between AT&T, America's telephone monopoly, and a craftsman in their employ. The idea that AT&T would agree to support and assist Legge's plans to make a marble telephone seems unusual to say the least. Perhaps most difficult of all to conceive is the idea of *crafting* a telephone. In North America today, the telephone-object remains the embodiment of the modern ideal of form as function—its appearance so logical, so admirably suited to its purpose that it somehow leaves one at a loss to imagine alternatives. The telephone appears to us as what theorist Roland Barthes has called "a purely magical object," the result of some sort of immaculate production, not something that a tinker—or a mason—might craft in his spare time.²

The pervasive image of the telephone as a purely functional, common-sense object—reinforced by its ubiquitous presence in western societies—has acted to obscure its material history. It has also acted to reinforce a perception of the telephone as the quintessential paradigm of democratic communication—a neutral technology disconnected from the influences of class, taste, and style. By 're-connecting' the telephone with the social, economic, and cultural conditions of its production, I demonstrate how its appearance has been inextricably linked to transformations in the nature of capitalism, including changes to the practices and principles associated with production and consumption, and their mediation by modern business strategies, advertising, and marketing. I argue that the design of the telephone was a site of negotiation for the competing interests of experts involved in the telephone's production and promotion and I consider the ways in

² Roland Barthes, *Mythologies*, trans. Annette Lavers (New York: Noonday Press, 1972), 88.

which these experts' social and occupational positions influenced how the telephone was imagined and how it was introduced to the public. What becomes evident is that, despite the Bell Telephone Company's monopoly status, competition and consumer demand *did* have an influence on the look of the telephone. Examining the material history of the telephone—in other words, beginning with the object—offers a way to understand the history of its place and meaning in our everyday lives.

TELEPHONE MANUFACTURING, THE MACHINE SHOP, AND THE CRAFT AESTHETIC

In late 1873 Thomas Watson, an expert machinist in the workshop of Charles Williams, Jr., Manufacturer of Telegraph Equipment, was assigned to put together an electrical apparatus according to specifications provided by Alexander Graham Bell. Over the next four years, Williams' shop acted as the *ad hoc* laboratory where Bell and Watson experimented with and improved the original design of their telephone. According to business historian George David Smith, Williams' shop was "a large but typical machine shop of the period, staffed by men who were more craftsmen than laborers."³ The conditions in the shop were also typical for the day: "personal, informal, and essentially unstructured in any bureaucratic sense," and the work arrangements in the shop were varied and seemingly quite flexible.⁴ Of the twenty-five men working there, some worked for Williams while others—aspiring inventors who lacked the capital to set up their own shops—leased a bench from Williams and worked on their own projects. Yet others, such as Watson, struck "half-time arrangements" whereby they worked on both shop projects and contracts of their

³ George David Smith, *The Anatomy of a Business Strategy: Bell, Western Electric and the Origins of the American Telephone Industry* (Baltimore: John Hopkins University Press, 1985), 30.

⁴ *Ibid.*, 29.

own.⁵ Historian Paul Israel notes that telegraph inventor Moses Farmer maintained a laboratory in Williams' shop, as did inventor Thomas Edison. Over the course of his association with Williams and Bell, Thomas Watson worked under every type of arrangement conceivable. When commercial manufacturing of the telephone began in 1877, Watson supervised the construction process at Williams' shop while technically under contract to the Bell Telephone Company, located next door.

What is striking in Smith's account and even more clearly evident in Watson's autobiography is the degree to which the work process was grounded in a craft rather than factory tradition.⁶ The men working at Williams' shop were more tinkers than technicians, their knowledge and skill the product of apprenticeship, collaboration, and liberal experimentation rather than book-learning and formulae. Watson himself noted that prior to the beginning of commercial telephone manufacture, he "had made practically all the telephones in existence 'with my own hand.'"⁷ This creative environment, hands-on approach, and a mindset that was visual and spatial rather than logical and linear were in fact the necessary pre-conditions for eighteenth and nineteenth century inventiveness and invention.⁸ What we have come to see as scientific thinking was really grounded in an artistic inclination, noting that early inventors were often equally as well-respected for their artistic skills as for their technological accomplishments. Samuel Morse, inventor of

⁵ Bell's partner and backer, Gardiner Greene Hubbard, signed a contract on September 4 1876 with Thomas Watson whereby Watson was to devote half of his time to work on the development of the harmonic telegraph and the telephone in exchange for one-tenth interest in all of Bell's patents. AT&T Archives, *Events in Telecommunications History* (Warren, New Jersey: American Telephone and Telegraph Company, 1992), 5.

⁶ See Chapter 4, Thomas A. Watson, *Exploring Life* (New York: D. Appleton and Company, 1926).

⁷ Smith, *The Anatomy of a Business Strategy*, 30.

⁸ Brooke Hindle, *Emulation and Invention* (New York: W. W. Norton, 1981).

the telegraph, was a well-established painter, as was Robert Fulton, inventor of the steamboat.⁹

Given the atmosphere that prevailed at Williams' shop and the creative outlook of those most likely to have worked on the telephone, it is clear that most histories of telephone design underestimate (if not completely ignore) the degree to which aesthetic consideration came into play in the fabrication of early telephones. For example, Michael Sorkin's argument that "the early history of the telephone is so wrapped up with the provision of service [...] that pressures for design change were forestalled" categorically dismisses the attention paid to the appearance of the telephone by those charged with its fabrication. While much has been made of the nascent Bell Telephone Company's obsession with improving the telephone's reliability and transmission quality—Watson spent the summer of 1877 working at Williams' shop with a group of scientists from Brown University on such improvements—it is wrong to assume that the look and the ease of use of the telephone were neglected.¹⁰

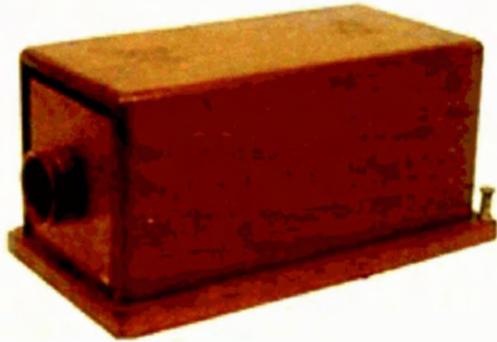
⁹ Fulton and Morse were not unique. Hindle notes that William Thornton and Benjamin Latrobe—architects and engineers most famous for their work on the design of the United States Capital between 1793 and 1830—both painted. Joshua Shaw, inventor of the copper percussion cap used in the discharge of heavy artillery, was also a painter. Charles Willson Peale, organizer of the first US scientific expedition in 1801, was a well known artist as was his son Rembrandt. Ithiel Town, inventor of the Town bridge truss, was an architect and Rufus Porter, inventor and founder of *Scientific American*, was a landscapist and muralist. Ibid. See Chapter 4, esp. 135.

¹⁰ Hubbard, in particular, was so concerned about establishing the telephone's technical reputation that he insisted that Watson test each instrument before it was shipped. See Smith, *The Anatomy of a Business Strategy*.

The prototype of the first commercial telephone was essentially a large rectangular wooden box housing the technical components.¹¹ An opening at one end of the box served as both transmitter and receiver, making it necessary for users to alternate placing their ear and their mouth to the aperture in order to communicate (Figure 1.1). Smith reports that between May and August of 1877 Thomas Watson guided the telephone “through no less than four distinct stages of development in shape and materials.”¹² Watson’s changes focused on the external design of the telephone, reducing and reconfiguring the dimensions of the box until he was left with a well-proportioned, wall-mounted instrument. The opening was replaced by a small brass bell-shaped mouthpiece that projected from the surface of the box. While users were still required to shift the position of their heads in order to speak and listen in turn, the telephone’s transformation from a unit which sat on a desk or table to one which hung on the wall was no doubt intended to allow the user to sit or stand upright and must have made it far more comfortable to use. The very next year, the Butterstamp telephone—so called because of the shape of its transmitter/receiver—was introduced in an attempt to make the telephone even more convenient to use (Figure 1.2).

¹¹ There were earlier versions of the telephone than the one I describe here, notably: the “Gallows Frame,” Bell’s first telephone to transmit speech sounds electrically dating to 1875; the 1876 Liquid Transmitter Telephone on which Bell issued his historic request for Thomas Watson to “come here”; and the Double Pole Membrane Transmitter and Iron Box Receiver combination (sometimes referred to as the Centennial Telephone) which Bell used in his early public demonstrations and to make the world’s first long distance call from Brantford to Paris, Ontario in 1876. I identify the 1877 Box Telephone as a prototype because it was the first set to be used commercially. Boston banker Roswell Downer was the first subscriber in the United States to lease a pair of Box telephones from the Bell Patent Association in 1877. *Ibid.*, 24. In that same year, the first pair of Box telephones were leased in Canada to Prime Minister Alexander MacKenzie and used to connect his office with the residence of the Governor General. Bell Canada, *Telephones through the Years* (Montréal: Bell Canada Historical Collection, 1982 c.).

¹² Smith, *The Anatomy of a Business Strategy*, 30.



1.1 The Box telephone, prototype of the first commercial telephone, 1877.

This telephone sat on a desk or tabletop and the aperture was used for both listening and speaking. (Used with permission of AT&T Archives and David Massey, Bell System Memorial website.)



1.2 The Butterstamp telephone, 1876.

Re-designed to hang on a wall, the Butterstamp also featured an transmitter/receiver that could be moved back and forth between the caller's mouth and ear. It was an improvement over the Box telephone because callers could sit or stand upright when using it. (Used with permission of AT&T Archives and David Massey, Bell System Memorial website.)

Although a single instrument was still used for both speaking and listening, it was no longer fixed to the body of the telephone but rather suspended from two flexible cotton- or silk-covered wires. The transmitter/receiver—now a shaped wooden spindle—could be held in the user’s hand and moved back and forth between the mouth and ear, eliminating the need for users to bob their heads up and down during their telephone conversation.

The design of the telephone underwent changes for a second time in 1878 when subscribers complained that using a single instrument for both speaking and listening was confusing and caused fragments of conversation to be lost. The resulting telephone, sometimes referred to as “Williams’ Coffin,” had two hand-held instruments, one for listening and one for speaking (although each instrument could be used as both transmitter and receiver) (Figure 1.3). It is significant that there were no technical changes that necessitated the marked difference in appearance between the Butterstamp and the Coffin telephones. Other than the change in the signaling mechanism—the pushbutton signal of the Butterstamp was replaced by a crank in the center of the front panel of the Coffin— the changes in the shape and disposition of the instrument were mostly cosmetic and meant to appeal to telephone users. The editor of Bell Labs’ authoritative *History of Engineering and Science in the Bell System*, M.D. Fagen notes that between 1879 and 1900 the changes to the technical components of the telephone were minimal “and the many designs which followed differed from each other largely in physical arrangement.”¹³

Between the summer of 1877 and 1879, the Bell Company manufactured at least eight distinctly different models of telephone, and again the technical changes

¹³ This is a particularly useful source of technical information about the telephone as it was prepared by the Bell Laboratories technical staff. M.D. Fagen, ed., *A History of Engineering and Science in the Bell System: The Early Years (1875-1925)*, vol. 1 (New York: Bell Telephone Laboratories, 1975), 129.



1.3 "Williams' Coffin," 1878. The telephone was re-designed again in response to subscribers' complaints about the Butterstamp's single transmitter/receiver. (Used with permission of AT&T Archives and David Massey, Bell System Memorial website.)

were insignificant. One of the new telephones made in 1879 was the first desk-top telephone, or desk stand. According to Fagen, its introduction largely had to do with ease of use: the desk stand “was a result of the natural desire for greater convenience than possible with a telephone firmly fixed in place.” He observed that the wall telephone “was not only inconvenient for the businessman who wanted access to his desk material while telephoning but also to use effectively by people of various height.”¹⁴ The first desk stand was rudimentary in appearance, little more than a Blake transmitter mounted on a stand (Figure 1.4). While not ‘designed’ in the sense that we have come to understand the term, it was clearly fashioned in response to complaints and requests of subscribers and telephone agents.

Reflecting on the conditions at Williams’ shop (and more generally, machine shops of this era), the most convincing explanation for the range and variety of styles of early telephones is that they were the outcome of work processes that depended on experimentation and collaboration. Machinists, usually working closely with an inventor or with a bench-partner, quite literally *crafted* rather than ‘produced’ telephones. Since much of the telephone was made of wood—the case, the spindles that held the receiver, and sometimes the transmitter’s faceplate—the manufacture of the telephone, while a new and modern undertaking, also drew on the older traditions of the woodshop. As the formal division of labor was not yet entrenched in the machine shops of the 1870s, the process of making telephones

¹⁴ Ibid., 132.



1.4 The first desk stand telephone (prototype), 1879. Little more than a Blake transmitter mounted on a wooden stand, the first desk stand telephone was very rudimentary in appearance. (Used with permission of AT&T Archives and David Massey, Bell System Memorial website.)

allowed workers to make adjustments that suited or amused them.¹⁵ Telephone fabrication proceeded in a collaborative fashion, with no clear lines being drawn between the work of inventors and that of machinists. Israel notes that “[e]ven after the machinist built a device, experiments often suggested further changes necessary to improve its operation. The pattern of constructing, testing, and altering a machine was an important part of the creative effort of invention.”¹⁶ Viewed in this light, the numerous design changes in the early years of telephone manufacture should be seen not as driven by technical development (which, according to Fagen, was negligible at this time) but rather as a consequence of the era’s work practices and environments.

The close relationship between the Bell Company and the Williams shop was mutually advantageous and humanistic: Williams acquired what were, to all intents and purposes, exclusive manufacturing rights to Bell’s patents and Bell benefited from Williams’ faith in their project and forbearance on the payment of invoices. Perhaps even more importantly for Bell, the exclusive arrangement with the Williams shop acted to safeguard the patents. There was little technical difficulty in duplicating

¹⁵ The ambiance of the workshop and the nature of the work—Watson described it as a “manly trade” practiced with much jesting and “expressive speech”—also offers a more prosaic explanation for the telephone’s often-noted anthropomorphic features. While psychoanalytic readings of the placement of the bells, or the angle of the mouthpiece are fascinating—Avital Rondell’s in particular—most are mute as to how it might come to be that the elements of the 1878 wall phone were unmistakably reminiscent of a face, or the bells of the 1900 common battery telephone were “indisputable analogues for breasts.” In fact looking at the numerous styles of telephones produced between 1877 and 1917 (after which point most, but not all phones featured concealed bells), the placement of the various elements varied so widely that perhaps the diversity of their design is the most striking thing about them. Watson cited in Smith, *The Anatomy of a Business Strategy*, 30. References to the telephone’s anthropomorphic features can be found in numerous texts; especially interesting are those found in Avital Ronell, *The Telephone Book: Technology, Schizophrenia, Electric Speech* (Lincoln, NE: University of Nebraska Press, 1989). Comments on the 1878 and 1900 telephones from Sorkin, “Just a Phone Call Away.”

¹⁶ For a discussion on the interaction between inventor and machinist, see Paul Israel, *From Machine Shop to Industrial Laboratory: Telegraphy and the Changing Context of American Invention, 1830-1920* (Baltimore, MD: The John Hopkins Press, 1992), 93-95.

the telephone and the protection of its patent rights was (and was to remain) the company's preeminent concern. Because it was the telephone-instrument itself that was patented, Bell's leasing and licensing agreements were carefully organized around the terms of ownership of the telephone.¹⁷ Leasing rather than selling the telephone acted as Bell's most powerful means of protecting its patents. By restricting who could manufacture the telephone and prohibiting its purchase, the Bell Company was able to keep track of the telephones held by their licensees and prevent their rivals from copying and manufacturing their own versions.¹⁸

While Bell's leasing and licensing arrangements have been given much attention in both histories of technology and business, their effect on the appearance of the telephone has been largely misinterpreted. Looking at the telephones manufactured during this period, there is little evidence to support the generally-held opinion that Bell's decision to lease rather than sell their telephones, or even their strict licensing arrangements, were responsible for introducing uniformity in telephone appearance and quality. While the company was scrupulous about protecting the *idea* of the telephone during these years, the shape it took and even its exact technical configuration were of less concern. The forms objects took were varied and often idiosyncratic in an era when the things people used such as tools, tables, chairs, and crockery, were made by numerous manufacturers in a wide array of local and regional styles. The homogeneity that came to mark mass-produced

¹⁷ Only "novel and utilitarian" objects and not human relations (i.e. services) can be patented.

¹⁸ The decision that Bell should lease rather than sell its telephones was put forward by Gardiner Hubbard and Chauncey Smith, the company's patent attorney. George David Smith notes how inflexible the Bell Company was on the question of selling the telephone. He writes: "In 1880, when the assistant general manager, Oscar Madden, received a request for the purchase of a telephone as a museum piece, he replied, 'It would be a departure from our custom to sell any of our instruments, even to be retained as you propose, as a relic. Such a door once opened, there is no telling where the thing would end.'" Smith, *The Anatomy of a Business Strategy*, 164-165.

goods in the early twentieth century was not yet in play; even technological objects bore strong evidence of the idiosyncrasies of their makers. This became obvious in 1879, when the Bell Company decided to turn to additional manufacturers to meet the growing demand for telephones.

MARKET PRESSURES, INDUSTRIAL REORGANIZATION, AND THE PUSH FOR STANDARDIZATION

Despite steadily rising demand for telephones, the Bell Company found itself on the verge of bankruptcy in 1878. The company's inability to generate sufficient capital made it difficult to fend off stiff competition from Western Union and increasing numbers of new telephone companies beginning to emerge in urban areas. Western Union, under the leadership of William Vanderbilt, had been waging a relentless attack on the Bell Company since it started operation in 1877. In addition to Western Union's economic advantage in the vast assets of its telegraph division, it also held a technical advantage—the Edison transmitter used in their telephones was superior to the one used in Bell instruments. The Bell Company's informal relationships with its licensees—typically based on a gentleman's agreement with Bell's partner and father-in-law Gardiner Hubbard—compounded its problems. In a bid to support its licensees against their competitors, Hubbard had discounted rental fees, and in some cases offered salaries to agents or subsidized their operations in other ways. The uneven leasing arrangements bit into the company's income and made administration difficult and costly. The great variety in the arrangements with individual licensees also made it impossible to develop system-wide policies and prices, and as the licensees' accounting practices were often as casual as their contracts, their royalty payments to the Bell Company were often overdue.

For the next two years the Bell Company's focus was on survival. To address

the problem of chronic undercapitalization, the partners reorganized the company into two divisions in 1878: the New England Telephone Company, the nominal headquarters located at Charles Williams' shop at 109 Court Street in Boston, and a new Bell Telephone Company headquartered in New York. Also in that year, the Bell Telephone Company's newly-hired General Manager, Theodore N. Vail initiated what was to become Bell's signature defense strategy against its competitors: he used Bell's patents to protect the company's market position.¹⁹ Actively seeking to acquire rights to transmitters that might be improvements on Western Union's, by December of 1878 he had acquired patents on transmitters invented by Emile Berlinger and Francis Blake, Jr. Perhaps most significantly in September of the same year, a patent infringement suit was filed against Peter A. Dowd, head of American Speaking Telephone Company, a subsidiary of Western Union, "to protect the Bell patents against Edison and Gray infringements." In order to speed national expansion of Bell's service to cities across America, the New England Telephone Company and the Bell Telephone Company were reunited as a single national licensing company in February 1879 and salaried traveling agents were introduced to provide a link between the licensees and the newly incorporated National Bell Telephone Company. And finally in November, on the recommendation of its patent lawyer, Western Union came to a settlement with Bell, giving up "all its patents, claims, and facilities in the telephone business—the Edison transmitter, various other technical improvements, and a network of 56,000 telephones in fifty-five cities—in return for 20 percent of telephone rental receipts over the seventeen-year life of the Bell patents."²⁰

While these changes addressed the most pressing legal and technical

¹⁹ John Brooks writes that Vail's first act as General Manager was to "sen[d] a copy of Bell's 1876 patent to every Bell agent in the country, along with a letter exhorting them to keep up the fight against Western Union's infringements." Brooks, *Telephone*, 69.

²⁰ *Ibid.*, 71.

problems facing Bell, the most fundamental dilemma—the company’s inability to meet the demand for telephones—remained unsolved. Williams added workers but was still unable to meet demand. The problem of supply was only alleviated when Vail decided that it had become necessary to look beyond the Williams shop and find additional manufacturers to augment production. While the uncertainty of Bell’s financing did not encourage potential manufacturers to come forward, by midsummer of 1879 four firms had been hired on to help meet the growing demand for telephones: the Electric Merchandising Company of Chicago, Davis and Watts of Baltimore, Post and Company of Cincinnati, and the Indianapolis Telephone Company (renamed Gilliland Electric Company in 1880).²¹

It is noteworthy that although there were strict guidelines concerning pricing, distribution, and accountability, the contracts these firms signed with the Bell Company did *not* call for the manufacturing licensees to adhere to uniformity in the design of telephone apparatus or instruments. Beyond the insistence that equipment be produced up to “a certain standard,” Bell provided the manufacturers no technical or aesthetic specifications. This was not an oversight: Vail noted that he “prefer[red] to have each manufacturer follow his own design” as he believed such competition would provoke the innovation that Bell desperately needed to entrench its position.²²

Competition between manufacturers did create an *ad hoc* system of research and development for Bell with improvements made in one shop being eventually implemented in the others but the economics of competition soon became a problem. The four manufacturers, keen to realize profits, tried to undercut each other’s prices, invaded each other’s territories, sold to unauthorized agents, and

²¹ Smith, *The Anatomy of a Business Strategy*, 61.

²² *Ibid.*, 70.

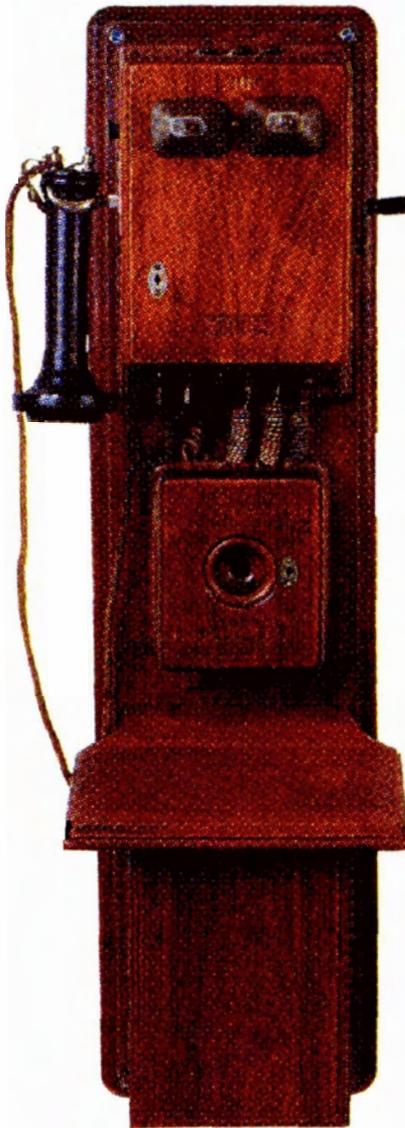
even exported Bell telephones to overseas markets. The Bell Company worked tirelessly to curtail these activities but showed little interest in standardizing the technical or aesthetic features of the telephone.

It was only in 1882, after the re-consolidation of telephone manufacturing in one plant, that the first 'standard' phone—the Magneto wall set or the 3-box wall phone—appeared (Figure 1.5).²³ Bell and Watson had both left the company by now; Bell in 1880 to work on the phonograph and Watson in 1881 to begin a new career as a shipbuilder.²⁴ The newly consolidated American Bell Telephone Company purchased majority interest in the Western Electric Manufacturing Company of Chicago in 1881, and immediately acquired licenses held by the Gilliland Company and Charles Williams, Jr. With the licenses issued to the Post Company, and the Davis and Watts Company having expired, the renamed Western Electric Company owned the only extant licenses to manufacture Bell equipment. The 'standardization' of the Magneto was in equal parts an outcome of Bell's regaining control over the manufacturing process and its satisfaction with the technical capabilities of the Blake transmitter, which it had acquired in 1878.

The standard elements of the Magneto were the Blake transmitter, Bell's receiver, a side-mounted crank for the magneto used for signaling the operator, and a battery which provided the necessary power. In appearance, the 1882 Magento was a large 3-box, wood-case wall set that featured a writing or resting ledge (clearly added for convenience of the user), small squared bells, and a beveled

²³ The Magneto was sometimes referred to as the 3-box telephone, for obvious reasons: the receiver, the transmitter, and the battery were each housed in a separate box mounted onto a wooden backboard.

²⁴ Ralph O. Meyer, *Old-Time Telephones! Technology, Restoration, and Repair* (New York: TAB Books, 1995), 68.



1.5 The Magneto wall set, 1882. Western Electric's first 'standard' telephone, the Magneto featured an oak casing, a Blake transmitter, and a Bell receiver. With the side-winder model shown here, subscribers turned the crank on the side to signal the operator. (Used with permission of AT&T Archives and David Massey, Bell System Memorial website.)

wooden speaking aperture. While the pattern of the Magneto case was set, many telephones manufactured in this year show variations in details which could be explained as experimentation, or perhaps more simply, a result of availability of parts.²⁵ Over the course of the next decade, the Magneto appeared in any number of variations: changes included a variety of bell-shaped metal mouthpieces replacing the speaking aperture, squared bells being replaced with round ones, and different positions for the crank and receiver. The idea that the 1882 Magneto was the first 'standard' telephone clearly has to be put in the context of its era. Even allowing for a definition of standardization which permits some degree of flexibility, the Magneto did not come close to what standardization would soon come to represent.

Despite few new technical advances, experimentation with different telephone styles continued through the turn of the century.²⁶ A wide range of styles were manufactured—most in small numbers—from the very plain to the highly elaborate. "Cabinet-type" telephones or "vanity sets" were telephones mounted in desks, some of which were quite ornate (Figure 1.6 and 1.7). An 1892 model had handsomely carved details including a scalloped skirt and pigeon-hole riser. The receiver was suspended from the side of the desk and a "long-distance" transmitter set in a curved metal arm was mounted to the top of the desk riser. Developed for use at "prestigious public locations" such as hotels or clubs which offered long distance

²⁵ For example, while most photographs of the Magneto show a beveled wooden aperture for the mouthpiece, one AT&T publication shows an 1882 Magneto with a bell-shaped mouthpiece. See Fagen, ed., *A History of Engineering and Science in the Bell System: The Early Years (1875-1925)*, 130.

²⁶ On the technical side there were only two notable improvements by American Bell engineers to the transmitter: an 1887 model used the higher-output "long-distance" transmitter developed in 1885, and the 1891 models used a "solid-back" transmitter invented by Anthony C. White in 1890. *Ibid.*, 128-129.



1.6 Western Electric Folding Cabinet Desk Set, 1892. Most often used in hotels and clubs but also in residential estates, cabinet desk sets were the most elaborate examples of the marriage of craftsmanship and technology that marked early telephone manufacturing. (Used with permission of the Christianson Telephone Collection.)



1.7 Kellogg Corner Vanity, 1902. This vanity was made by American Hardwood Telephone Cabinet Mfg. Co. and equipped with Kellogg Hardware. (Used with permission of the Christianson Telephone Collection.)

telephone service, the body of the desk housed up to three wet-cell batteries to provide the necessary transmission capacity for long distance calling.²⁷

In the mid-1890s Western Electric also began manufacturing “common-battery” wall-sets. In contrast to magneto—or “local battery” sets—in which the battery powering the telephone was located in the set itself, common-battery telephones drew power from a large circuit capacity battery located at a central telephone exchange office.²⁸ The first common battery telephone wall set—sometimes called the ‘fiddleback’ because the upper part of the cabinet narrowed at the top—was introduced in 1895 (Figure 1.8).²⁹ Also about this time, a small box version of the common-battery telephone was introduced and came to be used for intercommunicating systems, primarily in hotels and large institutions located in urban areas.

The desk stand telephone, introduced in a rudimentary form in 1879, became a viable commercial model as common-battery central exchanges started to become more widespread around 1893. Before this, it was necessary to include a small generator in the base of the desk stand set or else to have the desk stand wired to a standard local generator contained in a separate case—both versions were problematic in that they diminished the desk stand’s portability. All desk stands were made of heavy, nickel-plated brass and incorporated heavy machine-turned embellishments.³⁰ In 1892, Western Electric produced at least four models of the

²⁷ *Ibid.*, 129.

²⁸ The term ‘magneto’ came to be commonly used in reference to local-battery telephones. In this text, I use “Magneto” when referring to Western Electric’s local battery telephones and “magneto” when referring to local battery telephones generally.

²⁹ Meyer, *Old-Time Telephones!*, 71.

³⁰ *Ibid.*, 70.



1.8 Western Electric 'fiddleback' telephone, 1896. Introduced in 1895, the fiddleback was the first common battery telephone. (Used by permission of AT&T Archive and David Massey, Bell System Memorial website.)

desk stand, in which various combinations of simple and ornate supporting columns, square and round transmitters, and local- and common-batteries were tested (Figure 1.9). Between 1892 and 1900, when the desk stand telephone took on its characteristic shape, there were at least thirteen different versions of the telephone produced by Western Electric alone (Figure 1.10).³¹

Early telephone manufacturing was marked by an intuitive approach to experimentation which took into account *both* the technical and aesthetic aspects of the telephone. In America the nineteenth century machine shop grew out of colonial artisanal tradition and the values and mindset of craftwork were applied to the work of making machines.³² The machinists who worked on the telephone were more skilled generalists than the “electrical specialists” or engineers who would soon replace them. But while the artisanal practices of the workshop had not yet been fully eradicated, the Bell Company had taken the first steps towards rationalization. The consolidation of manufacturing under the single authority of Western Electric, the introduction of the concept of standardization, and perhaps most importantly, the establishment in 1883 of the “Experimental Shop” expressly for the purpose of conducting what would later come to be called “research and development” were all harbingers of the emergence of a new ethos that would bring with it a new aesthetic.

³¹ *Ibid.*, 83.

³² Material historian Brooke Hindle cautions against the error of seeing 19th century artisans and machinists as distinctly different categories of workers—in other words, applying modernist frameworks of specialization to make sense of earlier labor practices. He writes: “The colonial craftsman or artisan is often made to seem a different breed from the mechanic who built the nineteenth-century machines and the operative who tended them. This distinction was sometimes emphasized in Europe by conflict between the two classes, but in America the old craftsman often became the new mechanic—as did Oliver Evans and Chauncey Jerome. The distinction, in any case has been exaggerated by the appropriation of the crafts and craftsmen by the collectors and art historians, who are primarily interested in the aesthetic values of the products, and by the concentration of historians of technology on the mechanics engaged in machine production. The craftsman and his work call for more attention in terms of technological history.” Brooke Hindle, *Technology in Early America: Needs and Opportunities for Study* (Chapel Hill: University of North Carolina Press, 1966), 67.



1.9 Western Electric early desk stand telephone, 1892. One of several models of desk stands manufactured that year. It featured a Blake transmitter mounted on a heavily embossed nickel-plated brass stand. (Used by permission of AT&T Archive and David Massey, Bell System Memorial website.)



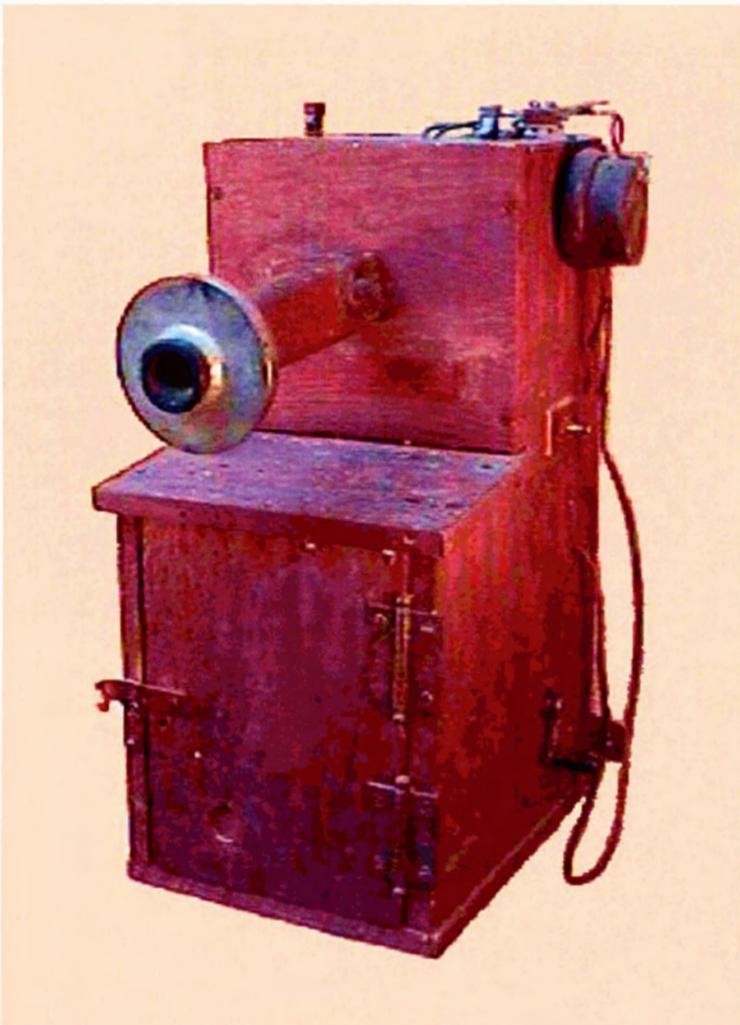
1.10 Western Electric desk stand telephone, 1897. By 1897 the desk stand had taken on the shape that it would keep for the next thirty years. (Used by permission of AT&T Archive and David Massey, Bell System Memorial website.)

The telephone instrument of the late nineteenth century embodied the contradictions of its historical moment. While it was clearly a modern technological object, it was constructed using both materials—metals, silk, cotton, and especially wood—and methods associated with traditional forms of artisanal fabrication. The influence of woodworking traditions in particular can be seen in early telephones and had an effect on both the appearance and the aesthetic of the telephone. Wood, a material which is easily cut and shaped, accommodated alterations and adjustments in the manufacturing process in ways that molded metal or (later) plastic could not. It was also a material which was familiar and available to almost all craftworkers, and most people in general, and hence one which could be and was often used to make home-crafted versions of desirable goods—including, the telephone (Figure 1.11).

The effect of a change of material on both the appearance and the character of an object can be seen by comparing the common-battery telephones manufactured before 1912 with those produced after that year. Common-battery telephones began to be manufactured in small quantities in 1894. Early common-battery telephones differed from local-battery phones primarily in that they did not require a wooden case holding the battery at the base of the instrument. Some of the early common-battery telephones, likely those destined for the lobbies of hotels or clubs, were elaborately fashioned upright models with elegantly carved and molded details similar in scale to a grandfather clock standing approximately six feet tall. By 1900, a common-battery telephone not much bigger than a contemporary wall-phone made its appearance, but the larger, more traditionally-styled wooden wall-sets continued to be manufactured. As the number of central exchanges equipped to power common-battery telephones grew, so did their use.



1.11 Wooden Cradle Desk Set, 1885. Little is known about the origin of this desk set, but it is a good example of the traditional craftsmanship that went into making 'modern' technological objects. (Reproduced with permission of the Christianson Collection.)



1.12 Homemade Wall Set, c. 1915. This telephone is made of plywood and is fitted with Western Electric components. (Reproduced with permission of the Christianson Collection.)

After 1912, the common-battery telephone began to be manufactured in metal and this version eventually replaced the wooden one.

It is important to recognize the relationship between the change in materials and the conditions of production and consumption. First of all, the changeover from wood to metal could only have occurred after the common-battery *system* was well-established—that is, once the central exchanges that could provide the necessary power were commonplace—after the technology reached a certain level of technical stability and there was a perception that no more major changes were required or anticipated. While the metal wall-sets were more economical to produce in the long term, the dies required to form the metal cases were expensive, and large scale production was necessary before any savings could be realized. And because metal does not easily accommodate adjustments, the configuration of the telephone's technical components had to remain relatively consistent. The metal telephone-cases, in other words, only became desirable and practical to manufacture once there was a need for large quantities of telephones to be produced to established technical criteria.

The second point is that the conditions which made it desirable or "efficient" to move to the production of a metal telephone case also had the effect of altering the aesthetic possibilities of telephone manufacturing. By virtue of moving from a material that was malleable to one that was rigid, the shape and appearance of the telephone also became 'fixed' in what can only be described as a thoroughly modern fusion of form and function. While wooden wall-phones continued to be manufactured by Western Electric and independent manufacturers until 1938—although toward the last years, in extremely small numbers and almost exclusively for rural service—the introduction of the standardized metal cases presupposed a rationally-organized or technological aesthetic of telephone design

and manufacturing. Driven by logics of mass production—economies of scale, and the division of research and production—and grounded in the modern ideals of efficiency, standardization, 'universality,' this new technological aesthetic became a means to control the costly excesses of competition—and the equally costly excesses of style—of the early era of telephone manufacturing.

"STRATEGIES OF INNOVATION" AND
THE EMERGENCE OF THE TECHNOLOGICAL AESTHETIC

The impetus for the ascendance of the technological aesthetic at Bell was the introduction in 1907 of corporate strategies which established a specific concept of innovation and defined the functionalist ideal that would drive the aesthetic and technical design of the telephone through most of the twentieth century. These strategies were the work of Theodore Vail, who returned to AT&T that year as its chief executive officer. Vail had left Bell in 1887, his vision of Bell's future as a "universal" telephone service provider at odds with the more profit-conscious orientation of the Board of Directors headed by William H. Forbes. When he returned in 1907, it was at the request of a consortium led by J.P. Morgan which had taken control of the Bell System after it had been badly battered in a long struggle against independent telephone companies.

Between 1879 and 1894, Bell's market position had been relatively secure. Its patents allowed it to function like a virtual monopoly despite the fact that the Bell "System" was made up of a number of loosely linked exchanges, coordinated more through stock ownership and common interest than by any technological coherence. Often exchanges operated with different, and sometimes incompatible, equipment and wires—a consequence of both the settlement with Western Union which brought over 50,000 non-Bell telephones into the system, and more generally the *laissez-*

faire approach which marked the manufacturing process of the late nineteenth century. Forbes and the Boston financiers who sat on the board had believed their responsibility to be first and foremost to the stockholders, not to the subscribers of the telephone system.³³ Prices were held high to maximize profits, and little attention was paid to the quality of service. The protection offered by Bell's patents managed to insulate the company from market pressure, but when the first patent expired in 1893, new telephone companies formed and challenged American Bell's position. Because Western Electric would not sell telephones to unlicensed independents, competing manufacturers soon began to set up shop as well. Ralph Meyer reports that by year end, there were "about 85 of these independent telephone manufacturing companies, including Sears, Roebuck & Co., Montgomery Ward, the Stromberg-Carlson Telephone Manufacturing Co., and the Kellogg Switchboard & Supply Co."³⁴ By the end of the decade, both Bell and the now loosely affiliated independent telephone companies were operating dual telephone systems in many towns and cities and over fifty percent of the telephones in service in the United States were supplied by manufacturers other than Western Electric.³⁵ AT&T historian John Brooks writes that rather than improving service and lowering costs, American Bell elected to compete with the independents in the courts. But with thousands of telephone patents in force and public opinion decidedly behind the independents, Bell began to lose its infringement suits in 1897. Bell's reputation with the public and

³³ To this end they were very successful—"[b]y the 1890s, the company had paid out \$25 million in dividends, and early owner' stock was worth ten times what they had paid for it." Vail's proposal to expand the network was deemed impractical as it would 'needlessly' bring down dividends and diminish Bell's control over the licensees. Brooks, *Telephone*, 82.

³⁴ Meyer, *Old-Time Telephones!* , 73.

³⁵ John Brooks writes that by 1906 there were "10,000 Bell phones, 10,000 independents, and several thousand duplications" in Indianapolis, and "10,000 independent phones to 6,700 for Bell with 3,400 duplications" in Toledo. "Cleveland, Pittsburgh, and Detroit had rather similar experiences." Brooks, *Telephone*, 109.

federal regulators was badly tarnished. When Morgan's group took control of American Bell in 1907, the company was almost bankrupt—the value of its stock had declined by over 50 percent since 1902.

Returning as CEO of AT&T in 1907, Vail implemented those strategies that he had advocated in 1885. Under the motto, "One Policy, One System, Universal Service," Vail instituted an aggressive campaign to eliminate dual services wherever feasible. He directed Bell's agents to encourage the independent telephone companies that had come to dominate small town and rural markets to purchase Bell telephones and equipment, and to link up with Bell into a federated Bell System. Most importantly, he moved to regain control of telephone service within major urban centers and to eliminate all competition in the long-distance market—an action that would lead to AT&T's eventual domination of the telephone industry. During Vail's first tenure, he presided over the successful development and expansion of the Long Lines System and he believed that the key to gaining control over the industry was to build a high caliber, national telephone network, an "interdependent, intercommunicating universal service" that provided better connections between exchanges than any of its rivals. With the goal of eliminating the "excessive and uneconomical diversity of types of apparatus and methods" that plagued Bell's operations and impeded 'interconnectivity,' Vail closed Western Electric's Engineering branch in Chicago and the AT&T Engineers Department in Boston and consolidated these activities at the Western Electric Engineering Department in New York.³⁶ He also implemented severe cost-saving cuts to the workforce, dismissing 12,000

³⁶ J.J. Carty to E.J. Hall, memorandum dated 17 July 1907. Box 2045, AT&T Archives, New York. Cited in Leonard S. Reich, *The Making of American Industrial Research: Science and Business at G.E. And Bell, 1876-1926* (Cambridge, UK: Cambridge University Press, 1985), 151.

employees (many of them engineers) who were unwilling or unable to relocate to the New York facility.

The changes implemented by Vail had a number of important repercussions. First, they freed AT&T from responsibilities at the level of the local exchanges and allowed its resources to be applied to the development of the long distance network.³⁷ They also created a vast market for AT&T's manufacturing subsidiary, Western Electric, which emerged as the largest producer of telephone equipment in the United States. Finally, the consolidation of engineering activities at Western Electric allowed the application of scientific knowledge and what could be described as technical reason to what were essentially problems of production and distribution, in the form of a program of ongoing technical innovation based on the implementation of 'systemization' as a key strategy to manage and control market conditions and resources.³⁸

The quality of Bell's telephones and equipment was a crucial element in Vail's plan. In August of 1907, he reproached E.M. Barton, then president of Western Electric, for the decline in the quality of Bell's telephone equipment. Vail insisted that "it is necessary that the Western Electric should have apparatus that in every respect

³⁷ See Galambos, "Theodore N. Vail and the Role of Innovation in the Modern Bell System."

³⁸ My use of the term 'systemization' follows that of business historian Louis Galambos, who employs it to make a helpful historical distinction between standardization and systemization. He suggests that the standardization that Bell implemented in the 1880s was "an 'adaptive' strategy of eliminating uncertainty in the process of producing equipment and providing services" -- an essentially "static" approach to research and development. He contrasts this with the strategies of systemization that emerged after 1907 and which he identifies as the more "formative" strategy of research and development based on innovation and progress. He argues that Vail's success was in managing to balance adaptive and formative research so that ongoing technological innovations were integrated into the network in a systematic and predictable manner. See Ibid. Alfred D. Chandler also makes the distinction between, what he identifies as "defensive or negative" strategies which "stemmed from a desire for security" and "positive" strategies whose goals were expansion and efficiency "by means of administrative coordination." He comments that defensive strategies came to be less significant with the rise of the modern business enterprise. See Alfred D. Chandler, *The Visible Hand: The Managerial Revolution in American Business* (Cambridge MA: The Belknap Press of Harvard University Press, 1977), 486-487.

is equal to that offered by the independent manufacturers," noting that he found some equipment to be "in every way inferior" to that of the independents.³⁹ On one hand, Vail's insistence on high levels of equipment quality, reliability, and efficiency was meant as a corrective to the poor reputation that AT&T developed in the years after Bell's original patents had expired. On the other, ongoing technological progress was indispensable to Vail's goal of 'occupying the field' by securing new patents and extending AT&T's long distance network. Whereas early technical innovations had often been the result of creative experimentation, under Vail's "ideology of systems engineering," technological innovation and implementation took on strategic objectives and a market orientation, and this would have long lasting repercussions on the way the telephone looked and how it came to be perceived.⁴⁰

With "One Policy, One System, Universal Service" as Bell's overriding goal, telephone designs became more simple and utilitarian. Meyer points out that with technical developments on a plateau, efforts were focused on designing an efficient and dependable telephone instrument. Western Electric's No. 317 wall phone, a model that would remain in production for over 30 years, was introduced in 1907 (Figure 1.13). Made of oak and cast iron, the No. 317 was a 'single box' design with nickel-plated hardware and an arched backboard—called a 'cathedral top'—to accommodate exposed line terminals. It also had a decorative groove that ran along the edge of the front face—called a 'picture frame front'—and a writing shelf mounted on shaped wooden brackets. The No. 317 was the first phone to include a ringer with adjustable bell spacing to control loudness, a feature that became standard on all the Western Electric telephones that followed.

³⁹ T.N. Vail to E.M. Barton, memorandum dated 16 August 1907. Cited in Galambos, "Theodore N. Vail and the Role of Innovation in the Modern Bell System," 105-106.

⁴⁰ This term is used by Galambos. *Ibid.*: 108.



