History of Communications Media

Class 4

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What We Will Cover Today

- Telephone
  - Its Invention & Implications
- Still Photography
  - The Film Era
- Typewriter
  - What Christopher Scholes & Remington Wrought

Telephone

- Alexander Graham Bell
  - Son of a professor of elocution in London & Edinburgh who emigrated to Canada
  - Taught deaf mutes in Boston. There
    - Met Gardiner G. Hubbard, an affluent businessman and philanthropist
    - Married Hubbard's deaf daughter, Mabel
    - Became professor of vocal physiology and elocution in 1873
    - Conceived of the telephone in July 1874

Graham Bell began teaching deaf-mutes in Boston in 1871, where he met Gardiner Greene Hubbard, an affluent businessman and philanthropist. One of Hubbard's daughters, Mabel, had been deaf from scarlet fever since the age of five. She became one of Bell's pupils. He fell in love with her and they were married. Bell was very sensitive to the psychological plight of deaf children and gained the support' of Sarah Fuller, a prominent Boston teacher of the deaf. He became interested in multiple telegraphy as a means of communication and tried to make an instrument for transmitting sound vibrations.

Bell's considerable reputation as a teacher led Lewis Monroe, dean of the School of Oratory of the recently formed Boston University, to offer him a chair in vocal physiology and elocution in 1873. This provided him with a permanent base from which he could pursue his research. Bell was the first person to realize that the electrical transmission of the human voice was physically possible and commercially practicable.

Origins of the Telephone

- Invention of the duplex and quadraplex telegraph showed:
  - A telegraph wire could be made to carry the traffic of first two and then four wires
- Concept of the harmonic telegraph
  - Bell's experience with a stuck reed led to the realization that a wire could also transmit a voice message
- Bell obtained a patent for the telephone on March 7, 1876

Duplex Telegraph - In 1872, Joseph Stearns of Boston built and patented a *duplex telegraph* which could send messages over a single line in both directions simultaneously.

Quadraplex telegraph - In 1884, Thomas Alva Edison invented the *quadraplex telegraph* which enabled a single wire to carry four streams of traffic

Harmonic telegraph - The duplex and quadraplex had shown that with the right approach, a single telegraph wire could carry the traffic of first two and then four wires. Could a wire carry even more traffic? Since such an invention would save telegraph companies a lot of money, many inventors tried. One possible approach was a *harmonic telegraph* -- use of a series of reeds vibrating at different frequencies with each separate frequency sending an electrical signal that would be combined, sent down a telegraph wire, and then separated out at the other end using an identical series of reeds, each of which would respond only to the signal generated by its counterpart. By starting and stopping the vibrations of each reed to make dots and dashes, Morse telegraphy would be possible. Eventually, Western Union's Varioplex system in 1936 enabled a single wire to carry 72 transmissions (36 in each direction) simultaneously.

The stuck reed - Bell conceived the idea of the telephone in July 1874. While he was working on a harmonic telegraph, Thomas Watson's plucking of a stuck reed caused the sound of the reed's twang to be heard. Bell realized that with a few modifications, his device could transmit any sound – including the human voice.

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How the Telephone Worked

- Caller would talk into vibrating plates or reeds
  - This would induce a continuous fluctuating current
  - Current would carry the exact amplitude and voice frequency along a wire
  - An electromagnet at the receiver would transform the current into pulses of magnetic force
  - These pulses would act on another set of tuned reeds to reproduce the original sound

Creation of the Bell System

- Hubbard was excited by Bell's invention
  - Opposed Western Union because it was a monopoly & favored a U.S. Postal Telegraph Company
  - Organized the Bell Telephone Company in July 1878
  - Persuaded Theodore N. Vail to run the company
- Bell Telephone won a suit against a Western Union-sponsored competitor

Threatened in its monopoly of communications, Western Union brought together a motley collection of rival claimants to dispute Bell's authorship and impugn his character. In December 1878, Western Union established a rival, the American Speaking Telephone Company, but not before the Bell Company had sued for an injunction in Massachusetts against Western Union's agent, Peter Dowd, for renting out telephone transmitters illegally. The case was first heard on January 25, 1879. Western Union claimed that Elisha Gray had first invented the telephone and that Amos Dolbear had perfected it. Bell produced a letter he had received from Gray dated March 5, 1877, acknowledging Bell's prior claim, and this crucial piece of evidence was taken as positive proof that Bell had conceived, made practical, and patented the telephone before anyone else. The Dowd case was resolved on November 10, 1879, when Western Union agreed to forfeit its telephone business and to assign all its telephone patents to the Bell Company in return for 20 percent of telephone rental receipts for seventeen years.

Notes about the Bell System

- Bell Telephone would manufacture the phones & license them to local phone companies
  - This meant that Bell:
    - Could for its first 16 years dictate, via its license agreements, both common technologies and the cost of local phone service
    - Due to its technical standardization, could begin long-distance phone service
- Bell created Bell Labs to solve the technical problems that beset long-distance service

Thus, between 1877-1893, the *Bell Telephone Company,* through its local affiliated operating companies, controlled and standardized every telephone, every telephone line, and every telephone exchange in the country. This permitted Bell in the 1880s to conclude that they could profitably connect one local operating company with another precisely because all the operating companies were using standardized technology. While there were technical problems in maintaining voice clarity over long distances, the organizational problems in connecting New York with Chicago or Los Angeles were minimal.

