LECTURE FOUR: ELECTRICITY CREATES THE WIRED WORLD

Overview

Despite the various developments in the communication process which we have previously discussed in our earlier lectures, the fact remained that communication at this time was still dependent on transportation (slide) – in other words, the medium of communication had to be physically moved from one point to another. Electricity however, paved the way for a new era in communication technology – one in which communication was (slide) disarticulated from methods of transportation. Although, this in itself was not a particularly new concept – examples of some of these earlier methods of transmitting messages without the use of a specific medium include (slide) – talking drums, smoke signals, heliographs (the use of polished metal to flash signals across distances) and torch signals.

The Navy used the semaphore system of communication (slide) – a series a flag movements (slide) which enabled messages to be transmitted from ship to ship or ship to land. This concept provided the inspiration for “the construction of [a] land-based system of towers that used mechanical arms to signal numbers in a codebook as well as alphabet letters” (Crowley & Heyer 2003:120). The most developed system of land-based semaphores (slide) was produced in France – the Chappe telegraph enabled messages of up to several sentences to be transmitted “from the south of France to Paris in under four hours” (Crowley & Heyer 2003:120). However, the question remains – was the development of the optical telegraph, and later the electric telegraph, a direct result of cultural determinism? In other words, (slide) what came first – the telegraph or the need for rapid information transmission? The invention and wide-spread use of the optical telegraph system indicates that (slide) civilization had advanced to a point where it had developed a strong need and desire for rapid communication over distances. And (slide), it is initially this need for a certain ability or requirement that ultimately drives the search for and development of technology that can fulfill these needs in society.

Electricity was to have a significant impact not only on the optical telegraph, but also on the communication process as a whole. “With the coming of the [electrical] telegraph in the 1840s, words were transformed into electrical impulses” (Crowley & Heyer 2003:120). This combination of short and long electrical impulses (slide), known as Morse code, was then transmitted through a network that eventually spanned the entire continent. Yet while this rapid ability to communicate across vast distances technically (slide) existed independent of modes of
transportation, the railroad still played a significant role in the spread of the telegraph network. In fact (slide), “almost everywhere the railroad went, the telegraph [inevitably] followed” (Crowley & Heyer 2003:120). This arrangement proved to be mutually beneficial to both parties – telegraph companies benefited from using “an already established right-of-way”, whilst the railroad benefited from “the telegraph’s ability to monitor rail traffic and warn of breakdowns” (Crowley & Heyer 2003:120).

While initially in the 1840s, the telegraph (slide) emerged as a national communications network, by the end of the 19th century (slide), it had become “a global system” (Crowley & Heyer 2003:120) of communication. Tom Standage explores this progression in his essay entitled *Telegraphy – the Victorian Internet*. According to Standage, the United States employed a very different system of operation to Europe’s in that the government refused ownership and operation of the telegraph network system, thus enabling the establishment of “one of the first corporate media monopolies in the United States, Western Union, and set the stage for a future of private ownership of the new electronic media” (Crowley & Heyer 2003:120).

Telegraphy was also to have a significant influence on the newspaper, and the manner in which news was reported, particularly in the development of new “journalistic practices” (Crowley & Heyer 2003:121). In the third essay of this section – *The New Journalism*, Micahel Schudson examines two major forms of journalism that emerged in the later part of the 19th century – the information press and the entertainment press. (slide) Information press mainly consisted of political and economic news, and as such was tailored more toward the business community. The entertainment press however (slide) tended to revolve around the dramatic, and often scandalous, lives of others, and was instead directed towards “a growing urban working class” (Crowley & Heyer 2003:121). Both forms of press were directly connected to “a new system of reportage” (Crowley & Heyer 2003:121) in which stories were sent to major centers where they were pooled together (slide) and forwarded along through such “telegraph-based wire services” (Crowley & Heyer 2003:121) as the Associated Press (AAP). Schudson also demonstrates “how newspapers (slide) created new forms of meaning in response to social and technological changes that yielded a new reading public” (Crowley & Heyer 2003:121) – these changes eventually leading to the establishment of mass society in the 20th century.