1.13 Western Electric No. 317 wall set, 1907. Made of oak and cast iron with a 'single-box' design, the No. 317 would remain in production for over thirty years. (Reproduced by permission of AT&T Archive and David Massey, Bell System Memorial website).

Although the model number did not change, there were a few significant changes to the No. 317 over the years. The earliest version was, according to Meyer, technically relatively primitive. The wiring was for the most part unprotected, with the wood of the box often providing the only insulation. The electrical connection to power the transmitter and ringer (which were mounted on the door) was provided by soldering the wires directly to the four hinges that attached the door to the body of the box. The 1909 version had numerous modifications, including the use of cloth-insulated wiring throughout. Most of the exposed electrical contacts were concealed inside the cabinet body including the external terminals on the backboard, eliminating the need for the cathedral top. The door hinges were still used to provide the electrical connection, but they were moved from the right to the left side of the box to correct an earlier design error which allowed the door, when opened, to hit the magneto crank. The overall dimensions of the box remained the same (with the exception of the protruding cathedral top) as did the picture-frame front. The third version of the No. 317 appeared in 1911. The cabinet was slightly more compact than earlier models and no longer had the characteristic picture-frame front. Technical changes included the use of insulated stranded copper wire. More flexible than the wire used previously, this wiring could be connected directly to the transmitter and ringer on the door instead of being soldered to the, now three, hinges. The trend towards simplification became more pronounced with the final version of the No. 317 introduced in 1916. A short stamped-steel bracket replaced the long cast iron transmitter arm of the earlier versions. The writing shelf was tilted at a steeper angle and the shaped brackets were eliminated. The cabinet was shortened and its front panel remained plain.

The last model of Magneto telephone, the No. 417, was produced by Western Electric in 1938. In appearance, the only difference between the No. 417 and the No.

317 was the 'bulldog' mouthpiece. Short and stubby in design, the mouthpiece housed the newly developed F1 transmitter which, combined with an improved anti-sidetone circuit, achieved Vail's objective of producing a telephone with superior signal clarity. The No. 417 was produced, painted olive drab, for the military during World War II and then was put back into production again briefly in 1945 for the rural market.

The independent manufacturers who came on the scene after 1893 also made magento telephones, most of which were similar to Western Electric models. Two of these companies, Stromberg-Carlson (founded in 1894) and Kellogg (founded in 1897) supplied most of the independent operating companies. Stromberg-Carlson's early magnetos also had external line terminals which were also mounted on a cathedral-top backboard. The No. 101 model, produced in 1907, also featured similar picture frame detailing and a writing shelf, but its treatment of these aesthetic flourishes was a little more generous than Western Electric's comparable No. 317. The cathedral top was more prominent and the turning on the picture frame and shelf edgings was visibly more pronounced. Unlike the Western Electric No. 317, the Stromberg-Carlson No. 101 also had a lightning arrestor—a device meant to overcome the debilitating effects of atmospheric static on telephone use—integrated into the terminal arrangement on the cathedral top. It also did not have volume adjustment on the ringer, but on later models the adjustment could be made by turning the bells which were mounted with off-center screw holes.

The Kellogg Company began producing magnetos a few years after Western Electric and Stromberg-Carlson introduced their earliest models, but with the exception of some differences to the electrical components, the Kellogg phones were not greatly different than those of their competitors. Like Stromberg-Carlson, Kellogg incorporated a lightning arrestor into their design, located on the upper left side

panel above the receiver, and like Western Electric, it had a mechanism to adjust the ringer volume. Aesthetically, magneto phones manufactured between 1907 and 1938 shared a characteristic simplicity, with each successive version appearing to be slightly more pared down than its predecessor. There were however some subtle but notable differences between Western Electric's designs and those of its competitors. Both Stromberg-Carlson and Kellogg telephones had a regard for artistry that Western Electric's more 'purist' models lacked. As mentioned above, Stromberg-Carlson's telephones were marked by slightly more lavish detailing of edgework and more pronounced cathedral tops, while the transmitter arms of Kellogg phones were distinguished by a distinctive clover-leaf shaped base.

The momentum towards simplification which was evident in the design of the magneto wall sets could also be seen in the desk stand telephones produced during this same period. The desk stands which had been manufactured during the 1890s were often quite stylish and even ornate, ranging from the elegantly tapered 'oil-can' to the globular shapes of the 'pot-belly' desk stand. All of the earlier desk stands were made of nickel-plated brass and featured many heavy machine turnings.

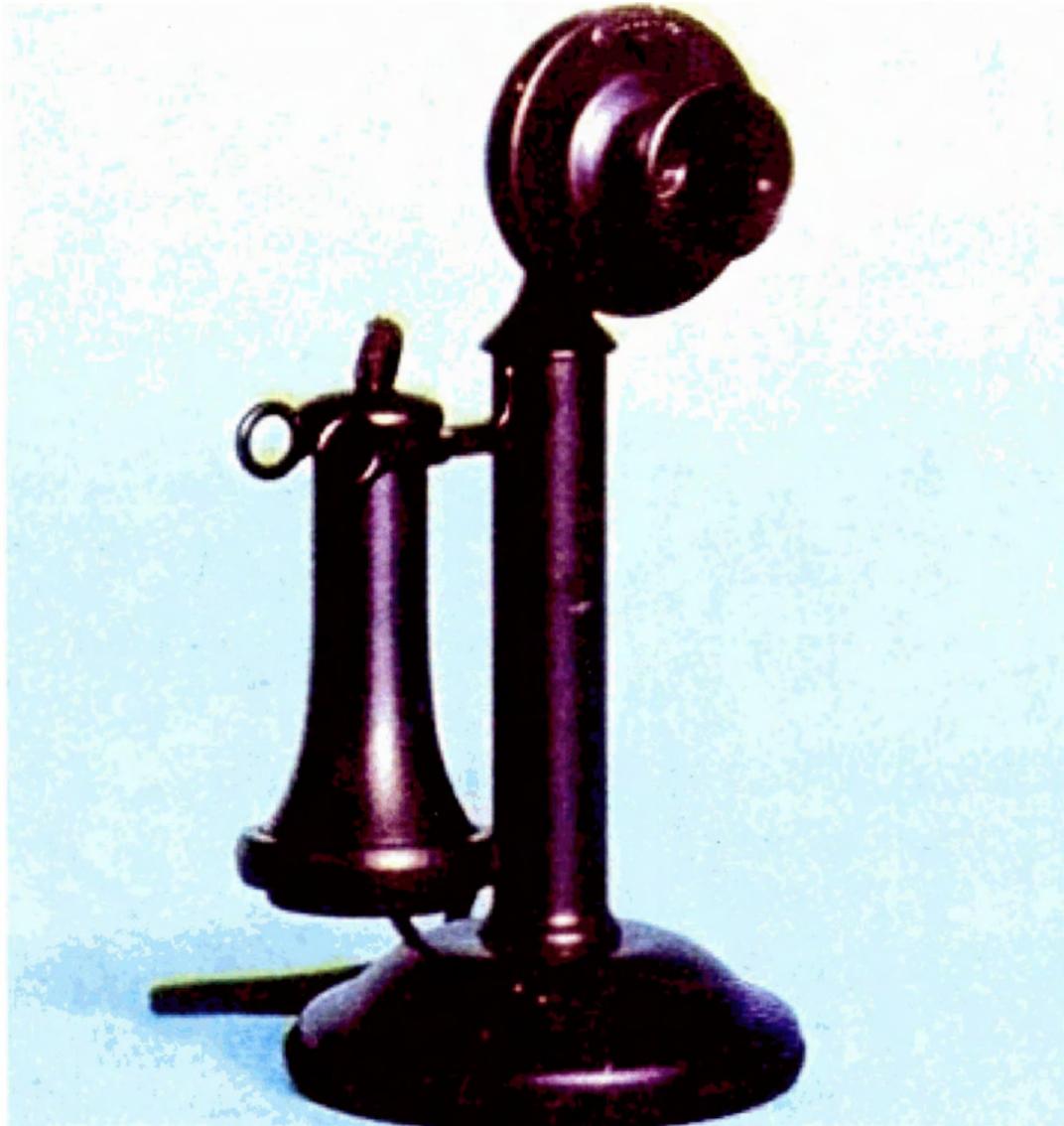
The first tubular-shaft 'candlestick' desk stand—so named because the cylinder and its plain circular base were roughly the size and shape of a candle in a holder—had come into widespread service in 1904, the last of the Western Electric candlesticks to be made of nickel-plated brass. Although electrically and mechanically unsophisticated, with un-insulated metal parts and exposed receiver terminals, the 1904 desk stand remained virtually unchanged for eleven years. As with the Magneto telephones, the newer model of the desk stand was more refined than the 1904 model, with the wiring properly insulated and enclosed in the body of the telephone. Western Electric manufactured two versions of the 1915 desk stand, identical in shape and function but made of different materials and with different

finishes. One version was made of brass but instead of the traditional nickel-plating, it was painted with a black japan, an asphalt-like varnish that is baked to a hard surface, giving the telephone a dull-polished, durable 'rubber-finish' (Figure 1.14).⁴¹ The base and shaft of the second 1915 candlestick was made of steel and finished with a "Bower Barff process"—"a chemical-scale finish produced by oxidizing their surface in the presence of steam and oil."⁴² The surface produced by this technique had a agreeable gray patina and was very durable, with a high degree of resistance to corrosion, but what came to be known as the 'Bower Barff candlestick' was the only example of its use. Both of the 1915 models also came in versions with dials.

Stromberg-Carlson also manufactured a candlestick-style desk stand. Its version was an inch shorter than the Western Electric model and continued to use nickel plated components in combination with a black painted steel tube and base well into the 1920s. Meyer notes that although dial versions were available, Stromberg-Carlson did not manufacture its own dials until after World War II and earlier models were fitted with dials manufactured by Automatic Electric, Kellogg, North Electric, and Western Electric. Kellogg's desk stand, taller than the Stromberg-Carlson but shorter than the Western Electric's model, was also manufactured in versions with and without dials. By the 1930s, the Kellogg Company had begun experimenting with 'Kellite'—its own brand of bakelite—as a material for manufacturing the telephone. Desk stands produced in the 1930s were typically made of black-painted steel with a Kellite sleeve around the tubular shaft.

⁴¹ Meyer notes: "The term *rubber finish*, coined by its Western Electric manufacturer, refers to its semi-dull black appearance that looks like a polished piece of hard rubber; the japan contains no rubber." Meyer, *Old-Time Telephones!* , 85.

⁴² Ibid.



1.14 The candlestick telephone, 1915. An example of the more common of the two candlestick telephones manufactured on 1915. Made of brass, it was painted with a black japan varnish that was very durable. (Reproduced by permission of AT&T Archive and David Massey, Bell System Memorial website.)

Here it is worth noting that despite Western Electric's dominance some of telephony's technological and aesthetic innovations and improvements were introduced by the much smaller independent manufacturers. For example, the Kellogg Company—which in 1905 introduced North America's first handset, the Grab-a-phone—was highly-regarded in independent circles for its innovations.⁴³ One reason for the independents' ability to keep pace with Bell's advances—which also helps to explain the growing similarity in the appearance of telephones by different manufacturers—is that there was a great deal of job mobility for skilled engineers in the first decades of the twentieth century. Charles Pleasance notes in his history of independent telephony, that many engineers gained their early experience with Western Electric but then moved on to work for the independents where there were fewer constraints and greater opportunities to pursue one's fame and fortune. He describes an environment that was relatively free-wheeling when it came to ideas and inventions in spite of the Bell Company's willingness to file patent infringement suits against its rivals:

The defectors from Bell brought knowledge to the independent manufacturers that they could have obtained otherwise only with great difficulty. [...] [A]lthough these companies contributed innovation and perfected concepts that would otherwise have fallen by the wayside, the upstart manufacturers copied substantially from earlier ideas that had been originated or acquired from others by Bell. They also copied rather freely from each other. And the talented men who circulated among companies always carried their pet projects with them.⁴⁴

⁴³ For example, Kellogg began using a stamped steel transmitter arm for its Magnetos approximately five years before Western Electric began to manufacture them. See *Ibid.*, 89. For a more detailed discussion of the innovations of Independents, see Chapter 14 of Charles A. Pleasance, *The Spirit of Independent Telephony: A Chronicle of the Accomplishments, Intrigue, and the Fight for Survival That Accompanied the Independent Telephone Movement in the United States*. (Johnson City, TN: Independent Telephone Books, 1989).

⁴⁴ Pleasance, *The Spirit of Independent Telephony*, 127-128.

In the first decades of the twentieth century, the first priority for Bell engineers was improving and then maintaining a high level of transmission quality and efficiency. Technical innovation was the goal but always within the framework of systemization—in other words, innovation at Bell was an economic strategy and not an abstract objective. Technical innovation was necessary to develop the capability to build a long distance telephone network which would insure Bell's market dominance. Innovation in the context of a program of systematic research also provided Bell—through the resulting patents—with a relatively secure hedge against independent manufacturers. Although most research on this period of telephone history focuses on these two aspects of innovation, a less examined but crucial element of the innovation strategy involved the standardization and optimization of production.

Historically, it was too much demand for the telephone—and Bell's inability to meet it—that was the cause of many of Bell's problems. Bell's attempt to meet that demand by increasing the number of licensed manufacturers failed because the highly competitive nature of capitalism made it difficult to maintain control over production that was geographically dispersed. For a manufacturer located far from company headquarters, the temptation to make a quick profit by undercutting another licensee, or skimping on a technical detail, was far too great. Bringing manufacturing under one roof with the acquisition of Western Electric solved one aspect of the problem: it gave control over the process and the product back to Bell. However it did not in and of itself create the necessary economies of scale that would allow Bell to produce a dependably high-quality telephone instrument in sufficient numbers to meet demand. While the acquisition of Western Electric in 1882 set the stage for the mass-production of telephones, mass-production in a true sense was

not possible at that time because the production process was still tied—by its materials and practices—to earlier more integrated forms of manufacture.

This changed when Vail's strategies of innovation put the newly consolidated and reconfigured engineering department, under the leadership of John J. Carty, at the forefront of the drive for systemization. Leonard S. Reich writes that Carty "redirected engineering efforts toward standardizing Bell equipment and operating methods[,] minimizing supplies and parts needed for repair and reducing the number of different items Western Electric manufactured."⁴⁵ In fact under Carty, research was more likely to be curtailed than expanded, especially if it threatened to undermine the coherence of the emerging Bell System. Reich notes the "Carty took the opportunity to remove experimental hand-telephone sets from circulation because their adoption would have made older equipment obsolete."⁴⁶

In the area of production, innovation for Bell—and other telephone manufacturers—had to do with optimizing the efficiency and flexibility of the manufacturing process. Increasingly, transmitters and receivers were designed so that they could be used in either desk stands or in wall sets, and could be put together in different combinations. Manufacturers experimented with materials that were durable, inexpensive, and better suited to mass production techniques than wood. Different metals, new finishes, and various processes were tried in hopes of reducing the time and cost of production. For Bell and Western Electric, these experiments were an integral part of the strategies of innovation and systemization, and consequently, the design of the telephone instrument came to be fully subsumed within the engineering process and governed by its principles. Just as the stylish

⁴⁵ Reich, *The Making of American Industrial Research*, 152.

⁴⁶ *Ibid.*

flourish of earlier models of the desk stands and wall sets stood in relationship to older artisanal traditions of manufacturing, the minimalism and functionalism of the telephones produced after 1907 emerged as the aesthetic counterpart to Western Electric's increasingly rationalized processes of production.

It was not that the look of the telephone didn't matter, it was rather that the standards by which aesthetic value was judged had changed. While independent manufacturers shared many of the same concerns as Bell—especially with respect to rationalizing production—their designs exhibited less commitment to the technological aesthetic, in fact, concessions to style increased over time until by the mid-1920s, there was a striking contrast between Western Electric telephones and those manufactured by the independents.

FROM FUNCTION TO FASHION:
CONSUMERISM AND THE EMERGENCE OF A DESIGN AESTHETIC

It is not clear if the marble telephone described at the outset of the previous chapter was ever built. I have not been able to find Legge's design nor evidence that he proceeded with his project. Still the very existence of Legge's plan to make a marble telephone illustrates that the shift to a technological aesthetic on the part of AT&T and Western Electric was arguably out of step with the growth of twentieth century consumer culture. Indeed, Legge's belief that there was a market for his marble telephone could only have been inspired by the upsurge of enthusiasm for consumer products that signified luxury and style. "By the beginning of the twentieth century," observed cultural historian Roland Marchand, "both the relative social fluidity of the upper ranges of American society and the pace of technological change had conditioned Americans to expect and relish each 'new look' [...] in such accepted fashion goods as clothing, furniture, and home decorations."¹ Manufacturers used color to transform everyday items into fashionable—and desirable—goods. Images of

¹ Marchand, *Advertising the American Dream: Making Way for Modernity*, 120.

colored ranges, refrigerators, kitchen cabinets, bathroom fixtures and accessories, and even basement heaters, jumped out at readers from advertisements and magazine articles. As manufacturers began to apply the criteria of color and style to lower-cost items such as cookware and kitchen utensils, and towels, sheets and pillowcases, it became possible for those who could not to afford to redo their kitchens and bathrooms to display evidence of their good taste.

As fashionable items became more affordable, home décor took on new significance for the middle class. Encouraged by advertisers, middle class Americans began to think about the fashionable objects with which they furnished their homes as “outward and visible signs of an inward and spiritual grace.”² The new passion for personalization of the home and the stylistic coordination of its furnishings was at odds with the technological aesthetic of the telephone. By the turn of the century people were looking for ways to ‘hide the telephone’ because its appearance was not in keeping with emerging ideas about the styles and sensibilities of modern life. All manner of ‘hideaways’ came to be used in the effort to ‘civilize’ the candlestick telephone: boudoir dolls that hid the telephone under their skirts, telephone cozies, and globes of the world and decorative busts that swung open on hinges to contain the “unprepossessing” instrument (Figures 2.1, 2.2, 2.3 and 2.4). Transforming the

² Roland Marchand notes that this description was used in a promotional booklet produced by the Henri, Hurst and McDonald agency for a bathroom fixture manufacturer. It also appeared in an ad for the company’s products in *Printer’s Ink*, July 28 1927, 30-31. It was employed by A.W. Page, AT&T’s vice president of publicity and public relations in a speech at the AT&T general Sales Conference in 1929. Marchand writes that the Henri, Hurst and McDonald booklet used “Page’s borrowed phrasing” despite the earlier publication date for the booklet. This may mean that Page had used the phrase before as this quote is usually attributed to him. *Ibid.*, 126. For use of quote by Page, see Arthur W. Page, “Coordination of Sales and Advertising Activities,” paper presented at the AT&T General Sales Conference, January-February 1929. Box 2034, A.W. Page: Talks and Papers, Corporate Collection, AT&T Archives.



2.1 Boudoir doll, c. 1920. A telephone 'hideaway' used to conceal the "unprepossessing" telephone. (BCHC artefact #45524, photographed by Lise Noel. Reproduced with permission of Bell Canada Historical Collection.)



2.2 Boudoir doll (open), c. 1920. A candlestick telephone hides beneath the doll's skirts. (BCHC artefact #45524, photographed by Lise Noel. Reproduced with permission of Bell Canada Historical Collection.)



2.3 Telephone cozy, c. 1930. A pink plush telephone 'hideaway.' (BCHC artefact #45525, photographed by Lise Noel. Reproduced with permission of Bell Canada Historical Collection.)



2.4 Telephone cozy, c. 1930. The cozy hides a French phone. (BCHC artefact #45525, photographed by Lise Noel. Reproduced with permission of Bell Canada Historical Collection.)

telephone was another strategy. 'Telephone-holders' such as the Metaphone tried to temper technology with artistry by using the outstretched arms of art deco figurines as the supports for the telephone's switchhook. The 'problem' of the telephone was serious enough to warrant consideration in the pages of the style-conscious *House & Garden* magazine, which featured an article in the December 1923 issue titled "Concealing the Unsightly Telephone." In it, the author noted that:

It is a curious fact that the telephone, probably the most indispensable of all our modern luxuries, has been allowed to retain its original unprepossessing aspect. Even when painted to harmonize with the surroundings, it strikes a discordant note by the very ungainliness of its lines which no amount of painting and decorating can transform. There is only one thing to do with the telephone—conceal it.³

STYLE, STATUS, AND THE POPULARITY OF THE 'FRENCH PHONE'

What is clear though not explicitly stated in the article noted above is that the telephone's 'ungainly' appearance had become a dilemma for America's middle class. The article's tips on how the reader, with a little ingenuity, could modify "[h]anging cabinets, chests, small commodes or built in cupboards" to hide the telephone were do-it-yourself solutions that emulated the elegant telephone vanities that had become the hideaway of choice for those with taste and means.⁴ Concerned about style and status, and eager to distinguish themselves from the laboring class, the middle class aspired to live with at least the semblance of the elegance and comfort of the social elite. As the quintessential 'modern luxury,' a telephone in the home conferred a certain degree of status or social prestige onto its owner. The cost of

³ "Concealing the Unsightly Telephone," *House & Garden*, December 1923: 65.

⁴ Telephone vanities from the 1910s and 1920s were made of fine woods such as walnut and mahogany, and often ornately carved or appliquéd. For examples, see Kate E. Donner, *Telephone Collecting: Seven Decades of Design* (Atglen, PA: Schiffer Publishing, 1993), 12-13.

telephone service was sufficiently high to put it out of the reach of manual workers, so that a telephone was one way in which the new professional middle class—the teachers, merchants, and office workers with earnings sufficient to afford the cost—could announce their class position. But the functional, almost industrial appearance of the telephone was at odds with middle class taste and aspiration.

Hiding the telephone became popular in part because of Bell's outright resistance to introducing fashionable telephones. The strategic push for standardization introduced in 1907 had resulted in Western Electric finally having the quantity and quality of telephones sufficient to meet demand. From Western Electric's point of view, introducing new telephone models would simply make their stock obsolete and create new supply problems. In addition, because of Bell's leasing arrangement with subscribers, the cost of producing the numbers of telephones needed to supply even a percentage of their subscribers would require that Bell make a sizable capital investment in what was essentially an aesthetic and not a technological improvement. To the engineers at Bell Labs and Western Electric, imbued with "the ideology of systems engineering," fashion was simply not a legitimate consideration when it came to the design of the telephone.⁵

Other manufacturers did not have the same reservations. Smaller Independent manufacturers, not having the benefit of Western Electric's exclusive arrangement with AT&T, were more open to using style as a selling point. Kellogg introduced the Grab-a-phone—a desk set with an integrated hand set—in 1905. The hand set, which combined the receiver and transmitter in the handle, had been in use in France since 1882 and had become common in Europe by mid-decade. The French hand set telephone became popular in the United States when Americans

⁵ Galambos, "Theodore N. Vail and the Role of Innovation in the Modern Bell System," 108.

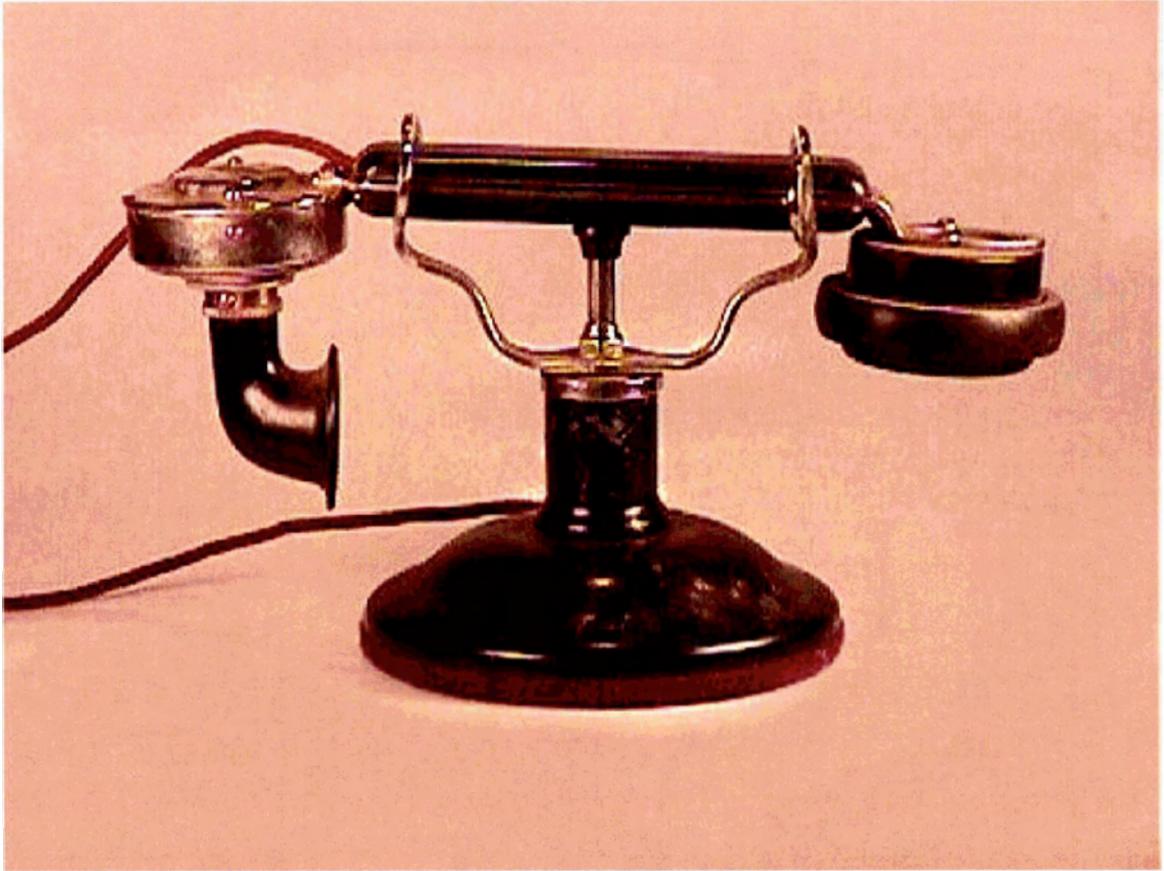
traveling in Europe began to purchase the telephones for use in their homes. As early as 1910, Bell subscribers began to show a keen interest in acquiring the stylish telephone. By the mid-1910s, other American manufacturers began producing a version of the French phone, including Magnavox and De Veau (Figure 2.5). By the 1920s, numerous versions were available and some manufacturers were beginning to experiment with various finishes and colors. The Kellogg Grab-a-phone was made in a variety of finishes including a black hand set with chrome detailing, a copper model with chrome and brass details, and one with an embossed antique brass cover over the base of the telephone.⁶ In 1926, the Mor-Tel Corporation's "French Phone" was available in nickel, brass, bronze, as well as gold- and silver-plate; and in 1929, the American Electric Company advertised the Monophone in eight decidedly fashionable colors—among them, mahogany, Chinese red, orchid, and Nile green.⁷

The popularity of the hand sets was greatly fuelled in the 1920s as images of the French phone began circulating nationally in "leading class magazines" and Hollywood films.⁸ Magazines and movies were growing in popularity as leisure time activities of the middle class, especially middle class women. As art and film directors began to use the French phone to denote sophistication, refinement, and wealth, it soon came to be the symbol of modern style. Manufacturers of the hand set phones also advertised their products in magazines, appealing to the fashion-conscious middle class by stressing the hand set's modern lines and convenience. Presenting

⁶ Donner, *Telephone Collecting*, 14.

⁷ American Electric Company, "Now in Color, the Monophone," in *Telephony* (1929); Mor-Tel Corporation, "The 'French Phone'," in *American Perfumer & Essential Oil Review* (1926).

⁸ This term was used to designate a publication targeting middle and upper class consumers by Charles Frenz, president of the Mor-Tel Corporation in a letter sent to J.S. McCulloh, president of the New York Telephone Company, an Associated Company of the Bell System. C. Frenz to J.S. McCulloh, letter dated March 10 1927. Box 73, Series 7: Apparatus and Systems, F.B. Jewett Collection, AT&T Archives.

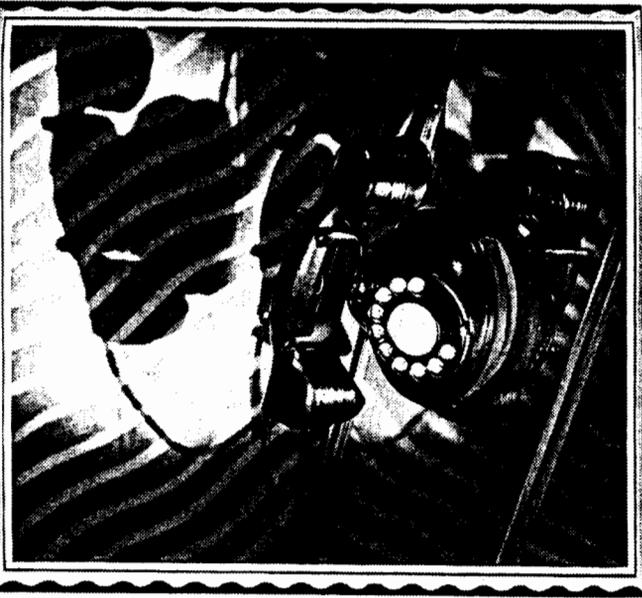


2.5 De Veau desk set, 1915. (Reproduced with permission of the Christianson Collection.)

the hand set as the solution to the middle class dilemma of trying to reconcile technology and taste, the independent manufacturers were not overly subtle in their references to Western Electric's technological aesthetic. The headline of a 1928 advertisement for the Monophone asked bluntly "Why Should a Telephone Be Ugly?" while a 1929 ad for the same phone notes that "the graceful form and attractive appearance of this modern telephone instrument make it of definite value to the tasteful furnishing of any room. It is a decorative asset, rather than a liability" (Figures 2.6 and 2.7). An ad for the Mor-Tel French Phone addressed itself to "Those who take pride in the appearance of their home and office, shun to every degree possible, the too evident present day influence of standardization" and asked "Do you enjoy in your home, the phone that is used in every factory, garage and store?"⁹ Increasingly, these advertisements began to address their appeals to women as the modern managers of the middle class home and its values. While earlier ads by all manufacturers promoted the hand set telephones as an improvement to both home and office settings, increasingly advertisers began to focus on the telephone's residential uses and directed their messages to middle class homemakers. "When Mrs. Marshall Uses the Telephone" declared one such ad with an illustration of a well-dressed woman at ease in her elegantly appointed drawing room, "she demands beauty as well as efficiency" (Figure 2.8).

Much to the consternation of Bell System officers, determined subscribers did not let Bell's unwillingness to offer the hand set telephone stand in their way. Undeterred by the fact that they were in violation of their contract with Bell,

⁹ Mor-Tel Corporation, "The 'French Phone'."



The Type 1-A automatic desk stand Monophone is pictured here. A variety of other styles is also available. Some are equipped with dial blanks for later dial installation.

When variety is automatic. Electric No. 10266 standard. P.E.I. 2111-11-27

Reflecting the Modern Trend

THE Monophone fits perfectly into today's mood. More than just an excellent mechanism, the graceful form and attractive appearance of this modern telephone instrument make it of definite value to the tasteful furnishing of any room. It is a decorative asset, rather than a liability.

In use, the Monophone is the ultimate in convenience. The transmitter-receiver unit is shaped for maximum comfort, and balances perfectly in the hand. There is no awkward, strained position no fatigue. One relaxes comfortably and talks as easily and naturally as in ordinary conversation. People like to use the Monophone and gladly pay the slight additional charge for its use. Telephone companies everywhere have been quick to employ the Monophone which satisfies their subscribers and promotes public goodwill as well.

Automatic Electric Inc.

Manufacturers of Strower Dial Telephone Systems
Factory and General Office: 1013 West Van Buren Street, Chicago, U. S. A.
Sales and SERVICE DISTRIBUTORS
In Australia - Automatic Telephones, Ltd., Sydney
In Canada - Automatic Telephones, Ltd., Toronto
In France - International Telephone Corporation, Paris
In Germany - The Automatic Electric Company, Ltd., Cologne

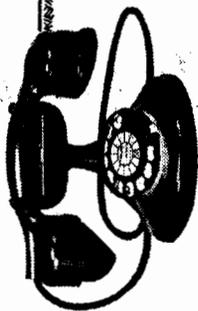


When variety is automatic. Electric No. 10266 standard. P.E.I. 2111-11-27

2.6 Automatic Electric Inc. advertisement for the Strower Monophone. Telephony (23 February 1928).



Why Should A Telephone Be Ugly?



This Type Can Be Used with Existing Bell Box

With the recent development of the Production Call Receiver, the Monophone can be used with any existing bell box containing a bell, or with the automatic and expansion of a bell box. The receiver is designed in appearance like a bell, but when used with the Monophone transmits the message in a clear, distinct tone with a moderate reduction of

THE first automobiles were ungainly and clumsy affairs, far from attractive in appearance. So were the first telephone instruments. The important thing at that time was that they both worked and represented distinct advances in the fields of transportation and communication.

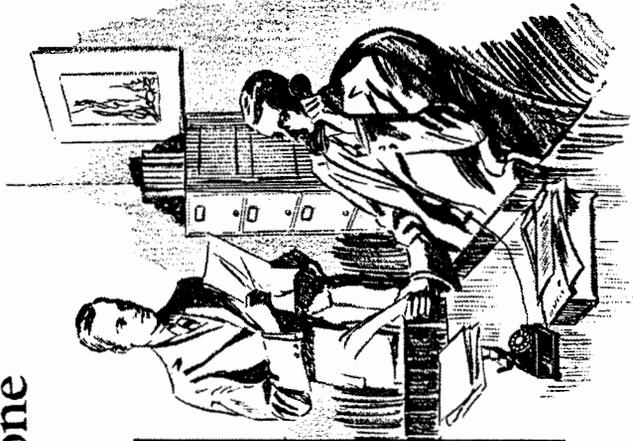
With the perfection of the automobile to its present state of mechanical perfection and absolute reliability, people have demanded in lines, artistic color schemes and perfections in design which give grace of operation. The same period of evolution has produced the Monophone. Linking the same mechanical perfection and dependability of operation of the old style telephone, the Monophone has in addition unequalled convenience and an unusual grace of line and beauty of appearance hitherto unknown. Combining as it does in one instrument the three qualities of beauty, convenience and perfect operation, it is any wonder that it is being demanded by telephone users everywhere that it has been seen or used?

Circle 1 on the Monophone, impressed with the name of the manufacturer, is the only telephone receiver of its kind in the world. It is the only company for distribution of telephone receivers are available.

Automatic Electric Inc.

1033 West Van Buren Street, Chicago, Ill., U. S. A.

For Australia—Automatic Telephonic, Ltd., Melbourne—Automatic Electric Company, Ltd.



The Monophone

STROWGER AUTOMATIC

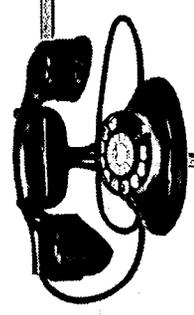
When writing to Automatic Electric Inc., please mention TELEPHONY

When writing to Automatic Electric Inc., please mention TELEPHONY

2.7 Automatic Electric Inc. advertisement for the Strowger Monophone. Telephony (5 May 1928).



When Mrs. Marshall Uses The Telephone---



This Type Can Be Used with Existing Bell Box

With the recent development of Moniophone, the Bell Telephone Company has introduced a type of telephone which can be used with existing Bell boxes. This new type of telephone is a rotary telephone, and it is the only one of its kind which can be used with existing Bell boxes. It is a rotary telephone, and it is the only one of its kind which can be used with existing Bell boxes. It is a rotary telephone, and it is the only one of its kind which can be used with existing Bell boxes.

No telephone executive nowadays can afford to neglect the importance of feminine opinion regarding the activities of his company. Not only is woman unrivaled in the realm of business, but she is also the most efficient and convenient, but she is carrying out of her mind the "heavy" work of the office, and she is the agency of which she makes use.

The Moniophone incorporates these highly desirable qualities in one instrument. It is a rotary telephone, and it is the only one of its kind which can be used with existing Bell boxes. It is a rotary telephone, and it is the only one of its kind which can be used with existing Bell boxes. It is a rotary telephone, and it is the only one of its kind which can be used with existing Bell boxes.

Automatic Electric Inc.

Factories and General Offices: 100 West Van Buren Street, Chicago, U. S. A.
London Office: 10, Abchurch Lane, London, E. C. 4, England.
Export Distributors:
For Australasia—Automatic Telephone, Ltd.
For Europe—Automatic Electric Company, Ltd.

The Moniophone

STROWGER AUTOMATIC



When writing to Automatic Electric Inc., please mention TELEPHONY

When writing to Automatic Electric Inc., please mention TELEPHONY

2.8 Automatic Electric Inc. advertisement for the Strowger Moniophone. Telephony (28 April 1928): 26-27.

customers began to connect hand sets made by other manufacturers to the Bell network. Consumer interest in the French phone took the Bell System by surprise and its responses were for the most part provocative without being especially effective. AT&T encouraged its associated companies to disconnect "foreign" (that is to say unlicensed) instruments and ran warnings in local newspapers advising subscribers not to use French telephones.¹⁰ Under Vail's strategies of innovation, AT&T's technological ethos gave priority to standardization and engineering over considerations of taste and convenience; it certainly did not include a conception of the telephone as a decorative article. Conditioned to assume that subscribers shared their views, AT&T management was unprepared for the degree of consumer enthusiasm for the French phone and perplexed as to how to negotiate a path between its commitment to systemization and its concern over losing subscribers to competitors willing to give them what they desired.

Western Electric engineers were not unfamiliar with the design of the hand set. Robert G. Brown, an engineer with Western Union's Gold and Stock Exchange, developed a functional hand set in 1878 and registered a patent for it in 1880.¹¹ Bell engineers began experimenting with various hand set designs in 1890 but all work on the hand set stopped in 1907 when experimentation was curtailed to focus on research directly related to improving transmission quality and expanding the Long Lines division.¹² AT&T's continued reluctance to design and manufacture a hand set

¹⁰ See for example the *New York Times*, 1 March 1927. See also C. Frenz to J.S. McCulloh, this chapter, footnote 8.

¹¹ Some years after patenting his hand set, Brown went to France where he accepted the position of Electrical Engineer of La Société Générale. Hand sets based on his design were put into general use, hence "the French phone." Fagen, ed., *A History of Engineering and Science in the Bell System: The Early Years (1875-1925)*, 140.

¹² J.J. Carty, then newly appointed chief engineer at AT&T, was responsible for halting research on the hand set and spearheading Long Lines research. In 1925, Carty was appointed

telephone was due in large part to the disappointing results of its earlier attempts. Putting the transmitter together with the receiver in a single unit created problems with signal efficiency and sound clarity, because the transmitter acted to amplify speech. With the transmitter and the receiver in close proximity, the vibrations between them caused the hand set to “howl” and overpower the vibrations associated with speech. “Sidetone” was a problem that stemmed from the transmitter picking up ambient sounds—including the speaker’s voice— and relaying them along the short electrical wire to the receiver where they would be reproduced and amplified. Transmission problems were further compounded by the tendency of telephone speakers, upon hearing their own voices resonating at exaggerated levels, to speak more quietly.

Yet another problem, known as “positional effect,” arose from the very circumstances that made the telephone so popular. Unlike the desk stand, which encouraged the person using the telephone to maintain a more or less stationary position, the compactness of the hand set allowed the user to move around and do other things. But while the design of the hand set allowed freedom of movement, the design of the transmitter was less tolerant. The solid-back transmitter consisted of a chamber filled with carbon granules that, when in contact with two electrodes, acted to convert sound waves into electrical signals. It was very effective at transmitting and amplifying sound but its efficacy was predicated on the transmitter remaining in a relatively fixed position. Housed in the handle of the French phone, the transmitter position—and hence the sound quality—could no longer be assured. When a caller tipped the handle, the carbon granules shifted and lost contact with the electrodes,

chairman of the board of directors at Bell Laboratories and vice president of AT&T. See AT&T Archives, *Events in Telecommunications History*.

resulting in a sudden drop in signal clarity and sound volume.¹³ Reducing the transmitter amplification could diminish howling and sidetone—and this was the strategy for European hand sets which were used mostly for short-distance calling.¹⁴ Since reducing the level of amplification also weakened the signal emitted by the transmitter, it was a solution that was poorly-suited to American geography and AT&T's objective of creating a high caliber national Long Lines system.

Although they believed their hand set was better than those of their competitors, AT&T engineers were not confident in its capability. The Bell System Associated Companies were under extraordinary pressure to supply the French phone. Subscribers' impatience was taking its toll. AT&T found itself in an uncomfortable predicament. On one hand, delaying the release of the hand set could only further intensify the negative public opinion and create difficulties for the Associated Companies.¹⁵ On the other hand, releasing the still experimental hand set without putting it through rigorous trials had longer term risks. A memo sent on September 14 1925 from Frank B. Jewett to its vice president E. B. Craft, and the head of special research, E.H. Colpitts, noted that if "we do at this time embark on the policy of furnishing hand sets to customers as a service, we will have embarked

¹³ A Bell technical report noted that when the transmitter was held at a ninety degree angle, its output dropped as much as ten to fifteen decibels—that is to say, a sound would be two to three times quieter. See W.C. Jones and A.H. Inglis, "Development of a Handset for Telephone Stations," *Bell System Technical Journal*, no. 11 (1932).

¹⁴ Between 1900 and 1921, demand for the hand set was very high in Europe and Western Electric produced a number of models for the European market, first in their Hawthorne plant near Chicago and then in their Antwerp plant in Belgium. These models were tested for use in the United States and rejected for the reasons described above. See Fagen, ed., *A History of Engineering and Science in the Bell System: The Early Years (1875-1925)*, 140-141.

¹⁵ E.D. Nims, president of Southwestern Bell wrote to AT&T vice president Bancroft Gherardi on the dilemma facing Associated Companies: "It has become rather an embarrassing situation for us. [...] [S]ome of our subscribers think our attitude is rather arbitrary. Our explanation about the service does not seem to satisfy them—they say the service is good enough for them and they prefer the hand sets." E.D. Nims to B. Gherardi, letter dated 14 May 1926. Box 73, Series 7: Apparatus and Systems, F.B. Jewett Collection, AT&T Archives.

on a course from which it would be difficult to withdraw."¹⁶ Bell's experiences with inferior quality instruments between 1894 and 1906 were still fresh in the company's memory—and were the original impetus for the development of the stringent trial protocols it was now hard-pressed to circumvent. Once the phones were in the hands of the subscribers, the claim that they were experimental would do little to salvage public opinion, and the public's opinion was not inconsequential to Bell's future. Bell's monopoly position had been secured by convincing regulators that it alone could provide the high quality instruments and reasonably priced service needed for "universal and interconnected" communication. Bell's French phone dilemma threatened to erode not only its reputation but also the footing on which its monopoly status was built.

By the fall of 1926, Bell Labs had made a number of improvements that reduced the problems with positional effect and howling, but many problems remained. Increasingly concerned by inroads being made by the independent manufacturers, AT&T president Walter S. Gifford decided to release a small number of experimental hand sets in January 1927, while the necessary development work and field trials continued. In a letter announcing the release of the experimental sets to the officers of its Associated Companies, AT&T vice president Gherardi advised that "precautions [...] be carefully observed in order to prevent the creating of a general demand which would be embarrassing to you prior to the availability of the commercial instrument." These precautions included only providing the hand set to the most demanding subscribers and not advertising its availability. The letter also introduced the possibility of imposing monthly charges and/or installation charges as a means to control demand, but Gherardi warned the licensees to proceed with

¹⁶ F.B. Jewett to E.B. Craft and E.H. Colpitts, memorandum 14 September 1925. Box 73, Series 7: Apparatus and Systems, F.B. Jewett Collection, AT&T Archives.

caution because such charges “might be questionable from a policy standpoint” and provoke the ire of both subscribers and government regulators.¹⁷

From AT&T's perspective, its experience with the design of the French phone was an unmitigated fiasco. Writing a report on the state of hand set production in July 1928, Frank B. Jewett—who had recommended against releasing the experimental sets—remarked that they had “developed an excessive amount of very serious trouble and [...] we have no assurance whatever of being able to eliminate the cause by changes in design or manufacturing methods.”¹⁸ Nearly one-third of all handsets released were removed from service by June of that year. Compounding the problem was the fact that despite the lack of promotion on the part of AT&T and the associated companies, demand for the French phone continued to rise: handsets accounted for just 0.4 percent of Bell phones in 1927, rising to 3.3 percent in 1928, and doubling to 6.4 in 1929.¹⁹

What no one at AT&T had anticipated was the critical response the design of the French phone would receive. While Bell Labs engineers had scrutinized every conceivable technical detail of the hand set—going so far as to take “4,000 measurements of head dimensions” to insure optimal spacing and position of the receiver and transmitter on the handle—they ignored the aspect of the French phone

¹⁷ B. Gherardi to F.B. Jewett, memorandum re: sample letter to the Presidents of the Bell System Associated Companies, dated 4 May 1926. Box 73, Series 7: Apparatus and Systems, F.B. Jewett Collection, AT&T Archives.

¹⁸ F.B. Jewett to C.P. Cooper, letter dated 13 July 1928. Box 73, Series 7: Apparatus and Systems, F.B. Jewett Collection, AT&T Archives.