The "Talking Telegraph"

- Early leaders of Bell saw the telephone as simply a "talking telegraph"
  - Assumed the telephone would be used just like the telegraph and by the same types of users
- This had three effects
  - Led independent phone companies to take advantage by providing services that Bell didn't
  - Slowed down the pace of telephone adoption
  - Brought Bell to near bankruptcy, leading to its takeover in 1907 by Morgan banking interests and the stabilization of AT&T under Theodore Vail

"Talking Telegraph" - Bell officials assumed that the telephone system would be used similarly to the way the telegraph network was used -- I.e. the primary customers and users would be businesses in urban areas. Thus rates were kept high in order to provide the most reliable and clearest voice service possible. By the end of the company's first year, 3,000 phones had been leased; by 1880 -- 60,000 phones; by 1893 (when the Bell patents expired) -- 260,000 phones. About 2/3rd of the phones were in business establishments. Most of the country's business information and transactions still traveled by mail and by telegraph because businesses normally wanted a written record of their transactions *{which mail and telegraph provided}.* What the organizers of the Bell system failed to understand was that, while in technological terms the telephone was similar to the telegraph, in social terms it was quite different. The telephone provided user-to-user communication -- with the telegraph there were always intermediaries in the form of the telegraph operators. Also, the telephone was a form of voice communication -- as such, it facilitated emotional communication which was impossible with the telegraph. In short, the Bell Company failed to understand that people would use the telephone to socialize with one another. Instead they saw such socializing as a trivialization or an abuse of the service.
Independents - The independent companies took advantage of Bell's mistake. Some offered services that Bell hadn't thought to provide: *Dial telephones which allowed customers to contact each other without having to rely on an operator* (who sat at a switchboard manually connecting one line to another with plugs and often relieved the boredom of her job by listening in on the conversation). *Party lines which drastically lowered the cost of residential service* by allowing anywhere from 2 to 10 residences to share the same telephone line and telephone number, and *Phone service in rural areas*.
Telephone Adoption – Initially, Bell and Vail focused their advertising on trying to create a need for the phone, publicizing the existence of the phone, telling people how to use it, and encouraging courteous conversation while on the phone. From 1900 to the 1927, Bell directed its advertising primarily to businessmen – telling them that phone service impressed customers, saved time, facilitated planning, and allowed businessmen to keep in touch with their offices while out of the office. A secondary focus was on home management – housewives could call doctors, schools, grocers, coal dealers, etc to facilitate the conduct of household-related business – and conveying messages of importance. It was not until the mid-1920s that Bell's advertising recognized that the telephone was made for socializing – calling friends and relatives to chat and even then the focus was on invitations, calling home while on a business trip, and conveying news of a safe arrival. The combination of a misconstrued medium, misdirected advertising, and high phone rates slowed down the pace of public adoption of the telephone. As late as 1920, only 35% of all households had phones and it wasn't until 1950 that over half of all American households (61.8%) had them, with near-universal adoption (90.5%) of the phone not occurring until 1970.
Near Bankruptcy - In 1907, the Boston investors that had dominated Bell lost control of the company to the Morgan banking interests, as a consequence of soaring debt, multiple stock offerings, and declining profit that resulted from the competition with independent phone companies after Bell's patents had expired. AT&T's new president, Theodore N. Vail, had a goal of 'one system, one policy, universal service.' Telephone service 'should be universal, interdependent, and intercommunicating, affording opportunity for any subscriber of any exchange to communicate with any other subscriber of any other exchange.' This meant creating an integrated telephone network throughout the country. In pursuit of this end, Vail had both a political and a business strategy. Instead of rejecting any role for government, he was willing to accept regulatory control by an independent commission. Instead of holding Bell aloof from public opinion, Vail undertook the first major public relations campaign designed to improve a corporation's public image. Instead of trying to suppress all independent phone companies, Vail began to entice them into the Bell system by allowing them to connect with the Bell system network provided they bought telephone equipment that met Bell's technical standards. The system that Vail established lasted until the 1980s when anti-trust decrees and the desire for cheaper long-distance rates (Vail had kept long-distance rates high to subsidize cheap local-area phone service) led to both phone service competition and new phone services.

Telephone Timeline - 1

- 1878 - First commercial switchboard established in New Haven, CT
- 1880 – Local telephone companies reorganized as the American Bell Telephone Company
- 1880 – First telephone numbers
- 1880 – First pay telephone
- 1885 – Name changed to American Telephone & Telegraph Company
- 1893 – With the expiration of Bell's patents, independent phone companies enter the business
  - By 1902, there were 9,000 such companies

1880 saw the institution of telephone numbers -- the first telephone directories had no numbers, only names; but a measles epidemic in Lowell MA led to the idea of assigning each subscriber a telephone number to make it easier for substitute telephone operators to take over. 1880 also saw the installation of the first pay telephone. By 1902, there were 81,000 pay phones.

First transcontinental telephone - Using the first practical electrical amplifiers, developed by AT&T's Harold Arnold, AT&T opens the first transcontinental telephone line. The new line connected the network that AT&T had been building out in every direction from New York since 1885 with a separate network that had been constructed by AT&T's Pacific Telephone subsidiary on the West Coast.