The next major electrical-based communication medium after the telegraph was the telephone. This technology, invented “in the third quarter of the 19th century” (Crowley & Heyer 2003:121) was based upon voice transmission (slide), and as such, had several distinct advantages over telegraphy. The telegraph was primarily based around written communication – words were translated into Morse code and then translated back. Therefore, those operating the telegraph not
only had to be skilled in Morse code, they also had to be literature. As such, it simply was not viable for the telegraph to be incorporated into the average home. The telephone was initially used primarily “in the urban context of (slide) business and government” (Crowley & Heyer 2003:121). Ironically, it is within these same areas that telegraphy had its beginning. This illustrates what seems to be “a recurring theme in the history of communications” – namely that it is often the case that a new medium simply “tries to do what was already the preserve” (Crowley & Heyer 2003:121) of earlier forms of communication. However, it does this in such a way as to avoid “the problems and limitations of its predecessor” (Crowley & Heyer 2003:121).

Other benefits of the telephone included its ability for “rapid two-way exchange” (Crowley & Heyer 2003:121), which proved extremely beneficial in speeding up business decisions. The telephone was also interactive (slide), enabling person-to-person contact. It is therefore hardly surprising that telephones gradually began to penetrate domestic space (slide). As this transition occurred, (slide) so too did there occur a slow decline in the number of telegraphers, who were instead replaced by the growth of telephone exchange operators as one medium gradually began to make way for another. Alexander Graham Bell was perhaps best known as the inventor of the telephone. However, as Claude S. Fischer discusses in his essay, The Telephone Takes Command, Bell was also a businessman trying “to build a viable business around early telephone technology” (Crowley & Heyer 2003:121) in an intersection of innovation and business (slide). Initially, the invention of the telephone was seen as more of “a novelty than [as] a practical tool” (Crowley & Heyer 2003:121), with early use of the telephone (slide) centering around “simple two-point communications” – for example, “between two buildings of the same firm or between the home and office of an executive” (Crowley & Heyer 2003:121). (slide) It wasn’t until switchboards were installed that the telephone began to seriously compete with the telegraph as a general communications tool. In fact, in the period after the 1880s, “the telephone grew as rapidly as exchanges could be installed” (Crowley & Heyer 2003:121).

Carolyn Marvin in her essay, Inventing the Expert, examines another important development that the “rise of [such]…electricity-based communication systems” (Crowley & Heyer 2003:121) as the telephone generated – namely the need for ‘electrical literacy’. (slide) What exactly is ‘electrical literacy’? The flood of new technology that occurred after the advent of electricity resulted in an increased need for experts trained in the functioning and operation of these new systems. “Trade and technical journals arose to support the standardizing and dissemination of expert knowledge” (Crowley & Heyer 2003:122). This, combined with the eventual development of trade schools and associations helped to establish this sense of ‘electrical literacy’, and “in the process [built]…a culture of electrical insiders” (Crowley & Heyer 2003:122).
In the final essay of this section – *Time, Space and the Telegraph*, James W. Carey uses the example of the telegraph to effectively demonstrate “the impact of a new media on culture and society” (Crowley & Heyer 2003:122). Carey’s argument shares certain similarities with a concept raised by Harold Innis in the first section of the textbook dealing with *Media in Ancient Times*. According to Crowley and Heyer (2003:122), Crowley drew on (slide) “Innis’s emphasis on space and time to suggest how the telegraph – and by extension the telephone – helped reshape a range of business practices”. How (slide) exactly? One example that Carey uses is how the telegraph “brought diverse regional centers of buying and selling under [one]…unified price and market system”, and the subsequent establishment of “standard time zones” (Crowley & Heyer 2003:122). Perhaps we all should (slide) consider the many ways that electrical technology has either changed or influenced our own lives!

**FOCUS: Headrick and The Optical Telegraph**

Up until the 1790s and the development of the optical telegraph, (slide) the communication process was often slow and cumbersome, relying on “messengers and the postal system” to meet the “everyday needs of governments and merchants, with fire signals” (Headrick 2003:123) used in emergency situations. Claude Chappe’s invention however, enabled messages of any description to be sent “in either direction much faster than any horse could gallop” (Headrick 2003:123). It is important to stress at this point that (slide) “it was the demand for rapid communication that created the telecommunications systems, [and] not the other way around” (Headrick 2003:123). It is this distinction that lies at the heart of cultural determinism – does technology determine a culture’s development, or do the particular needs and requirements of a culture determine technology’s development? It is very clear that in this particular case there definitely existed a cultural demand for faster communication which, in turn, inspired the search for a technological solution. It is also important to remember that while the design of Chappe’s optical telegraph was original, the concept behind it wasn’t. From the time of the Ancient Greeks, whether it be a system of large vases or a series of boards on hilltops, mankind has long been searching for ways to communicate with each other across vast distances. However, up until the 1790s there lacked the necessary demand and subsequent investment needed to turn any of these concepts into reality.