¹⁹ Statistics on demand for handsets cited in Sally Clarke, “Negotiating between the Firm and the Consumer: Bell Labs and the Development of the Modern Telephone,” in *The Modern Worlds of Business and Industry: Cultures, Technology, Labor*, ed. Karen R. Merrill (Turnhout, Belgium: Brepols, 1998), 172.

that seemed to matter most to the public.²⁰ To make the early hand sets, Bell engineers had simply shortened the shaft of the candlestick base and fitted it with a cast aluminum cradle-style hook switch (Figure 2.9). Bell System subscribers who had been eagerly awaiting the opportunity to install the French phone were soon comparing it unfavorably with the models of other manufacturers. One disenchanted subscriber wrote to C.G. Dubois, the chairman of Western Electric:

Our office has recently installed a French-style of telephone made by your Company. We gave the order without looking at the design. I know you will take it in good spirit when I state to you that in my opinion the real French type telephone is attractive in design, whereas the type made by the Western Electric Company and furnished by the Telephone Company strikes me as being "something awful."²¹

It is difficult to understand how the appearance of the French phone was given such short shrift by Bell Labs engineers, especially as it was *precisely* the look of the telephone that was the key issue for subscribers. A partial explanation may be found in Roland Marchand's suggestion that, "perhaps subconsciously," some of the resistance to the French phone at AT&T "stemmed from a reluctance to abandon so visually embedded a cultural icon as that serious, utilitarian, black desk set." In many ways, the desk set had come to symbolize the Bell System itself. In its institutional advertising between 1908 and 1912, the desk stand telephone quite

²⁰ Fagan describes the thoroughness of Bell Labs undertaking: the 4000 measurements were made "on a sample of adults carefully selected to approximate the population as indicated in the most recent census. [...] This survey of the population was one of the early applications of anthropomorphic measurements in industry and one of the first applications of "human factors" studies in the Bell System." See Fagan, ed., *A History of Engineering and Science in the Bell System: The Early Years (1875-1925)*, 146.

²¹ C.M. Owens to C.G. Dubois letter dated January 24 1927. Box 73, Series 7: Apparatus and Systems, F.B. Jewett Collection, AT&T Archives. See also Dubois's letter to F.W. Jewett dated 5 April 1927, requesting advice on how to respond to Owen's letter. Ibid.



2.9 The No. 100-type telephone (with E1 handset), c.1927. The first desk set or French phone was considered ungainly and unattractive by the public. (BCHC #42452, photographed by Lise Noel. Reproduced with permission of Bell Canada Historical Collection.)

literally 'stood in' for the Bell System and its values. More metaphorically, the desk set's formal efficiency and functionalism was an embodiment of the ideal of scientific rationality that was the goal of AT&T's engineers and managers. It is not without relevance that the chief engineer at AT&T who had halted research on the handset in 1907 was a vice president at AT&T and chairman of the board of directors of Bell Laboratories in 1927, when the "awful" looking French phone was released. I suspect that it was not, as John Brooks suggests, that "[J.J.] Carty just didn't like French phones," but rather that the technical rationalism which informed the views of Carty and those engineers charged with the development of the telephone lacked the framework within which to consider questions of style and taste. The strategies of systemization and innovation which organized the company's research, production, and distribution efforts were based on a conception of progress as technological advancement. Design at Bell Labs was an engineering function and a scientific practice, not an aesthetic one. The public, on the other hand, saw progress as also having an aesthetic dimension. Progress for the middle class was embodied in ideas of self-improvement and refinement, and in the objects they chose as reflections of their elevated taste and status. Within the framework of AT&T's technological aesthetic, the telephone was a instrument of intercommunication; within the context of the emerging consumer society, the telephone was also an accoutrement of a new, modern way of life.

THE 1929 DESIGN COMPETITION: FUNCTION TAKES FORM

Mass production techniques really took hold in the United States between 1910 and 1920. The spread of mass-production had transformed the processes and practices of manufacturing and in doing so had also radically altered the relationships between producers, products, and consumers. As mass-produced goods flooded the market,

consumers and their desires began to play an increasingly important role in the business strategies of manufacturers. Independent telephone manufacturers, who made their telephones to be sold, were quick to see the change and to perceive the importance middle class consumers placed on style. Early on, they began designing and manufacturing telephones that responded to middle class desires and affirmed the value of those desires in their advertisements. The Bell System's monopoly status, its relationship with Western Electric, its leasing arrangements, and its research strategies had insulated it from the new social and economic realities that had emerged over the first decades of the twentieth century but its experiences with the French phone served to illustrate that it could no longer dismiss consumers' demands as ill-considered or capricious. Reluctantly recognizing that "the modern trend is toward a more pleasing appearance of utilitarian things," Bell Labs began to consider improvements to the look of its telephones.²²

In 1929, Bell Labs invited four artists—John Vassos, Réne Clark, Gustav Jenson and Lucian Bernhard—to submit designs for a new telephone.²³ This design

²² William Fondiller, Bell Lab's assistant director of apparatus development, speaking at the American Management Association convention in 1929. See E. Grosvenor Plowman, *Fashion, Style and Art Spread to Other Lines of Business*, vol. 106, *General Management Series* (New York: American Management Association, 1929).

²³ Some accounts state that there were ten designers asked to submit designs for the competition. See Jeffery L. Meikle, *Twentieth Century Limited: Industrial Design in America 1925-1939* (Philadelphia: Temple University Press, 1979), 58-59. Also Ellen Stern and Emily Gwathmey, *Once Upon a Telephone: An Illustrated Social History* (New York: Harcourt Brace and Company, 1994), 41. Sally Clarke holds, as do I, that only four designers were solicited: see Clarke, "Negotiating between the Firm and the Consumer," 178. The files on the design competition at the AT&T Archives contain numerous letters and reports that discuss the design process but they identify only the four designers listed above as the final participants. Most significantly, the "Report on Artists' Models" prepared by D.H. King only lists Vassos, Clarke, Jenson, and Bernhardt. There is a report on a meeting between W. Fondiller of Bell Labs and the designer Thomas Cleland, and a letter of recommendation for Donald Deskey from Alon Bement, director of the Art Center, so it would appear that other industrial designers were approached and considered. (See William Fondiller, "Report of Conference with Mr. Thomas Cleland, artist," dated 16 January 1929. Also Alon Bement to William Fondiller, letter dated 30 April 1930. Both documents, file "Correspondence with Outside Consulting Artists," case 35585 vol. A, AT&T Archives.) Most design histories also maintain that Henry Dreyfuss was one of the original group of artists invited to prepare a design, but that he refused because he would not

competition was intended to provide Bell with the blueprint for a completely new mounting, one that addressed subscribers' desires while allowing Bell to put the French phone fiasco behind them. As the consulting artists began to work on their designs with Bell Lab engineers, it soon became clear that there was a conflict between how the two groups imagined the telephone. Like most artists working in applied arts during this period, they had little knowledge or experience with the design of industrial products.²⁴ Accustomed to designing fashionable consumer goods, the artists hired by Bell approached the design of the telephone from the same perspective. Employing art nouveau and art deco motifs, the telephone designs were highly idiosyncratic, with beveled edges, fanciful cradle lugs, and other decorative details. In the analysis that accompanied his submissions, Vassos explained that his goal was to make the telephone "an interesting object from a

be able to consult with Bell Lab's engineers. This assertion is repeated in both Dreyfuss's biography, see Russell Flinchum, *Henry Dreyfuss, Industrial Designer: The Man in the Brown Suit* (New York: Rizzoli International Publications, 1997). Also see, Meikle, *Twentieth Century Limited: Industrial Design in America 1925-1939*, 58. I have not found any evidence in AT&T's files of correspondence with the consulting artists of an offer being made to Dreyfuss in 1929. Nor does it appear that Dreyfuss's request to work closely with the engineering department would have been seen as all unusual or undesirable. In fact, there is every indication that Bell Labs encouraged and expected the designers to confer with engineers. The letter of agreement securing the designers' services indicated that they would be "working independently and/or jointly with the employees of the Laboratories," and that the design work was "to be performed under the direction of an engineer designated by the Laboratories." (See "Generic Letter of Agreement," undated. File "Correspondence with Outside Consulting Artists," case 35585 vol. A, AT&T Archives.) Gustav Jensen's response to Bell's offer affirmed his intention to "freely consult with your engineers" (see Gustav Jensen to William Fondiller, letter dated 12 March 1929. File "Correspondence with Outside Consulting Artists," case 35585 vol. A, AT&T Archives.) There is also little evidence to suggest that all Bell Labs engineers were resistant to the idea of employing outside designers to help with the design of a new telephone. Writing in April 1929, René Clarke noted that, despite "somewhat painful" previous experiences working with engineering departments, he was "impressed with the helpful and cordial attitude" of the four Bell engineers assigned to assist him (see René Clarke to William Fondiller, letter dated 10 April 1929. File "Correspondence with Outside Consulting Artists," case 35585 vol. A, AT&T Archives.)

²⁴ Jensen had gained some notoriety for the Montel metal sink he designed for International Nickel, but most of his work was in the area of packaging and publication design. Vassos was primarily an illustrator and graphic designer, as was Clarke, and Bernhard was known for his work in typography and graphics. See Meikle, *Twentieth Century Limited: Industrial Design in America 1925-1939*, 40.

sculptural point of view.” His view that “[t]he telephone should not be classed in the minds of the public as a mechanical device but rather as a desk accessory” could not have been more out of step with the sentiments and sensibilities of the Bell Labs engineers.

The report on the artists’ models prepared in 1932 by apparatus development engineer D.H. King indicates that Bell Lab’s engineers considered the designs to be fraught with problems that would be difficult and costly to resolve. King’s list of flaws included fragility of parts, too many fine edges which would cause finishing problems, high cost of making and maintaining the molds for some of the more decorative housings, and in some cases, inadequate space allowance in the body of the phone to accommodate technical apparatus. While ostensibly limiting his analysis to their mechanical aspects, King’s remarks critically assessed the appearance of the telephones. He objected to one of Vassos’ more elaborate designs on the grounds that “[i]t offers too many places for the collection of dust and dirt” (Figure 2.10). On Bernhard’s designs, which featured a groove to accommodate a pen or pencil—“what apparently was intended as a feature”—he wrote: “[t]his convenience may prove to be a serious maintenance nuisance as it probably will invite subconscious defacing of the mounting surfaces while the subscriber is writing” (Figure 2.11). Clark’s designs did not “provide sufficient space for parts” and were not “rugged enough to withstand the hard [use] it would be subjected to” (Figure 2.12). While apparently impressed with Jensen’s “novel” and restrained design, he ultimately concluded by rejecting it because its unusual handset support would require completely redesigning the switchhook mechanism (Figure 2.13). King wrapped up his report by



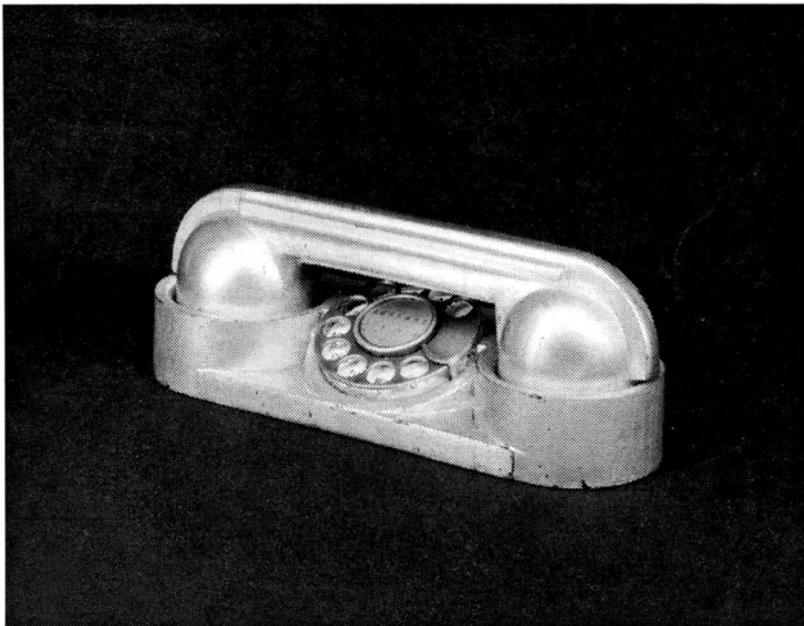
2.10 Telephone design by John Vassos, 1932. (AT&T Photo File #HM36987. Reproduced with permission of AT&T Archives.)



2.11 Telephone design by Lucien Bernhardt, 1932. (AT&T Photo File, #HM36985. Reproduced with permission of AT&T Archives.)



2.12 Telephone design by Rene Clark, 1932. (AT&T Photo File #HM36991. Reproduced with permission of AT&T Archives.)



2.13 Telephone design by Gustav Jensen, 1932. (AT&T Photo File #HM36992. Reproduced with permission of AT&T Archives.)

noting that taken as a whole, the designs exhibited "very little consideration from the practical or manufacturing viewpoint."²⁵

Well before King's report was submitted, Bell Labs managers recognized that the results of the design competition would not yield a design that would satisfy their criteria. The competition confirmed their belief that all questions regarding aesthetics must be subsumed under the umbrella of engineering. In a memo to vice president H.P. Charlesworth, dated February 18 1930, director of apparatus development R.L. Jones wrote that "our experience leads us to believe that we shall have the best results by having in our own organization men who combine training along artistic lines with training and ability in designing objects for manufacture." He proposed production as well as the high cost of its maintenance and replacement. AT&T had that Bell Labs assign two of its engineers to work on apparatus design, and that a consulting designer be placed under contract to "aid and inspire" them. In addition, he proposed that "an advisory committee consisting of an architect, a master designer, and an interior decorator" be established to assess the forthcoming designs.²⁶

The minutes of the first meeting of the advisory art committee in 1930 show that the designs of the four consulting artists were largely set aside. The one notable exception was Vassos' recommendation that the circular numberplate at the center of the dial be designed so as to remain stationary when the dial was rotated.²⁷ That year Bell engineers redesigned the offending French phone, smoothing out its lines

²⁵ D.H. King, "Report on Artists' Models," dated 9 August 1932. Box 2, case 34648, AT&T Corporate Collection, AT&T Archives.

²⁶ R.L. Jones, "Proposal to Strike Advisory Committee," memorandum to H.P. Charlesworth dated 18 February 1930. File "Correspondence with Outside Consulting Artists," case 35585 vol. A, AT&T Archives.

²⁷ See "Report on the First Meeting of the Advisory Art Committee," dated 17 June 1930. File "Correspondence with Outside Consulting Artists," case 35585 vol. A, AT&T Archives.

and replacing its round base with an elliptical base (Figure 2.14). Appropriately, its redesign was announced and praised in the *Bell Laboratories Record*. The article explained the French phone's new contours were based on Euclid's Golden Section, "the empirical rule for achieving beautiful proportions" and "a fundamental principle underlying all creations of beauty."²⁸ It is perhaps not surprising that Bell engineers would find their solution to the dilemma of the French phone's appearance in a mathematical formula.

It is also not surprising that Bell management would turn to technological innovation to solve the larger problem created by consumer demand. AT&T had imposed a special charge on the French phone so as to recuperate its higher cost of also hoped that the extra charges would "be an aid to controlling demand."²⁹ These strategies backfired when, as the Depression took hold in the 1930s, subscribers began to complain and the FCC launched an investigation of AT&T's rate structure.

As business historian Sally Clarke explains:

In the 1920s, when a small number of users attached foreign handsets to the network, and even after the Bell System introduced its own handset, insofar as the vast majority of users kept deskstands, AT&T could call the new device a luxury and set a special fee. But in keeping with its theme of universal service, AT&T pledged to provide high-quality service and to lower prices. As more and more consumers acquired handsets—the device claimed 6.4 percent of Bell phones in 1929, 30 percent in 1934, and 52 percent in 1937—the handset no longer seemed special and neither did its extra fee.³⁰

²⁸ Marion M. Dilts, "The Golden Section," *Bell Laboratories Record*, vol. X (September 1931), 97. See also Marion May Dilts, *The Telephone in a Changing World* (New York and Toronto: Longmans, Green and Co., 1941).

²⁹ B. Gherardi to F.B. Jewett, memorandum dated 4 May 1926. Box 73, Series 7: Apparatus and Systems, F.B. Jewett Collection, AT&T Archives.

³⁰ Clarke, "Negotiating between the Firm and the Consumer," 176.



2.14 The No. 200-type telephone (with E1 handset), c.1931. The redesigned French phone met with a better reception from subscribers than the first model. (BCHC #42729, photographed by Lise Noel. Reproduced with permission of Bell Canada Historical Collection.)

Bell's solution, a step forward from an engineering perspective, was also an effective retrenchment of the technological aesthetic. In 1934 Bell Labs engineers developed a new "direct-action" transmitter which suffered none of the problems of output efficiency that had plagued the French phone and was economical to manufacture.³¹ That same year, designer Henry Dreyfuss, who had acted as a consulting designer for Bell Labs on a number of occasions, was hired to design the new telephone that AT&T planned would replace the troublesome French phone and restore "appearance" to its proper place in the hierarchies of significance within the Bell System.³²

When approached by AT&T, Dreyfuss' first proposals were in keeping with the prevailing styles and tendencies exhibited in the design of most contemporary industrial objects. He suggested a 'streamlined' design, and recommended that Bell offer the telephone in a range of fashionable colors, but the engineers' perspective and the technological aesthetic prevailed. The resulting combined set, or No. 302 phone, which went into production in 1937, was a model of functional design (Figure 2.15). While AT&T prized innovation in the field of engineering, it did not seek the same goal in the area of industrial design (Figure 2.16). Dreyfuss' contribution was largely limited to giving form to the ideas of Bell Labs engineers. In this light, the oft-noted similarity of Dreyfuss' No. 302 design to Swedish designer Jean Heiberg's

³¹ Clarke states that the 625 transmitter saved AT&T approximately fifty cents per telephone and that a further sixty cents was saved by housing all components (including the ringer) in the base of the No. 302 telephone. On this basis, E.H. Colpitts projected that No. 302 would save AT&T approximately \$5.8 million over the first five years of production. See *Ibid.*, 177.

³² On Jewett's impatience with the dilemma of "appearance," see F.B. Jewett to E.S. Bloom, letter dated 28 May 1935. File 08 04 03, H.P. Charlesworth Collection, AT&T Archives.



2.15 Western Electric No. 300-type desk set, 1939. The 300 was the first of the telephones designed for AT&T by Henry Dreyfuss and Associates. (Reproduced with permission of AT&T Archives and David Massey, Bell System Memorial website.)

Your Bell Telephone can take it!



"Where IS that letter from...whoa! There goes the telephone!"

...because it stands harder knocks in Western Electric testing

Bang! There it goes on the floor. This may happen to yours, no matter how you try to avoid it. You fear the worst. But the telephone continues its job of carrying your voice.

Why? Because hard knocks in daily service were anticipated in design and manufacture. That's true of all Bell System telephone equipment made by Western Electric.

Rigid "built-to-take-it" standards and quality-producing craftsmanship are Western Electric's contribution to better telephone service for you.



"I guess I put it out of commission this time!"



"Oh, boy! It works as well as ever."

Western Electric ... made your
BELL TELEPHONE

JUNE 10, 1939

7

2.16 Western Electric advertisement, 1939. In contrast to its competitors—as evidenced in the Stromberg Carlson advertisement that follows—Western Electric advertising focused on the reliability and durability of patented Bell telephones. *Telephony* (10 June 1939).

1930 telephone design for Sweden's L.M. Ericsson Company is not surprising.³³ In 1929, Bell Labs had imported samples of the Neophone—the first combined handset of this type produced by the Siemens' Brothers for the British Post Office—for its engineers to examine and test.³⁴ Whether Bell had also examined Heiberg's molded plastic telephone is not known, but the fact it had been modeled on the Neophone suggests that there was a great deal of latitude when it came to borrowing aesthetic elements of telephone design. At the very least, the similarity in appearance seems to suggest, that the proprietary interest Bell Labs maintained with respect to its own designs did not extend to the designs of its competitors.

It is also interesting to note, as does Dreyfuss's biographer Russell Flinchum, that "the fact that the No. 302 as it first appeared was available only with a die-cast metal base while the Heiberg design was produced in Bakelite plastic from its inception is a gauge of the relative conservatism of the engineers at Western Electric and Bell Labs."³⁵ During these years, independent manufacturers were continuing to experiment with both materials and appearance. In 1933, Kellogg introduced the Masterphone 900—a non-dial combined set telephone with a bakelite housing—and in 1935, the Masterphone 925, a dial version. Sometimes called the 'ash tray phones,' with their quintessentially art-deco styling, they approached René Clarke's ideal of a telephone that was more along the lines of a desk accessory than a mechanical device. Stromberg-Carlson's first combined telephone, the stylish No. 1212 was introduced in 1936 and it too featured a bakelite housing (Figure 2.17).

³³ See Kathryn B. Hiesinger and George H. Marcus, *Landmarks of Twentieth-Century Design: An Illustrated Handbook* (New York: Abbeville Press, 1993), 121. Also Flinchum, *Henry Dreyfuss, Industrial Designer*, 97.

³⁴ R.H. Colpitts to H.P. Charlesworth, memorandum dated 3 July 1929. File 08-04-03, H.P. Charlesworth Collection, AT&T Archives.

³⁵ Flinchum, *Henry Dreyfuss, Industrial Designer*, 97.



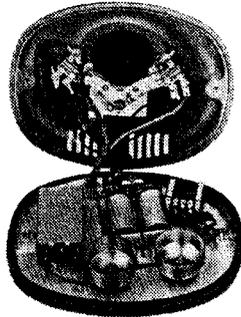
The Stromberg-Carlson No. 1212
Self-contained Handset

She insists ON A TELEPHONE IN KEEPING WITH *her* HOME

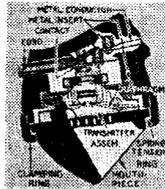
In its No. 1212 Handset, Stromberg-Carlson has proved that a telephone in addition to being an instrument of utility can also be a decorative article.

Of particular interest to discriminating subscribers is the fact that their walls need no longer be defaced by a bell box, for this instrument is completely self-contained—induction coil, ringer and condenser being mounted in the base of the instrument. Two-tone gongs provide a pleasant yet attention-compelling signal. The instrument is light in weight.

By ordering a test sample of the No. 1212 Handset, you can prove to yourself what an aid it will be in selling new subscribers or extension service.



Specially designed induction coil and condenser are small and compact, yet do the work of larger units with equal efficiency.



The patented transmitter used with the Stromberg-Carlson 1212 Handset employs the cone-shaped diaphragm of a radio speaker. It moves as a rigid piston. Maximum flexibility is insured by angular corrugations near the outer edge.

Firm clamping of the diaphragm without excessive tension is insured at all times because the ear cap's thread is entirely independent of the receiver's mounting thread. The result is a quality of reception that pleases subscribers.



Stromberg-Carlson Telephone Mfg. Co., Factory and General Offices, 100 Carlton Road, Rochester, N. Y., U. S. A., Branch Offices: Chicago, Kansas City, San Francisco, Toronto

Stromberg-Carlson

2.17 Stromberg-Carlson advertisement for the stylish No. 1212 hand set, 1939. *Telephony* (14 Januarv).

By 1940, there was general move to standardization in telephone design and what appeared to be a general acceptance of the Bell System's technological aesthetic by the independents. Stromberg-Carlson replaced the No. 1212 with the 1222, which was very similar to Western Electric's No. 302 including its die-cast zinc housing, and the shape of the Kellogg Masterphone began a perceptible shift towards the Western Electric model as well. Meyer writes that "[i]t is interesting to observe, at the end of this art-deco period of great diversity, that all the phones began to look alike—the Western Electric 302, the Kellogg 1000, and the Stromberg-Carlson 1243"—a trend towards standardization that would formalized by the beginning of the next decade.³⁶

AT&T's experience with the French phone and the 1929 design competition had, if nothing else, helped establish a definition of design that was workable for Bell Labs managers and engineers. Rejecting unequivocally the idea of the telephone as a desk accessory or fashionable appliance, design came to be understood in purely functional terms: for Bell Labs, design became a form of *mediation* between the technology and its intended use. The design process—which came to be formalized under the title of "human factors research"—involved understanding how people used the telephone and then applying that knowledge to insure that the telephone was being used in ways that did not conflict with Bell's objectives.

One of the first applications of 'human factors' studies in the Bell System came about in the effort to find a solution to the transmission problems of the French phone. Bell engineers discovered that the problems of sidetone and distortion was improved if users kept the transmitter close to their lips—an increase of just one-half to one inch in the optimal distance reduced the transmitter output dramatically. The

³⁶ Meyer, *Old-Time Telephones!* , 117.

design of the handset ultimately became an important aspect of the solution to increasing transmission efficiency. By taking “4,000 measurements of head dimensions [...] on a sample of adults carefully selected to approximate the population as indicated in the most recent census,” Bell engineers were able to design the handset so as to control the amount of play between the transmitter and the user’s lips, and insure a relatively stable level of output efficiency. “With the chosen configuration,” Fagen writes “the average distance between lips and transmitter mouthpiece was reasonably small and all but 3 percent of the adult population could use the handset with the receiver held to the ear in a normal manner. Only minor adjustments were required by the remaining users.”³⁷

Design, in other words, became a means by which Bell engineers were able to standardize not only telephone apparatus and components but, more significantly, telephone *use*. By the time that AT&T introduced the Western Electric 500-type telephone in 1949, this approach to design was fully entrenched at Bell Labs—and more generally across the telephone industry—so much so that the first promotional spot for the 500-type telephone on television was accompanied by a press release that asserted “[t]he appearance of the set was designed by Bell Telephone Laboratories’ engineers working with Henry Dreyfuss, one of the country’s leading exponents of functional design.”³⁸

The 500-type telephone was an archetype of the human factors approach to design (Figure 2.18). Unlike earlier sets which had been made up of components that

³⁷ All citations in this paragraph from Fagen, ed., *A History of Engineering and Science in the Bell System: The Early Years (1875-1925)*, 146.

³⁸ AT&T Public Relations Department, “500-Type Set Takes a Bow on National TV Program,” press release dated 1 February 1955. File Subscriber Set, 500-type, Bell Canada Historical Archive.



2.18 Western Electric No. 500-type desk set, 1949. Designed by Henry Dreyfuss and Associates, exhaustive human factors research informed the engineers and designers who produced the 500-type. (Reproduced with permission of AT&T Archives and David Massey, Bell System Memorial website.)

were produced at different times, the 500-type was designed as an integrated unit, with technological advances driving every aspect of the changes to the telephone's appearance. The design problems Dreyfuss grappled with concerned how the telephone looked, but only in the context of how it functioned; its widely-proclaimed innovative design features were firmly tied to optimizing the utility of the telephone from AT&T's perspective. For example, the design of the 500's distinctively squared handle—which made it easier for users to hold it in hand and also to cradle against a shoulder—came about as a result of a new transmitter and receiver combination which allowed the design of a smaller, lighter handle in molded bakelite and resulted in significant cost savings for AT&T.³⁹ The 'user-friendly' dial with its new layout of numbers and letters outside of the fingerwheel was designed so as to improve dialing efficiency and accuracy.⁴⁰ The number ring—its numbers and letters die cut out of a black plastic ring then filled in with white extruded plastic—was designed so that it could withstand the constant rubbing and scraping which occurred as users rotated the fingerwheel while dialing. The design solutions incorporated in the 500 were

³⁹ The original handset for the type-500 telephone (the G1) was made of Bakelite, the later model (the G3) used a thinner shell made of molded thermoplastic and consequently had a larger hollow channel through the handle. The hollow handle, combined with the higher output receiver and transmitter components, resulted in the return of problems with acoustic feedback. The solution was very simple—"a cotton ball was inserted into the handle"—but the degree of Bell Labs' and Western Electric's reputed obsession with technical precision was such that, "it was said that the size and weight of the cotton ball was tightly specified." Meyer, *Old Time Telephones!*, 122. With respect to cost savings, based on production estimates for the Bell System for 1952, Western Electric estimated savings of "300 tons of copper, [...] 150 tons of polyethylene, 38 tons of aluminum, 70 tons of steel, 2250 tons of lead and 5000 pounds of tin" as a result of the 500-type telephone's use of smaller gauge conductors, and a saving of "3600 pounds of nickel and a substantial quantity of iron" as a result of the elimination of approximately 25,000 loading coils. "Use of New "500" Type Telephone Set Promises Savings in Critical Materials," *Western Electric News*, 10 January 1952. See also W.L. Tuffnell, "500 Type Telephone Set," *Bell Laboratories Record*, September 1951, 414-418.

⁴⁰ Ironically, this change actually had the effect of slowing down dialing time, it was later ascertained, because users were unable to gauge when the fingerwheel—black against a now all black background—had completed its full circuit. This problem was remedied by the placement of a white dot at the center of each finger hole so that user could see when the dial returned to its starting position. See Meyer, *Old-Time Telephones!*, 121.

essentially based on reducing the variance between the way in which the telephone was used and the objectives set for its use by Bell Labs.⁴¹

Mass production dictated that all possible production problems be identified and addressed during the design process. The human factors research work which began in the 1920s at Bell Laboratories did this and thus provided its engineers with a framework through which all future design considerations could be made. The approach essentially applied Taylor's principles of scientific management—originally intended to reduce waste and promote efficiency in the production process—to design and thus to the consumption process. The goal of human factors research was to study how people used the telephone in order to produce *system* efficiencies and to eliminate behaviors which compromised system productivity or instrument longevity. On one hand, the Bell System's desire to constrain the way subscribers used the telephone was based on the simple reason that Bell owned the telephones that subscribers used—this fact was the basis of D.H. King's concern about Bernhard's pencil rest. On the other hand, the design of the telephone also must be seen as playing an important role in managing how people not only used but also *imagined* the telephone, and is ultimately the source of popular perceptions of the telephone's unassuming ubiquity and its democratic appeal.

FASHION AND THE PHONE: THE EMERGING DESIGN AESTHETIC

The desire of subscribers for an attractive telephone in keeping with middle class taste and aspiration was never fully understood or appreciated by AT&T managers.

⁴¹ A notable exception was a pair of creases which appeared on the top of the 1956 wall phone version of the 500-type. They were added by Donald Genaro, at the time a student intern at Henry Dreyfuss and Associates, to provide an off-hook rest for the handset. It is interesting that user instructions were never provided by AT&T for this feature, and its function was never commonly understood. *Ibid.*, 123.

The flawed early version of the French phone was quickly revamped in response to subscriber criticism, but within a few years AT&T was working on its replacement—the 302—a telephone more compliant with Bell Labs’ functional ethos. While the appearance of goods continued to be important to consumers during the 1930s, it ranked very low on the list of Bell Labs design criteria. Dreyfuss’ “five-point formula” for good industrial design—written in 1955 after working with Bell engineers for over two decades—ranked ‘appearance’ fifth, after utility and safety, maintenance, cost, and sales appeal.⁴²

Bringing the consumers’ view into perspective for the managers at AT&T would prove to be difficult. As long as Bell’s competitors were restricted to a negligible share of the market, most company officials felt that offering decorative hand sets and especially colored phones was “a little silly,” if not a sign of “depravity.”⁴³ F.B. Jewett’s comment that “we have had enough experience with the public to know just how fickle they might be” was a good indication of how mistrustful Bell Labs engineers were of popular taste and public opinion.⁴⁴ Their insistence that the telephone be treated as a serious instrument was fed in equal parts by the technological ethos that ruled Bell Labs as well as AT&T’s secure monopoly position. On one hand, every diversion from standardization was seen as a blow to technological integrity and engineering ideals; on the other, AT&T’s monopoly status truly did allow its managers to remain insulated from—and to a large degree, disdainful of—public opinion.

⁴² Henry Dreyfuss, *Designing for People* (New York: Simon and Schuster, 1955), 178.

⁴³ J.M. Shaw to W.J. O’Conner, memorandum dated 7 November 1930. Cited in Marchand, *Advertising the American Dream: Making Way for Modernity*, 119.

⁴⁴ F.M. Jewett to B. Gherardi, memorandum dated 10 April 1928. Box 73, Series 7: Apparatus and Systems, F.B. Jewett Collection, AT&T Archives.

A significant exception to this view was held by vice president of public relations Arthur W. Page. Page was hired in 1927 as part of W.S. Gifford's efforts to re-organize AT&T and enhance its increasingly poor reputation with both regulators and the public.⁴⁵ Americans viewed monopolies with suspicion and distrust, and Page argued that AT&T "cannot afford to be a satisfied monopoly" if it intended to gain the public's goodwill.⁴⁶ With a background in publishing and not engineering, he believed that publicity and sales efforts needed to be brought into line with those of market-driven companies—or in his words, rather than continuing to "[g]ive the public what they needed," AT&T had to begin to "[g]ive the public what they *desire*. [emphasis in original]"⁴⁷ In keeping with trends then developing in advertising, he promoted the use of surveys and subscriber feedback, and pushed for the reorganization of AT&T's sales department as "a means to find out what they desire—not only to sell what we have now but to find out what we ought to sell to serve the public most effectively."⁴⁸ He asserted that,

there are a great many people who are perfectly willing and certainly capable of paying for telephone service who would immensely enjoy the comforts of being able to have a telephone at hand in a comfortable chair when they are reading, instead of jumping up and running to the coat closet or chasing around to the pantry or some other place.⁴⁹

⁴⁵ See Brooks, *Telephone*, 173.

⁴⁶ A.W. Page, "Coordination of Sales and Advertising Activities," speech at the General Sales Conference, January-February 1929. File A.W. Page: Talks and Papers, box 2034, Corporate Collection, AT&T Archives.

⁴⁷ *Ibid*, 2,5.

⁴⁸ *Ibid*, 5.

⁴⁹ A.W. Page, "Public Relations and Sales," speech at the General Commercial Conference, June 1928. File A.W. Page: Talks and Papers, box 2034, Corporate Collection, AT&T Archives. As Marchand points out—and this citation illustrates—Page was by no means a populist. When he talked about giving the public what they desired, "he envisioned providing suitable accessories for gracious living to the affluent, not sensual frivolities for the masses." See Marchand, *Advertising the American Dream: Making Way for Modernity*, 119.

Page pointed out that in pursuing its goal of “standardization [AT&T had] concentrated more on the public than on the operating forces”—he noted that while Western Electric provided Bell System Companies with “142 different kinds of switchboard cables [...], they were giving to the public one black desk set, a hand set, a wall set, and one of those black buttoned intercommunication systems.”⁵⁰ He pointed out that even Henry Ford—the stalwart champion of function over form—had bowed to public pressure and produced the stylish and colorful Model A. AT&T too, Page argued, would have to abandon the belief that “the telephone is a necessity and not to be trifled with.”⁵¹ While they did not espouse Page’s views, Bell Labs managers had been sufficiently taken aback by the persistence of subscribers’ demands for the French phone—to say nothing of the fad for painting the telephone being encouraged by magazines articles like “Concealing the Unsightly Telephone”—that they did begin to explore the cost of producing “a limited variety of colored handsets [for such] subscribers as may want them” in late 1927.⁵²

In reality, offering subscribers a limited selection of colored telephones was a compromise between AT&T’s programs of standardization and systemization and the artisanal process by which colored phones were already being manufactured for the wealthy and well-connected. Since 1917, Western Electric had produced custom colored candlestick telephones to meet the demands of ‘high society’ decorators and well-to-do subscribers.⁵³ For those willing to pay a \$35.00 charge, Western Electric would match a color swatch provided and spray the colored finish on the telephone,

⁵⁰ A.W. Page, “Public Relations,” speech at the General Operating Conference, May 1928. File A.W. Page: Talks and Papers, box 2034, Corporate Collection, AT&T Archives.

⁵¹ Page, “Public Relations and Sales.”

⁵² F.B. Jewett to E.B. Craft, memorandum dated 7 November 1927. Box 73, Series 7: Apparatus and Systems, F.B. Jewett Collection, AT&T Archives.

⁵³ “Data on Colored Telephone Sets,” March 1 1966. File: Coloured Sets, Bell Canada Historical Collection.

often dyeing the silk-wrapping for the cords as well. When only a very few select subscribers took advantage of this service, the extra expenditure of time and effort apparently could be accommodated but as the "color craze" took hold of the public imagination in the mid-1920s and requests for color-coordinated telephones increased, AT&T's Distributing House could not keep up with demand.⁵⁴

Over the course of the next year, AT&T experimented with various different colors and finishes until finally a selection of standard colors was chosen for the French Phone. After calculating costs, it was decided that the phones would be made available to all subscribers as a luxury item and that a special installation fee could be justified. On February 14 1929, a letter was sent to the presidents of Bell System companies introducing the color telephones and testing out what at first glance appeared to be a new approach to subscriber relations:

Because of the demand for hand sets that will harmonize more closely with interior furnishings and decoration and in accordance with the general System policy of meeting the desires of subscribers, colored hand sets are now becoming available in limited numbers on regular order in Ivory, French Gray, Oxidized Silver, Statuary Bronze and Old Brass with cords, felt bases, number cards and dials in matching colors.⁵⁵

It was surprising, given AT&T's long-awaited recognition of subscribers' preferences, that the letter also instructed licensees that it would be "clearly

⁵⁴ F.B. Jewett sent a copy of the poem "Color Craze" by Norah Smaridge to W.S. Gifford and A.W. Page with the note "I thought you would be amused at the following." The second to last verse goes, "I've got a rosy hope, That some day I will own, An Alice blue lawn mover, And a purple telephone." Given Jewett's generally disparaging views on 'styling' the telephone, it is likely that he found the poem's sentiment more alarming than entertaining. F.B. Jewett to W.S. Gifford and A.W. Page, memorandum dated 25 September 1928. Box 73, Series 7: Apparatus and Systems, F.B. Jewett Collection, AT&T Archives. Also see discussion in Plowman, *Fashion, Style and Art Spread to Other Lines of Business*.

⁵⁵ B. Gherardi to F.B. Jewett, memorandum dated 14 February 1929. Box 73, Series 7: Apparatus and Systems, F.B. Jewett Collection, AT&T Archives.

impractical to do anything which would stimulate the sales of these sets."⁵⁶ While the relatively small quantity of telephones that would be initially available for distribution across the entire Bell System—the letter estimated Western Electric could produce 400 sets a week—would suggest that it might be prudent to forestall launching an advertising and sales effort immediately, it appears that both AT&T and its Associated Companies might have been more comfortable not promoting the colored hand set at all. A letter sent on November 16 1929 to AT&T's operating vice presidents, noted that as "a very limited number" of the colored handsets were put into service, "the Western Electric Company has accumulated a stock of some five to six thousand which is increasing with the continued production of the 400 sets a week. In view of this situation," the letter concludes, "you may wish to arrange to ease up somewhat on the restrictions now in effect as to the sales of colored sets."⁵⁷ A letter sent to the operating vice presidents one year later stated that "[a]pproximately 100,000 hand sets are now in stock and the present rate of production is approximately 1,300,000 sets per year," pointing out that "[i]t seems advisable now to remove any further restrictions that remain and to push the sale of handsets."⁵⁸

For reasons that appeared to have more to do with the tastes and values of AT&T traditionalists than the desires of the public, the supply of colored telephones seemed to always be out of step with demand. Whether the Bell System's reluctance to advertise and distribute the colored hand sets was influenced by their technically shaky beginnings or whether it had to do with the perception that they were "a bit

⁵⁶ Ibid.

⁵⁷ B. Gherardi to F.B. Jewett, memorandum dated 16 November 1929. Box 73, Series 7: Apparatus and Systems, F.B. Jewett Collection, AT&T Archives.

⁵⁸ Ibid.

silly," the end result was that AT&T continued to treat them as a problem. Even once the decision to produce "standard" color telephones had been made, there seemed to be little consensus on what those colors should finally be. There were four proposed in 1927, five were itemized in the letter sent out in early 1929, with one more (gold) added to the list later in the year because of high demand.⁵⁹ On June 17 1930, AT&T's Advisory Art Committee recommended that "the three primary colors, red, yellow and blue, also Chinese red and green" be added to the five stock colors, while on October 16 of the same year, the committee announced that "it has been decided to make available nine colors in addition to the present standard ones."⁶⁰ By January 1935, the Advisory Art Committee was discussing the "desirability of providing 6 or 8 color finishes to replace the existing color standards."⁶¹

The failure to agree on the range and number of colors is potent evidence of the incommensurability of how the telephone was seen by Bell Labs' and AT&T's Publicity and Public Relations department. While Bell Labs' engineers viewed color telephones with great wariness, Page encouraged AT&T to apply the marketing ideas about color and style being implemented by other manufacturers to the products of Western Electric. Bell Labs resistance was notable, especially because it was so contrary to the contemporary trends. At the American Manufacturers' Association convention in October 1929, Bell Labs' assistant director of apparatus development William Fondiller was the only speaker who did not extol the virtues of "applying art

⁵⁹ See H.T. Martin, memorandum on "Use of Colored Molding Compounds for Station Apparatus," dated 24 July 1929. Case 34648, AT&T Archives.

⁶⁰ "Minutes of the First Meeting of the Advisory Art Committee," dated 17 June 1930. File "Correspondence With Outside Consulting Artists," case 35585 vol. A, AT&T Archives. "Agenda for the Second Meeting of the Advisory Art Committee," dated 16 October 1930. File "Correspondence With Outside Consulting Artists," case 35585 vol. A, AT&T Archives.

⁶¹ "Agenda for Meeting Re: Apparatus for Consideration by Advisory Art Committee," dated 11 January 1935. File "Correspondence With Outside Consulting Artists," case 35585 vol. A, AT&T Archives.

to industry,” instead cautioning of the negative effects on programs of standardization and the costs of production and distribution.⁶²

Page placed a new emphasis on selling the *idea* of the telephone and “creat[ing] a state of mind in the public” that would permit them to “visualize” the telephone, not as an instrument of utility but rather as a medium of “comfort, convenience, [and] luxury.”⁶³For Page, color was part of a new aesthetic, its criteria based on understanding the desires of the modern consumer and then fulfilling—and fuelling—them by design. In an often quoted speech at the General Operating Conference in May 1928 he suggested that the time had come for AT&T to reconsider the idea of standardization in terms of the telephone instrument. Alluding to Henry Ford’s longstanding and adamant refusal to consider producing color automobiles, Page observed:

He made just one little black instrument, too, and it did just what ours did: when it started, it went fine, and so did ours. But, you know, Henry has recently come to the point where he realized he had to make a change and I think now that he has made a lady out of Lizzie, we might dress up these children of the Bell System.⁶⁴

While efforts to dislodge the prevailing technological aesthetic of telephone manufacturing met with only indifferent success, Page was more successful in reshaping the image of the telephone and bringing it in line with the new design aesthetic through a different approach and attitude to the way the telephone was advertised. In 1928, in addition to the extensive advertising program AT&T traditionally ran, Page announced the launch of a “comfort and convenience”

⁶² Plowman, *Fashion, Style and Art Spread to Other Lines of Business*, 17-18.

⁶³ A.W. Page, “Coordination of Sales and Advertising Activities,” speech at the General Sales Conference, January-February 1928. File A.W. Page: Talks and Papers, box 2034, Corporate Collection, AT&T Archives.

⁶⁴ A.W. Page, “Public Relations,” speech at the General Operating Conference, May 1928. File A.W. Page: Talks and Papers, box 2034, Corporate Collection, AT&T Archives.

campaign directed specifically at expanding the residential market.⁶⁵ The full-page monthly advertisements were remarkable in that the telephone was represented as a luxury, indispensable—not for reasons of safety or security—but rather as an element of a refined lifestyle. Clearly directed at selling middle and upper class women on the idea of the telephone as an obligatory accoutrement of the well-appointed home, the advertisements used an art deco style of illustration to depict elegant urbanites in a variety domestic situations and locations—“by the dressing-table... in the library, sun porch, guest room” (Figure 2.19). Many of the images included a maid, either assisting the chatelaine or using a kitchen telephone—an entirely new idea—to manage household affairs (Figure 2.20 and 2.21).

One could say that the “comfort and convenience” campaign gave the public the “telephone-image” they desired, even though they did not yet get the “telephone-object” that they wanted. Color telephones had become quite common in Hollywood movies but remained rare in American homes.⁶⁶ They were for the most part unadvertised, and continued to be made-to-order at Western Electric. Color telephones remained the stuff of dreams until 1956, when Frederick R. Kappel, in one of the first decisions of his presidency at AT&T, announced that Western Electric

⁶⁵ AT&T ran its first advertisement in 1877. While early managers believed that advertising for something as useful as the telephone was unnecessary, by 1903 AT&T’s first institutional advertising campaign appeared, produced by the Boston-based Publicity Bureau. Under Vail, AT&T retained A.W. Ayer and Son as its agency in 1907 and began a relationship that lasted over 70 years. AT&T remained a committed advertiser over the entire period. See John Brooks, *Telephone* and Laird, *Advertising Progress*. By 1928, in addition to its institutional advertising, AT&T had eight categories of advertising including, Residential, Financial, Farm, Personnel, Juvenile, and Long Distance Advertising. See A.W. Page, “Public Relations and Sales.”

⁶⁶ Hollywood film sets typically featured white telephones, which were easily distinguished from the standard black telephone even in black and white films.

Telephones near at hand . . . for Comfort and Convenience



By the dressing-table . . . in the library, sun porch, guestroom . . . wherever they will save steps and time, and add comfort to living

OF THE many features which contribute to the livability and smartness of the modern home, few are more truly convenient than *enough telephones*, properly placed to give the greatest possible ease in the use of the service.