Telephone Timeline - 2

- 1915 – First transcontinental telephone call
- 1919 – First rotary dial telephone
- 1922 - AT&T opens WEAF, the first commercial radio station in New York.
- 1925 - AT&T establishes Bell Telephone Laboratories Inc. as its research and development subsidiary.
- 1927 - AT&T begins transatlantic telephone service
- 1934 – AT&T inaugurates trans-pacific phone service

Bell Labs – In 1937, Clinton Davisson of Bell Telephone Laboratories won the Nobel Prize in Physics for experimental confirmation of the wave nature of the electron. He became the first of seven Nobel Prize winners produced by AT&T.

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WEAF - AT&T left radio broadcasting in 1926, retaining the networking facilities used to send programs to stations across the country

Transatlantic service - The conversations crossed the Atlantic via radio. The initial capacity is 1 call at a time, at a cost of $75 for the first three minutes. In terms of constant 1990 prices, the cost of the call was $245 in 1930, $50 in 1960, 35 cents in 1999.

Telephone Timeline - 3

- 1941 – First non-experimental laying of coaxial cable
- 1946 – Beginning of mobile phone service
- 1947 - Bell Labs invents the transistor
- 1951 - First customer dialing of long-distance calls
- 1956 - First transatlantic telephone cable
- 1962 - First telephone satellite - Telstar

Coaxial cable - The first non-experimental installation of coaxial cable in the network is placed in service between Minneapolis, Minn., and Stevens Point, Wis. The type of coaxial cable installed was invented at AT&T in 1929 and is the first broadband transmission medium.

Mobile phone service - AT&T begins offering mobile telephone service. With a single antenna serving a region, no more than 12 to 20 simultaneous calls could be made in an entire metropolitan area

Transistor - AT&T Bell Telephone Laboratories scientists John Bardeen, Walter Brattain, and William Shockley invent the transistor, the first solid state amplifier or switch, and lay the foundation for modern electronics. The three shared the Nobel Prize in Physics in 1956 for the achievement.

Long-distance calls - AT&T introduces customer-dialing of long distance calls, initially in Englewood, NJ. The national rollout takes place over the second half of the 1950s. Until this innovation, all long distance calls required operator assistance.

Transatlantic cable - AT&T opens for service TAT-1, the first trans-Atlantic telephone cable. The initial capacity is 36 calls at a time at a price per call of $12 for the first three minutes. Since trans-Atlantic service opened in 1927, calls had traveled across the ocean via radio waves. But cables provide much higher signal quality, avoid atmospheric interference and offer greater capacity and security.

Telstar – Telstar transmits the first live television across the Atlantic

Telephone Timeline - 4

– 1963 – First touchtone phone
– 1968 - AT&T introduces 911 as a nationwide emergency number
– 1970 - First customer dialing of international telephone calls
– 1971 - Researchers at Bell Labs create the Unix computer operating system
– 1977 – Installation of the first fiber optic cable

Touchtone phone – With touchtone service, a keypad replaces the familiar telephone dial, initially in Greensburg and Carnegie, Pennsylvania.
International calls – First service was between New York City and London

Telephone Timeline - 5

- 1983 – AT&T opens the first commercial cellular telephone service in Chicago
- 1984 - Dissolution of AT&T and creation of the Baby Bells
- 1988 - First transatlantic fiber optic cable
- 1996 - Telecommunications Act of 1996

1984 - In 1982, AT&T and the Justice Department agreed on tentative terms for settlement of anti-trust suit filed against AT&T in 1974. AT&T agrees to divest itself of its local telephone operations. On January 1, 1984, the Bell System ceases to exist. In its place are seven Regional Bell Operating Companies – the Baby Bells - and a new AT&T that retains its long distance telephone, manufacturing, and research and development operations. This marks the beginning of competition, first in the long-distance telephone market and later in the telephone market generally. One consequence was a reduction in long-distance phone rates.

Transatlantic fiber optic - AT&T lays and opens TAT-8, the first fiber optic submarine telephone cable across the Atlantic. It has a capacity equivalent to 40,000 calls, ten times that of the last copper cable. (Today's cables have capacities equivalent to over 1,000,000 calls).

Phone competition - President Bill Clinton signs the Telecommunications Act of 1996 into law. It is the first rewriting of the nation's communications laws since 1934. The bill's purpose is to promote competition between local telephone companies, long distance telephone companies and cable companies by establishing procedures for the elimination of legal and regulatory barriers between these industries.