Claude Chappe’s optical telegraph basically consisted of a T-shaped structure with (slide) “a post topped by a thirteen-foot-long board…at both ends of which were six-foot boards” (Headrick
2003:124). By moving the boards in a variety of ways, up to 98 positions could be created to indicate particular signals. There were several types of code that Chappe initially tried in order to increase the range and efficiency of the messaging system. Eventually in 1830, he issued a code that “contained 45,050 [different] words and phrases” (Headrick 2003:124). Such a complex system of communication also required an extremely “skilled and efficient administration” operating it to ensure that messages were quickly and accurately transmitted and received. However, despite the fact that a message could be sent the 760 km between Paris and Toulon in just 12 minutes – a journey that would take a messenger by horseback three days to do – the overall system had two major weaknesses. (slide) First, in order for the telegraph to effectively work, it depended “on the punctilious performance of duty by every member of the organization” (Headrick 2003:125), with absolutely no margin for human error. Its second weakness was its susceptibility to such natural elements as the weather and time of the day. The system completely shut down in rain or fog and was basically useless at nighttime. In fact, on average, the optical telegraph was generally only operational “six hours a day in summer, [and only] three in winter” (Headrick 2003:125).

One of the first major applications of the optical telegraph was for the military. Chappe’s system was approved at the height of the French Revolution, and almost from its very beginning “it had a profound political, even ideological, significance” (Headrick 2003:126). Its use was seen almost as an act of defiance to those who felt that France’s size was a major deterrent in its attempt to form a Republic. As such, the telegraph’s ability to transcend distances was seen to be an essential component in the establishment of national unity and “the formation of the French nation-state” (Headrick 2003:126). In fact, the telegraph was so highly valued (slide) “as a means of consolidating and defending the unity of the nation” (Headrick 2003:126) that the French government placed the entire system under the jurisdiction of the Ministry of War. It is precisely this premise of dominance and control that is thought to have been the defining factor in the telegraph’s overall success. The entire network was simply too costly and complex, and too closely connected “to the government to be anything but an expression of power and culture” (Headrick 2003:125).

Others claim that the telegraph’s success was rather a matter of circumstance, in that its invention was a direct result of a time when humans were fascinated by the concept of reorganizing and transcending space and time. The optical telegraph was therefore, “not only a response to war but [was] also a child of the Age of Reason” (slide) (Headrick 2003:126). However, war and reason were not two factors completely unique to France at this particular point in history. It is then hardly surprising that the concept of the telegraph not only spread to but
was embraced by other countries around the world. As the war with France continued, the British rushed to find an alternative means of communication based upon Chappe’s system. Other interpretations also appeared in Sweden and Spain at this time. However, it does appear that war was the driving force behind its use as the initial “flurry of interest in optical telegraphy [that occurred] throughout Europe in the 1790s” appeared to fade during peace-time – in fact, the British system was basically discontinued in 1814. It wasn’t until “after a forty-year lull, [that] interest…[was once more] revived in the 1830s” (Headrick 2003:127), with the incorporation of electricity into telecommunications.

The next great advance in telegraphy was developed by Samuel Morse whose “contribution was not the electrical telegraph but a code that allowed the use of only one wire” (Headrick 2003:128) (slide). Not only did this save tremendous cost, the use of the code also enabled up to 60 characters to be sent along the network every minute, as opposed to the optical telegraph which could only transmit between 10 and 20 characters every minute. The electric telegraph’s performance was also not hindered in any way by bad weather or nighttime conditions. According to Headrick, the advent of the electric telegraph could only be described as revolutionary. (slide) “(I)t represented a quantum leap in capacity and flexibility” whilst demonstrating “a radical decline in cost compared with its optical predecessor”, opening up the way for real-time information to be transmitted – first to stockbrokers, railways and merchants and “finally to the general public” (Headrick 2003:129).