It is so desirable, nowadays, to have telephones in all rooms frequently used. Then important tasks need not be interrupted, nor long trips made to distant parts of the house, whenever an outside call is made or answered.

In many residences, the dressing-room suggests itself as an appropriate location. A telephone here not only saves steps and time, but tends to prevent annoying delays when one is preparing for bridge, travel or the theater.

And other rooms are equally suitable. The exact locations vary according to the requirements of different households. Your local Bell Company will be glad to survey your home, and recommend the telephone arrangements best suited to your needs. Just telephone the Business Office.



THE CORKER HART PAPER

2.19 Advertisement from AT&T's "Comfort and Convenience" campaign, 1929.
House and Garden (October).



Upstairs, Downstairs, all about the House ... the new Telephone Convenience



*Telephones
wherever you need them—
a modern way to increase
the living comfort of your
home*

New ideas for greater telephone convenience suggest the desirability of having telephone service in nearly every room in the house. The Bell System's modern equipment makes it possible.

This added comfort can be had either with permanently connected instruments, or with portable telephones which can be plugged into conveniently located sockets, wherever they are needed. Telephones may be used for intercommunication within the house, too, without interfering with outside calls.

How convenient it is to be linked with all parts of your house no matter what room you happen to be in . . . or to have telephones in whatever rooms you wish . . . yet from these same instruments to be able to talk with neighbors, with friends and relatives in other cities, or with London and Paris!

Many families nowadays have two or more telephone lines. In such homes, incoming and outgoing calls are never delayed, for the additional lines give assurance that at least one will always be available for service. If desired, an entire line may be devoted solely to servants' use.

Nearly every room in your house would be more livable with a telephone or telephone outlet in it. The Telephone Business Office will be glad to have a representative explain just how these modern telephone facilities can be applied to your own home, at moderate cost. Call them today.



2.20 Advertisement from AT&T's "Comfort and Convenience" campaign, 1929.
House and Garden (February).

Among the Conveniences of the Modern Kitchen is a Telephone



It is so handy in answering calls . . . in ordering the day's provisions . . . in household communication

The kitchen of the modern home is not alone a place for the preparation of food . . . it has emerged into something of an office for the household. Here—over the kitchen telephone, or one in the pantry adjoining—orders for supplies are placed. Communication is had with other rooms in the house, and the servants' calls can be handled without disturbing the rest of the household.

In smaller homes, the kitchen telephone is especially important . . . in avoiding, for instance, such domestic tragedies as burnt biscuits, or scorched roasts.

Telephones contribute to convenience in every part of the house. The modern idea is to have them sufficient in number, and so located, as to give the greatest ease in the use of the service. Each residence has its special opportunities for telephone convenience. Your local Bell Company will be glad to plan with you the arrangements best suited to your own. Telephone them today.



THE CONDÉ NAST PRESS

2.21 Advertisement from AT&T's "Comfort and Convenience" campaign, 1929. House and Garden (August).

would “put color phones in mass production and mass marketing” (Figure 2.22).⁶⁷ He saw that the only way to “modernize” AT&T in the eyes of consumers was to make telephones with the same awareness of design that other manufactured goods exhibited. Despite of the lack of support for his plan by AT&T’s board of directors, Kappel’s “coup” was a success with subscribers. In 1959, the Princess phone was introduced in limited markets (Figure 2.23). Designed by the Dreyfuss firm, with Robert Hose as the lead designer, the Princess telephone’s low profile and feminine styling was a radical change from the business-like appearance of the 300-type or the 500-type telephone. Notably, the telephone was not offered in black; it was available only in white, beige, pink, blue, and turquoise. The Princess was AT&T’s the first real break away from the technological aesthetic. Like Bell’s early telephones, the Princess design was a purely aesthetic change; technologically it used mostly standard 500-type telephone parts.⁶⁸ It is interesting to note that the first versions of the Princess telephone needed to have a wall-mounted ringer—something not seen since the French phone—because a ringer that was small enough to be incorporated in the body of the phone had not yet been developed. Subscriber dissatisfaction with the wall-mounted ringer encouraged the development of a small ringer but the fact that AT&T was willing to release the Princess with ‘old-fashioned’ technology is

⁶⁷ Kappel illustrated his announcement by showing the layouts of four double-spread advertisements promoting the soon-to-be available color telephones that had been prepared for insertion in leading national magazines. Kappel was the president of Western Electric from 1954 to 1956 and then president and chairman of AT&T from 1956 to 1967. See Brooks, *Telephone*, 266.

⁶⁸ Meyer states that the Princess telephone “used a standard G-type [500] handset, a No. 495A network that was merely a repackaged No. 425 in a more compatible shape, and a No.8 dial that was electrically and mechanically similar to the standard No.7 dial of the 500-type telephones. The Princess dial used the same clear plastic fingerwheel as the 500 set, but the dial numbers were brought back under the finger holes to save space.” Meyer, *Old Time Telephones!*, 128.



2.22 Western Electric No. 500-type color desk set, 1956. Designed by Henry Dreyfuss and Associates. (Reproduced with permission of AT&T Archives and David Massey, Bell System Memorial website.)



2.23 The Princess telephone, 1959. Designed by Henry Dreyfuss and Associates. (Reproduced with permission of AT&T Archives and David Massey, Bell System Memorial website.)

telling—clearly the fashion appeal of the telephone had finally become a key element in its design.

The Trimline—AT&T's last standard telephone—made its appearance in 1965 (Figure 2.24). It was also designed for AT&T by the Dreyfuss firm, with Donald Genaro as the lead designer on the project. The Trimline's inspiration was the lineman's test set: all parts needed for use, including the dial, were mounted in the handset so that the base could be kept out of the way. The small size of the shell required its components to be reconfigured and miniaturized, but like the Princess, the Trimline's components were substantially like those of any other standard telephone.⁶⁹ Again, the Trimline represented an aesthetic rather than a technological change.

The Princess and the Trimline were the cusp of the transition from a technological to a design aesthetic. The style changes were the result of Kappel's program to pursue a more consumer-oriented approach to marketing the telephone, and both designs demonstrated a self-conscious acknowledgement of style and an awareness of consumer taste preferences. But Kappel's decision did not occur in a vacuum. It was driven by the determination of a small but insistent number of subscribers who continued to connect non-Bell System 'decorator' or antique telephones to the Bell network because they found those telephones more attractive

⁶⁹ On Trimline technology, see Meyer, *Old-time Telephones!*, 129-133. Although the Trimline was not very different technologically from its predecessors, the miniaturization of some of the components was a significant change from a production perspective. Northern Electric, Western Electric's Canadian counterpart, found that—with its smaller market—the necessary miniaturization made the cost of manufacturing the Trimline economically impractical. Faced with the dilemma of having its telephones look outdated once the Trimline became available in the United States, Northern Electric began to work on the design of a telephone that would compete aesthetically with the Trimline but would use conventional components. The telephone that resulted was the Contempra, designed by John Tyson. It is interesting to note that its design was far more compelling and 'modern' than the Trimline.



2.24 The Trimline telephone, 1968. AT&T's last standard telephone and the last telephone to be designed by Henry Dreyfuss and Associates. This model had a new 12 button key pad for access to as-yet unavailable advanced services.

or more in keeping with the design of their homes. In fact just a few months after the limited release of the Trimline, AT&T announced a new policy that attempted to accommodate those subscribers and preserve the integrity of the network. A press release explained:

The policy makes it possible for customers to use their own telephone shells with standard components owned and maintained by Bell System companies. Under this policy, specifications to accommodate the internal working parts of a telephone will be made available, upon request, to telephone shell manufacturers, and a charge of about \$10 will be made to install Bell System components in a customer's shell. Where modification of a customer's telephone is required to accommodate Bell System components, a charge of about \$25 will be made. Both charges, of course, are in addition to the regular monthly extension or station rate. Implementing the policy will make it possible to maintain Bell System standards and insure compatibility with other parts of the telephone network.⁷⁰

Despite the introduction of the Princess and Trimline telephones, subscriber desire for style and choice in telephone design remained a problem for the Bell System and its companies. Rather than dissipating, demand seemed to increase over the years. An internal memo distributed in 1974 observed that "a definite customer interest in decorator telephones has emerged," and reported—in a manner reminiscent of the earlier difficulties with the French phone—that "many department stores," "smaller retail outlets," "and other lesser known dealers are selling sets of varying quality to our subscribers."⁷¹ The recognition that accommodating consumer demand was strategically a better approach to safeguarding standards of service led to the launch of AT&T's 'Design-Line' of telephones in 1974. The Design-Line took an

⁷⁰ AT&T, *195 Management Report*, No. 36, 22 October 1965.

⁷¹ To R. Drapkin, memorandum marked "not for publication," dated c. 1974. File: Subscribers Equipment-Decorative Telephones, Bell Canada Historical Collection.

approach to telephone design which philosophically was diametrically opposite to the ethos of AT&T's technological aesthetic.

The headline of Western Electric's brochure announcing the Design-Line declared: "If you think you've seen telephones, take another look!" The five new telephones included a model based on the French phone (intriguingly described in the brochure as a style "patterned after older European models"), a contemporary flat box-style available "with appliqués in brown alligator vinyl, apple-green leather or simulated silver-etched metal," an "apple-green or pigskin [leather], trimmed in simulated brass or silver" with contrasting dark green or white handsets," another box-style phone available in "lime, yellow, white or ivory housings with inlays of wicker or wood veneer," as well as a model called the Stowaway, a "small chest, made of natural wood" which opened "to reveal black or ivory handset with matched setting, trimmed in simulated brass or silver." Not only was the selection of styles and colors of the new phones strikingly different in sensibility from AT&T's earlier designs, so was the language in which they were promoted: the brochure described the telephones as "all designed to attract, to enhance conversation."⁷²

While it would be gratifying to suggest that the introduction of the Design-Line telephones was the result of some sort of an epiphany on the part of AT&T management that involved the recognition of the importance of subscriber satisfaction, it is more likely that the sudden harvest of designer telephones was influenced by the FCC's announcement in 1971 of its intention to launch a comprehensive investigation of AT&T and Western Electric. Its decision later that year to approve as many as 2000 applications for the construction of private line telecommunications systems—essentially dissolving AT&T's monopoly position—was

⁷² Mike Heymann, "It's Still a Phone—but What a Phone!," *Indiana Bell Highlights*, 31 May 1973, 22.

more likely the impetus for the Bell System to begin wooing its subscribers. In 1972, Henry Dreyfuss Associates was commissioned to develop "a line of unique shapes, forms, materials, and colors with three constraints—the set[s] had to be practical, attractive and utilize existing standard components."⁷³ The Dreyfuss firm came up with seven models, five of which were selected for rush production. In 1973, "AT&T established a new marketing department and new marketing strategy to meet the challenge of 'selective' competition in the telecommunications industry."⁷⁴

Spurred by the prod of competition, AT&T expanded the Design-Line over the years to include a Mickey Mouse telephone, and a Stars-and-Stripes candlestick, among others.⁷⁵ In 1984, the year the Olympics were held in Los Angeles, an advertisement promoted a line of "AT&T Commemorative Telephones"—each featuring the L.A. Olympics' "star-in-motion" logo as well as the option to purchase "any of seven specially designed sculptures [...] in bonded bronze or bonded pewter" depicting an athlete involved in an Olympic event which could be mounted on the surface of the telephone.⁷⁶ For better or worse, the desire of consumers for a fashionable telephone had been finally answered and the telephone had become a 'consumer product' like any other.

⁷³ Mike Heymann, "It's Still a Phone—but What a Phone!," *Indiana Bell Highlights*, May 31 1973.

⁷⁴ AT&T Archives, *Events in Telecommunications History*, 109.

⁷⁵ Bell Canada and Northern Electric followed AT&T's lead and marketed similar models of designer telephones under the name of Imagination series. It included a red and white Canada Phone, similar to the Stars-and-Stripes candlestick. See Bell Canada, *Telephones through the Years*.

⁷⁶ There were seven telephones shown in an advertisement that ran in the *New York Times Magazine* on 17 June 1984. They included "Runner," "Equestrian," "Discus Thrower," "Gymnast," "Swimmer," "Yachting," and "Torch Carriers."

II

SYSTEM

NINETEENTH CENTURY VISIONS OF THE TELEPHONE SYSTEM:
BELL'S "GRAND SYSTEM," HUBBARD'S "DEMOCRATIC INSTRUMENT," AND
VAIL'S "UNIVERSAL SERVICE"

In the *Evolution of the American Economy*, Ratner, Soltow, and Sylla write that: "Amazing as it may seem, many people living in 1900 could remember when neither railroads nor telegraphs nor telephones existed. In a sense, such people were older than the American economy." The development of these huge infrastructural enterprises, they argue, were instrumental in connecting the hitherto local and regional spaces of America into a "vast unified marketplace."¹ Before the development of mass transportation and communication technologies, neither agricultural or factory-made goods could move in any volume beyond the local regions that produced them. The growth of the railways and telegraph was phenomenal in the last thirty years of the nineteenth century, expanding at a compounded rate of four to six percent a year from 1865-1914. The telephone, after

¹ Sidney Ratner, James H. Soltow, and Richard Sylla, *The Evolution of the American Economy: Growth, Welfare, and Decision Making* (New York: Basic Books, 1979), 320.

its first seventeen years of experimenting with forms of patent monopoly, grew at an astounding rate of seventeen percent between 1893 and 1914.²

In conjunction with these technological advancements, other economic developments in the last quarter of the nineteenth century contributed to the whole-scale transformation of American society. Along with the growth of agricultural mechanization and output, the percentage of the population of Americans who lived by farming continued to decline rapidly. By the 1880's they constituted less than one half of the productive labor force. On the other hand, the number of people who worked in factories and lived in cities grew rapidly both through immigration and rural to urban migration. While America was rich in most raw materials needed for industrial expansion, most historians credit the revolution in technology for the huge growth from 1865 to 1914. Ratner, Soltow, and Sylla follow the majority of historians when they argue that America benefited from European science disseminated through immigrants but Americans excelled in its practical application. Before the turn of the century, "Most advances in manufacturing were made through empirical, trial and error methods [...] Development of the finished product for consumers was likely to be the work of amateurs."³ It was only at the end of the century that scientific laboratories became organized and standardized for the production of knowledge.

The late nineteenth century is also recognized as the period in which changes in business law and the techniques of raising capital facilitated the development of the large corporation.⁴ The intense capital outlay required to build railways resulted

² Ibid., 321.

³ Ibid., 275.

⁴ See William G. Roy, *Socializing Capital, the Rise of the Large Industrial Corporation in America* (Princeton, NJ: Princeton University Press, 1997). Also Chandler, *The Visible Hand*.

in the invention of the corporation with its limited legal liability and its ability to own stock in other companies. These developments encouraged the raising of large amounts of capital on the stock market as well as a variety of financial instruments which could be used to buy out competitors and suppliers. The growing consolidation of major industries under the control of a few companies, and the debate over trusts, pools, and monopolies occupied much political discussion in the late nineteenth century. As I mention later, the telegraph and later the telephone industry also developed in the thick of this larger social and political debate on the distorting economic effects of centralized ownership versus the perils of ruthless competition.

In short, the three decades before the turn of the century saw the American economy actually come into being, not always smoothly but definitively. A central and centralizing moment in this transformation was the development of communication technology, first the telegraph and later, and even more profoundly, the telephone.

FROM THE ONE TO THE MANY

In *A History of Engineering and Science in the Bell System*, M.D. Fagen wrote, "Alexander Graham Bell should be credited with two basic communication inventions. The first was the device, the telephone instrument. The second was what today we would call a 'system concept.'"⁵ Bell first described his idea for a "grand system" of telephone communication as early as 1877—the year that the new Bell Company was incorporated—in a prospectus he wrote encouraging British businessmen to invest in his invention.⁶ In a similar letter addressed to "the capitalists of the Electric

⁵ Fagen, ed., *A History of Engineering and Science in the Bell System: The Early Years (1875-1925)*, 59.

⁶ *Ibid.*, 21-22, 60.

Telephone Company" dated March 25, 1878, he described his vision of a "system of intercommunication" by drawing an analogy to the "perfect network of gas-pipes and water-pipes throughout our large cities." He proposed that,

it is conceivable that cables of telephone wires could be laid underground, or suspended overhead, communicating by branch wires with private dwellings, counting houses, shops, manufactories, etc., uniting them through the main cable with a central office where the wire could be connected as desired, establishing direct communication between any two places in the city [and] in the future [...] in different cities.⁷

While Fagen and other historians of the telephone, including Ithiel de Sola Pool and Sidney H. Aronson, cite these texts as evidence of Alexander Graham Bell's "remarkable prophetic vision," it is important to recognize that his conception of a system of communication drew on ideas and strategies that were already transforming the modern business and social landscape.⁸

Even though the telephone system was still a technological impossibility at the time that Bell was forecasting its future, the groundwork for it had already been laid—both materially and metaphorically—by railway and telegraph companies. The first transcontinental railroad and telegraph lines were completed in the 1860s (with 30,000 miles of rail constructed at this time).⁹ By the 1870s, the accelerated circulation of goods and information they made possible across long distances

⁷ Ithiel de Sola Pool, *et al.*, "Foresight and Hindsight: The Case of the Telephone," in *The Social Impact of the Telephone*, ed. Ithiel de Sola Pool (Cambridge MA: MIT Press, 1977), 156-157.

⁸ Fagen, ed., *A History of Engineering and Science in the Bell System: The Early Years (1875-1925)*, 37.

⁹ Amy Friedlander points out that "although the telegraph has been historically linked to the expansion of the railroads, it was actually developed independently of them." She notes that telegraph lines to the west coast were completed in 1861, while the Union Pacific and Central Pacific Railroads were joined at Provo, Utah in 1869. Amy Friedlander, *Natural Monopoly and Universal Service: Telephones and Telegraphs in the U.S. Communications Infrastructure 1837-1940* (Reston VA: Cooperation for National Research Initiatives, 1995), 16-17.

extended the scale on which businesses could operate and led to the opening up of what could be considered truly national markets. Increases in the speed of transmission—especially the rapid diffusion of information on prices and availability that the telegraph (and later the telephone) made possible—also facilitated the centralization and institutionalization of capital markets which could then be tapped, with the help of centralized banks, to fund greater expansion. In turn, centralized banks, with the capability to manage large-scale transfers of securities created the conditions for the emergence of what business historian Alfred Dupont Chandler has called “a new style of speculation”. This marshalling of vast capital resources resulted in the exponential growth of America’s modern transportation and communication systems.¹⁰ The relationship between the technological advances of the middle- and late-nineteenth century and the growth and consolidation of capital during this same period has been well documented by several authors including Chandler.

The *idea* of the system—the conceptual ability to imagine an ever enlarging coordinated social infrastructure that could be developed on a state or even national scale—is significant to understanding both the development of modern technologies as well as the transformations of economic forces and conditions which marked the shift from market to monopoly capitalism.¹¹ Fagen—while perhaps inaccurately assigning credit to Alexander Graham Bell—created a useful distinction between technological apparatuses and the (rhetorical) concepts which inspire and organize them. They are in fact very different things and seeing them as such allows us to examine and assess them (somewhat) separately, drawing out those disparities and variations between latent possibilities and pragmatic realities, and ultimately reveal

¹⁰ Chandler, *The Visible Hand*, 147.

¹¹ I use the terms ‘market’ and ‘monopoly capital’ following Fredric Jameson, who in turn draws on their use by Ernest Mandel. See especially Jameson, “Cognitive Mapping.”; Mandel, *Late Capitalism*.

the degree to which both are socially constructed. While the actual material “network” made up of telephone wires, cables, switches, and instruments was constrained by technical limitations, the telephone “system” idea expressed in popular texts and images of all kinds, but especially telephone advertising, was almost unfailingly flawless and limitless in its reach. As we shall see, the concept of the modern telephone system was fully evolved before the turn of the century, despite the fact that technical problems continued to impede the development of the telephone network well into the 1910s.

I argue that the idea of the ever expanding ‘system’ which underwrote the development of modern transportation and communications technologies was not a neutral concept. It was an idea and ultimately a phenomenon that was profoundly linked to concepts of ever increasing productivity—efficiency, rationalization, and speed—notions which derived their value not so much from a social or technological imperative but rather from the incentive structures of capitalism itself, namely what Marx has argued is the imperative to increase the turnover time of capital and hence its profitable investment.¹² The ‘system-concept’ can be quite usefully understood as a manifestation—or as Jameson might suggest, a cognitive map—of the social and economic relations of monopoly capitalism.¹³ While holding onto the sense of “the system” above, it becomes possible to explore other slippages of its use, especially as the concept of “the system” allows us to map the telephone’s emergence in the context of the representations, practices, and imaginary from which its importance was to be communicated.

¹² Karl Marx, *Capital: A Critique of Political Economy, Volume 1*, trans. Ben Fowkes, 3 vols., vol. 1 (London: Penguin, 1990).

¹³ Jameson suggests that the shift from market to monopoly capitalism brought about “problems of figuration”—that is to say, it became increasingly difficult to represent the real, structural co-ordinates of everyday life. See Jameson, “Cognitive Mapping,” 348-349.

BELL'S "GRAND SYSTEM" AND HUBBARD'S "DEMOCRATIC INSTRUMENT:"
EARLY VISIONS OF THE TELEPHONE SYSTEM

It is not surprising that Alexander Graham Bell's earliest descriptions of the telephone system appeared in letters appealing to capitalist entrepreneurs. His promotion of the telephone for use by "bankers, merchants, manufacturers, wholesale and retail dealers, dock companies, water companies, police offices, fire stations, newspaper offices, [...] in railway offices, [and] in mines" drew on familiar images and arguments already well-established in telegraphy and it was likely inspired less by prophetic insight than by the desire to find backers to finance the further development of his invention.¹⁴ However, it is important to note that at the time that Bell was writing his prospectus, the uses of the telephone were still not fixed. The first demonstrations of the telephone featured its entertainment uses and typically involved the transmission of music and singing, speeches and news dispatches. In truth, Bell's description of the telephone as a business tool at this time was no more close to actualization than if he had portrayed it as a broadcast medium or a personal communications device. Nevertheless it was a description that was attractive and—thanks to the telegraph—familiar to his audience of potential investors. While it seems reasonable—given the nature of Bell's invention and the magnitude of the telegraph's economic impact—that the telegraph system would serve as the model for the telephone system, it is important to recognize that its influence was not as straightforward as a cursory reading of Bell's letter would suggest.

While Bell's original experiments with "electric speech" were motivated by his desire to develop a teaching aid for deaf students, by 1872 he turned his knowledge

¹⁴ Fagen, ed., *A History of Engineering and Science in the Bell System: The Early Years (1875-1925)*, 23.

of acoustics to trying to develop a 'harmonic scheme' for the telegraph that would permit multiple messages to be transmitted over a single wire. He was encouraged in this by Gardiner Greene Hubbard, who had arranged for Bell to come and teach at a state-sponsored school for the deaf in Massachusetts that his daughter attended. Bell's patent application for a harmonic telegraph scheme—filed by Hubbard on February 14 1876—qualified as an "improvement in telegraphy," but only in theory. He had not succeeded in developing a working multiple-message telegraph, but his experiments had led him to discover the principles of what he called the "electric speaking telephone" in his patent application. Bell's patent was issued on March 7 1876, three weeks after his application was submitted. It was three days after that, on March 10, that Bell finally succeeded in transmitting a voice message—"Mr. Watson, come here, I want you"—to his assistant over a wire strung between his workshop and his bedroom. Bell continued to make improvements to his invention over the course of the year but neither he nor Hubbard began to actively promote the telephone until 1877, shortly before Bell married Hubbard's daughter and moved to England to promote the telephone and pursue new projects. He resigned his position in the company in 1881. Bell's interest in the diffusion of telephone remained—like his scientific research—essentially theoretical. He saw his invention primarily as the means by which he could establish himself financially and socially. Many histories of the telephone credit Bell with having had a well developed idea of a future telephone system, but in those few instances in which he did describe his concept, it was not substantially different than the existing telegraph system. It was in fact his partner Hubbard who was motivated by a larger social and political vision of what the telephone could become.

In order to understand how Hubbard imagined the telephone system, it is important to get a sense of its relationship to the telegraph and to understand the

turbulent social and political setting in which it first made its appearance in 1877. The rise to prominence of railway corporations in the 1840s and 1850s, of national banks, and of the development of monopolies had led to a situation in which it was difficult for new technologies that required large infrastructural investment to develop in more entrepreneurial and democratic ways. The paradox of Hubbard's vision is that he imagined the telephone as a progressive instrument that would allow the emerging middle class to form what we might call today a 'virtual community,' yet despite this the telephone eventually developed as a monopoly industry.

Historically, the public's initial response to the telegraph had been enthusiastic. Its introduction inspired an unparalleled optimism which reverberated through social, political, and economic life in America in the mid-nineteenth century. The telegraph—with its ability to conquer the barriers of space and time—was heralded as harbinger of a new era that promised equality, opportunity, and freedom for all in virtually every sphere of daily existence. Richard Du Boff writes that in 1847, the Cincinnati *Daily Chronicle* described the telegraph as "facilitating Human Intercourse and producing Harmony among Men and Nations."¹⁵ Herman Sibley, founder of the Western Union Telegraph Company, allegedly scandalized clergymen with his contention that the telegraph was equal to the Church as "the missionary of peace and goodwill to the world."¹⁶ It was suggested that on the political scene, the

¹⁵ Richard B. DuBoff, "The Telegraph in Nineteenth-Century America: Technology and Monopoly," *Comparative Studies in Science and History* 26 (1984): 571.

¹⁶ According to Du Boff, this event occurred in the late 1850s. Here he cites J.D. Reid, *The Telegraph in America. Its Founders, Promoters and Noted Men* (New York: Derby Brothers, 1879), 211. He also notes that Reid's observations on the humanizing effect of the telegraph offered a good example of the era's rhetoric of technological optimism, see *Ibid.*, 596.

telegraph would serve to improve "the political atmosphere of [...] nations" and to decrease the threat of "international hostility."¹⁷

Expectations about the telegraph's potential from a business perspective were contested in the economic arena. According to Du Boff, the enthusiasm with which the press and the business and financial sectors adopted the use of the telegraph was responsible for the rapid growth and consolidation of the telegraph industry after 1846. He writes that "[t]he earliest, and best, customers of the telegraph were newspapers, retail and wholesale merchants, brokers and bankers, as well as 'speculators'"—an inventory of users which is strikingly similar to the list found in Bell's letter.¹⁸ When the Western Union Telegraph Company achieved monopoly control of the telegraph industry in 1866, it moved quickly to concentrate its efforts on consolidating and expanding precisely this group's patronage.

In the last quarter of the nineteenth century, unprecedented economic expansion and acceleration—fuelled by the telegraph, the railways, and banks—gave enormous advantages to speculators and corporations while marginalizing small firms and local merchants. Local manufacturers, tradesmen, and craftsmen—whose economic survival was threatened by speculators who relied on an elite press and private 'express' postal services to advance their interests in growing commodity markets—were equally keen to insure that the telegraph remained in the a public trust.¹⁹ Their hopeful view that the telegraph would insure opportunity by making information instantly and *equally* available was expressed by the *Philadelphia Public Ledger and Daily Transcript* in 1846: "The telegraph being

¹⁷ DuBoff, "The Telegraph in Nineteenth-Century America," 571.

¹⁸ Richard B. DuBoff, "Business Demand and the Development of the Telegraph in the United States, 1844-1860," *Business History Review* 54, no. 4 (1980): 467.

¹⁹ DuBoff, "The Telegraph in Nineteenth-Century America," 572. Also see Schiller, *Theorizing Communication*, 4.

alike to *all* puts the whole community upon a par, and will 'head off' the most adroit spectators, because they will not have the power to *monopolize* intelligence" [emphasis in original].²⁰

Dan Schiller writes that most histories of modern communications underestimate the intensity and impact of public protest against the monopolization of communications media during the last decades of the nineteenth century. In fact, the domination of the media by business interests led to widespread demands for the democratization of all means of communication—the press, the news services, and especially the telegraph. Fuelled by “the recognition that the telegraph was acting as one of the three prime bearers of disequilibrating corporate capitalism,” the telegraph monopoly became a lightning rod for social reformers who believed that it exemplified the unrestrained predatory capitalism which threatened America’s republican ideals and democratic values.²¹ Many called for government intervention and regulation of the telegraph industry. Schiller notes that the nationalization of telegraph and later telephone service was raised as a campaign issue by at least one independent party in every presidential race between 1884 and 1924. Telegraph reform was the topic of numerous petitions submitted to the US Congress and, according to Daniel Czitrom, “[b]etween 1866 and 1900, Congress considered over seventy bills designed to reform the telegraph system.”²²

Among those reformers petitioning Congress to temper Western Union’s control over telegraphy was Gardiner Hubbard. In 1868, Hubbard entered the debate on the basis of his belief that Western Union was using its monopoly status and its technological advantage to extract excess profits by favoring the interests of

²⁰ DuBoff, "The Telegraph in Nineteenth-Century America," 572.

²¹ Schiller, *Theorizing Communication*, 4-6.

²² Czitrom, *Media and the American Mind*, 27.

business and the press. He claimed that by pursuing the business market and maintaining high rates, Western Union was willfully making telegraph service inaccessible to the public and in so doing threatening the democratic right of "individual Americans to pursue their own political and economic destiny."²³ To illustrate his case, Hubbard pointed to the contrast between telegraph use in America where commercial messages made up over 80% of telegram traffic, and in Europe where as much as two-thirds of the traffic was social in nature.²⁴ He argued that the problems created by Western Union's monopoly could be solved by extending access to the telegraph to non-commercial users and he sought funds from Congress to accomplish this end through the creation of a "postal telegraph system," built and managed by a private corporation—headed by Hubbard and his colleagues—and operated under contract with the Post Office. This would have made telegraph service widely available throughout America in local post offices, in small towns, and in rural areas.

It is important to locate Hubbard's ideas in the context of the debates surrounding telegraphy during this period. Far more radical positions were being circulated by advocates of reform, who called for a degree of 'mutualism' that would have seriously challenged the social and economic status quo. While Hubbard's proposal must have appeared extreme to the proponents of corporate liberalism, it sought only to moderate excesses and to flatten out extreme imbalances of social power. W. Bernard Carlson suggests that Hubbard's socially progressive but economically moderate position can best be understood by examining his personal

²³ W. Bernard Carlson, "The Telephone as Political Instrument: Gardiner Hubbard and the Formation of the Middle Class in America, 1875-1880.," in *Technologies of Power: Essays in Honor of Thomas Parke Hughes and Agnes Chibley Hughes*, ed. Michael Thad Allen and Gabrielle Hecht (Cambridge, MA: MIT Press, 2001), 36.

²⁴ DuBoff, "Business Demand and the Development of the Telegraph," 465-466.

history. Between 1849 and 1861, Hubbard had been involved in developing subdivisions outside of Boston through his investment in the East Cambridge Land Company. According to Carlson, Hubbard had recognized that the success of this venture depended on creating an environment that was attractive to middle class professionals like himself. "To accomplish this," Carlson writes, "Hubbard turned to technology."²⁵ He organized the construction of a commuter railroad between Boston and Cambridge Common, and when that faltered as a result of competition from a less expensive horse-drawn omnibus service, proceeded to establish a profitable horse-car service instead. In 1852, he helped to create the Cambridge Water Works and the Cambridge Gas Light Company. Carlson argues that Hubbard's uses of transportation and utilities to create a middle class community are evidence of his views on technology's social potential. For Hubbard, technology's promise was to be found in its embodiment of a spirit of progress and optimism about the future, and not strictly in its capacity to create profit for its owners.

Carlson goes on to suggest that this way of thinking subsequently shaped Hubbard's ideas about the telegraph and, later, the telephone. When his attempts to reform telegraphy by lobbying Congress were thwarted by Western Union's political influence, "Hubbard [again] turned to a technological solution: the telephone invented by Bell." Carlson writes that for Hubbard the telephone was "a telecommunications system that would overcome the defects he saw in Western Union. Literally in the hands of the user, the telephone seemed to eliminate Western Union and its operators as a meddlesome intermediary."²⁶ Carlson's hypothesis seems to have inspired the paragraph in Bell's 1877 letter to the capitalists of the

²⁵ Carlson, "The Telephone as Political Instrument," 35.

²⁶ *Ibid.*, 46.

Electric Telephone Company which contrasted the telegraph's coded communication with telephone's democratic appeal.

The great advantage [the telephone] possesses over every other form of electrical apparatus consists in the fact that it requires no skill to operate the instrument. All other telegraphic machines produce signals which require to be translated by experts, and such instruments are therefore extremely limited in their application, but the telephone actually speaks, and for this reason it can be utilized for nearly every purpose for which speech is employed.²⁷

While this passage could be interpreted as simply an attempt to differentiate the telephone from its more established competitor, its evocation of the populist ideals of independence, progress, and egalitarianism suggests the influence of Hubbard's ideas about the social roles of technology. The assertion of the telephone's superiority over the telegraph on the basis of its ease of use and adaptability in a letter addressed to precisely those individuals who had likely been the main users of the telegraph implies a belief that in the future the success of the telephone system would at least in part be tied to a middle class reaction against the power of monopolies in American society, especially those in the communication and transportation sectors.

Hubbard's vaguely utopian concepts of democratic communication can be dismissed as simply a recognition of—and an attempt to take advantage of—the new opportunities available to businessmen who catered to the needs and desires of the emergent middle class. But it would be more accurate, according to Schiller, to see his way of thinking as influenced by and reflective of the popular protests and the strong support for socialist ideals that arose in the face of the excesses of late nineteenth century capitalism. Schiller writes that reformers from all sectors of

²⁷ Pool, ed., *The Social Impact of the Telephone*, 156.

society—farmers, trade unionists, Marxists, feminists, and the growing urban middle class—“shared a loose commitment to collectivism, and even to ‘mutualism over competitive individualism.’”²⁸ And he notes that while the ideological differences between these groups were significant enough to flare up into many real disputes, there tended to be widespread agreement on the need to oppose the privatization of communications technologies.

In this milieu, the “postalization”—or nationalization—of the “telephone utility” came to be seen as especially important because, as one reformer explained: in an era of dramatically increased immigration “the telephone is everybody’s common means of communication, wherein, more so than written communication, all tongues, all thought and expressions can be conveyed or transmitted by persons interested, direct, without resort to writing and really by *personal* conversation.”²⁹ Viewed in this light, the proposition in Bell’s 1878 letter that residential use would prove to be “a very favorable application of the telephone” can be seen as an appeal to this group: while the installation of telephones in domestic residences (and hotels) made good business sense because of the significant potential for profit “on account of the large number of telephones that would be wanted,” it would also effectively create a new residential market for electrical communication, a market in which the telephone would have distinct competitive advantages over the telegraph. In his letter, Bell anticipated that the introduction of the telephone into the home would serve to habituate people to using it to conduct their everyday affairs, and would thus encourage the growth of the telephone network. However—in a move that was in keeping with the telephone company’s later resistance to the domestication of

²⁸ Schiller, *Theorizing Communication*, 5.

²⁹ N.G. Warth to Woodrow Wilson, Oct, 1913, US National Archives and Records Administration RG Box 38, 60-1-0, Section 6. cited in *Ibid.*, 14.

telephone technology—he imagined the telephones installed in residences (and hotels) forming closed and contained networks, intended as mere replacements for “speaking tubes and annunciators” and to connect the home to the interurban telephone system he envisaged for business communication.³⁰

Given Hubbard’s ideas about the telephone, it is difficult to understand what led him to the Western Union Telegraph Company when he went looking to find a buyer for Bell’s patents later that same year.³¹ When Western Union turned down his offer, Hubbard tried to interest well-to-do businessmen in promoting the telephone, and he found a number who wanted to set up exchanges that would compete against the “District” telegraph companies that provided fire and burglar alarm and messenger call services. It is worth noting that when Mr. E.T. Holmes of Boston established the first telephone exchange in May of 1877, it was originally intended as an addition to his burglar alarm service. His business then quickly grew as his established customers—including “large grocers, confectioners, and cookery merchants”—began to use the telephone to conduct their daily transactions.³²

The success of E.T. Holmes and other local entrepreneurs persuaded Hubbard that it might be possible for he and Bell to advance the patents themselves. In July 1877, along with the patent attorney Thomas Sanders, they formed the Bell Telephone Company. With neither the funds nor the financing for large scale development, the Bell Company established the policy of licensing local entrepreneurs—like E.T. Holmes—in designated territories as telephone service providers. The licensed operators were responsible for soliciting the subscribers,

³⁰ Pool, ed., *The Social Impact of the Telephone*, 156-157.

³¹ Hubbard offered Bell’s patents to the Western Union Telegraph Company for \$100,000 in the fall of 1876. See Smith, *The Anatomy of a Business Strategy*, 38.

³² Carlson, “The Telephone as Political Instrument,” 42.

stringing the lines, and providing the service, and they were required to lease telephones that were produced under patent for the Bell Company. Under these arrangements, the company managed to retain control over the telephone's development without capital investment but it drew no income on the provision of telephone service (which accrued to the licensed operators) nor on the manufacture of telephone instruments and equipment. The strategy worked well as a solution to the company's immediate problem of capitalization, but it was not without consequences. While there were obvious financial benefits to leasing rather than selling the telephone, the arrangement did not provide the infusion of capital that would have put the Bell Company on a secure fiscal footing, and as we saw in an earlier chapter, it also tied the company's income to both its manufacturers' capability to produce telephones in sufficient quantities as well as its licensees' success in attracting new subscribers. As a result, the telephone 'system' that was emerging in 1877 was an uneven patchwork pieced together from gentlemen's agreements that varied widely in intention, pricing, and technical capacity.

In 1877, Western Electric launched its attempt to take over the Bell Company by offering potential subscribers 'proof' that the Bell telephone was inferior to their own. Even though the telegraph monopoly had refused to buy Bell's patents for \$100,000 in the fall of 1876, less than a year later it reversed its decision and opted to spend millions contesting Bell's patents. After turning down Hubbard's offer, Western Union had acquired the rights to Elisha Gray's telephone and—on the basis of the close timing of the two inventors' patent applications—advanced the claim that Gray was the true inventor of the telephone. Western Union set up telephone

subsidiaries, including the American Speaking Telephone Company and Gold & Stock Telephone Company, and used its considerable influence to press its position and encroach on Bell's territory.

VAIL'S PROJECT: MAXIMIZING PROFIT THROUGH "UNIVERSAL SERVICE"

Before Hubbard left the Bell Company in 1879, he had convinced Theodore N. Vail to take the position of General Manager. Vail had been moving up the ranks of the Railway Mail Service until he was named its superintendent in 1876 and in that capacity he met Hubbard who was at that time serving as a member of the Congressional Postal Committee. John Brooks writes that "as a result of his association with Hubbard [Vail became convinced] that the telephone would revolutionize world communication" and when Vail took up his new position on May 22 1878, he set to working towards that end.³³

Vail immediately took a hard line against Western Union's take-over threat. In July 1878, Vail provided every Bell Telephone Company agent with a copy of Bell's 1876 patent and instructed them to fight off Western Union's infringements. When in September, after a year of indecision, Bell responded to Western Union's accusations by filing an infringement suit—naming Peter A. Dowd, the head of the American Speaking Telephone Company—to protect the its patents, Vail shifted his focus to the improving the company's resistance to competition. In Vail's evaluation, Western Union had two significant advantages over Bell when it came to attracting subscribers and establishing exchanges. The first was the technical superiority of the transmitter Edison had designed for the telegraph company, and the second was the national scope and scale of the Western Union network. Through a deft deployment

³³ Brooks, *Telephone*, 68.

of patent law and strategic investments in patent acquisition and research—an approach that would become the hallmark of his subsequent presidency of AT&T—Vail re-established Bell's position of technical leadership by early 1879.

On November 10 1879, before the Dowd suit went to trial, Western Union agreed to a settlement in which it ceded "all its patents, claims, and facilities in the telephone business—the Edison transmitter, various other technical improvements, and a network of 56,000 telephones in fifty-five cities."³⁴ In return, Bell agreed to give Western Union 20 percent of telephone rental receipts over the seventeen-year period remaining on its patents. With Western Union's abandonment of the field, the significant outcome of the Dowd Agreement was the emergence of the National Bell Company as a legally enshrined monopoly.

After the Dowd decision, Vail set out to rectify what he identified as Bell's second area of weakness by building a national network. In 1881 he supported the acquisition of Western Electric as a means of consolidating and gaining control over telephone manufacturing and distribution. He then established an aggressive plan of expansion intended to extend Bell's network across the nation. Vail offered local entrepreneurs the opportunity to set up telephone exchanges with very little capital outlay. In exchange, they were to give Bell a high stock interest—between 30 and 50 percent—in their companies and pay an annual rental fee of approximately \$10 for each telephone leased from the now Bell-owned Western Electric. Those businessmen who thought his terms were too restrictive and looked to set up service with an independent company were quickly served with a notice of patent-infringement. Brooks states that by 1885, Vail had put in place the rudiments of the

³⁴ Brooks points out that in all likelihood Jay Gould's relentless attempts to acquire control over Western Union were what motivated William H. Vanderbilt to settle the Dowd Suit with Bell. *Ibid.*, 71.

modern Bell System: “vertically integrated supply; a network of licensees substantially owned by the parent company; emphasis on research and development; and a strong supervision of the whole system by the parent company.”³⁵

Bell’s monopoly status insured that the company prospered even during the economically turbulent 1880s. After Alexander Graham Bell and Gardiner Hubbard were forced to step aside in 1879, the Bostonian venture capitalists who had come to control the board kept prices and stockholders’ dividends high while devoting little to maintenance, development, and expansion. It was on this point that Vail—ruthless as he was in using Bell’s monopoly advantage—came into conflict with William H. Forbes and the other State Street capitalists that made up the company’s board of directors. In their view, the only justification for expansion was an immediate increase in income; they saw no point in setting up exchanges in areas that promised little in the way of returns. Vail—no doubt influenced, like Hubbard, by his long years with the Post Office—believed that the success and viability of the telephone depended on its ability to provide “universal service.” It is important to note that Vail’s concept of universality was far removed from the more radical conceptions of democratized communication being put forward by “working-class advocates” of social change. Vail believed that in the long term, it would be the telephone *system* rather than any of its components that would be the source of profits. Unable to reconcile himself to the board’s approach, Vail severed his association with American Bell in September 1887.

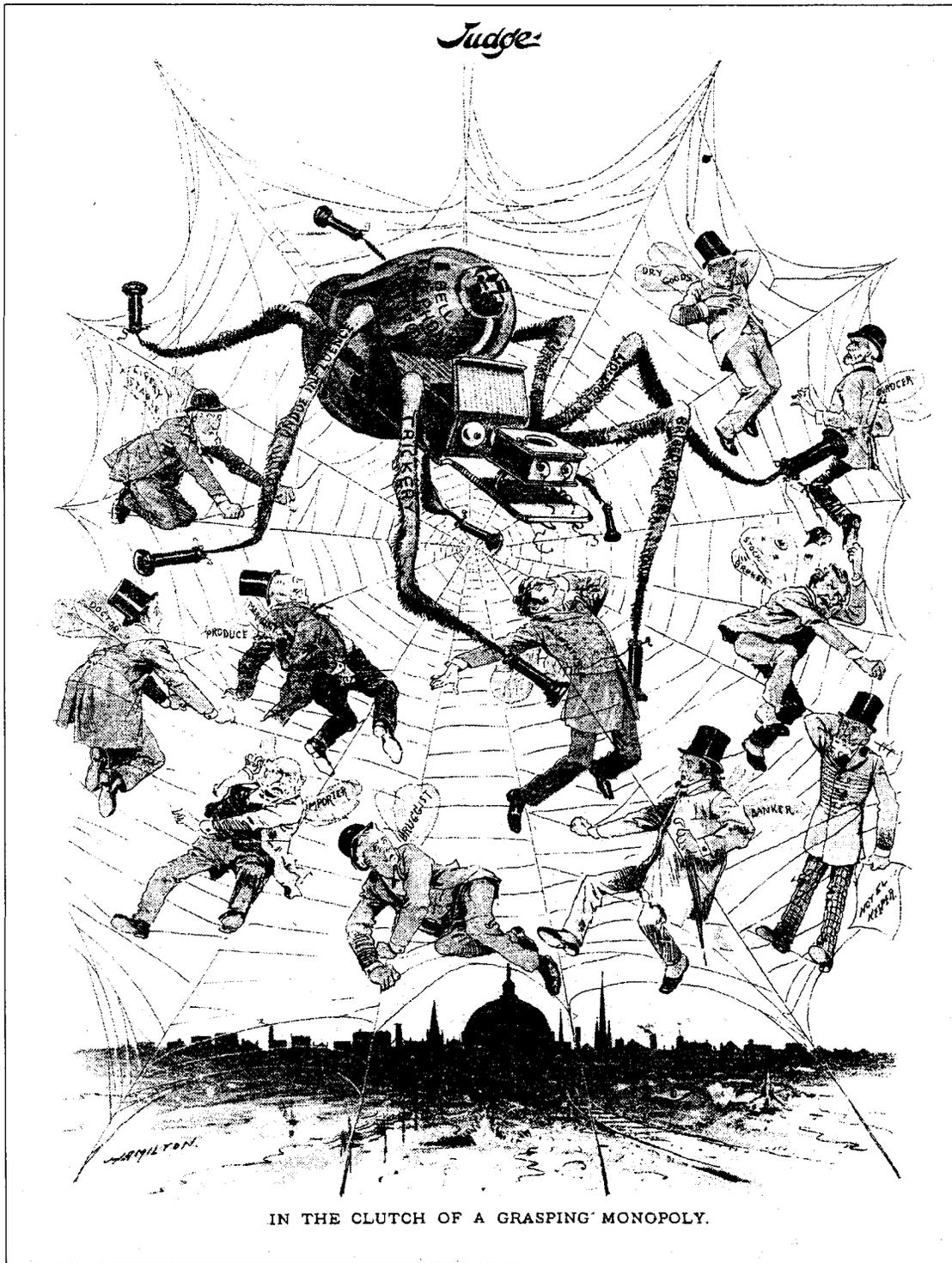
The philosophical differences between Vail and the board were lost on a public that was long distrustful of monopolies. Telephone rates were well above what most

³⁵ Ibid., 84.

people could afford. According to Schiller, in 1896 the cost of telephone service in New York was \$20 a month while a typical worker's monthly income was \$38.50. The public complained so bitterly about rates and service that some states attempted to pass legislation to limit the cost of telephone service. When Bell's patents expired after 1894, the growth of independent telephone companies exploded and by 1907 the telephone market was divided equally between Bell and the independents.