Bell on the Telephone

Early Edison Wall Phone

1151746 www.fotosearch.com
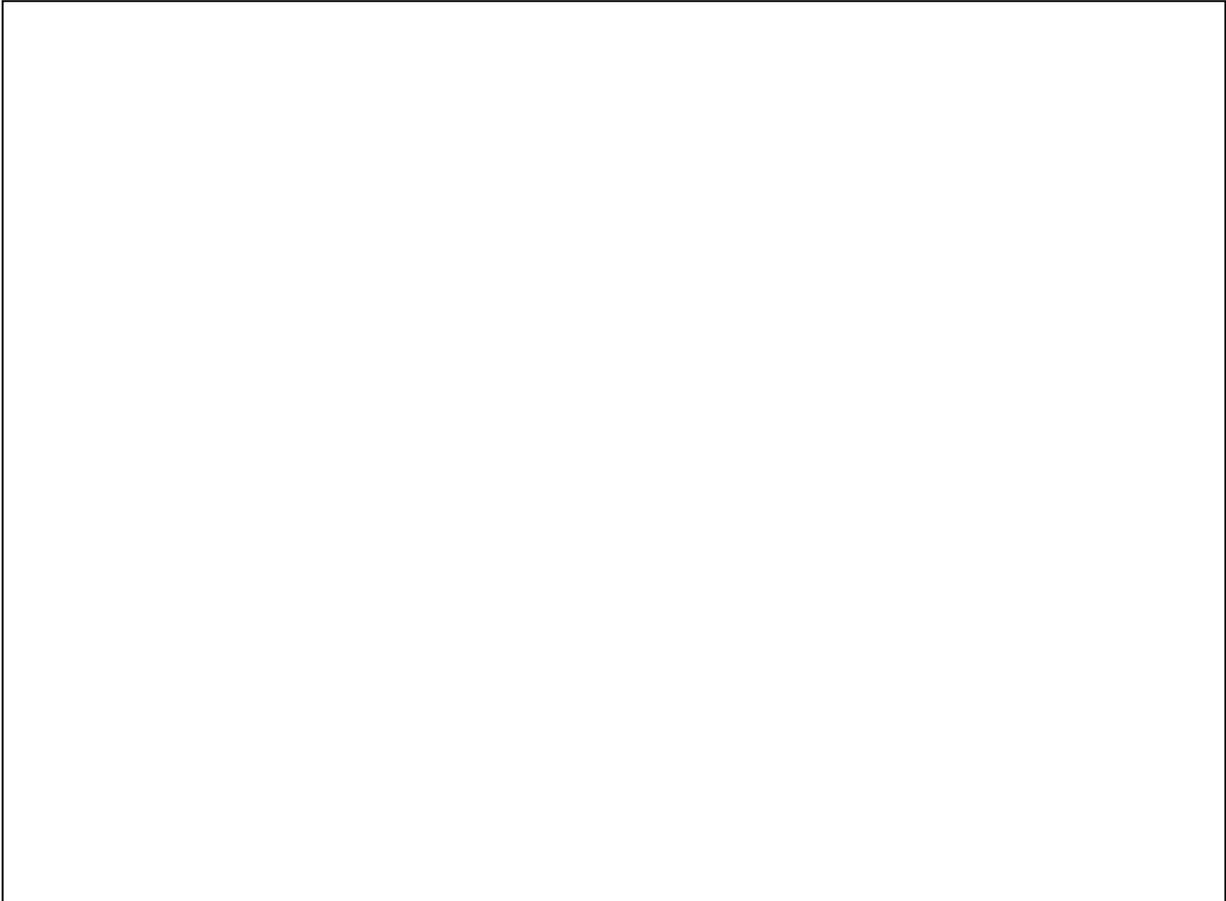
19th Century Phone Call

1920s Candlestick Phone

1950s Style Phone

phon10f www.fotosearch.com

Push Button Phone

×13598245 fotosearch.com

Telephone vs Telegraph

- Telephone permitted voice communication as opposed to Morse Code
- Telephone communication was synchronous and dialogic whereas the telegraph was asynchronous
- Telegraph left a written record – the telegram – whereas the telephone did not
- Telegraph required an intermediary – the telegraph operator – while the telephone within a local exchange did not

Effects of the Telephone

- It replaced the telegraph in the performance of many of its functions, particular its coordination and communication functions
- Its technical problems led to the creation of Bell Labs – from which many innovations and discoveries flowed
- Its linking of different exchanges created the first virtually universal network
  - A network that no longer required people to be at a fixed point to access the communication system

Replacing the telegraph - Thus, the phone replaced the telegraph in placing business orders, making hotel reservations, arranging theatrical and sports performances, making travel reservations, and scheduling events and performances.

Bell Labs – Among the innovations coming out of Bell Labs were the transistor, fiber optics, and the discovery of the background radiation left over from the Big Bank at the beginning of the universe.

Network – While the telegraph system had network effects, its network was limited. It linked railroad stations, business establishments, newspapers, and government offices; but it did not reach into private homes. Any telegram to a person at home had to be delivered by a messenger to the home. The phone not only linked the establishments formerly linked by the telegraph, but also reached into the home.

Effects of the Telephone – 2

- Telephone poles and wires changed the suburban and rural landscape
- Made obsolete the Victorian practice of card leaving
  - Led to people calling before coming over for a visit
- Led to large-scale solicitation by businesses and charities who started calling people at home

Card leaving - During its American vogue, 1870 to 1910, card leaving became an avenue for entering society, of designating changes in status or address, of issuing invitations and responding to them, of presenting sentiments of happiness or condolence, and, in general !! of carrying on all the communications associated with middle class social life. Done almost exclusively by women in the afternoon, calling and card leaving entailed complicated social arithmetic. Since husbands did not normally accompany their wives, the wife left her husband's card where she visited. If the lady of the house was "at home," the visitor left two of her husband's cards on the card receiver, one for the lady of the house and one for the lady's husband. She did not leave her card, since she had seen the lady. If, however, the visitor called but the lady of the house was "not at home," she left three cards on the receiver, one of her own (etiquette books prescribed that a lady should leave only *one* card for a lady) and two of her husband's. The contents of a family's card receiver were sorted and evaluated. Decisions then had to be made as to how to respond—to pay an actual visit or only a surrogate one by way of a card (a call for a call or only a card for a card). Mark Twain, writing in *The Gilded Age,* lampooned the intricacy of these social rituals by commenting: "The annual visits are made and returned with peaceful regularity and bland satisfaction, although it is not necessary that the two ladies shall actually see each other oftener than once every few years. Their cards preserve the intimacy and keep the acquaintanceship intact."