**FOCUS: Carey and Time, Space, and the Telegraph**

According to Carey (2003:157), “the simplest and most important point about the telegraph is that (slide) it marked the decisive separation of ‘transportation’ and ‘communication’”. After its advent, geography was no longer an issue in regards to the speed with which a message could be conveyed. However, as this topic has already touched upon in this section, we will instead concentrate on Carey’s argument that (slide) the telegraph’s effect was not only on the spatial, it also influenced the temporal. In other words, time as well as distance was simply no longer a factor in communication. It was realized that “not only can information move independently of and faster than physical entities”, it can also “be a simulation of and control mechanism for what has been left behind” (Carey 2003:158). This was particularly evident in the railways. Telegraphs could circulate along the network much faster than any train could travel and warn the train driver of any problems further along the track.
This time component of telegraphy was also to reshape the marketplace (slide), forever changing the way products were bought and sold. Before the telegraph, “the principal method of trading” (Carey 2003:159) was a system known as arbitrage (slide), in which products were purchased in one particular location for a cheaper price before being moved to a different area to be sold at an inflated price. This was made possible by the fact that before the telegraph, markets existed independently of each other, as such “prices of commodities were largely determined by local conditions of supply and demand” (Carey 2003:159). This allowed certain entrepreneurs to make significant profits by shifting products between these independent markets to take advantage of the best prices. The telegraph however, enabled a line of communication to be established between these various markets, thus ensuring that “the conditions of supply and demand in all markets [came] to bear on the determination of a price” (Carey 2003:159), effectively eliminating arbitrage from the trading system.

Yet this was not the full extent of the telegraph’s influence. “After the telegraph, commodity trading moved from trading between places to trading between times” (Carey 2003:159). Future product speculation thus became the basis of trade. According to Carey (2003:160), this system of moving “commodities out of space and into time” had three other consequences (slide) besides the elimination of arbitrage that were “of great importance in examining the effect of the telegraph”. First, no longer were local conditions of any significance to marketplace supply and subsequent demand. Second, goods were traded and circulated completely independent “of the actual physical movement of goods” (Carey 2003:161). Commodities were instead represented by the exchange of warehouse receipts. The third consequence was the establishment of a grading system – products were no longer “shipped in separate units” but were “mixed, standardized, [and] diluted in order to be reduced to a specific, though abstract, grade” (Carey 2003:161). The telegraph was also of fundamental importance in the establishment of standardized time zones. Carey (2003:162) concluded his essay by summarizing that the advent of the telegraph, and “the growth of communications in the nineteenth century [in general] had the practical effect of diminishing space as a differentiating criterion in human affairs”.

**Australian Perspective: Telegraphy in Australia**

Unfortunately, there isn’t a wide range of resource available on this subject which is why we are resorting to a text published in 1984. However, Moyal’s *Clear across Australia – a history of telecommunications* is a fairly comprehensive examination of Australia’s communication history. According to Moyal (1984:61), “the impact of the overseas cable on the Australian Colonies was
immense” (slide). This is hardly a surprising statement when you consider just how isolated Australia was at this particular point in history, when all news and information had to travel by ship for months before it could be received.

It seems that one of the first major applications of the telegraph in Australia was in relation to the mining industry (slide). In fact, “even before the overland telegraph was completed, the line merged as a generator of speculation and mining growth” (Moyal 1984:61). Details of newly discovered goldfields for example could quickly be transmitted along the line fuelling goldrush fever as prospectors quickly reacted to the news. The telegraph also (slide) generated considerable overseas investment in the Colonies, so much so that by “the early 1890s so great was British investment interest in Australian minerals, stimulated by the quick exchange of information, that London replaced Melbourne as the great investing centre for the Colonies” (Moyal 1984:62). The capital generated by these investments aided the growth and development of Australian society. Trade routes were also established (slide), with the flow of products and orders between England and Australia steadily increasing. In short, the telegraph “bolstered the prosperity of a country which depended heavily in its remoteness on accurate information for the successful transaction of its overseas trade” (Moyal 1984:63).