The animosity which had been reserved for the telegraph was increasingly directed at American Bell. A cartoon appearing in the periodical *Judge* in January 1888 captured the public's antipathy to the telephone monopoly. On a web above a desolate landscape lined with railway tracks and telephone poles, sits a fat spider. Its body is fashioned from a wooden wall phone protruding from a bell emblazoned with the words "Bell Telephone Monopoly", telephone receivers dangle at the ends of its eight legs which bear the words "undue influence," "trickery," "bribed officials," "extortion," and "bribery." Caught like flies in the web, an array of businessmen—a druggist, a banker, a doctor, a merchant, a grocer, a manufacturer, a hotel keeper and a stock broker among them—writhe and struggle to free themselves from the spider snare (Figure 3.1).

The optimism which the telephone had inspired in the wake of the public's disappointment with the telegraph was quickly dissipating. It should not pass unnoticed that the 'flies' trapped in the Bell Monopoly's web are precisely those middle class professionals whose ascendant social, political, and economic interests Hubbard had hoped the telephone would help promote and protect. Bell Hubbard and



3.1 "In the Clutch of a Grasping Monopoly," 1888. This cartoon conveyed public antipathy towards the Bell Telephone monopoly, *Judge* (14 January). (Warshaw Collection of Business Americana - Telephone, file 8, OS box 61. Reproduced with permission of the Smithsonian Institution, Behring Center, National Museum of American History, Archives Center.)

Vail's visions of the telephone system were all inherently wrapped up with their own personal histories but also influenced by broader trends emerging in America at the end of the 19th century. For all their differences, both of their views, were influenced by the rise of the middle class and they viewed technology as the definer of that class.

BUILDING THE TELEPHONE NETWORK AND ENGINEERING THE BELL SYSTEM

The actual telephone system that existed in 1877 did not approach the “grand system” of Bell’s representation. Most telephone links were simple point-to-point connections and “establishing direct communication between any two places in the city” often meant that there had to be a wire quite literally strung between them. Early telephone exchanges—the “central offices” that formed the nucleus of Bell’s system of interconnection—typically offered the telephone as a “second service” to customers who subscribed to messenger and alarm services.¹ The quality of sound transmission could range from unpredictable to abysmal.²

Yet despite the less than ideal state of telephony, increasing numbers of entrepreneurs were willing to wager on its future, and they heeded Gardiner Hubbard’s advice to set up local telephone exchanges to compete with the services offered by the district telegraph companies. Between July 1878 and December 1879, the number of Bell operating licensees in New England almost quadrupled—rising

¹ Carlson, “The Telephone as Political Instrument,” 42.

² Martin, “Hello Central?” 22.

from eleven to forty-three. During the same period, the number of licensees increased from three to thirty along the Atlantic Coast, and from two to sixty-one in the Midwest. In the South and in the West, where there were no Bell exchanges operating before March 1879, by December 1879 there were respectively forty-five and three affiliated companies in service. The number of Bell telephones in use rose from 234 in July 1877 to 5600 in July 1878, and then shot up to 249,711 by February 1883.³

Paradoxically, as the number of subscribers grew so did the problems with the telephone. Many of the problems could be traced to the telephone industry's appropriation of telegraph practices, and in some cases, telegraph apparatus. In order to manage the increased numbers of interconnections that resulted from the expansion of users, some licensees in New England borrowed the idea of circuit switching from the district telegraph system. Communications researcher Amy Friedlander observes that some of the entrepreneurs who established local exchanges in the wake of the Dowd decision "literally took over Western Union's equipment and wiring plant for use in telephone service."⁴ Technical incompatibilities, problems with transmission, and inefficiencies of interconnection soon emerged as serious impediments to the continued expansion of the telephone network. While this chapter is not intended to be an account of the technical development of the telephone, it is important to examine some of the problems and their solutions in detail because it was in the process of identifying problems and determining solutions that this technology was shaped.

³ Smith, *The Anatomy of a Business Strategy*, 161-162.

⁴ Friedlander, *Natural Monopoly and Universal Service*, 29.

TECHNICAL DIFFICULTIES AND MATERIAL RESISTANCE

In 1876, telephone lines followed the “ground return” pattern established for telegraphy, which employed a single “open” wire to link two locations; the wire was fixed to the ground, the earth providing the return path for the electrical current.⁵ While this system worked quite effectively in telegraphy, it caused two significant problems for telephone transmission: induction and attenuation. Induction refers to the adverse effects of atmospheric disturbances and high levels of electrical activity on the quality of sound transmission. “Open” lines—typically un-insulated iron wires strung from poles—were highly susceptible to atmospheric conditions and ambient electrical activity, with the result that transmission clarity was extremely variable and highly unpredictable. Subscribers were never sure of what they might hear when they picked up their receivers:

There was sputtering and bubbling, jerking and rasping, whistling and screaming. There was the rustling of leaves, the croaking of frogs, the hissing of steam, and the flapping of birds’ wings. There were clicks from telegraph wires, scraps of talk from other telephones, curious little squeals that were unlike any known sound. The lines running East and West were noisier than the lines running North and South. The night was noisier than the day, and at the ghostly hour of midnight, for what strange reasons no one knows, the babel was at its height.⁶

The problem of induction was vastly improved by the introduction of cables in the early 1880s. The lead-covered cables were composed of seven or more iron wires wrapped in two layers of cotton or jute (eventually, paper was used) and insulated with rubber or treated paraffin.⁷ The water-tight protection the cables

⁵ Fagen, ed., *A History of Engineering and Science in the Bell System: The Early Years (1875-1925)*, 201.

⁶ BCHC, File: Traffic Years 1901-1916, 88. Cited in Martin, “Hello Central?” 23.

⁷ Fagen, ed., *A History of Engineering and Science in the Bell System: The Early Years (1875-1925)*, 209-213.

afforded lessened the effects of the elements, improving transmission quality and protecting the wires from corrosion as well.

While cables reduced induction, they greatly exacerbated the problem of attenuation—the progressive weakening of the electrical signal that occurs as the length of the connection increases. Fagen noted that, with respect to attenuation, an “open wire line was in many ways not a bad medium for telephone transmission.”⁸ Cable lines were more problematic—the attenuation per mile was 10 to 25 times greater for cable than for open wire.⁹ The problem of attenuation did not begin with the introduction of cables though. In large part, it was due to the fact that the wires initially used by telephone companies—typically No. 12-gauge iron or No. 14-gauge steel but sometimes other sizes as well—were those that had been developed for use in telegraphy. While these wires had worked well enough for the transmission of relatively low frequency signals—such as telegraph messages—telephony required the transmission of frequencies that were between fifty and a hundred times higher than those in telegraphy, and the attenuation of the signal was therefore proportionally greater.¹⁰

The problem of attenuation was not to be quickly resolved for both technical and organizational reasons. Experimentation with copper wire had resulted in a vast improvement of transmission quality, but managers concerned over costs were reluctant to replace inexpensive iron wires, even though the copper wires proved to

⁸ *Ibid.*, 207.

⁹ *Ibid.*, 234.

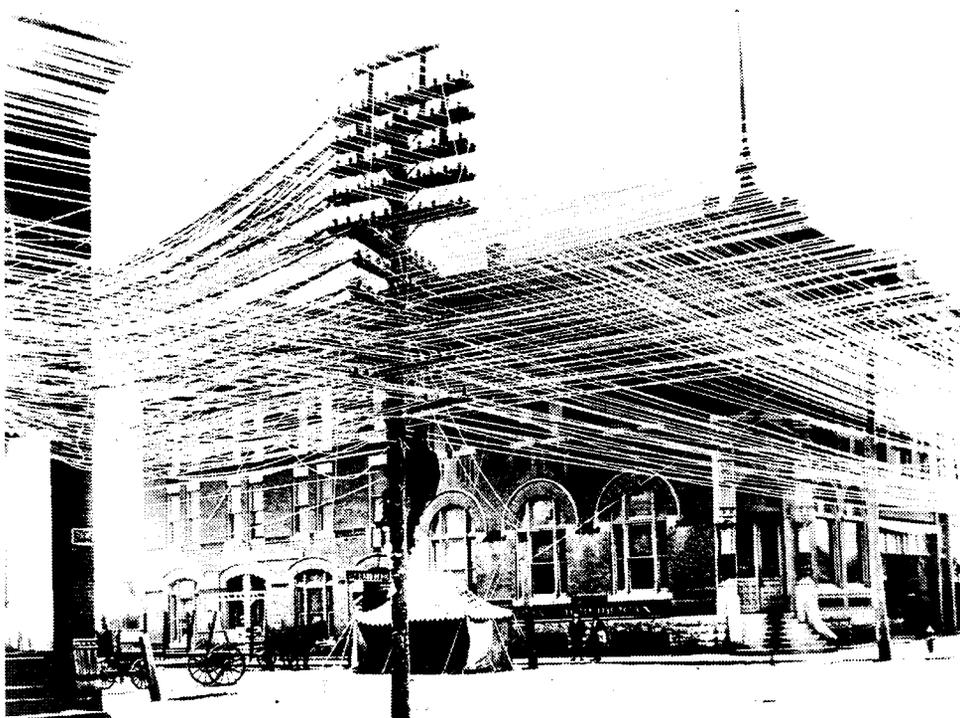
¹⁰ *Ibid.*, 198.

be cheaper in the long term.¹¹ Managers were also slow to recognize the advantages of the full wire (or metallic) circuit—that is, a two-wire circuit—over the single wire ground-return circuit in general use. Introduced in early 1881, the two-wire metallic telephone circuit effected significant reductions in transmission ‘crosstalk’ and interference, but the cost of the additional wire and the need for new switchboards deterred managers from changing over to metallic circuits and several years passed before full conversion.

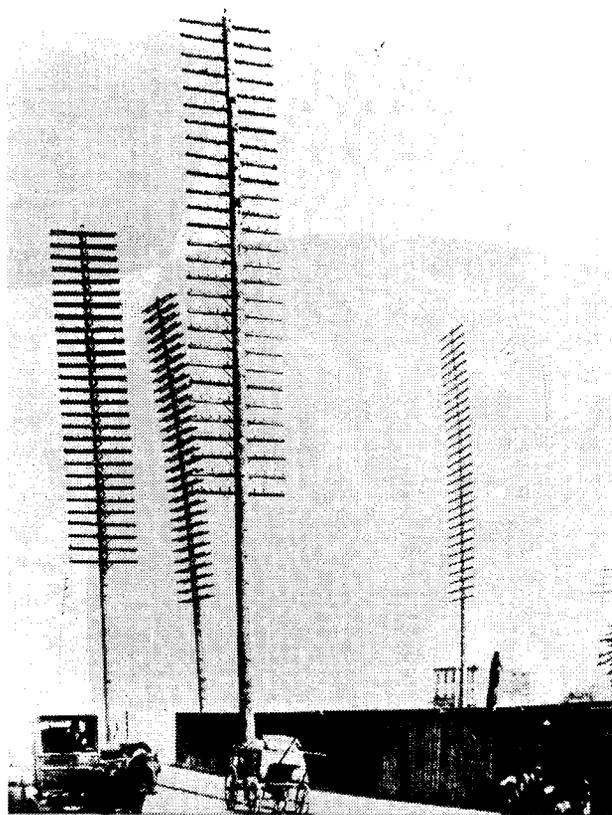
While cables aggravated attenuation, they provided the solution to another problem that emerged as the telephone gained in popularity: the increasingly dense canopy of overhead wires that was spreading over the streets of most cities. Given that each connection required a wire to link the subscriber to the central office, the number of wires required to insure “interconnection” soon became overwhelming. Historian Michèle Martin writes that in Montréal and Toronto telephone companies erected poles that were between forty to sixty feet tall with up to twelve crossarms in order to accommodate demand, which caused one observer to write that “by 1890, the wires on poles had increased until in the centre of the city they literally darkened the streets.”¹² On West Street in New York, ninety-foot poles each with twenty-five crossarms were erected in 1887 (Figure 4.1). Aside from the aesthetic and health concerns raised by pedestrians and commuters, the collapse of pole lines

¹¹ Fagen noted that Theodore Vail, at that time the general manager of the American Bell Telephone Company, was one of the only managers to express an interest in the new ‘hard-drawn’ copper wire. He authorized research on the new wire and when it proved encouraging, provided the wire to the Southern New England Bell Company so that an experimental line could be put in between New York and Boston. The first conversation transmitted on the line was in March 1884. See *Ibid.*, 203.

¹² Martin, *“Hello Central?”* 23.



4.1 (above) Maze of wires in Pratt, Kansas, 1900. Back of photo is stamped: Superior Fototech Inc. for re-orders AT&T Photo File No. Picture #S1030. Used by permission of David Massey, Bell System Memorial website.



4.2 Telephone poles with twenty-eight to thirty-two crossarms, (undated). Used by permission of David Massey, Bell System Memorial website.

during a sleetstorm in 1881 that draped the central exchange in Boston under a tangle of wires was dramatic testimony to the safety problems that the overhead wires posed. Cables of insulated wires drawn into metal pipes could be buried safely underground in conduits, solving the aesthetic dilemma as well as calming anxieties over health and safety concerns.¹³

It is worth briefly noting here, so as to consider in more depth later, the dramatic effect of replacing overhead wires with underground installations. Highly visible, unattractive, and potentially dangerous, telephone lines were evidence of the physical reality of the telephone network: they quite literally sketched out its shape and size for all to see. As overhead wires disappeared underground, the telephone network effectively vanished from both the visible landscape and soon afterwards from the public imagination.

Fagen points out that while “the main transmission objective was the conquest of distance, [even] the use of the best line materials available came far short of providing even tolerable conversation over United States continental distances.”¹⁴ Problems of relaying and amplifying voice transmission remained unresolved for almost forty years—despite some successful developments in research. It was only after improvements to loading coils in 1910 and the invention of the vacuum-tube repeater in 1914 made it possible for voice signals to be transmitted over long distances without degrading that the technology of wire transmission was up to the requirements of a national telephone system. It was for this reason, Fagen writes, that “for some 40 years there was great pressure put upon

¹³ The underground conduits were made first of wood and later vitrified clay. For a discussion of cable installation techniques, see Fagen, ed., *A History of Engineering and Science in the Bell System: The Early Years (1875-1925)*, 220-227.

¹⁴ *Ibid.*, 488.

the development of high-efficiency station equipment since gains in this area were the most effective means available for achieving increased distance."¹⁵

The key piece of station equipment was the switchboard. Switching—the process by which the links between incoming and outgoing lines were managed at a central office—was the basis of the telephone system-concept because it provided the means of interconnection between the exchange's subscribers. The earliest switchboards were relatively straightforward: about fifty subscribers' lines were connected into an upright board equipped with linking apparatus (most commonly the jack-and-cord that would become the standard) and signals—or 'annunciator shutters'—that indicated when a subscriber wished to place a call. A power source at the exchange office provided part of the power for the switchboard, with the other part provided by a battery located in the subscriber set.

The early 'Standard' boards had two significant shortcomings that quickly became apparent as more and more people began to sign on for telephone service. The first flaw was the absence of a mechanism by which the operator could be signaled that a call had been disconnected, so that it was not evident if a line was free unless the operator actually checked the connection. While this was a manageable solution when there were a relatively small number of lines to keep track of, it came to pose a significant limitation to the efficient operation of the switchboard as more and more callers were being connected through the exchange. The second problem had to do with the capacity of the switchboard and would prove to be far more challenging to resolve. By late 1878, each switchboard could handle about a hundred subscribers. Each time the number of subscribers at a central office exceeded a hundred mark, a new switchboard had to be added and calls between

¹⁵ Ibid.

boards required a "trunk" connection. A trunk connection drastically increased the time and effort needed to make one connection. The process required the operator know the board the desired connection was located on, to find an open trunk connection to that board, and signal that board's operator. Typically two or more operators had to work together to set up, take down, and monitor the call.

Switching began to pose significant problems during the period leading up to the 1879 Dowd decision, when the competition between Bell and Western Union resulted in many exchanges rapidly growing to require numerous switchboards. The switching process became increasingly complex not only because of the many operations required to make a trunk connection, but also because the number of possible connections increased exponentially to the number of subscribers. Exchanges in large cities such as New York and Chicago, with three times the number of subscribers as medium-sized exchanges in Albany and Buffalo, needed almost ten times as many trunks to provide interconnection for its subscribers and twice the number of operators to handle the same number of subscribers.

Communications historian Milton Mueller explains in his study of the problems associated with manual switching during this period that it was this "diseconomy of switching that was the most important 'reverse salient' encountered during the early years of telephone development. More than any other factor it constricted progress by linking system growth to slower service and higher costs."¹⁶ The costs of switching grew in inverse proportion to the expected economies of scale and, much to the dismay of Bell subscribers, many exchange managers chose to raise rates. In 1881, the manager of a newly established Milwaukee Bell exchange protested that "the general impression among subscribers is that if an exchange of 100 subscribers

¹⁶ Mueller, "The Switchboard Problem," 535.

can be run at [rates of] \$12 a month, then an exchange of 1,000 ought to be run for about 40 cents. You can't make them believe anything else."¹⁷ The problems of switching inefficiency and cost were serious enough that representatives of the affiliated Bell companies convened a national conference in September 1880 to discuss the issue. The group incorporated itself as the National Telephone Exchange Association (NTEA) and met once or twice yearly until 1890 but the economic and the technical solutions to the problems of switching would not be quickly solved.¹⁸ The pressure to find a solution was augmented by the fact that Bell's patents were soon to expire, leaving their 'patent monopoly' vulnerable during a period of intense competition. The situation was, to say the least, chaotic. Fagen writes that:

Naturally, such a situation attracted many technicians to the field. At the time, Bell interests were concerned with the many attempts being made to infringe the important basic patents on telephone instruments and their policy on switchboards was that, in the absence of a reliable central manufacturing company, the local company should adopt the best apparatus readily available to them and make improvements as they came along. As a consequence, every little shop with electrical experience entered the field and applied the inventive genius of their staff to switchboard development. In fact, inventions were made in so many places and came along so fast that it was practically impossible to produce a reliable chronological account of this period. Dozens of different types of boards were produced.¹⁹

It took almost twenty years and numerous attempts by various Bell System franchises until the switching problem was finally solved. Over the course of those years, several switchboard designs were tried and rejected. The first attempts limited

¹⁷ Ibid.: 534.

¹⁸ C.N. Kay, president and general manager of Bell's largest exchange in Chicago, warned that the costs were so substantial that it may become necessary to replace the Bell Company's mandated flat annual rate \$40 for business and \$20 for residences with a rate structure based on charging "by the switch" (or per call). See Ibid.: 540.

¹⁹ Fagen, ed., *A History of Engineering and Science in the Bell System: The Early Years (1875-1925)*, 482.

the number of boards—and consequently the number of wires—but the organizational complexity and the cost of managing connections remained. The next solution, the “multiple” switchboard, was tested in over a dozen cities in 1885. It put the connections for all subscribers in front of each operator who was limited to answering the calls of only 100 subscribers. This did away with the need for trunk connections, but the switchboards in large urban exchanges were so big that operators were unable to make the connections efficiently. When the multiple switchboard came into common use after 1887, it solved many of the technical problems of the Standard board. In addition, by centralizing the work process and limiting the number subscribers each operator was responsible for, it also made service more efficient, reliable and personal.²⁰ Unfortunately, the multiple did little to alter the cost ratios that plagued urban exchanges and as the number of subscribers (and conduits) continued to increase, so did the number of electrical complications that could cause connections to fail and lines to go out of service.²¹

At a three-day Telephone Switchboard Conference held in the offices of AT&T in December 1887, representatives of AT&T and Western Electric Company met with managers and electricians of the larger urban Bell affiliates that were most affected by the switching problem. The conference is significant because—in addition to revealing the growing differences between the technical requirements of the urban centers and those of the rest of the country—it resolved to retain the switching and signaling function of telephone service within the exchange, and that all operations associated with making a connection be handled by trained employees. Commenting on the motion at a later conference, AT&T vice president and general manager E.J.

²⁰ Green, *Race on the Line*, 29.

²¹ *Ibid.*, 31.

Hall expressed that the committee felt that “any attempt to take the user into our service and make him do a part of the work is a movement in the wrong direction.”²²

The introduction of this resolution was a reflection of the belief that the success of the telephone depended on a literal interpretation of Alexander Graham Bell’s assertion that using the telephone—unlike the telegraph—required no intermediaries and no skill or effort on the part the user. The Bell managers were very aware that the egalitarian character of the telephone was no small part of its appeal. It distinguished the telephone as more ‘modern’ and ‘democratic’ than the telegraph, making it “the bellweather of a new age” and “an indispensable utensil of modern life.”²³

The commitment to maintaining “user transparency” prevailed at Bell until 1919, long after Almon Strowager had introduced his “machine-switching telephones with ‘finger-wheels’” in 1896.²⁴ In pledging to promote user transparency, the switchboard committee had affirmed its commitment to maintaining control over the technology—and simultaneously the labor process—and redoubled its investment in improving switchboards and switching protocols. Two more proposals for switchboard designs—the horizontal switchboard and the combination switchboard—were introduced and evaluated at a subsequent conference, but neither board was adopted. Finally at the fourth meeting in 1892, a resolution was made to replace the multiple concept with a concept of “divided” exchanges. Divided exchanges

²² Mueller, “The Switchboard Problem,” 544.

²³ Marvin, *When the Old Technologies Were New*, 209. Mueller, “The Switchboard Problem,” 544.

²⁴ At the time that the switchboard committee made their commitment to ‘user transparency,’ independent manufacturers were working on developing an automatic switching system. “Thousands of patents” had been filed since the first patent for a rudimentary automatic system had been granted in December 1879. Most systems were less than satisfactory until Strowager’s dial system was introduced in 1896. It went on to become popular with the independent telephone companies. AT&T Archives, *Events in Telecommunications History*, 24.

completely reversed the multiple switchboard's principle of centralization: every call was handled like a trunk connection over two different kinds of switchboards—an A and a B board—and required two or more operators to complete each connection. Incoming call requests were answered at an A board and routed to the appropriate B board. Incoming call requests from up to 8000 subscribers were answered at A boards. B boards were equipped with the completing jacks for 100 subscribers. The trunk lines from several B boards were connected to an A board. The A operator responded to all call requests and using a call-circuit notified the appropriate B operator who in turn indicated the correct trunk number to the A operator.

The divided exchange solved the diseconomies of scale associated with switching for large exchanges, but it contributed little to building the system that Bell had envisioned. If anything the divided exchange exacerbated the technological differences between the big urban networks and those of smaller cities. While divided exchanges came into common use in larger cities like San Francisco, Chicago, and New York by the mid-1890s, smaller cities continued to use modified multiple boards.²⁵ As long as the telephone exchanges remained fundamentally local networks, the use of different switching technology did not have a huge impact, but technical incompatibility quickly emerged as a problem when the American Bell Telephone Company's experiments with long distance transmission began in earnest.

In practical terms, the problems with wire transmission and switching insured that the telephone 'system' remained functionally little more than a loosely affiliated

²⁵ There were a number of proposals for different types of divided exchanges. One of the ideas which was successfully adopted was the "Express System" developed by John Sabin, president of the Pacific Telephone Company. Mueller writes, "More than 10,000 subscribers on the Pacific Coast were served by Sabin's Express system in 1895. In 1894 the Chicago Telephone Co. implemented an express system designed by Hibbard and Sabin in two of its offices. By 1896, about 15 percent of Chicago subscribers were served by it." Mueller, "The Switchboard Problem," 552.

group of local telephone exchanges. The most significant advance towards what could be seen as approaching the "system of intercommunication" described by Bell was the introduction of common battery switchboards in the late 1890s. The concept for the common battery switchboard was introduced by Hammond V. Hayes, chief engineer of American Bell Telephone's Mechanical Department, at the fourth switchboard committee meeting in 1892 where it was met with extremely little enthusiasm and some opposition. It took over five years of persistence by Hayes before the first trials of common battery boards were initiated.²⁶ Unlike the earlier arrangement whereby each telephone instrument was equipped with its own battery and magneto calling-signal, common battery switchboards used a central power source located in the telephone exchange to supply the necessary electrical current to the subscriber's telephone and to operate the all telephone transmitters and signals. Mueller argues that more than any other technical advance, the common battery switchboard "wove the patchy Bell network into an integrated system, simultaneously absorbing and solving problems of signaling, transmission, maintenance, and local-long distance relations."²⁷

The shift to a centralized power supply effectively altered the economy of telephone manufacturing, rearranged the organization of the telephone industry, and transformed the experience and perception of telephony in everyday life. By doing away with the need for a separate power source for each telephone instrument the common battery switchboard dramatically lowered the cost of producing and

²⁶ The patent for the common battery switchboard was issued to Hammond V. Hayes on December 15, 1888. The first multiple board with a common battery was installed in Louisville Kentucky in 1897. New York City's first common battery switchboard was installed in November 1898. For a discussion of the history of the common battery switchboard, see AT&T Archives, *Events in Telecommunications History*, 24-25; Mueller, "The Switchboard Problem," 554-555.

²⁷ Mueller, "The Switchboard Problem," 554.

installing telephones. The battery and the magneto generator were the largest and most expensive parts of the station set to manufacture and the potential savings promised by their elimination were sizable. Subscriber sets could be made lighter, smaller, and easier to install. Eliminating these bulky components also removed a key obstacle to the design of a compact, more 'portable' desk set—something that would make the telephone more appealing to both business and residential customers.

Centralizing the power supply at the exchanges drastically reduced maintenance costs as well. Local batteries (at least until the 1890s) were wet cells which required regular inspection and recharging, and "telephone companies paid men in wagons to circulate through the city" to keep local batteries functioning and to replace those which had failed.²⁸ Even after the more convenient dry cells were introduced, their high rate of failure continued the need for ongoing attention by servicemen.²⁹

From a technical standpoint, the common battery switchboard was the first real step towards the realization of a national telephone system because it effectively did away with the disparities in power that could disrupt local connections and preclude long distance ones. The common battery switchboard, according to Mueller, "made it possible to equalize the electrical properties of two subscribers' lines when connected and ensured that a bad local circuit would not imbalance a long-lines circuit."³⁰ More importantly from the perspective of the burgeoning Bell System that was to become increasingly obsessed with the goal of standardization and

²⁸ Ibid.

²⁹ Fagen, ed., *A History of Engineering and Science in the Bell System: The Early Years (1875-1925)*, 497-498.

³⁰ Mueller, "The Switchboard Problem," 554.

surveillance, the common battery switchboard evened out and harmonized service because it “allowed for instant detection of a defective local circuit and made the quality of telephone service more uniform and less dependent on the distance to the exchange.”³¹ Using a central power supply forced a high degree of technical compatibility, obliging the notoriously independent Bell System affiliates to comply with increasingly standardized equipment and apparatus requirements more effectively than any dictate from head office could hope to realize. In 1897, Hayes was able to write in the Mechanical Department’s annual report that “all the equipments of telephone central offices ordered during the past year have been of the common battery type.”³² Even still, the changeover to common battery power took many years. As could be expected, large urban exchanges were the first to convert to the common battery divided switchboards as it solved what had come to be known as switching’s ‘big city’ problem. Smaller (typically rural) exchanges were slower to adopt centralized power, and many continued to use local battery multiple boards or purchased convertible switchboards that could be used with either local or common batteries. As late as 1911, the Western Electric Company Bulletin 1017 recommended the continued use of local battery boards in exchanges with 100 lines or less, while encouraging the use common battery boards in exchanges which had (or expected to have) 500 or more lines.³³

From the perspective of the subscriber, the change to common battery power made the telephone instrument less machine-like and more abstract and intangible in nature. The maintenance required by local batteries—the not infrequent battery

³¹ Ibid.

³² H.V. Hayes, “Engineering Department Annual Report,” American Bell Telephone Company, 1897. Box 2021, AT&T Archives.

³³ Fagen, ed., *A History of Engineering and Science in the Bell System: The Early Years (1875-1925)*, 498.

failures, the comings and goings of repairmen, the damage done to wallpaper and floors by corrosive battery fluids, the unpredictability of the service—acted as a constant reminder that the telephone was a man-made contraption. With the pragmatic and messy workings of telephony sequestered away at the central exchange, the subscriber's material experience of the telephone changed perceptibly. In this way, the transition to a centralized power supply was analogous to the change from overhead wires to underground cables. Both developments—in the experience of the user and the public-at-large—rendered the technological workings of the telephone network increasingly invisible.

SYSTEMS ENGINEERING

The growing complexity of the technical problems of transmission and switching that challenged Bell managers and engineers in the 1880s and 1890s seriously impeded the expansion of the telephone network. While creative experimentation had been sufficient to overcome problems of interconnection at a small scale, increasingly sophisticated and complex, large scale solutions were required as the number of subscribers and connections grew. The problems associated with the increasingly large and complex telephone network were becoming less and less responsive to what historian of science Lillian Hoddeson has referred to as the "cut-and-try methods" of the workshop floor.³⁴

Thomas Watson was the sole member of the company's technical staff until late 1878 when Emile Berliner was brought in to work on improving transmitter quality during Western Union's takeover bid. In 1879, George Lee Anders and Thomas Lockwood joined the company, Anders to work with Berliner on improving

³⁴ Hoddeson, "The Emergence of Basic Research in the Bell Telephone System, 1875-1915," 522.

transmitters and transmission, while Lockwood attended to matters related to the growing numbers of patents. Even though the newly formed Electrical and Patent Department was small, its organization was indicative of the research priorities of the company. The technical research effort was focused on making improvements to the quality of sound transmission and had two main goals: first, attracting new business and second, keeping potential competitors at bay. By the time that the Dowd settlement was signed, the use of patents in assisting with the latter had become an integral part of the research process.

Theodore Vail was responsible for establishing the strategies that effectively turned Bell's telephone network into the Bell System. Vail believed that if AT&T was to 'possess the field' in the telephone industry, it needed to accomplish four goals: first, improve the quality and reliability of telephone service; second, create a long distance telephone network on a national scale; third, legally enforce existing patents while generating new patents to be used to stave off the competition; and fourth, control traffic between local operating exchanges. Achieving these objectives necessitated that research and development were placed at the top of AT&T's corporate agenda.

Vail's conception of scientific research and its uses was qualitatively different than prevailing ideas. He set AT&T technicians to solving technological problems which arose not in the context of science investigation but rather from commercially defined objectives. His key objective was the creation of a universal telephone system which depended first on being able to build a transcontinental network and that required the development of a technological solution—a non-mechanical repeater—to the problems of long distance transmission. The first Experimental Shop was organized in 1883 to complement the work being done to solve the problems of attenuation, induction, cross-talk, and switching in the Electrical and Patent

Department with a more research-oriented agenda. By December 1885, the technical staff included two recently graduated PhDs trained in physics and engineering whose assignment was to continue work on the more complex problems of transmission and to begin development on the technology for long distance voice transmission.³⁵ Bell's in-house research division continued to grow, although its research was largely focused on the ongoing technical problems at the exchanges after Vail's departure in 1887. Between 1885 and 1895, Bell's technical staff increased from 29 to 81 employees. On January 1 1905, the re-organized Engineering Department had grown to 195 employees.

Once again at the helm in 1907, Vail resumed his plan where he had left off—working toward the construction of a national network. He restructured and consolidated AT&T's Engineering Department and Western Electric's research division, bringing research and development operations closer to manufacturing in preparation of standardizing and streamlining production and distribution.³⁶ He increased AT&T's stake in the operating companies and compelled them to reorganize along functional rather than regional lines so as to establish national standards of technology and service. Most significantly, he began to build an elite corps of managers—most drawn from AT&T's ranks of scientists and engineers—to oversee and direct key corporate divisions.

In the introduction to his book *America by Design*, David Noble writes that “the professional engineers who emerged during the second half of the [nineteenth]

³⁵ William Jacques, a graduate of John Hopkins University—hired in 1880—was the first Bell employee (and one of the first people in the United States) to hold a PhD in physics. Hammond V. Hayes, a graduate of Harvard and MIT, was hired in 1885. Reich, *The Making of American Industrial Research*, 143-144.

³⁶ The 1907 restructuring resulted in massive cutbacks to engineering staff. See *Ibid.*, 151. Also AT&T Archives, *Events in Telecommunications History*, 29-30; Fagen, ed., *A History of Engineering and Science in the Bell System: The Early Years (1875-1925)*, 37-58.

century as the foremost agents of modern technology became as well the agents of corporate capitalism."³⁷ In their capacity as those who conceived technological solutions, carried out programs of systemization and standardization, and made 'corrections' to improve system efficiency, they not only played key roles in the creating the modern telephone industry, they were deeply implicated in the process by which the modern economy formed and reproduced.

The modern engineer was a new phenomenon and how they saw their role in industry was colored by their rather ambiguous place in society. The American Institute for Electrical Engineers (AIEE) was just instituted in 1884. Carolyn Marvin points out that unlike most of the professional societies organized by other groups in the engineering fraternity, electrical engineering did not have a coherent set of qualifications by which it defined itself.³⁸ Marvin suggests that ambiguities about their social and professional status made engineers eager to achieve social recognition and legitimation for their work. In the 1880s most research departments were comprised of electricians and mechanics who had developed their expertise in machine shops and AT&T was no different. But as AT&T began to conduct research into long distance telephony and hiring more university educated engineers with physics background, the sensibility and direction of the labs began to shift. Ezra T. Gilliland "a mechanic, electrician, and engineer" who was appointed head of the Mechanical Department in 1884 "on the basis of his earlier work on the construction of telephones and switchboards" was replaced by the following year by Hammond V. Hayes—a graduate of Harvard and MIT trained in physics and engineering.³⁹ The

³⁷ David F. Noble, *America by Design: Science, Technology, and the Rise of Corporate Capitalism* (New York: Alfred A. Knopf, 1977), xxiii.

³⁸ Marvin, *When the Old Technologies Were New*, 10.

³⁹ Hoddeson, "The Emergence of Basic Research in the Bell Telephone System, 1875-1915," 521.

confrontation of old-world and modern approaches created its own form of class distinction and as research and development continued to rise in prominence in the telephone industry, science-based methods and commercially defined objectives began to infiltrate both the research agenda and the corporate culture of AT&T.⁴⁰

The beginnings of true scientific research at AT&T dates to 1907, when J.J. Carty was appointed chief engineer by Vail. The company's commitment to research was evidence by growth of research staff and budgets through years of economic downturn. David Noble writes that in 1910 "there were 192 engineers doing development work under Carty, with annual expenditures of half a million dollars. By 1916 this number had increased to 959, with expenditures of \$1.5 million, and by 1930 AT&T was spending \$25 million for research."⁴¹

As professional scientifically-trained engineers rose in the corporate (and social) hierarchy to become modern managers, they "naturally sought, in their technical work, to resolve the tension between the dictates of the capitalist system and the social potentials implicit in technological development."⁴² The objective at the heart of their work and at the core of the corporate ethos was the notion of control—and the ultimate goal of corporate engineering was to control the negative consequences of capitalist competition. At AT&T, science and technology were deployed to exercise control over competition in five areas: 1) through the production of technology in the form of solutions to technical problems and

⁴⁰ Mueller notes that in spite of his degrees and his virtual transformation of the telephone system with the design of the common battery switchboard, Hayes was "[s]tygmatised because of the practical, non-theoretical focus of his work." Hayes believed that AT&T's Engineering Department should focus on solving the pragmatic problems related to transmission, cables, and switching, and that the 'pure' scientific research required by Bell should be done by graduate students at MIT and Harvard. Mueller, "The Switchboard Problem," 554-555. Noble, *America by Design: Science, Technology, and the Rise of Corporate Capitalism*, 96.

⁴¹ Noble, *America by Design: Science, Technology, and the Rise of Corporate Capitalism*, 96.

⁴² *Ibid.*, xxiii, n.

improvements to the system; 2) through the generation of new patents on technological advances; 3) through the control of labor costs (hence the costs of production) by means of both labor-saving technologies and labor reorganization; 4) through the control and transformation of human labor; and 5) through “human factors” research on how consumers use the telephone.

The production of new technology as a means of gaining control of the market covered a wide range of activities and strategies at AT&T that fell into two broad key categories of research. ‘Adaptive’ research was geared to the production of technological advances that improved service, enhanced efficiency, or increased profits. It also provided AT&T the means to manipulate technology so as to prevent competitors from taking profitable advantage of the Bell network. For example, between 1902 and 1907 when independent telephone companies had a 50 percent share of the market, Bell used technology to prevent them from connecting to Bell long distance lines.⁴³

Adaptive research included both the development of apparatus as well as the development of the *criteria* for the type of apparatus to be developed, such as establishing the norms to be used in the implementation of standardization or planning for the most economical use of toll lines. The implementation of technical standardization was an essential aspect of this research for the reason that standardization is a prerequisite for the existence of systems. Vail’s ambitions for a transcontinental Bell System led ultimately to the establishment of a stream of ‘formative’ research which focused on general theoretical principles or pursued larger projects of long-term strategic value to the development of the Bell System, such as “the development of new means of improving long-distance transmission and

⁴³ Green, *Race on the Line*, 14.

exploration into wireless telephony."⁴⁴ These two streams of research work acted to control competition in different ways. Adaptive research—such as the development of the electromagnetic transmitter in 1930—usually resulted in immediate improvements to service, allowing AT&T to establish and maintain or expand its position in the market. In contrast, formative research typically involved extensive financial investment and carried significant risk but also led to system-wide advances that gave AT&T a formidable advantage over the field and discouraged incursions by competing companies. AT&T's domination of telephony with the creation of the Bell System was a direct outcome of its coordination of adaptive research with the goals of formative research.

The strategy of developing new technologies and technological protocols as a means of controlling competition was directly related to the Bell System's use of patents to the same end. Alfred Chandler and David Noble, among many others, have shown that patent control was a fundamental element in the emergence of the modern scientific corporation. While the use of patents originated as a defensive strategy, AT&T's formative research initiative allowed it to use patents as an offensive strategy as well. By identifying potentially valuable areas of research early—a key responsibility of its professional managers—AT&T was able to use the formidable research and capital resources of the Engineering Department (which became Bell Labs in 1925) to virtually insure AT&T's dominance through the development or acquisition of key patents. J.E. Otterson, general commercial manager of Western Electric, elaborated on this strategy in his memorandum of 1927:

⁴⁴ Galambos, "Theodore N. Vail and the Role of Innovation in the Modern Bell System," 112.

A primary purpose of the AT&T Company is the defense and maintenance of its position in the telephone field [...] It seems obvious that the best defense is [...] to maintain such a strong engineering, patent, and commercial situation in connection with these competitive activities as to always have something to trade against the accomplishment of other parties [...] It seems essential to [...] maintain an active offensive in the 'no man's land' lying between [AT&T] and potentially competitive interests.⁴⁵

The predatory nature of such "patent warfare" is obvious and, as Noble points out, confounded the independent inventor whom the patent system was created to protect. Corporate patent control, fortified during the war and substantially expanded again by a series of patent reforms in the 1920s, led sociologist Robert Lynd to write, "The problem we face today is that, in an era that increasingly lives by science and technology, business control over science and its application to human needs, gives to private business effective control over all the institutions of democracy, including the state itself."⁴⁶

While the use of technology to control labor cost was not a new concept, it was the application of engineering and the scientific method to the 'problem' of labor that caused it to be conceived as simply another element in the system to be optimized. In her study of the interaction between telephone technology and the racial and sexual division of labor, Venus Green notes that in the early years of telephony "[t]he drive to capture the market had led the Bell companies to adopt

⁴⁵ Otterson memorandum, quoted in N. R. Danielian, *A.T.&T.: The Story of Industrial Conquest* (New York: Vanguard, 1939), 114-115; Noble, *America by Design: Science, Technology, and the Rise of Corporate Capitalism*, 97.

⁴⁶ *Economic Power and Political Pressure*, Temporary National Economic Committee Monograph No. 26, 22-23, quoted by Robert S. Lynd, "You Can't Skin a Live Tiger," *American Scholar* XVII (1949): 109-110; Noble, *America by Design: Science, Technology, and the Rise of Corporate Capitalism*, 109.

new equipment with little emphasis on work organization."⁴⁷ The invention and improvement of telephone instruments and equipment were seen as the way to effect network efficiency. The problems with switching that emerged as the numbers of telephone subscribers increased and the network grew, led managers to an understanding of how technology could be used to reorganize the work process.

Mueller suggests that the third meeting of the Switchboard Committee in March 1892 marked one of the earliest examples of the search for a solution to the switching problem in the reorganization of human labor. For the first time, the committee based its deliberations on data drawn from four detailed "traffic studies" in which operators performed a "peg count"—that is they counted and recorded every call that was handled on a given day—in order to compile traffic statistics. Subsequent studies employing a standard method for data collection followed and established the norms for traffic studies for all Bell companies and became the basis for "traffic engineering"—the use of scientifically-gathered data to optimize the efficiency of an exchange.⁴⁸

Green writes that while managers claimed that traffic engineering was an accurate means to measure equipment performance and predict future needs, "[f]or the operators," the 'peg' count was a "harbinger of technological speedups, increased monitoring, and the opportunity to otherwise degrade operators' work."⁴⁹ The initiation peg counts and similar techniques of monitoring the activities of employees marked a deeper incursion of engineering's managerial control over the workplace,

⁴⁷ Green, *Race on the Line*, 26. Noble contends that the application of engineering to the labor process was quick to develop. A number of prominent engineers had utilized a scientific approach in order to find a solution to the "technical problem of wage incentive" in the late 1880s. Noble, *America by Design: Science, Technology, and the Rise of Corporate Capitalism*, 266.

⁴⁸ Mueller, "The Switchboard Problem," 549-550.

⁴⁹ Green, *Race on the Line*, 46.

extending the influence they already commanded through the design of equipment.

Noble describes this shift as occurring in two related and corresponding stages.

The first, social engineering was conscious attempt to exercise management prerogative through the medium of the workplace, through the organization of the work activity of labor. The second, human engineering was the movement to control the human element of production at the individual and group level through the study and manipulation of human behavior. These two phases were but different approaches to the same end and were inextricably linked; advances in one required advances in the other.⁵⁰

Noble points out that social engineering had its roots in nineteenth century machine shops with the implementation of "scientific management" techniques developed from Fredrick Taylor's early experiments with rationalizing the work process. According to Noble, engineers began to factor the human element—discipline and optimal output—into the scientific management approach as a logical extension of their professional concerns about project costs and outcomes. Ultimately, engineers came to see controlling the 'man problem' as a central aspect of their work.

At AT&T, the project of human engineering encompassed a wide range of programs geared to bring the employees in line with the concept of the Bell System. Venus Green writes extensively about how Bell management used self-improvement programs, employee training, a wide array of 'benefits' such as lunch rooms, beauty workshops, and rest homes for convalescing employees to secure worker loyalty, in particular the loyalty of the telephone operators who were on the telephone's system's 'front line' with respect to technological change.⁵¹

⁵⁰ Noble, *America by Design: Science, Technology, and the Rise of Corporate Capitalism*, 264.

⁵¹ Green, *Race on the Line*, 150-151.

Another important aspect of Bell's formative research that linked it to 'human factors' research were the rigorous trials which preceded the release of any Bell equipment, beginning with the extensive testing prior to the marketing of the French phone. Human factors research became a way in which scientific management was extended into the arena of promotion and marketing. In bringing together scientific engineering and 'human factors' research, Bell found a way to influence and control consumption (in addition to the usual means of advertising and marketing) via the application of stringently functional criteria to the design of telephone. As we saw in Bell Labs' apparatus development engineer D.H. King's assessment of the design competition prototypes, controlling the look of the telephone was another aspect of controlling the image of the Bell System itself.⁵²

It is worth noting that Vail coined his slogan "One Policy, One System, Universal Service" in 1907 and the expression "the Bell System" was used for the first time in AT&T's 1908 national advertising campaign. Both of these references to the System occurred well in advance of the completion of a transcontinental telephone network. This suggests that AT&T's fragmented telephone networks became a telephone *system* once they were fully embedded in a complex of legal (patent), strategic, and representational practices and relations through which the concept of the Bell System could be to be defined. As an advertisement that appeared in the 1960s so eloquently noted: "*The Bell System is an idea*" [emphasis in original] (Figure 4.2).