Typewriter – In the words of Marshall McLuhan in *Understanding Media*, "It was the telephone, paradoxically, that sped the commercial adoption of the typewriter. The phrase "Send me a memo on that," repeated into millions of phones daily, helped to create the huge expansion of the typist function. C. Northcote Parkinson's law that "work expands so as to fill the time available for its completion" is precisely the zany dynamic provided by the telephone. In no time at all, the telephone expanded the work to be done on the typewriter to huge dimensions. Pyramids of paperwork rise on the basis of a small telephone network inside a single business.

Effects of the Telephone - 3

- Sped the commercial adoption of the typewriter
  - The need to create memos or records of phone conversations helped increase the need for typists
- Fosters sociable conversation, gossip, and chit-chat
  - Thus teen-age girls are the biggest users of the phone
- Fostered the development of subsequent communication technologies

Subsequent technologies – The telephone helped inspire Edison to invent the phonograph. In 1877, after Thomas Edison had perfected a better transmitter for Bell's telephone, Edison worried that the high cost of telephones might limit their use. Thus, Edison sought a device on which a person could record a spoken message and then take the record to a central station which it could be transmitted to an addressee over a telephone. The instrument that Edison designed consisted of a rotating, grooved metal cylinder around which a piece of tin foil was wrapped to record and play back the sounds. In December 1877, Edison recorded and played back "Mary Has a Little Lamb." Edison quickly patented the device and formed the Edison Speaking Phonograph Company to manufacture and exhibit the instrument around the country. Later communication technologies inclueded fiber optics, communication satellites, and cell phones

Photography

The Film Era

Daguerreotype
by Louis Daguerre

Post Office – Washington DC

Monitor
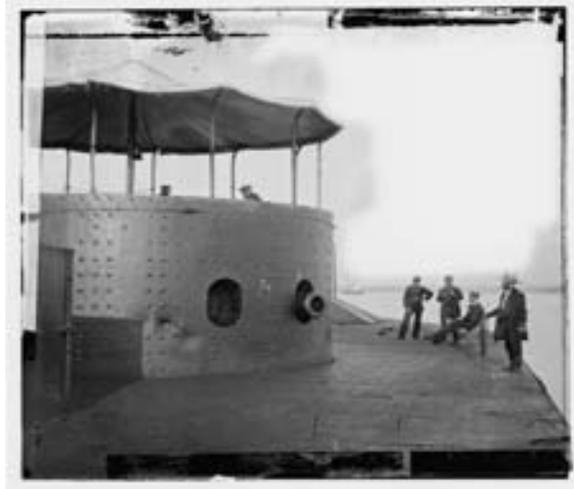
Little Round Top
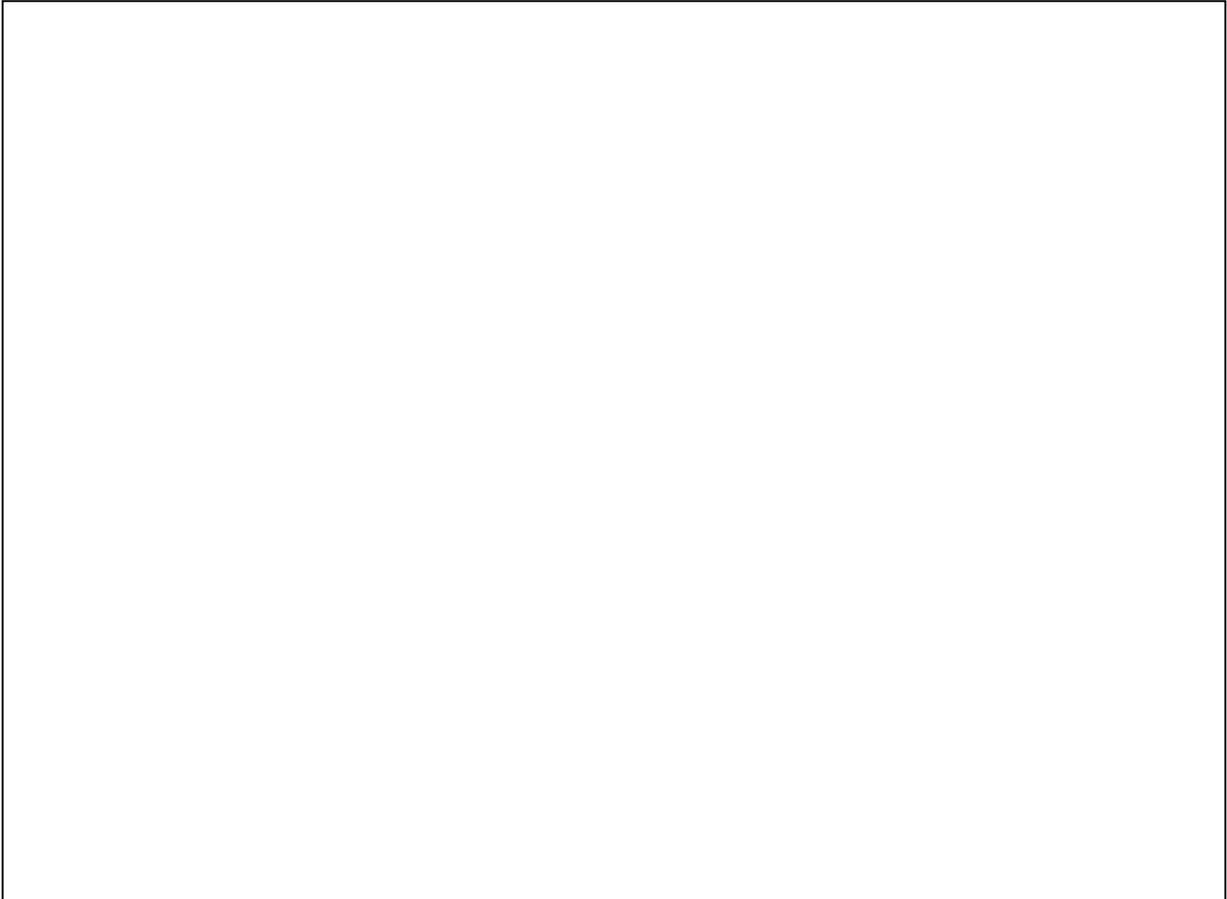
Richmond – 1865

USS Olympia

Photo # NH 76121 USS Olympia off Mare Island

The Buffalo Soldiers

Some of our brave colored Boys who helped to free Cuba.

Photography – Definition

- **Photography** is the process, activity and art of creating still pictures by recording radiation (normally visible light) on a sensitive medium, such as a film, or an electronic sensor.

- Light patterns reflected or emitted from objects activate a sensitive chemical or electronic sensor during a timed exposure, usually through a photographic lens in a device known as a camera that also stores the resulting information chemically or electronically.

Photography

- Photography is based to some extent on an optical illusion
  - The human eye sees a vast range of greys and colors but if the individual items of grey or color are small enough, it blends the distinct elements into a continuous tone
  - At the microscopic level, developed black & white film consists of either black or white film grains (or pixels in the case of digital photographs) but they are so small that the eye sees them as a continuous tone

Where continuous tone imagery contains an infinite range of colors or greys, the halftone process reduces visual reproductions to a binary image that is printed with only one color of ink. This binary reproduction relies on a basic optical illusion—that these tiny halftone dots are blended into smooth tones by the human eye. At a microscopic level, developed black and white photographic film also consists of only two colors, and not an infinite range of continuous tones.

Photography

– At the microscopic level, developed color film consists of the black or white film grains, but they are within three different dye layers – normally cyan, magenta, and yellow. When white light is reflected off or passed through the film, each layer subtracts from the white light to produce what we see as continuous tone colors

There are two different types of color photography – Additive systems which add red-green-blue to black and Subtractive systems which subtract cyan, magenta, and yellow from white. Both involve the use of dye layers or color filters to produce the optical effect of full-tone colors. Most modern color films – such as Kodachrome, Ektachrome, and Kodacolor - use the subtractive system. Digital systems use an additive system of 24- or more-bit pixels.

Photography – Origins

- Camera obscura
- Johann Schultz - discovered that a silver and chalk mixture darkens under exposure to light (1724).
- Thomas Wedgwood - first recorded images (1800)
- Joseph Nicephore Niepce –first photograph (1825)
  - Used bitumen and required an 8-hour exposure
  - Invented photoengraving
  - Partner of Louis Daguerre

Camera obscura – The camera obscura was a dark room with a tiny hole through the wall as a single light source – dates back to antiquity. The hole projects an accurate image of the outside view as an upside-down image on the opposite wall. Artists used the camera obscura to trace the image with a pencil. In the 16th century, they began making camera obscuras with lenses.

Wedgwood - Around 1800, Thomas Wedgwood -- a son of Josiah Wedgwood and a relative of the inventor of carbon paper -- placed small objects on a sheet of paper treated with a silver halide compound that was then exposed to sunlight. The light caused the paper to darken except where the objects covered it. !! Wedgwood and his friend, Sir Humphrey Davy, presented a paper on the phenomenon in 1802 but knew of no way to permanently fix the images they had created.

Niepce – Niepce dissolved bitumen in lavender oil, a solvent often used in varnishes, and coated the sheet of pewter with this light capturing mixture. He placed the sheet inside a camera obscura to capture the picture, and eight hours later removed it and washed it with lavender oil to remove the unexposed bitumen. It was said that he made his first long lasting images in 1824. The earliest known example of a Niépce photograph (or any other photograph) was created in June or July, 1827.

Photoengraving - Niepce oiled a paper print of an ordinary copper engraving -- in order to make the ink-free portions of the sheet translucent -- and laid on top of an unmarked copper plate coated with bitumen, the gunky black tar that hardens into asphalt. After several hours of exposure to sunlight, the bitumen under the translucent portion hardened and became insoluble. This allowed Niepce to wash away the unexposed portion of the bitumen coating with a kerosene-based solvent. He thereby obtained a negative image of the original drawing which he could then chemically engrave into the surface of the new plate -- etching the unprotected metal with an acid solution.