⁵² While there were technical reasons to constrain some subscriber behavior—for example, wet umbrellas leaning against telephones was an inexplicably common cause of electrical shorts—the Bell System seemed to be equally concerned with those activities that could be described as personalizing the telephone. The harm of attachments such as shoulder cups or clip-on telephone directories seemed to offend only the telephone company's aesthetic sensibility.



What is the Bell System?

THE Bell System is cables and radio relay and laboratories and manufacturing plants and local operating companies and millions of telephones in every part of the country.

The Bell System is people... hundreds of thousands of employees and more than two million men and women who have invested their savings in the business.

It is more than that.

The Bell System is an idea.

It is an idea that starts with the policy of providing you with the best possible communications services at the lowest possible price. But desire is not enough. Bright dreams and high hopes need to be brought to earth and made to work.

You could have all the equipment and still not have the service you know today.

You could have all the separate parts of the Bell System and not have the benefits of all those parts fitted together in a nationwide whole.

It's the time-proved combination of research, manufacturing and operations in one organization—with close teamwork between all three—that results in good service, low cost, and constant improvements in the scope and usefulness of your telephone.

No matter whether it is one of the many tasks of everyday operation—or the special skills needed to invent the transistor, the solar battery, or, with Telstar, to pioneer space communication—the Bell System has the will and the way to get it done.

And a spirit of courtesy and service which has come to be a most important part of the Bell System idea.

BELL TELEPHONE SYSTEM



American Telephone & Telegraph Company • Bell Telephone Laboratories • Western Electric Company • New England Telephone & Telegraph Company • The Southern New England Telephone Company • New York Telephone Company • New Jersey Bell Telephone Company • The Bell Telephone Company of Pennsylvania • The Diamond State Telephone Company • The Chesapeake & Potomac Telephone Companies • Southern Bell Telephone & Telegraph Company • The Ohio Bell Telephone Company • The Cincinnati & Suburban Bell Telephone Company • Michigan Bell Telephone Company • Indiana Bell Telephone Company • Wisconsin Telephone Company • Illinois Bell Telephone Company • Northwestern Bell Telephone Company • Southwestern Bell Telephone Company • The Mountain States Telephone & Telegraph Company • The Pacific Telephone & Telegraph Company • Bell Telephone Company of Nevada • Pacific Northwest Bell Telephone Company

4.3 Bell System advertisement, c.1961-1964. (Reproduced with permission of AT&T Archives and David Massey, Bell System Memorial website.)

As more and more exchanges converted to the use of common batteries and underground cables, as the telephone system became increasingly hidden and more complex, it became increasingly possible—or perhaps more accurately, necessary—to represent the telephone system through images and metaphors. One could argue that as it became increasingly difficult to see the telephone *network*, the *idea* of the telephone *system* could operate more freely in the social imaginary. The substitution of an image for the real is a hallmark of modernity, according to French critical theorist Henri Lefebvre.⁵³ The image of the telephone system—most insistently the one that was created and circulated by the Bell System itself—stands in for our knowledge of the reality of telephone communications and masks the limitations of networks, the conditions of labor for workers, as well as broader social relations of power that underwrite it. As the material trappings of telephone communication became obscured, Bell’s advertisements became free to employ notions of time, space, and the self in ways that aligned these concepts more closely with, not only the telephone system, but also the needs of monopoly capitalism itself.

⁵³ Lefebvre, *Everyday Life in the Modern World*; Lefebvre, *The Production of Space*.

III



IMAGE



ADVERTISING THE TELEPHONE:
IMAGES OF MODERN TIME, SPACE, AND SELF

At the end of the nineteenth century, advertising began to emerge as something more than just a means to promote goods for sale and services for hire. The developments in the spheres of production, transportation, and communication were matched by changes in business practices, methods of distribution. Advertising—which up until this time had typically been used to encourage the sale of traditional goods made plentiful by mass-production—changed as well. By the mid-nineteenth century, advertising was being used to promote new goods—such as threshers, reapers, bicycles, and sewing machines—for which no demand as yet existed. By the end of the century, advertising became the means by which the public came to learn about the far-reaching possibilities of modern technologies such as electricity and the telephone. Advertising was no longer just a way to promote the attributes of one commodity over another; it became nothing less than a narrative on the new disposition of modern life. It acted to explain and promote modern values and

became a means of transforming a society founded on “producer republicanism” into a culture of consumption.¹

THE RISE OF MODERN ADVERTISING

As industrialization changed the processes of production, changes also took place to the practice of advertising. The “space brokers” who bought advertising space from publishers and sold it to manufacturers wishing to advertise their goods were quickly being replaced by advertising agencies that offered their clients creative services such as illustration and copywriting. Increasingly, “ad men” were required to be well-educated and cosmopolitan. The illustrators and copywriters being hired by the new agencies were educated and middle-class, and the ads that they produced reflected both their social position and their aspirations. Like engineers and designers, the new advertising specialists were keen to legitimate their new profession. They presided over a concerted effort to change not only the public’s view of advertisements as “puffery,” but also its view of the advertising profession as well.² They sought to represent advertising in terms that would invoke ‘respectability and authority,’ and through professional associations they worked to standardize advertising, to

¹ Producer republicanism is based on the belief that political power should be vested in those individuals in a society who are involved in productive activity. Schiller writes that in the 1820s and 1830s, the group most associated with producer republicanism were urban artisans—“producers of everything from carriages to shoes to printed business forms”—and it was this group that was most antagonistic to the “accelerating integration of major media—both the press and the wireline systems of telegraphy and telephony—into the expanding circuits of corporate capital.” See Schiller, *Theorizing Communication*, citations 4, 3. For a discussion of relationship between producer republicanism and communication in late nineteenth century, see 3-38. For discussion of role played by advertising in the emergence of consumer culture in the early twentieth century, see Laird, *Advertising Progress*; Lears, *Fables of Abundance: A Cultural History of Advertising in America*; Lears, “From Salvation to Self-Realization: Advertising and the Therapeutic Roots of the Consumer Culture, 1880-1930.”; Marchand, *Advertising the American Dream: Making Way for Modernity*; Richard Ohmann, *Selling Culture: Magazines, Markets, and Class at the Turn of the Century* (London: Verso, 1996).

² See Marchand, *Advertising the American Dream: Making Way for Modernity*, 1-2, 7-9.

regularize its practices, and to make its costs and outcomes predictable for its clients. It is notable that one of the major proponents of this kind of 'scientific advertising' was A.W. Ayer.³ His firm, the N.W. Ayer and Son Agency (named in honor of his father), would become the agency of record for AT&T in 1908.⁴

Modern advertising began to come into its own during the depression of the 1890s. Industrial overexpansion in the decades prior to the crash of 1893 had created intensely competitive conditions for producers and manufacturers. As both sales and prices fell dramatically in 1893, many industrialists looked to make up their losses by creating national markets for their products. A frenzy of mergers and takeovers resulted in fewer, increasingly larger companies with considerable capital reserves and expanded production and distribution capabilities. Advertising emerged as the method of choice for achieving national exposure and gaining control in a volatile marketplace. Advertising historian Pamela Laird remarks that out of the misery of the depression of the 1890s, advertising acquired new status and influence as marketers and manufacturers observed that nationally advertised trademarked goods escaped the price declines that plagued most industries—even those that had established price-setting agreements.⁵

With these lessons in hand, the advertising profession began to change. While prior to 1900 ad men found legitimation through insuring the financial success of their clients, after 1900 "advertising professionals [saw themselves] as purposeful innovators and agents of modernity."⁶ More and more, they came to characterize their profession as 'civilizing' and 'uplifting,' and to see themselves as "apostles of

³ Laird, *Advertising Progress*, 316-317.

⁴ AT&T remained a client of the Ayer Agency until its court-ordered divestiture in 1984.

⁵ Laird, *Advertising Progress*, 203.

⁶ *Ibid.*, 6.

modernity," "modernity's 'town criers' [bringing] good news about progress" and educating the public to the new expectations of modern life.⁷ By the beginning of the twentieth century, advertising professionals had come to see advertising's role as crucial in promoting and insuring the nation's economic and social progress and prosperity. With this, the scope and focus of advertising's message changed. Whereas earlier advertisements had paid tribute to the forces of production and depicted manufacturers as "heroes of progress," increasingly they addressed the public directly and "portrayed individual, cultural, and national progress as the end results of consumers' decisions."⁸

ADVERTISING THE BELL SYSTEM

For AT&T, 1894 marked the date that Bell's original telephone patents expired and in the years that followed independent telephone companies made huge inroads into AT&T's territory. With the independents driving down prices, AT&T scrambled to compete but managed only to fuel subscriber discontent as efforts to reduce costs led to a deterioration in the quality of service. In 1903, then president of AT&T Frederick P. Fish retained the services of a public relations firm, the Publicity Bureau of Boston (probably America's first public relations firm) to woo the public and dispel the widespread animosity which had arisen towards AT&T during the 1890s. Claude Fischer writes that over the course of the next few years, the Bureau managed to circulate numerous unaccredited newspaper stories that portrayed the AT&T in a positive light.⁹

⁷ Marchand, *Advertising the American Dream: Making Way for Modernity*, 1.

⁸ Laird, *Advertising Progress*, 6-7.

⁹ Fischer, *America Calling: A Social History of the Telephone to 1940*, 63.

As the groundswell of support for government ownership of communications technologies grew between 1905 and 1915, selling the public on the benefits of monopoly became the central objective of AT&T's advertising. When Vail returned to AT&T in 1907, he initiated an effort to "recast the corporation's public image" and to offset "the dangerous example set for American reformers" by the nationalization of European telecommunications and by the growing support for public ownership by Canadian provincial governments.¹⁰ In 1908, Vail hired N.W. Ayer & Son, the nation's largest and most established agency, to change public attitudes and to promote his policy of "One Policy, One System, Universal Service." In 1905, the Ayer Company had produced what is widely held to have been the first institutional advertising campaign for New York Mutual Life Insurance Company in order to restore public confidence in the company following a crisis in its public reputation.¹¹ The goals and means of this kind of 'image advertising' were well suited to Vail's dual objectives of changing the public opinion about AT&T and building a national telephone system. N.W. Ayer & Son defined its goal as creating for AT&T a "series of advertisements which will sink deep into the hearts of all the classes of people who use the telephone."¹² They proposed that AT&T direct their messages to a national market and that mass circulation magazines were the best medium to reach that market. "Our idea," stated one of Ayer's executives, "is to make the AT&T advertising an

¹⁰ Roland Marchand, "AT&T: The Vision of a Loved Monopoly," in *Creating the Corporate Soul: The Rise of Public Relations and Corporate Imagery in American Big Business* (Berkeley: University of California Press, 1998), 50, 51.

¹¹ Laird, *Advertising Progress*, 238.

¹² Excerpt from a report by N.W. Ayer and Son account executive S.A. Conover following a meeting with Vail in the spring of 1908. Cited in Noel L. Giese, "AT&T: Nation's Oldest Continuous Institutional Advertising Campaign," *Journal of Advertising* 6, no. 3 (1977): 20.

institution and have the advertisements so attractive that the people will begin to look for the monthly story about the telephone."¹³

The first series of five advertisements ran in 1908. They were purely institutional in nature—that is to say that they did not sell telephone service but rather focused on “explaining all the problems that are experienced in running a big telephone company” and persuading the public to buy the idea of one system and the telephone system as a “natural monopoly.”¹⁴ Nevertheless, the ads proved popular and did result in an increase in new business. More importantly, as far as Vail was concerned, the national institutional campaign effectively communicated his vision of a ‘universal’ system.

Vail’s push for systemization, standardization, and innovation in the engineering department extended to the area of publicity. Marchand writes that “as early as 1909, AT&T executives badgered the associated Bell companies to adapt their advertising to the style of the national campaign in order to create an ‘appearance of uniformity’”—understanding that the campaign could be as much a vehicle for promoting corporate cohesion as it was for creating an image for the public.¹⁵ Before long AT&T had developed and deployed a comprehensive, all-encompassing advertising strategy in which advertising was seen as “not merely

¹³ S.A. Conover to AT&T, dated 19 February 1909. Box 1317, AT&T Archives. Cited in Marchand, “AT&T: The Vision of a Loved Monopoly,” 55.

¹⁴ Griese, “AT&T: Nation’s Oldest Continuous Institutional Advertising Campaign,” 20.

¹⁵ To this end, AT&T initiated a number of practices that would become fundamental protocols for national companies. N.W. Ayer and Son advertisements were provided to the operating companies with copies of the advertisements to adapt and run in local newspapers. AT&T also began to sponsor regular advertising conferences for regional and national managers. See Marchand, “AT&T: The Vision of a Loved Monopoly,” 56. Also M. McCulloh, “Opportunities for Publicity,” memorandum dated 1909. Box 1317, AT&T Archives. According to Galambos, Vail’s use of advertising as a way for communicating his message of “One Policy, One System, Universal Service” to the managers of the operating companies “helped transform his ideology into a lasting corporate culture.” Galambos, “Theodore N. Vail and the Role of Innovation in the Modern Bell System,” 119.

spending money for magazine and newspaper space” but rather as the process for “influencing of human minds and human actions.”¹⁶

Although it may be true that the rationale behind AT&T’s early national campaigns was essentially political—fending off the threat of government intervention and the “civic populism” of a mistrustful public—they ultimately accomplished much more.¹⁷ The advertisements were narratives that overwhelmingly employed metaphors of speed—instantaneousness, simultaneity, multiplicity—to create modern notions of time, space, and the self that were in keeping with capitalism’s ‘great acceleration.’ The following section looks at telephone advertising and considers how it shaped modern notions of speed and ultimately gave figural form to the novel experiences, interpretations, and impressions of modern monopoly capitalism and the aspirations of America’s emerging middle class.

IMAGES OF SPEED

The tropes of speed employed in advertisements appearing at the beginning of the twentieth century articulated the rhetoric of progress and efficiency that pervaded modern society at large. Along with interpretations put forward by politicians, engineers, economists, philosophers and novelists, advertisements influenced how ideas about progress and efficiency came to be defined. Speed expressed the modern sensibility. It appeared to ‘modernize’ every action, to enhance every transaction. In an era which social critics and commentators christened “the age of

¹⁶ M. McCulloh, “Opportunities for Publicity,” New York Telephone Company, 1909. Box 1317, AT&T Archives.

¹⁷ “[C]ivic populism was a protest against inadequate service by arbitrary, self-serving monopolies from which a small elite grew conspicuously rich.” See Christopher Armstrong and H.V. Nelles, *Monopoly’s Moment: The Organization and Regulation of Canadian Utilities, 1830-1930* (Philadelphia: Temple University Press, 1986), 141-162.

hurry" and the "most rapid age in history," speed came to be regarded as an indispensable, or at the very least unavoidable element of modern life.¹⁸

It would be an error to think of speed as an arbitrary value. Speed's attraction was neither aesthetic nor abstract, although it certainly took on aesthetic and abstract qualities as it captivated the popular imagination. The relationship between modernity's fascination with speed and capitalism's valorization of speed's effect on the circulation of capital was not lost on advocates of industry or advertising. To the businessman of the late 1800s, this correlation was plainly obvious. Andrew Carnegie wrote in 1886 that the speed of capital expansion "was an attestation of [America's] triumphant democracy." "The old nations of the earth creep at a snail's pace," he wrote, "the Republic thunders past with the rush of the express."¹⁹ In a speech to the New York Electric Club in 1889, Erastus Wiman, president of the Canadian telegraph system remarked: "if to accomplish things quickly, close transactions promptly, and generally to get through with things is a step toward a business man's millennium, then we must be nearing that heavenly expectation."²⁰

Following World War I, the tempo of capitalism and everyday life accelerated exponentially. No one understood the significance of speed in the modern economy more clearly than advertisers. The author of an article appearing in *Advertising & Selling* in 1928, commented that it is perhaps not coincidental "that a large number of the fastest moving securities have been those of companies which provided us

¹⁸ Willam Osler (1907) and Stuart Chase (1931) cited in Cecilia Tichi, *Shifting Gears: Technology, Literature, Culture in Modernist America* (Chapel Hill: University of North Carolina Press, 1987), 231.

¹⁹ Andrew Carnegie, *Triumphant Democracy* (New York, 1886), 1. Cited in Tarbell, *The Nationalizing of Business 1878-1898*, 8.

²⁰ Erastus Wiman, "Speech to the New York Electric Club," *Electrical Review*, no. June 15 (1889): 3.

with speedier processes, transportation or conveniences"—among his examples —"Dupont with quick drying Duco paint, the airplane manufacturers, the motors, the telephone and radio stocks."²¹ Advertisers of the era recognized the allure of speed and its association with modernity, progress, and optimism about the future, and they used it as a selling point for a disparate array of goods.²² Eastman Kodak announced the new No. 1A Speed Kodak camera by proclaiming its ability to take "Speed Pictures" of "[t]he mile-a-minute automobile, express trains at full speed, race horses, [and] athletes at their highest strain."²³ The Warner-Patterson-Perry Company advertised their shaving brush with the declaration "tis the speedy brush" noting that "you wouldn't travel by ox-cart when an express train was available." The Hawaiian Pineapple Company promoted the superiority of their product by boasting

²¹ Ray Giles, "Buying for a Rise in Tomorrow's Product Trends," *Advertising and Selling* (1928): 23.

²² Advertisers were also aware of the problems associated with the increasingly frenzied pace of the economy. In 1927, a self-promotional advertisement for the Calkins and Holden Agency alerted potential clients to the perils of the quickening economic pace: "Your world is being recreated by three important influences; first, the closeness of science and discovery to commercial manufacturing; second, the shortness of the link between the manufacturer and the consumer; and third, the amazing speed with which the American public makes up its mind to change its mind." Writing that same year, adman Robert Updegraff observed that as "life has become swifter," people became "less patient, more restless." The public was "quicker to take up new ideas, to sample new products, to test new services – but quicker also to toss them aside." Business failures were common as new social practices and habits replaced traditional ways, and competition between businesses for new products and for new markets increased. Updegraff noted that "if the American public has grown so busy, and so accustomed to telephones for communication that it is losing the art of social correspondence and consequently the demand for fine social stationary is falling off somewhat disconcertingly, no mere matter of advertising ingenuity is going to make people return to old habits of correspondence." Updegraff counseled businessmen and promoters that success depended on their ability to keep pace with the market, urging them to develop "a new sales or distribution policy or method more in line with the new American tempo and temper" – in other words to fight speed with speed. Caulkins and Holden Inc., "Your World Has Changed," *Advertising and Selling*, June 29 1927, 15. Robert R. Updegraff, "Tomorrow's Business and the Stream of Life," *Advertising and Selling*, April 20 1927, 44,49.

²³ Eastman Kodak, "Speed Pictures—Kodak Convenience." In *Country Life in America*, 1910. http://scriptorium.lib.duke.edu:80/dynaweb/aaa/databases/kodak/@Generic_BookTextView/12943;nh=1?DwebQuery=speed#1

that the canning of their pineapples proceeded with "Speed...speed...split-second speed..."²⁴

The representations of speed that informed telephone advertisements during this era were doubly potent because they were not just linking speed with any arbitrary product. Unlike Warner-Patterson-Perry's "speedy brush," the telephone really *did* offer its users appreciable advantages of speed and efficiency in both business and domestic transactions. The telephone's ability to 'annihilate distance' "was not a science-fiction fantasy or some theoretical leap of physicists" writes Stephen Kern, "it was the actual experience of the masses who quickly became accustomed to an instrument that enabled them to raise money, sell wheat, make speeches, signal storms, prevent log jams, report fires, buy groceries, or just communicate across ever increasing distances."²⁵ Telephone advertisements gave form to the benefits and uses of speed, and offered a way of imagining speed in the context of daily life. They presented an image of modern life which mimicked the ideals of capitalist circulation: a life where people, goods, and ideas were in constant motion. In doing so, they also implicitly warned businesses and businessmen against trying to resist the velocity and momentum of change for fear of being left behind—or worse, of slowing down the nation's financial growth. Telephone ads circulated these meanings and came to reify them, so that even those who had no vested interest in supporting these concepts were made familiar with them and came to associate them with ideas of progress, modernity, and democracy.

²⁴ Warner-Patterson-Perry Company, "—tis the speedy brush." In *Collier's*, 1919. Hawaiian Pineapple Company, "Speed...speed...split-second speed..." In *Good Housekeeping*, 1927. Both reproduced in Tichi, *Shifting Gears*, 237-238.

²⁵ Kern, *The Culture of Time and Space, 1880-1918*, 214. Also consider Casson's characterization: ...the telephone is above all else a *speed* instrument... Casson, *The History of the Telephone*, 271.

If we look back to the telephone ads that appeared in the late 1870s, they conveyed what was basically factual information in a more-or-less forthright manner. They were largely concerned with explaining the workings of the telephone and accentuating its clarity of transmission (a claim which, as we saw, was not always warranted). In the 1880 and 1890s, telephone advertisements became somewhat more businesslike. Appearing in newspapers or in telephone almanacs and directories, they offered information on the cost of services, announced new exchanges or long distance connections, and continued to promote of the quality of the patented Bell telephone (Figure 5.1).²⁶

Speed emerged as a trope in telephone advertisements only around the beginning of the twentieth century. Telephone ads started to become more evocative of specific relationships of time, space, speed, and profit. We can observe an early example of this shift in the conception and articulation of time and space in the advertisement titled "All Business Depends Upon Communication" which appeared in 1903 (Figure 5.2). While lacking the modern layout and images that would soon come to characterize telephone advertising, it engaged the metaphors of speed that would come to characterize representations of the telephone both in advertising and in the social imagination.

Rather than focusing on the tangible attributes of the telephone, it made references to the telephone's ability to alter traditional relations of time and space. No longer describing the telephone as a commodity—"a neat and portable [instrument], and an ornament to any room or office," "superior in design and workmanship"—instead it engaged two concepts that are key in tracking the changes

²⁶ Before telephone companies began to print directories, new subscribers' names and telephone numbers would appear in advertisements in local newspapers. See Figure 5.1.

THE
BELL TELEPHONE CO'Y
 OF CANADA.

— HEAD OFFICE —

30 St. John St., = MONTREAL.

This Company will sell its instruments at prices ranging from \$7 to \$25 per set. Its "**STANDARD BELL TELEPHONE SET**" (protected by registered Trade Mark), designed especially for MAINTAINING a perfect service and used by the Company in connection with its Exchanges, is superior in design and workmanship to any telephone set yet offered for sale.

Subscribers to this Company's Montreal Exchange and the public may now obtain telephonic communication over its

Long Distance Metallic Circuit Lines to Quebec,
 Ottawa or Sherbrooke,

and intermediate points, the rates for the present being as follows:—

	SUBSCRIBERS.	PUBLIC.
TO QUEBEC - - - -	60c.	\$1.00
TO OTTAWA - - - -	50c.	75
TO SHERBROOKE - - -	50c.	75

Silent Cabinets for conversations are provided at the Company's Montreal Agency Office, 1730 NOTRE DAME STREET, where full information regarding rates and places connected may be obtained.

5.1 Bell Telephone Company of Canada advertisement, 1893.
The Star Almanac, Montreal (November). (BCHC File: Advertising.
 Reproduced with permission of the Bell Canada Historical Collection.)

The Bell Telephone Company of Canada

**ALL BUSINESS
DEPENDS UPON
COMMUNICATION**

The more rapid and certain the communication the better, and the more profitable the business.

*The Telephone
—Service*

Affords the most rapid and certain communication possible to imagine. Nothing moves so swiftly as the Telephone; and the Extension Telephone is THE SWIFTEST of all Telephones.

**With An
Extension
Station**

On your desk you have half the country at your elbow.

Telephone service adds to the comfort of the household, lessens the laborious details of housekeeping by bringing the tradesmen within immediate and constant reach of the orders.

The Quickest Way

Of getting over the ground is to sit still and use THE TELEPHONE.

**A Journey
By Telephone**

Will give you a taste of ideal rapid transit.

Travel Is Expensive. Low Rates.
Talk Is Cheap. Perfect Service.

For particulars Call the Contract Department No. 430.
Hamilton, Dec. 19, 1903

5.2 Bell Telephone Company of Canada advertisement, 1903. (BCHC File: Bell Ads 1900-1919. Reproduced with permission of the Bell Canada Historical Collection.)

in representation which were absent in earlier ads paralleled the shift from market to modern capitalism. The first was its articulation of the speed of communication and profit: "The more rapid and certain the communication the better, and the more profitable the business. The telephone [...] affords the most rapid and certain communication possible to imagine."²⁷ By the end of the decade, telephone advertising would come to provide the public with ways of quantifying this relationship, and perhaps more critically, replaced traditional conceptions about time with new modern values.

The second conceptual shift can be seen in the advertisement's representation of the telephone as mediating a particular relationship between the user and (geographic) space, more specifically between the user and the nation: "With an extension station on your desk you have half the country at your elbow." This metaphor echoed the reduction of the geographic space of the nation to a human scale, placing it under human control, that was effectively accomplished in real terms with the emergence of national markets. The advertisement's allusions to the telephone as transportation are also noteworthy in this respect. "Nothing," claimed the ad, "moves so swiftly as the telephone. [...] The quickest way of getting over the ground is to sit still and use the telephone. A journey by telephone will give you a taste of ideal rapid transit." The depiction of the telephone as a mode of transportation both linked and distinguished it from the railways. It gave the impression that the telephone system, like the railway, was national in its scope despite the fact that this would not be the case for over a decade. Conversely, it also acted as a reminder that the separation of transportation and communication was a

²⁷ First reference from Bell Telephone Company of Canada, "The Telephone. Time and Distance Overcome!," (Bell Canada Historical Collection, 1877). Second from "The Bell Telephone Co'y of Canada" (Figure 5.1). Third from "'All Business Depends Upon Communication" (Figure 5.2).

relatively recent phenomenon, and that unlike railway travel, telephone communication transcended material limitations and truly 'annihilated' space.²⁸

The discourses of speed manifested in this representation of the telephone were not simply creative devices, but must be recognized as having a certain resonance, a particular significance during a period of rapid and unpredictable capital expansion. This is underlined by the fact that in 1903, advertisements (like the telephones themselves) were not yet 'standardized.' Individual licensees or telephone companies typically produced their own advertising—or rather purchased space in publications and arranged to have their advertisements produced by the printers.²⁹ The earliest examples of references to speed in advertising were not the result of a coordinated marketing plan but rather appeared because they 'made sense' in the context of the era's sensibility and logic. But I argue that these advertisements also 'made sense' another way: they created ways of knowing and imaging the world in which people lived.

TIME AND MONEY

AT&T's first five institutional advertisements made no references to speed—they focused completely on explaining the merits of monopoly and justifying the higher cost of Bell service. Just one year later in 1909 however, speed emerged as an underlying theme in AT&T's advertising. The advertisement titled "The Implement of

²⁸ James Carey points out that until the invention of the telegraph in 1837, the term "'communication' was used to describe transportation as well as message transmittal for the simple reason that the movement of messages was dependant on their being carried on foot or horseback or by rail." Carey, *Communication as Culture*, 203-204.

²⁹ Interestingly though, AT&T had established what amounted to a nationwide clipping service by the end of the 1900s. AT&T licensees clipped any stories about the telephone industry which appeared in newspapers published in their territory and sent them to company headquarters. This archive proved to be very useful once AT&T began advertising systematically as it allowed them to track and compare public response to each ad campaign. See Marchand, "AT&T: The Vision of a Loved Monopoly."

the Nation" is a good example of the complex articulations of speed used in telephone advertising to describe the telephone's impact on the new relations of time and space, and on the emergence of 'modern man' (Figure 5.3).

The *increased efficiency* of the individual, [...] the increased efficiency *of the nation as a whole*, because of the development of the Bell system, can hardly be estimated. [...] The modern corporation *itself* could not exist without telephone service of national scope. [...] The wheels of commerce have been kept at the necessary speed to provide this swift development by the universal telephone [emphasis in original].

Here speed manifested in the concept of efficiency and the Bell System was represented as the medium through which efficiency at the level of the individual and the corporation is translated into national efficiency and success. Although the telephone network was largely regional at this time, the advertisement relied on the allusion to the railway's "wheels of commerce" to provide images of speed, time, and space that compensated for the telephone's limitations of scale.

One of the most intriguing elements of this advertisement is the temporal accounting that it performed. By allowing the businessman to address urgent business matters without resorting to the expense of "either a messenger or a personal visit," the ad argued that the telephone not only saved time, it created wealth.

The mere item of *time actually saved* by those who use the telephone means an *immense increase* in the production of the nation's wealth every working day in the year. Without counting the convenience, without counting the wonderful increased efficiency, but just counting *the time alone*, over \$3,000,000 a day is saved by the users of the telephone! Which means *adding \$3,000,000 a day to the nation's wealth!* [emphasis in original].



SECRETARY of War Stanton sat in his office in Washington.

"If I ring that bell," he said, "any man, in the most distant State, is a prisoner of war!"

The telephone bell has succeeded the messenger bell.

Business has succeeded war.

If any man in the Union rings the bell of his Bell Telephone at his desk, any other man at the most distant point is at his instant command.

That is the Bell Companies' ideal—that you may take the receiver off the hook and get into communication with any man, even in the most distant State.

That is the really universal telephone that the Bell Companies set as their goal at the beginning. It is so far realized that already 20,000,000 voices are at the other end of the line, all reached by the one Bell system.

The increased efficiency of the individual, of the lawyer or bank president or corporation official; the increased efficiency of the nation as a whole, because of the development of the Bell system, can hardly be estimated.

It certainly cannot be overestimated.

The president of a corporation to-day could not be the president of such a corporation without it.

The modern corporation itself could not exist without telephone service of national scope.

Corporation officials could not have transacted business quickly enough by old methods to reach the totals which alone are accountable for our remarkable commercial development as a nation.

The wheels of commerce have been kept at the necessary speed to provide this swift development by the universal telephone.

The mere item of time actually saved by those who use the telephone means an immense increase in the production of the nation's wealth every working day in the year.

Without counting the convenience, without counting this wonderful increased efficiency, but just counting the time alone, over \$3,000,000 a day is saved by the users of the telephone!

Which means adding \$3,000,000 a day to the nation's wealth!

The exchange connections of the associated Bell Companies are about 18,000,000 a day—the toll connections half a million more. Half of the connections are on business matters that must have prompt action—either a messenger or a personal visit.

Figured on the most conservative basis, the money value of the time saved is not less than ten cents on every exchange connection and three dollars on every toll, or long distance connection—figures that experience has shown to be extremely low.

The saving in time only is thus \$1,800,000 daily on exchange messages and \$1,500,000 on long distance messages—this much added to the nation's productiveness by the Implement of the Nation, the Bell Telephone.

American Telephone & Telegraph Company

5.3 AT&T advertising proof, 1909. (File 1, box 1, series 1, N.W. Ayer Advertising Agency Record. Reproduced with permission of the Archives Center, National Museum of American History, Behring Center, Smithsonian Institution.)

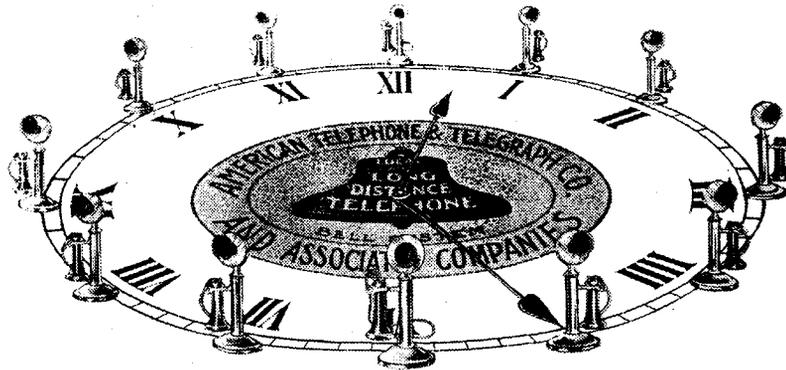
While the equation of time and money was not a new idea—this concept was operative during the era of market capitalism when Benjamin Franklin declared that “time is money” in the mid-eighteenth century—here the telephone was being shown as mediating an even more abstract comparison.³⁰ Rather than labor time being seen as money (and time not spent working perceived as a loss), the advertisement represented the telephone as transforming time spent *not* working into a source of value. The calculation of a \$3,000,000 profit on the basis of labor *not performed* is perplexing until one considers this new speculative value of time in relation to the growth of fictitious capital that accompanied the emergence of national markets, the expansion of trade, and the birth of the modern corporation.

Such a representation of time can only be deployed if time (and space) is ‘emptied’ of its social value or meaning—that is to say, its perceived value is independent of its use—leaving it available to take on a new and purely economic significance.³¹ This requires that time and space be conceived in abstract terms, the value of each minute and every mile standardized and also conceived as a unit of measurement of that value. This was accomplished admirably by AT&T and the operating companies—the Bell System—in the process of setting telephone rates, especially long distance rates. This new form of temporal and spatial logic had two consequences which had a profound impact on how modern time and space were conceived (and ultimately lived.)

³⁰ Benjamin Franklin not only equated time spent working with money, but also proposed a conception of unproductive time as a negative cost, a tangible loss against potential profit. “He that can earn ten shillings in a day by his labor, and goes abroad, or sits idle, one half of that day, though he spends but sixpence during his diversions or idleness, ought not to reckon that the only expense; he has really spent, or rather thrown away, five shillings besides.” From Benjamin Franklin, *Advice to a Young Tradesman* (1748) cited in Barbara Adam, *Timewatch: The Social Analysis of Time* (Cambridge: Polity Press, 1995), 87.

³¹ On the qualities of modern time, see Lefebvre, *The Production of Space*, 95-99.

The first consequence of the abstraction and standardization of time's value can be likened to the effect of the division of labor as a means of generating absolute surplus value. With each minute having the same relative monetary value as the next, minutes became interchangeable and the entire twenty-four hour day—not just the traditional workday—could be imagined as a zone for commercial activity. While electricity, especially electric lighting, had already extended the workday into the night, its diffusion had not imposed an absolute value on increments of time in the way that the commercialization of telephone service—and especially long distance service—would. Prior to the coming of the telephone, the partition of the day into work and family time was somewhat safeguarded by the physical separation of the business and the domestic spheres. Even the telegraph, because its use in the United States was largely restricted to the workplace, did little to challenge the partition between public and private domains. The telephone, as it became increasingly common in both offices and homes, disturbed these boundaries, so that time previously reserved for rest, relaxation, and social activities came to be opened up for all manner of commercial uses. Hence the 1910 advertisement, aptly titled "The Always-on-Duty Telephone," declares that the "Bell System is on duty 1440 minutes a day," noting perhaps ominously that "if any of these minutes are not used, their earning power is irrevocably lost" (Figure 5.4). As the 1440-minute-day expanded the potential for profit, it also increased competition and established new expectations. An advertisement with the headline "Telephoning Against Time"



The Always-on-Duty Telephone

Your Bell Telephone is on duty 1440 minutes every day. So is the telephone exchange; so are the toll lines which radiate through the neighboring communities; so are the long distance lines which connect you with far-away cities and other radiating systems.

The whole Bell System is on duty 1440 minutes a day—and if any of these minutes are not used, their earning power is irrevocably lost.

Like the Police Force or the Fire Department, the telephone is not always working—but it is always on duty and always costing money. But you would not be satisfied with the fire department if your burning house had to take its turn; nor with the police force if you had to wait in line to receive protection.

You want service at once. That is exactly what the Bell System endeavors to give you—immediate attention, instantaneous service. It strives to be always ready to receive your call at any point, and connect you with any other point—without postponement or delay.

It would be much cheaper if telephone customers would be content to stand in line, or if their communications could be piled up to be sent during slack hours; or if the demand was so distributed as to keep the whole system comfortably busy for 1440 consecutive minutes a day.

But the public needs immediate and universal service and the Bell System meets the public's requirements.

**AMERICAN TELEPHONE AND TELEGRAPH COMPANY
AND ASSOCIATED COMPANIES**

5.4 AT&T advertisement, 1910. *Town and Country* (14 May). (Box 1, Warsaw Collection of Business Americana - Telephone. Reproduced with permission of Archives Center, National Museum of American History, Behring Center, Smithsonian Institution.)

describes the modern American as active, forceful, and demanding: "When seconds count, Americans look to the telephone for *immediate* service. [...] They have no time to think of the *tremendous load* that is put upon the telephone system. They are not interested in the *means*. They demand *results*" [emphasis in original] (Figure 5.5).

In an attempt to justify the expense of an "always on duty" telephone system, the advertisement explained that the Bell System Companies would realize immense savings if calls placed during the busiest calling times could be delayed and placed during periods of lower demand. But, the copy continues, "the nation's talk would *lose in its race against time*, and the whole telephone service of the country would be demoralized" [emphasis in original].

The conflation of the political and economic well-being of the nation found in both "The Implement of the Nation" and "Telephoning Against Time" has the effect of making nation and market synonymous and is the second consequence of the telephone's abstraction of time and space. National space is represented as an undifferentiated space through which 'talk', goods, and capital circulate. The first advertisement's estimation that time saved by using the telephone adds \$3,000,000 a day to the *nation's* wealth obscured the fact that just as America's transportation and communications systems were privately owned, so too was the wealth that they generated. In this same vein is the second advertisement's association of accelerated flows of information with national progress. In this case, the advertisement does not identify profit as the reason for racing against time but there is little doubt that this

TELEPHONING AGAINST TIME



The American Demand for Prompt Service During the Busy Hour

WHEN seconds count Americans look to the telephone for *immediate* service.

At certain hours during the day everybody wants to talk at the same time and telephone calls come thick and fast. People become impatient of the slightest delay.

They have no time to think of the *tremendous load* that is put upon the telephone system. They are not interested in the *means*. They demand *results*.

The way that the Bell Companies have met this demand has made Bell Service the standard of excellence the world over.

To meet the requirements for the *busy hour* the entire system must be in perfect condition. Every operator must be on duty and keyed up to concert pitch. Every emergency must have been foreseen and provided for.

The promptness of American telephone service inspires the wonder of European visitors. They see an American call up a correspondent in a distant city with as much confidence as he calls his next door neighbor.

When the New Yorker says "Wait a minute until I telephone to Washington," his guest, judging by his own transatlantic experiences, *is prepared to wait an hour.*

Even the American does not appreciate what instantaneous service has cost. He does not realize that it means that the company must

have at instant command a separate line for each customer everywhere, at the rush hour.

Frequently one man talking over a long distance Bell line has the exclusive use of \$300,000 worth of equipment.

No one else can use it while he is using it. Talking from New York to St. Louis his voice travels over one million pounds of copper wire.

This is his own private, one-passenger, talk road while he is using it.

Each *additional circuit* demanded by the extra business means *an additional investment* in copper wire—a large expense for surplus plant, which is only used for a short period each day.

If during the busy hour the Associated Bell Companies could postpone each successive call for half an hour—string them out through the day—an enormous saving of expense could be made.

But the nation's talk would *lose in its race against time*, and the whole telephone service of the country would be demoralized.

This investment in extra facilities means that American out-of-town service is a matter of seconds, where minutes and hours are required in any other country.

As much as any other feature of American life this long distance service of the Associated Bell Companies is the measure of the unique progress of the country.

American Telephone & Telegraph Company

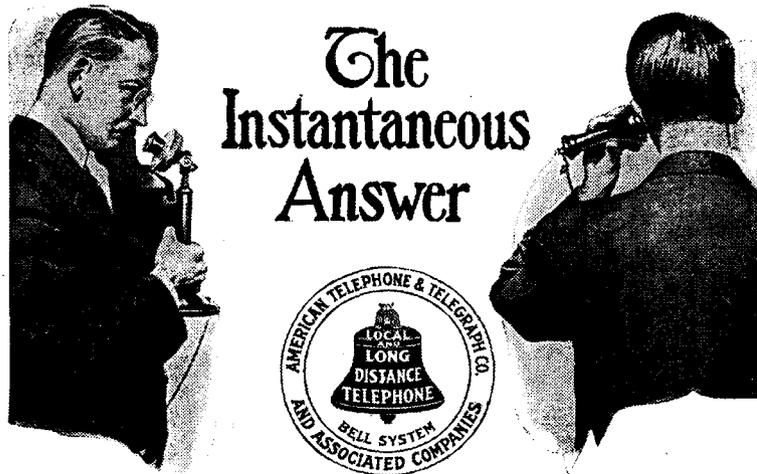
5.5 AT&T advertising proof, 1910. (File 1, box 1, series 1, N.W. Ayer Advertising Agency Record. Reproduced with permission of the Archives Center, National Museum of American History, Behring Center, Smithsonian Institution.)

is what it means. The race against time is a race against loss because, as Marx explained, the acceleration of capital circulation is a form of its expansion.³²

For business, speed's ultimate ideal is the 'annihilation of space by time' or instantaneousness because—as Erastus Wiman commented in 1889—"[t]here is no competition against instantaneousness."³³ Telephone companies—both AT&T and the independent manufacturers—were acutely aware of the telephone's competitive advantage and they used the idea of speed to promote the telephone at every opportunity. AT&T's advertisements advised the public on the telephone's ability to provide "The Instantaneousness Answer," and described how it "Saves Time and Steps" and "vitalizes affairs by instilling into them the spirit of NOW" [emphasis in original] (Figures 5.6 and 5.7). Stromberg-Carlson publicized the benefits of its switchboard with the headline "Service in the Modern Tempo" and Strowager Automatic's advertisement titled simply "Speed" cautioned readers that business proceeded "at a pace undreamed of by the business man of thirty or forty years ago, seconds or minutes lost in the transmission of intelligence now often mark the difference between success or failure" (Figures 5.8 and 5.9). In an AT&T advertisement titled "The Efficient Minute" an oversized telephone desk set stands paramount over a lineup of modern means of transportation—a steamship, a train, a tramcar, and an automobile, with an airplane circling above, while the copy affirms that "the Bell Telephone is quickest of all. It is *instantaneous*. [...] [It] has placed a new and higher value upon the minute" [emphasis in original] (Figure 5.10).

³² Marx writes that the "velocity of turnover [...] substitutes for the volume of capital." See Karl Marx, *Grundrisse*, trans. Martin Nicolaus (New York: Vintage Press, 1973), 519.

³³ Wiman, "Speech to the New York Electric Club," 2.



Sending a message is only half of the transaction. The other, and equally important, half consists in *getting back the answer.*

Sometimes this is a reply to a question, or the acceptance or rejection of a proposal. Sometimes it is simply an acknowledgment that the message has been received.

The value of the message depends upon getting an answer.

When a general manager sends word to a representative in a distant city, he wants to know that his

man is *there*, that he *receives the message*, and that he will act.

If the answer is not final, but raises another question, there is no delay. The other question can be settled at once. It is possible, in one telephone interview, to come to a decision which could not have been reached without the instantaneous answer.

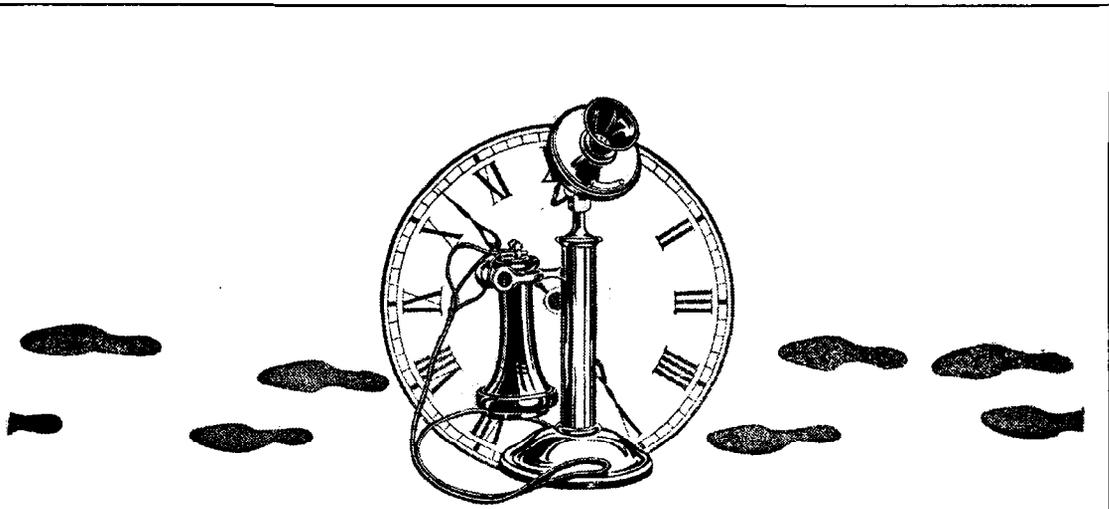
Each answer is made *instantaneous* by the Bell telephone service.

The Bell system, with its ten million miles of wire, provides the instantaneous answer for anybody, anywhere, at any time.

Increased use of the Long Distance Telephone means greater results in every line of human endeavor. Telephone efficiency means One Policy, One System, Universal Service. Every Bell Telephone is the Center of the System.

**AMERICAN TELEPHONE AND TELEGRAPH COMPANY
AND ASSOCIATED COMPANIES**

5.6 AT&T advertising proof, 1910. (File 1, box 1, series 1, N.W. Ayer Advertising Agency Record. Reproduced with permission of the Archives Center, National Museum of American History, Behring Center, Smithsonian Institution.)



Saves Time and Steps

Last year the Bell Telephone System handled Six Billion calls—or one hundred and ninety *for every second*.

If each message meant a **saving of only ten minutes** time—a most conservative estimate—it means that in 1909 the Bell System saved to the American people, *time equivalent* to 114,155 years.