Photolithography – today's descendent of what Niepce invented - Today photolithography (printing from photo-etched plates) not only produces the great majority of all plates for the printing industry, but also provides the basic technology for the electronics industry as well. In this latter application, layers of metal and other substances are deposited on sheets of semicon-ducting silicon crystals covered with photoresist, an updated version of

Photography – Origins - 2

- Louis Daguerre – invented daguerreotype
  - Daguerre was a panorama painter and theatrical designer
  - Announced the daguerreotype system in 1839
- Daguerreotype – a photograph in which the image is exposed onto a silver mirror coated with silver halide particles
  - The first commercially practical photographic process
    - Exposures of 15 minutes
  - The polaroid of its day – capable of only a single image

daguerreotype - This was an early type of photograph in which the image is exposed directly onto a mirror-polished surface of silver coated with silver halide particles deposited by iodine vapor. Initial exposure times were 3 to 30 minutes, depending on the time of day, the weather, and the season. In later developments bromine and chlorine vapors were used, resulting in shorter exposure times – eventually down to seconds. Exposure to a scene or image through a focusing lens formed a latent image. The latent image was made visible, or "developed", by placing the exposed plate over a slightly heated cup of mercury. The daguerreotype is a negative image, but the mirrored surface of the metal plate reflects the image and makes it appear positive in the proper light. Thus, daguerreotype is a direct photographic process without the capacity for duplication.
While the daguerreotype was not the first photographic process to be invented, earlier processes required hours for successful exposure or failed to produce a permanent image. Thus, the daguerreotype was the first commercially viable photographic process and the first to permit portrait photography. The daguerreotype, although stunningly beautiful, was rarely used by photographers after 1860, and had died as a commercial process by 1865.

Photography – Origins - 3

- William Henry Fox Talbot – invented the calotype or talbotype
  - Calotype was a photographic system that:
    - Used salted paper coated with silver iodide or silver chloride that was developed with gallic acid and fixed with potassium bromide
    - Produced both a photographic negative and any desired number of positive prints

Photography – Origins - 4

- Wet Collodion Process - 1
  - Invented in 1850 by Frederick Scott Archer and Gustave Le Grey
  - Wet plate process that required the photographer to coat the glass plate, expose it, and develop it within 10 minutes
  - Required a portable photographic studio
  - Created a glass negative from which any number of positive paper prints could be made

Wet collodion process – In this process, bromide, iodide or chloride salts were dissolved in a collodion mixture that was poured onto a cleaned glass plate, and allowed to sit for a few seconds. The plate was then placed into a solution of silver nitrate and water, which would convert the iodide, bromide or chloride salts to silver iodide, bromide or chloride, respectively. Once this reaction was complete, the plate was removed from the silver nitrate solution, and exposed in a camera while still wet. It was developed with a solution of iron sulfate, acetic acid and alcohol in water

Photography – Origins - 5

- Wet Collodion Process -2
    - It was a relatively inexpensive process in comparison with the daguerreotype
    - Produced better positive prints than Talbot's paper calotype negatives
    - Reduced exposure time to seconds
    - Matthew Brady used this process
    - Dominated photography until the invention of dry photographic plates and roll film

Photography – Origins - 6

- The wet collodion process was used with other supports as well as glass plates
  - Tintypes used metal
  - Ambrotypes used glass plates coated with a black varnish on one side to produce a positive photographic image
    - Wet collodion version of the daguerreotype

George Eastman

- Developed a practical photographic process that used dry plates coated with a gelatin emulsion that contained silver bromide
- Developed a coating machine to produce uniform quality gelatin emulsion dry plates
- Invented photographic roll film
- Invented a camera that used the roll film he developed
- Introduced the Kodak Brownie camera for $1

Kodak camera - In 1888, started selling the Kodak camera for $25 -- the first celluloid roll film camera and the first camera an amateur could operate. When the camera operator shot the 100-picture roll, he returned the camera to Kodak for processing of the film and mounting of the finished prints and received the camera back loaded with a new roll of film. The photographer had only to point the camera at the subject and 'push the button.' When he had exposed all the film, he had only to return the camera to the factory where for $10, the film was removed, processed, and reloaded with a fresh roll of film. By late summer 1888, the demand for cameras and film astounded even the usually unexcitable Eastman.
Kodak Brownie - In 1900, Kodak came out with the Brownie, costing $1.00 and made especially for children. !! "Cheap cameras and inexpensive film meant that for the first time, ordinary people in considerable numbers had the means to make their own pictures."
What Eastman accomplished - Thanks to Eastman, anyone who wanted photographs could press the button on a simple hand-held camera, remove the exposed film from the camera and mail it to either Eastman Kodak or a local photographer, and in a few days obtain finished prints. The change in the practice of photography from the dominance of the professional to that of the amateur revolutionized both the photographic industry and the social role of photography

Effects of Eastman's Innovations

- Changed photography from an endeavor practiced by a few professional photographers to an endeavor practiced by nearly everyone
- Gelatin emulsions made possible shutter speeds as fast as 1/50th of a second
  - Made possible the news photographer and the war photographer who could now photograph people without requiring them to pose
- Roll film made possible the development of motion pictures

Photography – Some Notes - 1

- The photograph freezes an image of reality in time
  - While people age and things change, the photographic image does not age or change
  - Thus the photograph did for visual information and space what the manuscript and printed text did for verbal information and time
- "A picture shows us something about the world. A story tells us something about the world."

Photography – Some Notes - 2

- Visual images depict and organize objects in space
    - Describing space –whether it be a landscape, a street scene, or a person's features – takes a considerable amount of words, but only one picture
- Verbal information in the form of a Narrative or Story places and organizes people and objects in time
    - This is especially true in the genres of the novel, the history, and the movie which all have a beginning or starting point, a middle, and an end
- Media that lack images (such as the novel and radio) must use words (and one's imagination) to provide a spatial context

The construction and reception of narrative depends on the concepts of time and causality, neither of which are essentially visual. Narrative organizes time, the visual image organizes space. When space is described in a narrative text -- as in the description of a landscape, a street, or a person's physical appearance -- the narrative qua narrative stops, because the chronological progress of the action is arrested." Visual images, however, play a significant part in our experience of literary narrative because literary narratives of any sophistication contain more than just narrative. The 19th and 20th century novel, in contrast to the absence of highly conventionalized descriptions of landscape, townscape, people's physical appearance, dress, etc. in the 18th century novel, in particular is notable for the amount of description it contains of the visible world. From Sir Walter Scott onwards, novelists became lavish in detailed descriptions of such things.