In other words the Bell System rendered a service which would take an individual messenger 114,155 years to accomplish.

A saving of ten minutes per call does not begin to represent the saving of time and steps even in the message



across the street—much less the saving in the long distance message across the country.

Nor does the mere saving in time begin to represent the comfort, the convenience, the *dispatch* afforded by these six billion messages sent from

the five million Bell stations all over the country.

The Bell System *gets things done*. It vitalizes affairs by instilling into them the spirit of **NOW**. Makes the business of tomorrow the transaction of the minute. Makes thoughts *facts*. Economizes a Nation's time. Conserves a Nation's energy.

The Bell Long Distance Service has broadened the scope of a Nation's interests. Has given the minute a value of many. Has given the people a hold on time. Has brought Opportunity within grasping distance. Has accelerated the growth of the NATION.

American Telephone and Telegraph Company and Associated Companies

For Rates and Other Information Regarding Service, Call the District Manager

The Central District and Printing Telegraph Company

BELL SYSTEM



5.7 AT&T advertising proof, 1910. (File 1, box 1, series 1, N.W. Ayer Advertising Agency Record. Reproduced with permission of the Archives Center, National Museum of American History, Behring Center, Smithsonian Institution.)



Speed

EVEN before the days of Caesar and Hannibal, speed was an all important factor in the transmission of messages. Decisive victories in battle were won by commanders whose runners were swifter than those of the opposing forces, and who thus had knowledge of important events hours and sometimes days before their enemies.

In modern business, the time element in the transmission of messages is even more important than it was in former days. With projects undertaken and transactions completed at a pace undreamed of by the business man of thirty or forty years ago, seconds or minutes lost in the transmission of intelligence now often mark the difference between success and failure.

By its contribution of increased speed to telephonic communication, the growing adoption of Strowger Automatic telephone equipment is more than justified. But when it is also realized that in addition to speed it brings secrecy, machine-like accuracy and increased efficiency and convenience to telephony, its importance in modern business and social life is more truly appreciated.

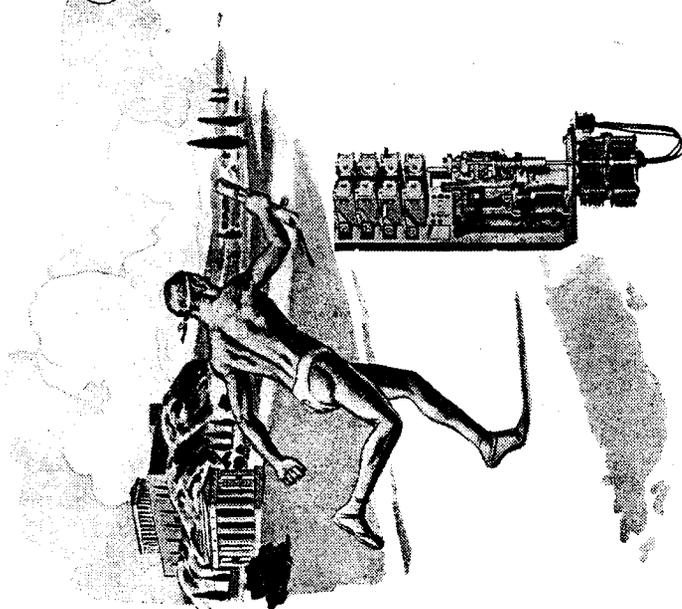
Automatic Electric Inc.

Factory and General Offices: 1033 W. Van Buren St., Chicago, U. S. A.

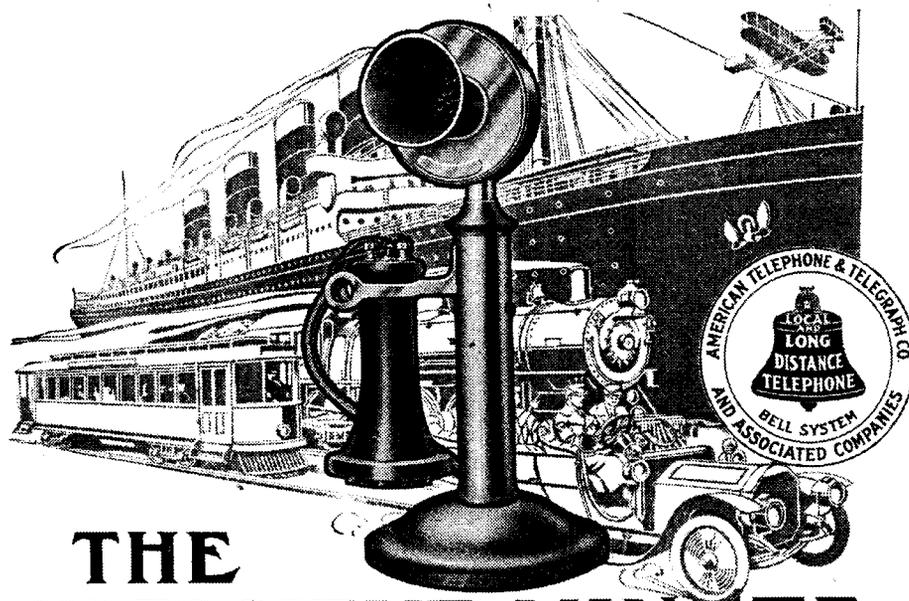
Sole and Service Office in All Principal Cities

EXPORT REPRESENTATIVES
For Australia - Automatic Telephone, Ltd.
Bangkok - Automatic Electric Company, Ltd.

STROWGER AUTOMATIC



5.9 Strowger Automatic advertisement. Telephony (2 June).



THE EFFICIENT MINUTE

We have speeded up our ships and railways; we have made rapid transit more and more rapid; we have developed a mile a minute in the air and much faster in an automobile.

But the Bell Telephone is quickest of all. It is *instantaneous*. No weeks or days or minutes wasted in waiting for somebody to go and come; no waiting for an answer.

It is the most effective agency for making minutes more useful, more efficient.

In almost every field of work men are accomplishing more in less time with the Bell Telephone than they could without it. They can talk with more people, near and far; they can keep the run of more details; they can buy or sell more goods, and to better advantage; they can be active in more affairs.

The Bell Telephone has placed a new and higher value upon the minute—for everybody. It has done this by means of One Policy, One System, and Universal Service.

Bell Long Distance Telephone service not only gives an added value to a man's minutes—it accomplishes business results which would be absolutely impossible without it. Every Bell Telephone is the Center of the System.

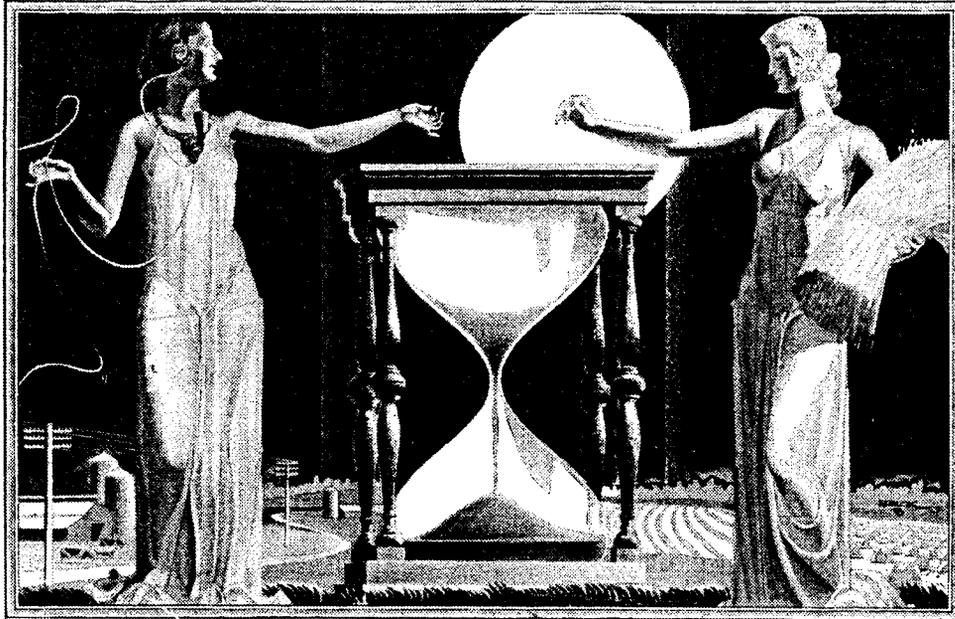
AMERICAN TELEPHONE AND TELEGRAPH COMPANY
AND ASSOCIATED COMPANIES

5.10 AT&T advertising proof, 1910. (File 1, box 21, series 1, N.W. Ayer Advertising Agency Record. Reproduced with permission of the Archives Center, National Museum of American History, Behring Center, Smithsonian Institution.)

The concept of speed as a calculation of abstract time was most evident in advertisements created in the early 1910s, but Bell System advertisements continued to make use of temporal calculations well past mid-century as a way to illustrate the telephone's convenience for subscribers, to introduce improvements to service, and to proclaim the importance of innovation and research.³⁴ An advertisement produced in 1910 announced: "Last year the Bell Telephone System handled Six Billion calls—or one hundred and ninety *for every second*. If each message meant a saving of only ten minutes time—a most conservative estimate—it means that in 1909 the Bell System saved [the] *time* equivalent to 114,155 years" [emphasis in original] (Figure 5.7). In 1928, AT&T reported that technological advances resulted in "6,820,000 long distance and toll calls made in Kansas in 1927 an average reduction of a minute and a half was made on each call—a total of twenty years saved" (Figure 5.11). And Bell Labs' commitment to research was given as the explanation of "How Telephone Research 'Saves' 77 Years" in an ad from 1959 (Figure 5.12).

Even though the factors involved in these calculations varied, the representation of time that underwrote them—fragmented, interchangeable, yet uniform—remained constant. Whether framed as efficiency, instantaneousness, or convenience, 'saved time'/speed was the product being sold by these ads and like all

³⁴ Contemporary representations of the telephone continue to employ the idea that savings of transaction time can be accumulated and converted into working capital. In a 1990 article on mobile offices in the financial magazine *Money*, a Los Angeles attorney is quoted as saying that his cell phone and mobile fax machine have "added two hours to my day and 25% to my annual gross." James Katz cites a 1993 survey of cell phone users by Motorola which reports its findings in similar terms. Those canvassed claimed that a cellular phone "added 0.92 hours to their productive working day [and] increased their own or their company's revenues by 19 percent." James E. Katz, *Connections: Social and Cultural Studies of the Telephone in American Life* (New Brunswick, NJ: Transaction Publishers, 1999), 20.



Kansas saves Twenty Years

*An Advertisement of
the American Telephone and Telegraph Company*

MORE than three hundred studies are being carried on constantly by the research, engineering and business staffs of the American Telephone and Telegraph Company and the associated companies of the Bell System to accomplish definite improvements in telephone service.

In 1927 the number of local calls not completed on the first attempt was reduced by 5 per cent. This means the better handling of 200,000,000 calls a year.

In 1926 the average time of handling toll and long distance calls was 2 minutes. In 1927 this average was reduced to 1½ minutes, with further improvements in voice transmission.

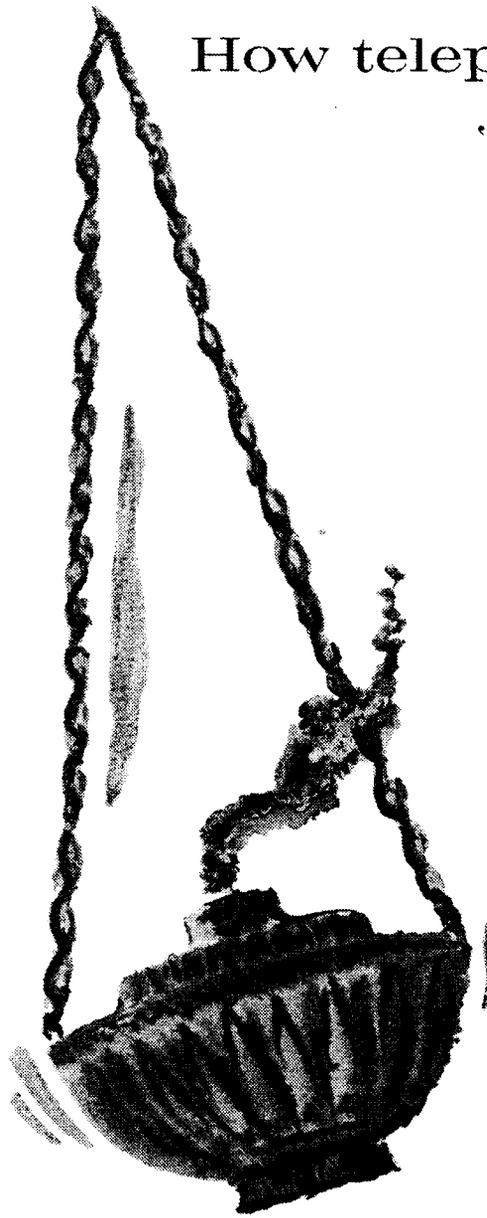
On 6,820,000 long distance and toll



calls made in Kansas in 1927 an average reduction of a minute and a half was made on each call—a total of twenty years saved. These more than three hundred special studies have as their goal definite improvements in local, toll and long distance service. It is the policy of the Bell System to furnish the best possible service at the least cost to the user.

The American Telephone and Telegraph Company accepts its responsibility for a nation-wide telephone service as a public trust. It is fundamental in the policy of the company that all earnings after regular dividends and a surplus for financial security be used to give more and better service to the public.

5.11 AT&T advertising proof, 1928. (File 3, box 21, series 1, N.W. Ayer Advertising Agency Record. Reproduced with permission of the Archives Center, National Museum of American History, Behring Center, Smithsonian Institution.)



How telephone research “saves” 77 years

When the boy Galileo first observed the regular motion of a cathedral lamp set swinging by the wind, he had no idea of inventing the pendulum clock. But he jotted down a thought he had.

Not until 77 years later did Christian Huygens pick up his notes and apply to an actual clock the pendulum principle first observed by young Galileo: no matter how far a pendulum swings, its movement takes the same amount of time.

The creative thinker of today, too, does not always have a specific use in mind when, by equation or formula, he branches off from the known into the unknown. The classic invention of this decade, the Transistor, evolved in Bell Telephone Laboratories as scientists sought a deeper understanding of semiconductors.

On the other hand another great invention, the feedback amplifier, came from the acutely creative mind of one Bell engineer who was faced with a specific problem.

Current Bell Laboratories activities—in such areas as data transmission, radar and submarine cable development—call for the co-ordinated efforts of all types of thinkers and all types of approaches. One type complements another.

77 years would not elapse today between the swinging lamp and the clock pendulum. And certainly not at Bell Laboratories, where ideas, though not rushed, are carefully advanced toward fruitful applications in national defense, industry and communications.

An important result of this application of new ideas is the efficiency of America's telephone system—an efficiency unequalled in the world.

BELL TELEPHONE SYSTEM



5.12 AT&T advertising proof, 1959. (File 4, box 15, series 1, N.W. Ayer Advertising Agency Record. Reproduced with permission of the Archives Center, National Museum of American History, Behring Center, Smithsonian Institution.)

commodities it was mute about the conditions of its production. Speed was produced for telephone users in two ways. First, speed—the acceleration of circulation—was the objective and the product of technological change. Technological advances improved the reliability of connections and increased the ability for (fewer) operators to handle more calls more quickly. As noted in the previous chapter, this acceleration was just as often the result of human engineering as electrical engineering: telephone speed came at a human cost. Venus Green writes that in order to insure the most efficient service possible “[s]ervice inspectors with stopwatches timed ‘speed of answer’ and ‘speed of handling calls,’” often severely penalizing operators who did not achieve the expected rates of calls per hour.³⁵

The second way in which speed was produced was through the colonization of space by capital interests. Although time—through its saving and control—acted as a key dimension in the discourses of speed found in early twentieth century telephone advertising, increases in the speed of circulation also manifested in representation as a new ‘mastery of space.’ “The conquest of space,” writes Harvey, “first required that it be conceived of as something useful and malleable, and therefore capable of domination through human action.”³⁶

THE MASTERY OF SPACE: THE LANDSCAPES OF CAPITAL

Roland Marchand tells us that one of the most stereotyped scene to appear in the advertising of the 1920s was the image of the modern man at work. “Again and again he reappeared in a setting so predictable that it became one of advertising’s contributions to the nation’s store of visual clichés. [...] His minimal but sufficient

³⁵ Green, *Race on the Line*, 47. For an illuminating discussion on the means of control and the effects of technological advances on labor, see pp. 73-81

³⁶ Harvey, *The Urbanization of Capital*, 37.

props," Marchand notes, "included a telephone, the inevitable window, and a pristinely uncluttered desk."³⁷ Advertisers for a wide range of businesses—including Goodrich Tires and Gulf Refineries—employed this visual blueprint to connote power, distinction, and control over the future. Marchand observed that the combined symbolism of the telephone and the 'window-with-a-view' "inspired the welling up of a feeling best epitomized by the phrase, 'master of all he surveys.'"³⁸

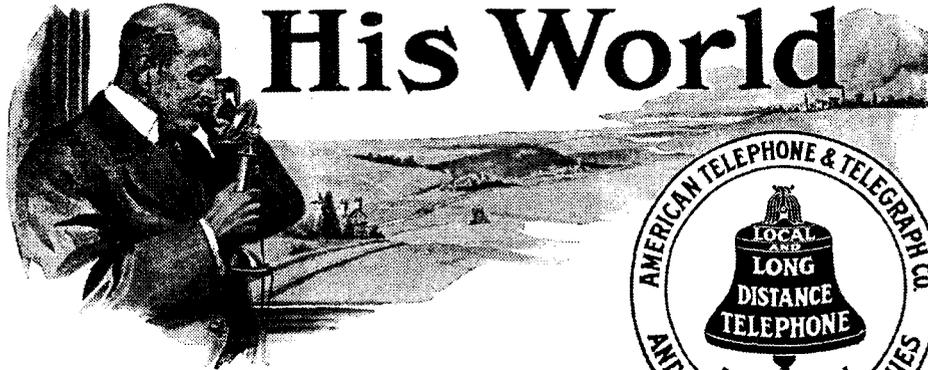
Corporate advertising of the 1920s was able to use the telephone as a symbol of power and prestige because that meaning had already been put into circulation by early telephone advertisements. In fact, the 'master of all he surveys' tableau Marchand describes emerged well before the 1920s. Over a decade earlier, the image of a businessman speaking on a telephone while surveying a panoramic view made its first appearance in AT&T advertisements. Unlike Marchand's newly minted 1920s white collar professionals though, the businessmen of the 1909 and 1910 AT&T ads were railway presidents and business magnates whose dominion of space was real and had truly been abetted by the telephone.

The 1909 advertisement "In Touch With His World" tells the story of the modern railway president who uses the telephone to stay in command of his system even as he "spends the greater portion of the summer at his country home renewing his energy" (Figure 5.13). The image depicts an elegantly attired man, candlestick phone in hand, surveying the view from a large window. The window is, in fact, so large that its frame is visible only at a point directly behind his back, so that the

³⁷ Marchand, *Advertising the American Dream: Making Way for Modernity*, 238.

³⁸ Marchand's phrase "master of all he surveys" is the referent for my description of these images as examples of a new mastery of space. See *Ibid.*, 239.

In Touch With His World



The railroad president to-day spends the greater portion of the summer at his country home renewing his energy. He keeps in touch with his railroad system over the telephone.

He may be one hundred miles or more away from headquarters, yet *his office* and the *principal business centers* of the country are *within talking distance*.

He is notified immediately when anything important occurs; his advice and direction are asked and given *over the telephone*; the machinery of the road goes on.

Each day, at the noon hour or in the early morning or late afternoon, he conducts his business over the long distance line.

He is in touch with his world.

Through the day he has been renewing his energy—sailing, driving, or playing golf—making himself *more fit for the busier season* and able at all times to handle a larger system and a larger volume of business than the railroad president of two decades ago.

This is simply an illustration which applies to every busy man, whether he be railroad president, merchant, manufacturer or professional man.

It shows the importance of universal service, which is the constant aim of the Associated Bell Companies—of *one system*, extending to every nook and corner of the United States, keeping *all localities* within speaking distance of one another.

Long Distance Bell Service is universal in two ways—in its extension to all localities and in its application to all human activities. Whatever your interests, it will advance them economically, certainly, constantly.

The American Telephone and Telegraph Company
And Associated Companies

One Policy, One System, Universal Service

5.13 AT&T advertising proof, 1909. (File 1, box 21, series 1, N.W. Ayer Advertising Agency Record. Reproduced with permission of the Archives Center, National Museum of American History, Behring Center, Smithsonian Institution.)

partition between the railroad president and the landscape is insubstantial and yielding. The view from the window is of open fields and gently rolling hills. In the far distance, in the upper right hand corner of the image, is a city with billowing smokestacks and chimneys. "He may be one hundred miles or more away from headquarters, yet his office and the principal business centers of the country are within talking distance." The image and copy capture the sensibility of the ad's headline: one's world no longer need be defined in terms of one's location but could now be organized in ways that defy the real coordinates of physical space. In other words, the value of the telephone lay less in that it made it possible to speak to anyone-anywhere, and more in that it permitted its users to connect with only those people and places they deemed important, and to forgo the time-consuming niceties that human intercourse required.

Harvey argues that while technology played a critical role in shaping the experience of modern time—the impact of Greenwich Mean time, cheap timepieces, electricity, rail travel, the telegraph and especially the telephone "all contributed to a new sense of simultaneity over space and total uniformity in coordinated and universally uniform time"—he insists that "more fundamentally it was a question of class relations which forced the use of those technological possibilities along lines dictated by capital circulation that had the most profound effect on the perception and experience of social time and space."³⁹ It is significant to note the degree to which the class interest Harvey describes is visible in telephone advertising. The advertisement does not recommend the time-saving virtues of the telephone to all citizens, but rather to those men, the "railway president, merchant, manufacturer or professional man," who commanded space in real terms, who sought to speed up

³⁹ David Harvey, *The Urban Experience* (Baltimore: John Hopkins University Press, 1989a), 173.

circulation and overcome the profit-draining effects of distance. Their class position reflected the status (or the aspirations) of those people who were the early subscribers of the telephone, and they were also the group that would be most likely to assess the value of the telephone in the terms imagined in this advertisement and to use the telephone in ways that would be most profitable for AT&T.

An advertisement from the following year, unambiguously titled "Annihilator of Space," represents a markedly different set of spatial relationships (Figure 5.14). The businessman is no longer held at a remove from the landscape by a window frame but rather reaches over it. Here, the landscape in question is a map of the United States. The businessman is seated at the map as if at a desk, candlestick telephone resting in the vicinity of New York and Boston, his arm extended to point to Chicago. Whereas the copy of the earlier ad refers to telephone connections linking "principal business centers," the 1910 ad asserts that "[t]here can be no boundaries to the telephone system as it is now understood and demanded." Here telephone-space is represented as "contiguous territory," not as a network of differentiated places.

The representational expansion of the telephone's domain is noteworthy. Whereas the 1909 ad depicted the telephone's reach as extending to neighboring cities "one hundred miles or more away," the advertisement of 1910 represents the telephone's territory as equivalent to the geographic space of the nation. Perhaps surprisingly, this new figuration of the telephone system did not reflect either new technological developments or an expansion of the telephone network. What *had* occurred in 1910 was the finalization of a purchase organized by Theodore Vail in which AT&T acquired control of 30 percent of Western Union Company stock—an

Annihilator of Space



To be within arm's reach of distant cities it is only necessary to be within arm's reach of a Bell Telephone. It annihilates space and provides instantaneous communication, both near and far.

There can be no boundaries to a telephone system as it is now understood and demanded. Every community is a center from which people desire communication in every direction, always with contiguous territory, often with distant points. Each individual user may at any moment need the long distance lines which radiate from his local center.

An exchange which is purely local has a certain value. If, in addition to its local connections, it has connections with other contiguous localities, it has a largely increased value.

If it is universal in its connections and inter-communications, it is indispensable to all those whose social or business relations are more than purely local.

A telephone system which undertakes to meet the full requirements of the public must cover with its exchanges and connecting links the whole country.

The Bell Telephone System annihilates space for the business man to-day. It brings him and any of his far-away social or business interests together.

**AMERICAN TELEPHONE AND TELEGRAPH COMPANY
AND ASSOCIATED COMPANIES**

One Policy,

One System,

Universal Service.

5.14 AT&T advertising proof, 1909. (File 1, box 21, series 1, N.W. Ayer Advertising Agency Record. Reproduced with permission of the Archives Center, National Museum of American History, Behring Center, Smithsonian Institution.)

acquisition that blocked Western Union from establishing a competing telephone network and effectively gave AT&T a “spatial monopoly.”⁴⁰ In that its key function was to insulate the company from the deleterious effects of competition, Bell’s spatial monopoly was similar to its earlier patent monopoly, but with the crucial difference being that AT&T’s strategic control of space gave it enormous authority over how the telephone system would develop, as well as how and by whom it would be used.⁴¹ Although AT&T was forced to liquidate its holdings in Western Union on March 19 1914 in compliance with the terms of the Kingsbury Commitment—an agreement between AT&T and the Attorney General of the United States which terminated the anti-trust suit brought against AT&T by the Justice Department—by that time it had succeeded in gaining mastery of national space in very real terms.

With the 1912 advertisement “Your Telephone Horizon,” AT&T’s colonization of the spaces of representation broke through national borders (Figure 5.15). The ad depicts a businessman surveying a global landscape, its horizon line following the earth’s curvature. As was the case in 1910, the advertisement’s transcontinental allusions were not matched by real capability—the first transcontinental telephone line did not open for service until January 25 1915—but its allusions to expanded boundaries for the telephone user are suggestive of AT&T’s aggressive program of corporate expansionism and Vail’s “One Policy, One System, Universal Service.”

⁴⁰ The transaction occurred on December 20 although the negotiations began much earlier. Vail had been named president of Western Union on November 23, 1910 and held that position simultaneously with his presidency of AT&T until April 15 1914 when he stepped down as head of Western Union. His resignation followed the sale of AT&T’s holdings in Western Union on March 19 1914. AT&T Archives, *Events in Telecommunications History*, 31-33.

⁴¹ For a discussion on space as a source of social power, see Harvey, *The Urban Experience*, 186-187.



Your Telephone Horizon

The horizon of vision, the circle which bounds our sight, has not changed.

It is best observed at sea. Though the ships of today are larger than the ships of fifty years ago, you cannot see them until they come up over the edge of the world, fifteen or twenty miles away.

A generation ago the horizon of speech was very limited. When your grandfather was a young man, his voice could be heard on a still day for perhaps a mile. Even though he used a speaking trumpet, he could not be heard nearly so far as he could be seen.

Today all this has been changed. The telephone has vastly extended the horizon of speech.

Talking two thousand miles is an everyday occurrence, while in order to see this distance, you would need to mount your telescope on a platform approximately 560 miles high.

As a man is followed by his shadow, so is he followed by the horizon of telephone communication. When he travels across the continent his telephone horizon travels with him, and wherever he may be he is always at the center of a great circle of telephone neighbors.

What is true of one man is true of the whole public. In order to provide a telephone horizon for each member of the nation, the Bell System has been established.

**AMERICAN TELEPHONE AND TELEGRAPH COMPANY
AND ASSOCIATED COMPANIES**

Every Bell Telephone is the Center of the System.

5.15 AT&T advertising proof, 1912. (File 1, box 21, series 1, N.W. Ayer Advertising Agency Record. Reproduced with permission of the Archives Center, National Museum of American History, Behring Center, Smithsonian Institution.)

It would be an error to dismiss the representations of space in these advertisements as idiosyncratic or insignificant. Taken as a whole, the three ads can be seen as what Jameson might call the figural equivalents of spatial transformations occurring at the structural level in the movement from market to monopoly capitalism. The growing distance between the businessman and the landscape finds a resonance with the increasing distance between an individual's experience of life and the strategies and operations that restructured local economies at first national and then international levels. Simultaneously, the elimination of barriers to circulation creates greater distances between the businessman and the market resulting in the increasing dematerialization and abstraction of the marketplace.

"Control over spatial organization," writes Harvey "and authority over the use of space become crucial means for the reproduction of social power relations."⁴² The telephone's conquest of space ultimately reproduced and inscribed relations of class, gender, and race in social space. As businesses expanded and head offices began to locate at a distance from factories and plants, there emerged new geographically-inscribed relations between owners and workers, between white collar and blue collar activities. The telephone created a new economic landscape in very tangible ways. Wealth and power increasingly came to be concentrated within key urban centers drawing on resources (including labor) situated in (or relegated to) outlying suburban and rural areas.

The 1909 advertisement advised the businessman that the time saved by conducting business at a distance could be put to use by "renewing his energy—sailing, driving, or playing golf, making himself more fit for the busier season and able at all times to handle a larger system and a larger volume of

⁴² Ibid., 187.

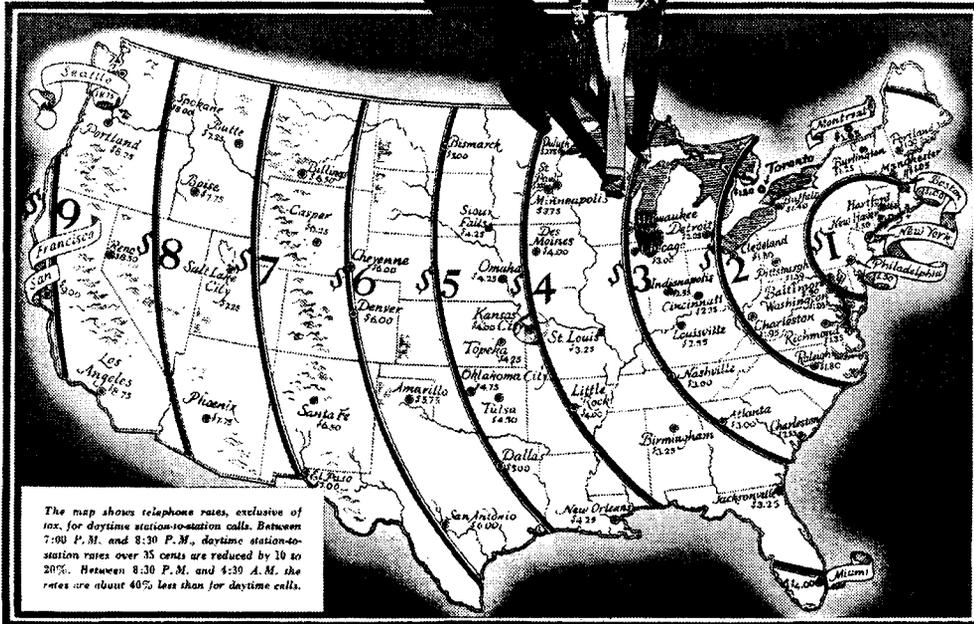
business than the railroad president of two decades ago" (Figure 5.13). Likewise, the 1910 advertisement promoted the telephone as "indispensable to all those whose social or business relations are more than just purely local" (Figure 5.14). It is noteworthy that in these early ads time saved by 'annihilating space' translated into time for leisure. As business use of the telephone became more common and was no longer restricted to the entrepreneurial class, time savings no longer accrued to the telephone user but rather came to be represented as time available to increase output. In an advertisement from 1933 titled "For the Salesman... Extra Arms and Longer Legs," the reader is advised that "speed [...] means repeat business" and allows for increased productivity: "[w]here formerly each salesman averaged six personal visits a day, he now makes six personal visits plus twenty telephone calls" (Figure 5.16). The illustration which accompanies these observations shows a map of the United States in which geographic space is sectioned off and given a dollar value. Beside each city's name is a price—the cost of long distance communication calculated on the basis of its distance from New York (and Wall Street). This image is noteworthy because it represented precisely what AT&T had accomplished with the creation of its Long Lines division and the establishment of transcontinental service: it inscribed national space with a cost/value ratio. Here not only time equals money but so does space, with the value of both determined by the telephone and AT&T.⁴³

⁴³ This ad is interesting for the way in which it designates the center and the peripheries of the business world. I did not find a corresponding map showing prices for calls originating in the west although it may well have been produced. Nonetheless, locating New York-Boston-Philadelphia at the center of the economic universe did have a certain resonance in respect to the transportation and communications networks of the day, and it was true most of all for AT&T. The inscription of long distance prices on a national map can also be seen as the 'privatization' of national space by AT&T—in that public space is used for private profit. On this point, the following assessment by Marx is notable: "Division of labour and private property are [...] identical expressions: in the one the same thing is affirmed with reference to activity as affirmed in the other with reference to the product of the activity." Karl Marx and Frederick Engels, *The German Ideology* (New York: International Publishers, 1970), 53.



FOR THE SALESMAN...

Extra arms and longer legs



BUSINESS is scattered over wider areas these days. Salesmen have to see two or three times as many people to get the same volume. They just can't afford to spend a large part of each day waiting in outer offices and calling upon people who aren't available.

Through the systematic use of Long Distance telephone service, many companies are greatly increasing the effectiveness of their sales efforts. This is like giving the salesman extra arms and longer legs—it enables them to cover their territories much more quickly and inexpensively, and at the same time visit many more customers and prospects.

The Telephone Will Find Your Prospect

The telephone serves them as scout in locating sales possibilities in nearby and distant towns. Without neglecting their present customers, salesmen can focus their efforts on securing new business in those districts that are changing for the better. They can arrange to be on the ground when orders are being placed and can handle the orders with a speed which means repeat business. From all over the country come reports of unusual



successes—achieved by companies both large and small—through the organized use of Long Distance, as worked out in co-operation with the telephone company. Here is an example:

6% Increase in Yearly Sales

The Consolidated Products Company, large dealer in used machinery, reduced sales costs by 10% and increased yearly sales by 6% through a Long Distance plan developed by the telephone company. Where formerly each salesman averaged six personal visits a day, he now makes six personal visits plus twenty telephone calls.

The Atlantic Refining Company says: "Long Distance gets results at lowest cost." Sparks-Withington Company: "Thoroughly convinced of its effectiveness, not only in the promotion of new business, but in the proper handling of production and distribution problems."

The organized use of Long Distance gets the approval of both salesmen and executives, because it brings such big returns in increased sales and reduced expenses. The Business Office of your local Bell Company will gladly give further information.

5.16 AT&T advertising proof, 1933. (File 4, box 20, series 1, N.W. Ayer Advertising Agency Record. Reproduced with permission of the Archives Center, National Museum of American History, Behring Center, Smithsonian Institution.)

The images of space which began to appear in the telephone advertisements of the 1930s represented the 'businessman' and the spatial coordinates of the business world in ways that were very different from the ads of the 1910s and 1920s. If the 1922 advertisement "As if Across a Desk" seems to have gained its inspiration from Ida Tarbell's 1904 description of Rockefeller "bent over a map [planning] with military precision the capture of the strategic locations on the map of the East Coast oil refineries," then the ads that appeared in the 1930s bore more resemblance to the traveling man eulogized by Dale Carnegie, whose personality was his capital and made each sale by "get[ting] on the customer's side of the fence" (Figure 5.17).⁴⁴ With the crash of 1929 came a profound loss of faith in the market system. A crisis of representation accompanied the economic crisis. Public antipathy towards robber baron industrialists coalesced, and the Rockefellers, Carnegies, and Goulds were compromised as representatives of the capitalist system. The representatives of business in AT&T's advertising in the 1930s were no longer entrepreneurs manipulating affairs at a distance but rather purchasing agents, sales managers and most often, salesmen trying to make the business day as productive as possible.

Images of smiling salesmen confidently striding across or straddling a map of the United States conveyed the image of the new American capitalism, one purged of corruption and excess, built on the hard work and effort of 'every-man.' But despite the populist outlook of these advertisements, the representations of space which they articulated were contradictory. Whereas the advertisements of the 1910s and

⁴⁴ Dale Carnegie, *How to Win Friends and Influence People* (New York: Simon and Schuster, 1936); Ida M. Tarbell, *The History of the Standard Oil Company*, vol. 1 (New York: The MacMillan Company, 1925), 146.



As if across a desk

"New York is calling!" says the operator in San Francisco. And across the continent business is transacted as if across a desk.

Within arm's length of the man with a telephone are seventy thousand cities, towns and villages connected by a single system. Without moving from his chair, without loss of time from his affairs, he may travel an open track to any of those places at any time of day or night.

In the private life of the individual the urgent need of instant and personal long distance communication is an emergency that comes infrequently—but it is imperative when it does come. In the business life of the nation it is a constant necessity. Without telephone service as Americans know it, industry and commerce could not operate on

their present scale. Fifty per cent more communications are transmitted by telephone than by mail. This is in spite of the fact that each telephone communication may do the work of several letters.

The pioneers who planned the telephone system realized that the value of a telephone would depend upon the number of other telephones with which it could be connected. They realized that to reach the greatest number of people in the most efficient way a single system and a universal service would be essential.

By enabling a hundred million people to speak to each other at any time and across any distance, the Bell System has added significance to the motto of the nation's founders: "In union there is strength."



" BELL SYSTEM "

AMERICAN TELEPHONE AND TELEGRAPH COMPANY
AND ASSOCIATED COMPANIES

One Policy, One System, Universal Service, and all directed toward Better Service

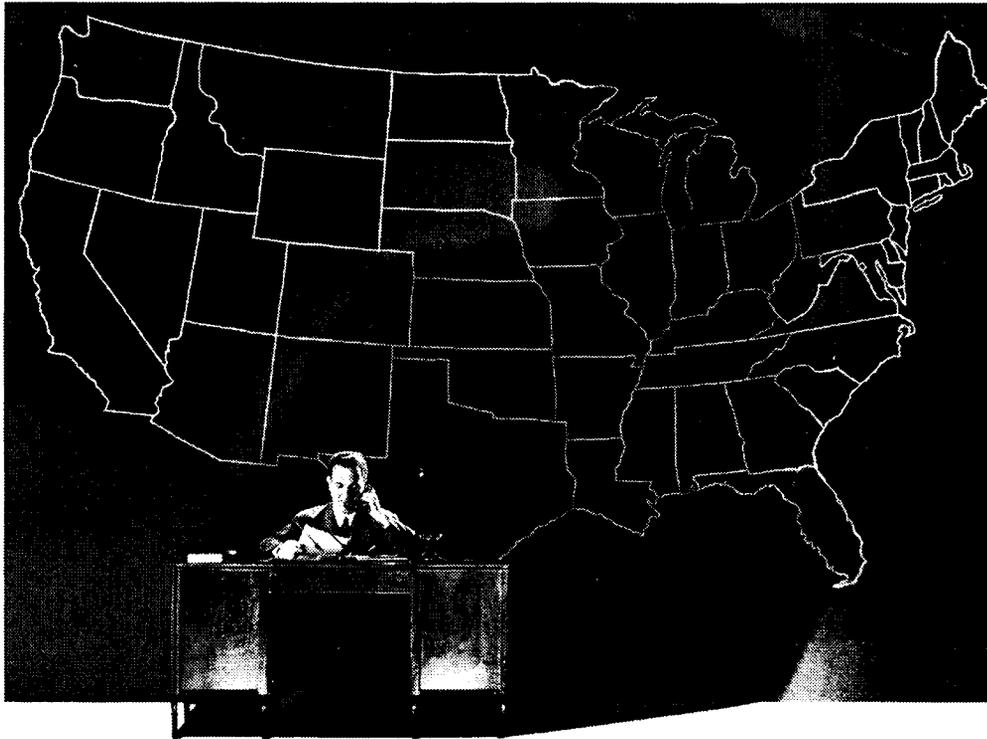
5.17 AT&T advertising proof, 1922. (File 1, box 21, series 1, N.W. Ayer Advertising Agency Record. Reproduced with permission of the Archives Center, National Museum of American History, Behring Center, Smithsonian Institution.)

even the 1920s represented space as a landscape of marketplaces constituted by the gaze of the industrialist, space now appeared as territory—abstract and homogeneous, no longer dependent on human perspective for its value but measured instead in terms of money. In fact one might go so far as to argue that only is the market presented as an abstraction, but so is the salesman. His relationship to the geographic space he straddles is ambiguous. While in the earlier ads, the telephone clearly allowed the entrepreneur to *possess* the space he surveyed, by the thirties, the telephone acted as a means of *projecting* the salesman (and the sales effort) across space. In advertisements such as “Salesman: New Style,” “Spread Yourself across the Map by Long Distance,” and “Between trips... he covers his territory *by telephone*,” it is not the salesman’s gaze that is cast upon the space but rather his shadow. For him the effect of the telephone was prosthetic—extra arms, longer legs, amplified speech, and projected personality—at once extending his ability to sell while holding him at a distance [emphasis in original] (Figures 5.18, 5.19, and 5.20).

FROM ‘MULTIPLICATIONS OF POWER’ TO ‘MULTIPLE SELVES’: PERSONAL INVESTMENTS
IN THE PRODUCTIVITY OF CAPITAL

The fragmented, outgoing, almost-spectacular self depicted in early twentieth century advertising stood in stark contrast to the Victorian ideal of “unified, controlled, sincere selfhood” that had dominated American bourgeois ideology in the mid-nineteenth century.⁴⁵ According to Alan Trachtenberg, America’s traditional middle class—made up largely of artisans, farmers, small merchants and

⁴⁵ Lears, *Fables of Abundance: A Cultural History of Advertising in America*, 75.



Salesman: NEW STYLE

HE COVERS HIS TERRITORY . . . BY TELEPHONE . . . BETWEEN PERSONAL TRIPS

Time was when he wasted hours in lobby waits and useless visits. Now, before every trip in person, he telephones ahead to arrange appointments—and covers more territory more often. • Once, too, he made no contact with customers or prospects between trips. Now he keeps in touch by telephone—answering inquiries, making friendly suggestions, saving sales that occasionally slipped away. • Many kinds and sizes of businesses have stepped up sales volume, cut down sales costs with the help of Long Distance telephone service. Try it a week or a month and see.



5.18 AT&T advertising proof, 1936. Original inscribed: *Fortune*, June. (File 3, box 21, series 1, N.W. Ayer Advertising Agency Record. Reproduced with permission of the Archives Center, National Museum of American History, Behring Center, Smithsonian Institution.)



**SPREAD YOURSELF
ACROSS THE MAP
BY**

**LONG
DISTANCE**

Whether buying, or getting the facts, or asking for specifications, your sources of supply are as near as your telephone. Thousands of purchasing men use Long Distance telephone service constantly . . . to discover the best offers . . . to avoid time-robbing misunderstandings . . . to discuss shipments.

To many purchasing agents it has become almost second nature to feel the pulse of markets by Long Distance. To them, speed is essential and now they secure it more economically than ever at the *present low rates*.

You'll find a gratifying thoroughness about planned Long Distance buying. It will leave you untroubled by doubts as to whether a better quotation could have been secured. *Purchase greater peace-of-mind by Long Distance.*



5.19 AT&T advertising proof, 1937. Original inscribed: *Purchasing*, January '37. (File 2, box 21, series 1, N.W. Ayer Advertising Agency Record. Reproduced with permission of the Archives Center, National Museum of American History, Behring Center, Smithsonian Institution.)



Between trips...
he covers his territory by telephone

The successful salesman knows he has to get the most out of every day —at the office and on the road.

So now, more than ever, he turns to the telephone.

Between personal visits it keeps him in close touch with out-of-town customers and prospects. It helps him arrange appointments. Follow up inquiries. Clear up questions and

complaints. Save sales that might otherwise slip away.

Many businesses—large and small—are stepping up sales volume, cutting sales costs through the *planned use of the telephone*. We'd like to offer you some specific suggestions how. Just call your Bell Telephone Business Office. A representative will visit you at your convenience.

BELL TELEPHONE SYSTEM



LONG DISTANCE RATES ARE LOW

Here are some examples:

Baltimore to Philadelphia	55¢
Cleveland to Indianapolis	90¢
Denver to Oklahoma City	1.25
Atlanta to New York	1.50
Los Angeles to Chicago	2.20

These are the daytime Station-to-Station rates for the first three minutes. They do not include the 10% federal excise tax.

Call by Number. It's Twice as Fast.

5.20 AT&T advertising proof, 1956. Original inscribed: [business magazines, future]. (File 3, box 24, series 1, N.W. Ayer Advertising Agency Record. Reproduced with permission of the Archives Center, National Museum of American History, Behring Center, Smithsonian Institution.)

manufacturers—evolved a sense of self based on democratic republican values that rewarded “honest labor, frugal self-management, and disciplined personal character.”⁴⁶ Rooted in Protestant beliefs and fueled by “popular sermonizing and storytelling about character reform, temperance, diligence, and self-made men,” this conception of the self thrived amid the face-to-face social relations and shared experiences of smaller cities and towns.⁴⁷ It did not however hold up well in the increasingly impersonal environment fostered by the rapid progress of industrialization, the emergence of an interdependent continental market economy, the rise of speculative capital, and deepening of class divisions. The highly competitive conditions that prevailed in late nineteenth century capitalism—the depression of 1873, the violent labor unrest of 1877, and the unscrupulous tactics of big business—challenged the foundations on which the model of democratic republican individuality was erected.

Jackson Lears writes that with the assimilation of liberal Protestantism into “the secular creed of progress,” the earnest individualism of the old bourgeois gave way to a “new managed self”—a conception of self that was more and more defined in the idiom of a burgeoning corporate bureaucracy and a new professionalism. Building on Trachtenberg's thesis, he argues that advertisers, along with others in the growing ranks of managerial professionals—Lears lists social scientists, business executives, physicians, psychotherapists, and reform-minded ministers, and to this I would add designers and engineers—“created powerful images of the human subjectivity that embodied the values of the emergent social system.”⁴⁸ Among those

⁴⁶ Alan Trachtenberg, *The Incorporation of America* (New York: Hill and Wang, 1982), 74.

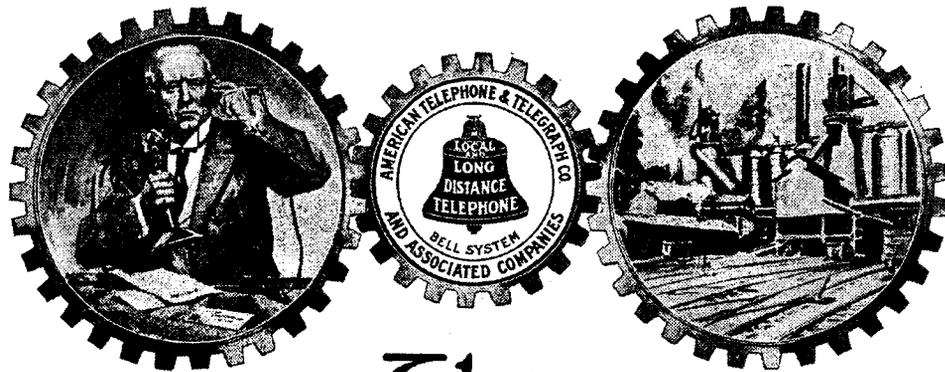
⁴⁷ *Ibid.*, 75.

⁴⁸ Lears, *Fables of Abundance: A Cultural History of Advertising in America*, 138.

values identified in advertisements and other popular representations as key to achieving personal success in the modern world was “personal efficiency.”

The application of notions of speed and efficiency to the human subject in telephone advertising was not a great leap for the Bell System—the early traffic studies in 1892 had already effectively begun the process in real terms. Even so, the earliest appearance of references to personal efficiency were not yet rooted in a concept of the managed self but rather drew on traditional ideas about self control and time-thrift. While the ad titled “The Multiplication of Power” declares: “There is no higher efficiency in the world than that of the American business man,” it also described the businessman in terms that were substantial and grounded. The telephone “bring[s] people to him” and is “the cause of the multiplication of his power and his principality” and as such “his most precious asset next to his capital itself” (Figure 5.21). It describes the quintessential self-made man honored in democratic-republican discourse.

Lears makes the point that the *function* of the new “managed self” was not that different than the older Protestant project of self-control. Both were attempts to reconcile the problem of human identity within an increasingly alienating social structure. It is also important to note that the modern self did not *replace* the older, more traditional self in representation anymore than it did in real life. Advertising provided one forum in which the tensions and contradictions between these two conceptions of self could be explored and potentially resolved. The currency of both models of self-hood in the first decade of the twentieth century is made evident by comparing the advertisement described above with another that appeared in the same year.



The Multiplication of Power

There is no higher efficiency in the world than that of the American business man.

The multiplication of *power* in a business man—if he has the ability within him—depends upon the *increased number* of people whom he can, *by personal contact*, interest in his purposes.

He does this by telephone, and the multiplication of *the telephone's* usefulness depends on the *increased number* of persons whom he can reach.

In 1890 the Bell System had 200,000 subscribers' telephones in use. As late as 1899—ten years ago—it had only 500,000.

To-day it has 4,400,000—one for every twenty persons in this country—and is increasing at the rate of 500,000 a year.

The Bell Long Distance Telephone means as much to the home as it does to the office. It is the most marvelous convenience of modern times—if not all time—added to home life.

The American Telephone and Telegraph Company
And Associated Companies

Every Bell Telephone Is a Long Distance Station

Has the vast development of industries since 1890—the greatest period of advance in the world's history—*when America has advanced faster than all the rest of the world*, been the force that has built up this great, unified, efficient telephone service; or

Has the increased ability of the American business man to bring people to him from every locality, far and near, *over the Bell Telephone System*, been the cause of the multiplication of his power and his principality?

Whichever the cause and whichever the effect, the advancement of one is inseparably linked with the advancement of the other.

The business man's Bell Telephone, with its long distance and emergency advantages, is his most precious asset next to his capital itself.

5.21 AT&T advertisement, 1909. *Town and Country* (11 September): 29. (Box 1, Warshaw Collection of Business Americana - Telephone. Reproduced with permission of the Archives Center, National Museum of American History, Behring Center, Smithsonian Institution.)

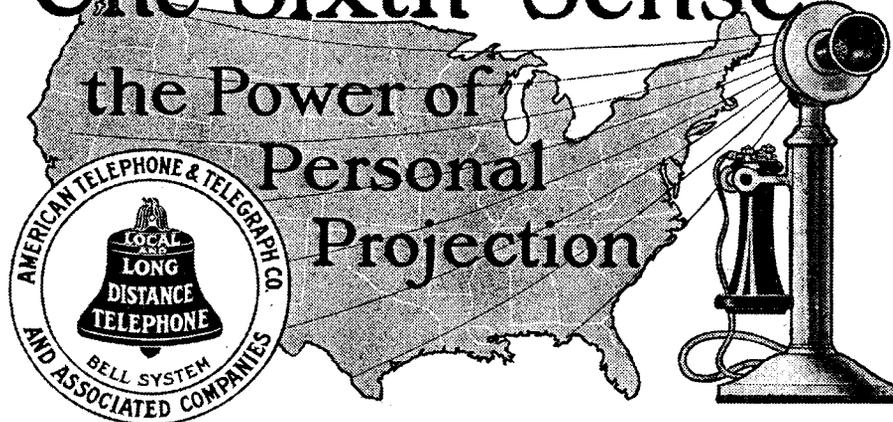
In "The Sixth Sense—the Power of Personal Projection," the telephone is no longer represented as placing the American businessman at the center of the system but rather as providing him with the means of "projecting himself far beyond the skies and hills of his forefathers" (Figure 5.22). Identifying this sense of personal projection as "responsible for his self assurance—for his mental vigor and the progress which this has meant," the advertisement engages what Lears identified as the "therapeutic ethos," representing the telephone not only as a tool for business but also as an aid to the fulfillment of personal potential.⁴⁹ Unlike the characterization of the telephone as a means of bringing others to the businessman in "The Multiplication of Power," here the telephone is represented as facilitating a much more dynamic exchange—it "conveys *his personality*," and "carries his voice with *directness* [...] with its tone qualities and inflections—things which are *vital* to the expression of personality" [emphasis in original]. No longer does the telephone bring others to the businessman, now it *connects* the businessman to others just like himself. In one sense, the telephone can be seen as a means of both producing and reproducing—even duplicating—the businessman.

While *you* are projecting *your* personality—the strength of your individuality, to the distant point, the party at the other end is projecting *his* personality, at the same instant and by the same means to you. *You are virtually in two places at once* [emphasis in original].

According to Warren Susman, the notion of 'personality' is a phenomenon of the twentieth century. In his study of self-help books, pamphlets, and articles

⁴⁹ Lears coined the concept of the "therapeutic ethos" to describe the response on the part of advertising professionals, medical practitioners, and reformers of all stripes to "a bourgeoisie suffering from identity diffusion and inner emptiness." The therapeutic ethos held out the promise of "harmony, vitality, and the hope of self-realization." See Lears, "From Salvation to Self-Realization: Advertising and the Therapeutic Roots of the Consumer Culture, 1880-1930."

The Sixth Sense—



An American's sense of projecting himself far beyond the skies and hills of his forefathers is largely responsible for his self-assurance—for his mental vigor and the progress which this has meant.

This Sixth Sense—the sense of projection—is due to the telephone. It is due to the *Bell telephone system* which at any instant conveys *his personality*, if not his person, to any part of the country. It carries his voice with *directness* to the ear of the person wanted. Carries it with its *tone qualities* and *inflections*—things which are *vital* to the expression of personality.

Bell telephone service is more than a mere carrier of messages. It is a system of sensitive wire nerves, carrying the perception-message to the nerve centre and the return message simultaneously. *It is the only means of communication which thus carries the message and the answer instantly.* While you are projecting your per-

sonality—the strength of your individuality, to the distant point, the party at the other end is projecting *his* personality, at the same instant and by the same means, to you.

You are virtually in two places at once.

Though this service is in a class by itself, the Bell telephone has no fight with the other public utilities. Its usefulness is dove-tailed into *all other utilities.* Each of the others is unquestionably made more effective by the Bell telephone.

A telegram is delivered from receiving office to house by *telephone.* The more people telegraph, the more they *telephone.* The more people travel, the more they *telephone.* The more energetically a man pursues business of *any* kind, the more he needs and uses the *telephone.*

The universal Bell telephone gives every other utility an added usefulness. It provides the Nation with its Sixth Sense.

A business man has one important arm of his business paralyzed if he does not have a Long Distance Telephone at his elbow. It extends his personality to its fullest limitations—applies the multiplication table to his business possibilities. It keeps things moving.

The American Telephone and Telegraph Company
And Associated Companies

Every Bell Telephone Is a Long Distance Station

5.22 AT&T advertising proof, 1909. (File 1, box 21, series 1, N.W. Ayer Advertising Agency Record. Reproduced with permission of the Archives Center, National Museum of American History, Behring Center, Smithsonian Institution.)

produced before and after 1900, he found that nineteenth century writings stressed the importance of developing one's *character*—with its corresponding values of “duty, democracy, work, [...] conquest, [and] integrity.” Twentieth century texts on the other hand employed a very different set of adjectives to describe personality—“fascinating, stunning, attractive, [and] forceful.” Susman noted that after 1900, success came to be represented less and less in terms of “mastering one's environment” (as was seen in AT&T ads such as “In Touch With His World” or “Annihilator of Space”) and more as a result of displays of “personal magnetism.”⁵⁰

Especially noteworthy—because it implies the significant role played by the telephone in the construction of the modern identity—is Susman's observation that every example of the “personality literature” he examined “stressed the importance of the human voice [and gave instructions on] methods of voice control and proper methods of conversation or public speaking. Everyone was expected to impress and influence with trained and effective speech.”⁵¹ A pleasant and persuasive speaking voice supplemented those other outwardly-directed qualities—such as an attractive appearance, good grooming, and good manners—which had taken on value with the rise of personality. But the attention paid to the qualities of the voice should not be seen simply as an example of the era's superficiality. The increased importance of the voice made sense in a society that had come to be reorganized across vast distances, and can be seen as an attempt to reconcile the tension between old and new conceptions of the self. When most interactions were face-to-face, people used physical clues to ‘read’ the truthfulness of another's intentions; in an age when

⁵⁰ Warren I. Susman, "'Personality' and the Making of Twentieth Century Culture," in *New Directions in American Intellectual History*, ed. John Higham and Paul Conkin (Baltimore: Johns Hopkins University Press, 1979), 220-221.

⁵¹ Warren I. Susman, *Culture as History: The Transformation of American Society in the Twentieth Century* (New York: Pantheon, 1984), 280.

business was transacted at a national scale, a sincere and confident manner of speaking came to be the equivalent of a steady gaze and a firm handshake.

Developing what a 1923 advertisement called "A Telephone Personality" moved quickly from being "a business and a social asset" to becoming a necessity for effective communication generally (Figure 5.23). An article in the *New York Times* in December of the same year reported that "[s]o important has become the use of the telephone in the conduct of business" that New York Edison Company employees were provided with a booklet on the proper use of the telephone and "examined in the company's educational courses to make certain that he or she [was] thoroughly familiar with good telephone procedure."⁵² While it can be argued that the technical imperfections of the late-nineteenth century telephone network forced the issue of clear enunciation and carefully-paced speech, telephone advertisements (and articles in popular magazines) that offered the public advice were quite explicit in their observation that the qualities that produced the best telephonic results—a restrained demeanor, quiet voice, and precise diction—were exactly those which were associated with middle-class manners.⁵³ Although Carolyn Marvin notes that "the diffusion of middle class standards of speech was advertised as a happy consequence of the spread of the telephone," it could also be seen as standardizing expression, generating universal forms of talk, a homogeneity of speech, and a general diffusion of a middle-class worldview.⁵⁴

⁵² "Finds Telephone Instruction Needed," *New York Times*, 2 December 1923, 13.

⁵³ A series of over 30 advertisements produced by the Bell Telephone Company of Canada in 1917 educated the public on all aspects of telephony, including numerous lessons on telephone manners and courtesy. File: Advertising, Bell Canada Historical Collection.

⁵⁴ Marvin, *When the Old Technologies Were New*, 90.



A telephone personality

In your face to face contacts with people, your appearance, your bearing and many other things help you to make the right impression. But in your telephone contacts there is only one thing by which you can be judged—your speech.

An effective telephone personality is to-day a business and social asset. Everybody appreciates the person who speaks distinctly and pleasantly, neither too fast nor too slow, with a clear enunciation of each word, with lips facing the mouthpiece and speaking into it. In business, this is the telephone personality which induces favorable action on the part of the listener. To the salesman it may mean the difference between an order and

no order; between an interview granted and an interview refused.

Curiously enough, people who are careful to make themselves effectively heard and understood face to face, often disregard the need for effectiveness in their telephone speech. Perhaps they shout, perhaps they mumble, perhaps they hold the mouthpiece far from their lips. And frequently they never realize that their carelessness has defeated the purpose of their talk.

The Bell System maintains for telephone users the best facilities that science, modern equipment, skilled operation and careful management can bring to telephone speech. But these facilities can be fully effective only when they are properly used.



"BELL SYSTEM"

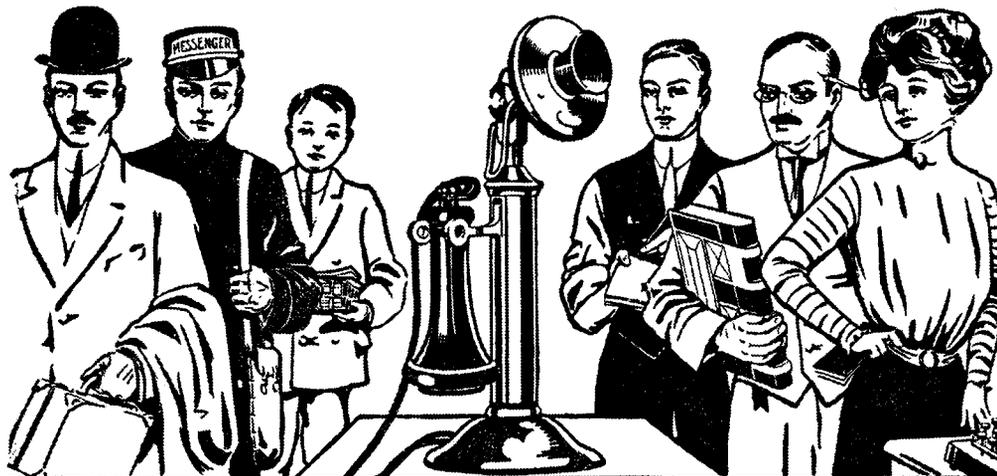
AMERICAN TELEPHONE AND TELEGRAPH COMPANY
AND ASSOCIATED COMPANIES

One Policy, One System, Universal Service, and all directed toward Better Service

5.23 AT&T advertising proof, 1923. (File 3, box 21, series 1, N.W. Ayer Advertising Agency Record. Reproduced with permission of the Archives Center, National Museum of American History, Behring Center, Smithsonian Institution.)

The themes of personality development and personal efficiency appropriated with such enthusiasm in telephone advertising resonated with their intended audience. For members of the business elite and increasingly the new professional-managers, the instantaneousness of telephone communication really did open up time and space and bring them into a wider world of interconnection. Other telephone users, such as salesmen, the employees of the New York Edison Company, and telephone operators, experienced the effects of the telephone on the self very differently. As business and commerce took to the telephone, it very quickly came to be seen and used as a tool for the acceleration of the work process and management of people—as it was within the Bell System itself. It can be argued that the telephone functioned as one of the key instruments for the application of scientific management principles in the white-collar workplace. While the office-place workforce enjoyed considerably better working conditions than factory workers, their labor came under as much scrutiny as the workers on Ford's famous assembly line. Speed-ups, surveillance, rationalization, and the threat of being replaced by new technologies were all real concerns for the new middle-class worker of the early twentieth century and the telephone was often as much a means of coercion as it was a tool of convenience. The Bell System advertisement titled "The Telephone as an Employee" [sic] does not mince words in its description of the value of the telephone to modern business owner (Figure 5.24):

The well managed modern business house, or mill, or factory, has no dead expense. [...] He realizes that the salary of an office boy or clerk will pay for a private branch exchange and that the salary and expenses of one traveling salesman will cost more than the cost of the most liberal use of local and long distance service. He puts the telephone on his payroll and makes it his most effective and profitable employe.



The Telephone as an Employe

THE well-managed modern business house, or mill, or factory, has no dead expense.

Each employe, each tool, each machine, must contribute in proper proportion to the success and the profits of the enterprise as a whole.

The progressive manager has more than a TELEPHONE—he has a TELEPHONE SYSTEM and a definite TELEPHONE POLICY.

He realizes that the salary of an office boy or clerk will pay for a private branch exchange and that the salary and expenses of one traveling salesman will more than equal the cost of the most liberal use of local and long distance service.

He puts the telephone on his pay roll and makes it his most effective and profitable employe.



A weekly telephone talk with the live man at headquarters will add 25 per cent to the value of any traveling salesman

For rates and other information regarding service, call the District Manager

**The Central District and Printing
Telegraph Company**

BELL SYSTEM



5.24 AT&T advertising proof, 1910. (File 1, box 21, series 1, N.W. Ayer Advertising Agency Record. Reproduced with permission of the Archives Center, National Museum of American History, Behring Center, Smithsonian Institution.)

Like their blue-collar counterparts, office workers increasingly came to be seen as interchangeable with the technologies they used in the course of their work. The advertisement's judgment that "[e]ach employe, each tool, each machine, must contribute in proper proportion to the success and the profits of the enterprise as a whole" is founded in the logic that flows from the observations of Charles Babbage and Adam Smith on the economic advantages of the division of labor, through Fredrick Taylor's rationalization of the labor process according to the findings of his time and motion studies, and to the assembly line concept introduced by Henry Ford.⁵⁵ Harvey writes that what distinguished Ford's approach was "flowing the work to a stationary worker"—and in this way the automated car-assembly line that Ford established at Dearborn Michigan in 1913 bore a marked resemblance to the telephone's ability to "bring people to the [American businessman] from every locality, far and near, *over the Bell Telephone System*," closing up the gaps in production, eliminating the distance between buyers and sellers, and synchronizing all aspects of purchasing, production, and distribution (Figure 5.21).

But perhaps even more telling is the comparison can be drawn from Antonio Gramsci's characterization of Fordism in 1934 as "the biggest collective effort to date to create with unprecedented speed, and with a consciousness of purpose

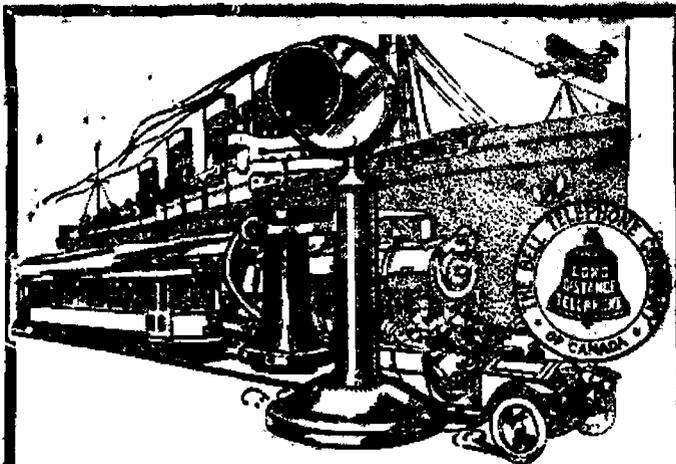
⁵⁵ On the role of the machine in the division of labor nineteenth century economist Alfred Marshall wrote "machinery constantly supplants and renders unnecessary that purely manual skill, the attainment of which was, even up to Adam Smith's time, the chief advantage of division of labour. [...] It is obvious that the efficiency of specialized machinery or specialized skill is but one condition of its economic use. [...] As Babbage pointed out [...] 'the master manufacturer by dividing the work to be executed into different processes, each requiring different degrees of skill or force, can purchase exactly that precise quantity of both which is necessary for each process [...].' [...] Just in the same way the economy of machinery requires that a powerful turning-lathe when specially arranged for one class of work [...] that should be such as to be worthy of the lathe, and not such as could have been done equally well by a much smaller machine. Here then, so far as the economy of production goes, men and machines stand on much the same footing." Alfred Marshall, *Principles of Economics* (1890). available from <http://www.marxists.org/reference/subject/economics/marshall/bk4ch09.htm>.

unmatched in history, a new type of worker and a new type of man."⁵⁶ If Ford's recognition of the need for high levels of consumption to match high levels of production was the first step towards building a society "through the proper application of corporate power," then his experiments in 1916 with worker socialization through company-sponsored programs of instruction in modern living revealed just how deeply the influence of corporate ideology would come to be felt.⁵⁷ Just as the worker on the assembly line who along with producing the automobile was himself (re)produced in the image of the system, so too the telephone user, caught in the ever-accelerating circuit of capitalist circulation, became at once the producer and the product of the telephone system.

Representations of the telephone's almost magical effect on the self found in Bell Telephone advertisements between 1909 and 1954 illuminate changing social perceptions of self-hood. While popular texts describe images of the self in the mid-1800s—prior to the invention of the telephone—as grounded in ideas and rhetoric of unity, integrity, and mutualism, a study of representations of the self in telephone advertising from the beginning to the middle of the twentieth century maps the gradual disintegration of that unified self by means of 'multiplication.' In the earlier advertisements, the telephone multiplied 'things and stuff,' such as the businessman's "power and his principality," it "applie[d] the multiplication table to his business possibilities," or acted to "multiply the hours," but by 1933 an AT&T ad announced the telephone presiding over "The Multiplication of You" (Figures 5.21, 5.22, 5.25, and 5.26).

⁵⁶ Antonio Gramsci, *Selections from the Prison Notebooks*. Quoted in David Harvey, *The Condition of Postmodernity. An Enquiry into the Origins of Cultural Change*. (Oxford: Basil Blackwell, 1989b), 126.

⁵⁷ *Ibid.*



Multiply the Hours

THE average business man finds his working hours all too brief.

What other means equal to the telephone for extending that personality so essential in every business transaction and to accomplish more in the time at his disposal?

How many firms continue to grow and yet expect the same volume of business to be done in the same premises which might have been adequate three years ago.

Your additional telephone equipment to meet the increased demands made upon it is equally essential. It promotes and retains trade.

**A Private Branch Exchange—Extension Telephones—
Intercommunicating System—Extra Desk Sets
— More Trunk Lines to Central.**

These, according to your requirements, whether for large or small office, store, warehouse or manufactory, are all means whereby you can get the full percentage of usefulness from your telephones, and mean perfection of telephone service both for you and those you do business with.

Apply to Contract Dept. Main 5480. We will give further particulars regarding cost upon learning your requirements. A call will bring our representative.

With 21,000 telephones in Toronto, which represent an enormous increase over the number three years ago, the increased number of people who are enabled to call your firm up will justify the increasing of your present telephone facilities to meet the situation.

THE BELL TELEPHONE COMPANY OF CANADA

5.22 Bell Telephone Company (Canada) advertisement, 1910. (BCHC: Advertising File. Reproduced with permission of the Bell Canada Historical Collection.)



THE MULTIPLICATION OF YOU



A NEIGHBOR, passing by, glances through your window and sees you in the living-room. But you are around the corner on Main Street, ordering from the druggist. You are in a nearby town chatting with a friend. You are in a distant city, delivering a message of cheer and assurance. You are across a continent, or an ocean, talking clearly and easily, as if distance had ceased to be. . . . Your neighbor, returning, glances in again. You are still in your living-room.

Your telephone is you. In a moment it multiplies and projects your personality to many different places and many different people, near or far. Part of your very self is in every telephone message—your thoughts, your voice, your smile, your words of welcome, the manner that is you. You use the telephone as you use the power of speech

itself, to play your full part in a world of people. With it in your grasp, you are master of space and time. You are equal to emergency, ready for opportunity, receptive to ideas, equipped for action. The extraordinary fact is that the more you use your telephone, the more it extends your power and personality.

All you see is the familiar telephone instrument in your office or home. Back of it are hundreds of thousands of trained employees, attending almost endless stretches of wire—so that you may call, easily and quickly, any one of more than sixteen million telephones in this country and an additional thirteen million in other lands.



You are cordially invited to visit the Bell System Exhibit in the Communication Building, Century of Progress Exposition, Chicago.

AMERICAN TELEPHONE AND TELEGRAPH COMPANY

5.26 AT&T advertising proof, 1933. Original inscribed: Inst. - Gen - E - July S.E.P. - June 17. (File 1, box 21, series 1, N.W. Ayer Advertising Agency Record. Reproduced with permission of the Archives Center, National Museum of American History, Behring Center, Smithsonian Institution.)

A neighbor, passing by, glances through your window and sees you in the living room. But you are around the corner on Main Street, ordering from the druggist. You are in a nearby town chatting with a friend. You are in a distant city, delivering a message of cheer and assurance. You are across a continent, or an ocean, talking clearly and easily, as if distance had ceased to be... Your neighbor, returning, glances in again. You are still in your living room.

Your telephone is you. In a moment it multiplies and projects your personality to many different places and many different people, near or far. Part of your very self is in every telephone message—your thoughts, your voice, your smile, your words of welcome, the manner that is you. You use the telephone as you use the power of speech itself, to play your full part in a world of people. With it in your grasp, you are a master of time and space. You are equal to emergency, ready for the opportunity, receptive to ideas, equipped for action. The extraordinary fact is that the more you use your telephone, the more it extends your power and personality.

This is no longer the omnipotent self that can be “in two places at once” but rather one whose attributes—thoughts, voice, smile, words, and manner—are perceived as divisible and marketable. The prosperity of the 1920s had ended in a spectacular economic collapse. If the public had not yet fully comprehended the degree to which the revolutions in transportation and communications had made markets—and individuals—interdependent, then the crash of 1929 and the Depression of the 1930s certainly made it evident. Rampant levels of unemployment and homelessness devastated traditional expectations and raised social anxiety. The upbeat tone of the advertisement echoed the self-help messages popularized in Dale Carnegie’s *How to Win Friends and Influence People* and Protestant preacher Harry Emerson Fosdick’s radio sermons on the virtues of positive thinking and individual initiative. Although the Depression all but wiped out the recent gains made by AT&T in the residential market, the company continued its expansion of international long distance service (with reduction of long distance rates) all through the decade.

While the Depression and then the World War that followed it had caused many to question the viability of capitalism, the prosperity of the post war boom silenced the majority of capitalism's critics and led people to believe that permanent economic stability and even permanent economic growth was achievable. Abundance, not social equality, was seen as the way to eliminate poverty and the goals of business were once again synonymous with national well-being. There were over 4000 mergers during the 1950s alone, resulting in large increases in corporate size and power as diversified conglomerates replaced single-industry businesses.

For the first time, white-collar workers outnumbered blue-collar workers, and most of them worked in corporate settings with rigid hierarchical structures. Dale Carnegie's message of "fitting in" became not only the way to succeed but also the way to survive in increasingly bureaucratic organizations. Technological developments increased worker uniformity and interchangeability. In the mid-1950s, IBM produced its first data-processing computers using transistors developed at Bell Labs in 1948. Customer toll dialing between New York and New Jersey became available in 1950, a development that would allow subscribers to place their own long distance calls, leading to the elimination of long distance operators. In 1952, Bell Laboratories made limited quantities of its first telephone answering machine available to business subscribers.

It is from this context that the 1954 Bell System advertisement titled "You'd Like To Have More Salesmen Like Him..." takes its meaning (Figure 5.27). As in the 1933 advertisement, it is not time or opportunities but rather the salesman himself who is multiplied by the telephone. But while the 1933 ad described the businessman using his telephone to project 'himself'—or rather his voice and personality—to

You'd like to have more salesmen like him



...and you can



He's the top man on your sales force. The last to complain that selling is tough, he's the first to need a new order book.

These days you wish you had more men like him. And that's where Long Distance telephone service can help you—and help him, too.

Long Distance multiplies any valuable salesman. It helps him to keep in close, regular touch with his present customers. Gives him more time to develop new accounts. Helps him cover more territory in fewer days. Sets up

appointments that often save hours of wasted waiting time.

In short, it makes the most productive use of salesmanship. You can prove it profitably in your own business.

Long Distance doesn't cost—it pays.

We have some specific suggestions for the profitable use of Long Distance in Sales, Purchasing, Administration, Traffic, Production, Engineering and Accounting. A call to your Bell Telephone Business Office will bring a representative to discuss them with you.

BELL TELEPHONE SYSTEM



**LONG DISTANCE RATES
ARE LOW**

Here are some examples:

New York to Philadelphia... 50¢

St. Louis to Indianapolis... 85¢

Cleveland to Chicago... \$1.00

New Orleans to Houston... \$1.05

New York to Los Angeles... \$2.50

These are the daytime Station-to-Station rates for the first three minutes. They do not include the new, lower federal excise tax of 10%.

Save time—Call by Number

5.27 AT&T advertising proof, 1954. Original inscribed: 1 page-7x10-Business Week, etc., June. (File 1, box 21, series 1, N.W. Ayer Advertising Agency Record. Reproduced with permission of the Archives Center, National Museum of American History, Behring Center, Smithsonian Institution.)

"many different places," the 1954 advertisement represented the telephone as the means by which the salesman could be kept in his place. Technologies like the telephone, the computer, and the answering machine, while promoted for their ability to reduce the amount or tedium of work, more often ended up increasing or 'multiplying' the number of tasks workers were assigned.

The telephone's ability to increase the productivity of capital is the underlying message of all of the advertisements discussed in this chapter. The themes of speed, efficiency, and instantaneousness which were used in advertising to help fashion new meanings of time and space were also used to describe the qualities of the modern man, creating ways of imaging a world that meshed more closely with the demands of life under monopoly capitalism.

CONCLUSIONS AND CONNECTIONS

Although the telephone has been a part of the everyday life for over a century—more than two decades longer than the radio, and over five decades longer than the television—it remains the least examined of the modern media. And while some excellent work has been done on the social and cultural histories of telephony and the political economy of the telephone industry, the banal and obvious fact of the telephone itself has been consistently overlooked.

This dissertation has shown that contrary to the prevailing perception that the appearance of the telephone has somehow escaped “the vagaries of taste and the manipulations of the marketplace,” a closer look at the history of the telephone tells another story.¹ From the first wooden box prototype telephones until telephone design was finally truly standardized with the introduction of Dreyfuss’ 300-type model, the look of the telephone was important to the people who made it and to those who used it. Far from being indifferent to its design, subscribers made were

¹ Sorkin, “Just a Phone Call Away,” 25.

quick to register their disapproval and their preferences with telephone companies. Early telephones were crafted using techniques appropriated from cabinetry and woodworking. Well into the early years of the twentieth century, different craftsmen produced telephones that differed in their details. And as much as official accounts might downplay it, even after the telephone was standardized, telephone companies were forced to contend—and sometimes comply—with consumers' demands for 'attractive' styles.

When Mr. Legge approached AT&T about making his marble telephone in 1933, the crafts aesthetic with its traditional way of thinking about and making objects had waned but was not yet fully extinguished. The techniques and practices associated with mass production were still in the process of being formulated and improved. Manufacturers were experimenting with new materials, implementing new technologies and systems, and debating new ideas. Plastics, such as Bakelite, held great promise but needed to be refined before they could be dependably used in manufacturing. Fredrick Winslow Taylor's ideas about efficiency, conceived in the last years of the nineteenth century, were just beginning to be systematically applied—though they were not always welcomed—to the labor process and the workplace.

One thing that the ethos of mass-production was slow to displace was the desire for style and distinction in the objects that people owned. The desire expressed by middle-class consumers for fashionable telephones—the French phone and then color telephones—should be seen as an attempt to retain the values associated with a crafts aesthetic—"beauty," refinement, style—and apply them to the products of mass production. Whether Mr. Legge in fact built his marble telephone or not, the fact that his plan to do so came over fifty years after Bell had introduced its first 'standard' telephone and over twenty-five years after it had

implemented its strategies of systematization, is evidence of the tenaciousness of traditional values and ideas associated with the things of everyday life. Appreciation for the aesthetic associated with technology—with its emphasis on efficiency, universality, speed—was not automatic. Like other aspects of modernity, it needed to be acquired and normalized.

Philosopher Henri Lefebvre has argued that the loss of 'style' was one of the key consequences of the shift to modern capitalist production, when the look of things no longer corresponded to the desires or the creativity of individuals but rather to the needs of "the productive forces, the technological means and the specific problems of the modern world."² While designers and design historians typically acclaim the telephone as the supreme example of a purely functional object untainted by consumerist sentiment, they do so only by ignoring the rich history of early telephone manufacturing and the many ways in which subscribers found to challenge and subvert AT&T's insistence on the telephone's utilitarian image.³ They also fail to appreciate that the telephone's functional design was no less a strategy of modern capitalism than the use of fashion and style obsolescence as solutions to the problems of over-production.

Telephone advertising can be seen as a second moment in the modern capitalism's production of the telephone, a moment when the telephone is reproduced in its image form. This study has looked at the discourses of speed which informed telephone advertising at the early years of the twentieth century and argued that they gave the public ways of imagining the new spatial and temporal coordinates of the modern world and familiarizing themselves with the accelerating

² See Lefebvre, *The Production of Space*, 123-126.

³ The view of the telephone as an icon of functional design is prevalent in histories of design. The most outspoken proponent of this view is design critic Michael Sorkin. See Sorkin, "Just a Phone Call Away."

tempo of modern life. More than simply promote telephone service, advertising described new protocols and practices for capitalist competition, illuminated the attendant transformation of social relations, and gave form to new conceptions of the self. Because it captured—and defined—modernity’s sensibility and aesthetic, advertising played a significant role in shaping the public’s understanding, and ultimately, their experience of speed as a sensibility of modern life.

This dissertation has focused on the overwhelming majority of early telephone advertisements which were directed at the businessman and promoted the business uses of the telephone and has demonstrated how they addressed and expressed the criteria of monopoly capitalism. When AT&T recognized and then began to pursue the residential market in earnest in the late 1920s, advertising for the domestic telephone became a critical site for the creation of images and ideas that reflected the new role of the home and the homemaker in a society increasingly organized around the rationalization of consumption. It is valuable to briefly consider here how ideas about speed, under different guises, made an appearance in advertising targeted at the domestic sphere. A comparison between the 1954 advertisement “You’d Like to Have More Salesmen like Him...” and the 1957 advertisement, “This is Your Wife” is enlightening (Figures 5.27 and 6.1). While the telephone ‘multiplied’ the salesman as a way to intensify his labor and make “productive use of [his] *salesmanship*,” its effect on the homemaker was one of division: the telephone “help[ed] her to become five busy people.” The advertisement’s representation of the telephone’s ability to re-create the homemaker—as a divided-self—is equally expressive of her role in the new consumer society. Telephone advertising could be seen as providing a blueprint for the symbolic construction of the middle class



This Is Your Wife

How the telephone helps her to be five busy people

This is the pretty girl you married.

She's the family chef. And the nurse. And the chauffeur and maid.

And when she's all dressed up for an evening out—doesn't she look just wonderful!

How does she do it?

Of course she's smart and it keeps her busy, but she never could manage it without the telephone.

When the "chef" needs groceries, she telephones. Supplies from the drugstore? The "nurse" phones her order.

A train to be met? The telephone tells the "chauffeur" which one. A beauty shop appointment? A call from the "glamour girl" makes it easily and quickly.

Handy, ever-ready telephones—in living room, bedroom, kitchen and hobby room—mean more comfort, convenience and security for everybody.

Working together to bring people together . . . BELL TELEPHONE SYSTEM

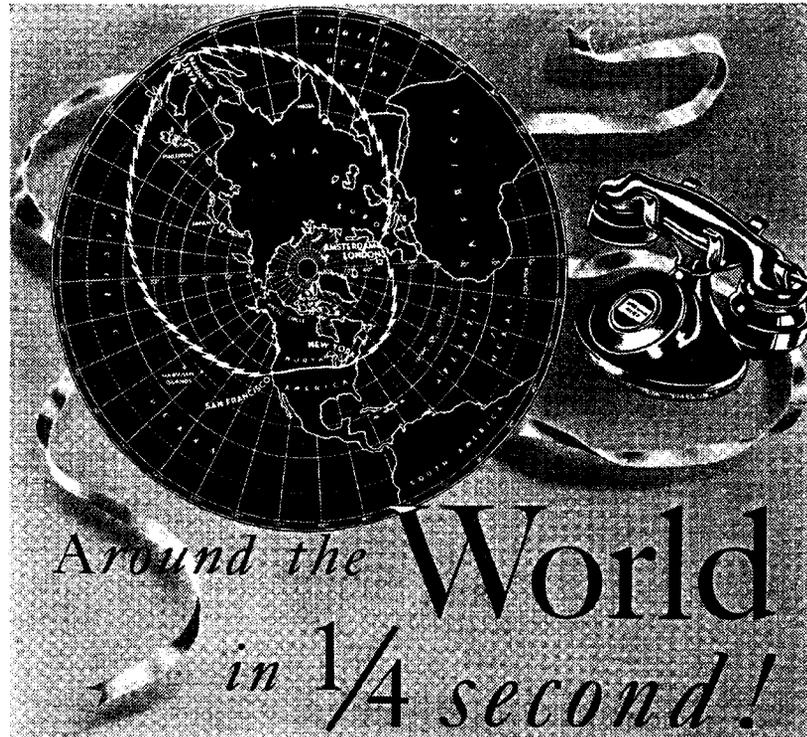


6.1 AT&T advertising proof, 1955. Original inscribed: 1 page-8 5-16 x 11 1-4—*American Home*, Oct., 1957. (File 2, box 15, series 1, N.W. Ayer Advertising Agency Record. Reproduced with permission of the Archives Center, National Museum of American History, Behring Center, Smithsonian Institution.)

home—with its modern (but not necessarily new) gender roles and family ideals mediated by technology and grounded in consumerism.

Telephone advertising also provided a way in which the public could imagine the expanded boundaries of 'the modern world' and come to terms with the new international scope of the economic and political power relations which defined monopoly capitalism. AT&T produced hundreds of advertisements which document the telephone's increasingly dramatic 'annihilation of space by time,' its colonization of global space, and its homogenization of (cultural) difference. A particularly compelling example is the 1935 advertisement with the headline "Around the World in 1/4 second!" (Figure 6.2). Above the headline floats a two dimensional image of a globe, showing the five continents from a vantage point suspended high above the North Pole. Beside the globe and slightly behind it sits a telephone. A loose ribbon laying in the background, suggestive of the telephone wires encircling the world, appears as though it is about to be used to wrap up the globe like a parcel or gift. New York—located close to the center of the image thanks to a skillful compression of the Arctic—is linked with San Francisco, Randoeng in Java, Amsterdam, and London by a ring of tiny lightening bolts which completes its circuit back at New York. The lightening bolts symbolize the speed of electrified speech, and its alacrity is reproduced in the staccato of the ad copy:

It is 9:30 A.M. in New York City. The President of the American Telephone and Telegraph Company is sitting at a desk. Fifty feet away, in another office, a Vice-President of the Company is at his desk. The President picks up his telephone and speaks. Faster than you could ever imagine, his voice speeds across the continent to California—where it is only 6:30 in the morning.



IT IS 9:30 A. M. in New York City. The President of the American Telephone and Telegraph Company is sitting at a desk. Fifty feet away, in another office, a Vice-President of the Company is at his desk. The President picks up his telephone and speaks. Faster than you could ever imagine, his voice speeds across the continent to California — where it is only 6:30 in the morning.

The voice leaves the telephone wires, and, magnified many millions of times by short-wave radio, hurdles the rolling Pacific. 9000 miles from San Francisco, at romantic Java in the Dutch East Indies, the voice gathers new energy and rushes 7000 miles across Asia and Europe toward England—traveling the last lap by submarine cable under the North Sea.

The hands on Big Ben, in

London, show 2:30 in the afternoon as the voice leaves England and leaps the Atlantic to Netcong, New Jersey, U. S. A. A few miles more, by telephone cable, and the head of the Bell System is heard by his associate—whose reply is traveling over the same route but in the opposite direction! For the first time in history, men's voices have girdled the globe in a two-way conversation . . . and in only one-quarter of a second.

It is unlikely that you will ever ask such service from your telephone. But it is thrilling to think of the possibilities in that black instrument standing so calmly on the table in your living-room. At any moment of the day or night, because of the facilities offered by the Bell System, you can speak by telephone to almost any one, anywhere in the world!



B E L L T E L E P H O N E S Y S T E M

6.2 AT&T advertising proof, 1935. Original inscribed: Inst. Juvenile Boys & Girls Sept. & Oct. Release Cut. (File 1, box 21, series 1, N.W. Ayer Advertising Agency Record. Reproduced with permission of the Archives Center, National Museum of American History, Behring Center, Smithsonian Institution.)

The voice leaves the telephone wires, and, magnified many millions of times by short wave radio, hurdles the rolling Pacific. 9000 miles from San Francisco, at romantic Java in the Dutch East Indies, the voice gathers new energy and rushes 7000 miles toward England— traveling the last lap by submarine cable under the North Sea.

The hands on Big Ben, in London, show 2:30 in the afternoon as the voice leaves England and leaps the Atlantic to Netcong, New Jersey, U.S.A. A few miles more, by telephone cable, and the head of the Bell System is heard by his associate – whose reply is traveling over the same route but in the opposite direction! For the first time in history, men’s voices have girdled the globe in a two-way conversation...and in only one-quarter of a second.¹

It is noteworthy that this advertisement was designed to appear in popular children’s magazine—one of a series that undertook to explain the telephone to a youthful readership. These ads were fashioned as primers on topics that might be of interest to the school-aged boy or girl, such as the manufacture of the telephone or the scientific principles behind its invention. But they were also eloquent, in words and images, about the ways in which the telephone had altered the temporal and spatial coordinates of the modern world, transformed social relations, and perceptions of the self. This advertisement’s transparent reference to Jules Verne’s 1916 novel, *Around the World in Eighty Days*, was no doubt meant appeal to the youthful readers of the magazine, but the allusion also acts to summon up images of travel that, by comparison, seem both slow and quaint. In Verne’s novel, set in 1872, the characters use all kinds of conveyances including trains, air balloons, ships, and steamers to travel from place to place in their race to circumnavigate the globe in eighty days. In contrast, the telephone that appears in the advertisement—quite appropriately a French phone with all its connotations of

modernity—is no less than a “*speed-instrument*,” a time-and-space machine that allows one to ‘travel’ around the world instantaneously.⁴

While I argue that advertising played a key role in diffusion of modern ideas and ideals, it is important to recognize that the relationship between advertising and creation of cultural knowledge is not a straightforward one. Telephone advertisements did not invent the concepts they engaged; rather, they interwove emerging perceptions and themes arising in popular discourse to make sense of the new possibilities offered by the telephone. They provided what can be called “a mediating pedagogy” between the reality of an experience and how it came to be imagined and understood.⁵ The influence of advertising and on social conceptions of the world must be seen as taking place in collaboration with the many emerging practices and institutions of the late nineteenth century. The dramatic changes that accompanied the introduction of new systems of industrial production, increasingly rapid transportation, and long distance communication had no context within conventional perceptions and traditional practices of the late nineteenth century. Design and advertising served both as sources of information and sites for the negotiation about the meaning of these changes.

While the diffusion and use of new technologies must be seen as having the greatest effect on emerging perceptions of reality because they did in fact change individuals’ experience of reality, the roles played by design and advertising should not be underestimated. The appearance and shape of a technological object had an impact on how it was perceived and how it spoke to its intended audience and uses. Concepts about the system influenced the design of telephone instruments and

⁴ Casson writes, “the telephone is above all else a *speed instrument*” (emphasis in the original). Casson, *The History of the Telephone*, 271.

⁵ James Donald, *Imagining the Modern City* (Minneapolis: University of Minnesota Press, 1999), 63-65.

apparatus, and these ideas materialized in the layout of the telephone network and the organization of the telephone industry. Through its images and texts, advertising circulated ideas about modern values nationally, and acted to interpret for individuals the meaning and experience of electric communications in their daily lives. When considered in the context of cultural and social events, the design of the telephone and its representation in advertisements and popular media offer important insights into the values and debates of the era. While they do not directly reflect how people used the telephone, they do show us how the public was encouraged to imagine it and allow us to speculate on how they might have made sense of it and its place in everyday life.

Dick Hebdige has observed that "far from being silent, the number of voices which speak through 'dumb things' are legion. The enigma of the object resides for us less in its 'silence,' its imagined essence than in the babble which proliferates around it."⁶ In this dissertation I set out to listen to and make sense of the "babble"—those discourses from which the telephone draws meaning as well as those discourses that it animates. My study has implicitly argued for and demonstrated the relevance of a critically and historically grounded study of design and representation to mapping the history of modern media. By examining how our knowledge of the media we use is formed, it has provided insight into how design and popular representations negotiate social knowledge and has illuminated the links between the histories of modern media and the histories of their representation.

⁶ Hebdige, "Object as Image: The Italian Scooter Cycle," 80.

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