Photography – Some Notes - 3

- Photographs imply transparency – that they don't lie, that they are a window on a part of the world
  - One reason is that the photographer does not impose himself between us and the content in the way that the artist does in a painting
- Photographs (along with MOPIC film and video) focus attention on a subject or event
  - What is photographed or recorded is seen to exist
  - What is NOT photographed or recorded is often not noticed
- Photographs, like art, however, are composed
  - What is shown in the photograph depends on several factors
  - What is not shown often can affect the context in which the photograph is interpreted
  - The caption affects perception of the content and provides vital contextual information

Transparency - As David Sless notes in his *Learning and Visual Communication,* "The mechanical basis of photography seems to deny any role to the photographer. As the early photographers described the process, it is light, not the artist, which paints the picture. This places the photographer in a subtly different role to that of other communicators. The areas of choice are different. A painter, for example, can choose a whole range of techniques of painting and he can innovate with new styles. (It is partly on the basis of style that one can distinguish between a Rembrandt, a van Gogh and a Matisse; the artist, if he chooses and has the ability, can use every stroke of his brush to mark the image with his own identity.) Realism in art was a deliberate and difficult choice to make."

Focusing attention – Photographs focus attention on the subjects and events they record, especially if the arouse the viewer's emotions. But if something happens and no one is there to photograph or record it, then often out of sight, out of mind – not only for the public at large, but also for the news media and key decision-makers.

Photographic composition – What is visible in the photograph depends on such things as the angle at which the subject(s) are shot,

Captions

- Caption - short text message that appears with the image and clarifies its import.
  - Identifies the subject(s) of the photograph
    - Who and/or What
  - Add vital context to a photograph
    - Who took the photo
    - When, Where, and sometimes How and Why
    - If relevant, what happened before and after the photo was shot and/or what is not in the picture
  - Can draw attention to something in the image that is not obvious, such as the presence of someone or something in the background that gives the photograph added meaning or relevance
  - Permits or facilitates retrieval of individual photographs from a large collection of photographs

Context – We have often had the experience of coming across old photos and often wondering – who are the people in the picture? Where was this taken? When was it shot? And sometimes wondering – what were they doing? Why are they wearing those clothes? One reason photos often fail to convey much information to us is precisely because the contextual who, when, where information is missing. It was present in the photographer's brain when he/she shot the pictures but that information is now lost to us unless a caption was written and is available to us.

Example of a photo where someone or something in the background gives added relevance – Photo of a large crowd in Munich patriotically cheering the announcement of German mobilization for World War I. In the crowd is a joyful Adolf Hitler.

Photographic Genres

- Photography has a whole host of different genres
  - Examples
    - Snapshot
    - News photograph
    - Advertisement

The same subject in each of the different genres will convey a different message and meaning to the viewer. A **snapshot** of a husband and wife depends on a consuming interest in this particular family, representing as it does a moment in their shared personal history. The **newspaper photograph** also represents a moment — but it is a public moment; the husband and wife are observed by an outsider. Something has happened to bring them under public gaze. Some incident, whatever it may have been, has catalyzed a change from the private to the public domain. That is part of the defining characteristic of photo-journalism. The **advertisement** is also public, but in a different sense. The advertising photograph is the product of a stage-managed 'event' It is a fiction. This photograph sets up very different expectations, and of all the photographs this one is in a certain sense the easiest to relate to. The only standard of judgment is plausibility. The husband and wife, as a family, are simulated, idealized, flattered, but we accept this as part of the rhetorical role of advertising. In each case there is a different implied epistemological status: personal knowledge in the first, public detached knowledge in the second and plausible fiction in the third.

Newspaper Photography

- In the early-1890s, it became commercially feasible to incorporate photographs in large newspaper editions. This was because of Halftone printing.
- Halftone printing uses dots that vary in either size or spacing to create the optical illusion of a smooth tone photograph
  - Thus the halftone print of a black & white photograph that we see as containing a range of continuous tone shades of grey will consist of black and white dots that are so small that we perceive them as a continuous tone

Halftone is the reprographic technique that simulates continuous tone imagery through the use of dots, varying either in size or in spacing. 'Halftone' can also be used to refer specifically to the image that is produced by this process.

Where continuous tone imagery contains an infinite range of colors or greys, the halftone process reduces visual reproductions to a binary image that is printed with only one color of ink. This binary reproduction relies on a basic optical illusion—that these tiny halftone dots are blended into smooth tones by the human eye. At a microscopic level, developed black and white photographic film also consists of only two colors, and not an infinite range of continuous tones. Just as color photography evolved with the addition of filters and film layers, color printing is made possible by repeating the halftone process for each subtractive color—most commonly using what is called the 'CMYK color model.' The semi-opaque property of ink allows halftone dots of different colors to create another optical effect—full-color imagery

Newspaper Photography - 2

- Before half-tone printing, photographs had to be transcribed into line engravings
  - This meant that newspapers and magazines had very few illustrations and virtually no photographs
- Half-tone printing led to a new brand of newspapers using halftone illustrations based on photographs in place of woodcuts based on drawings
  - Newspapers begin to employ photographers as well as (and often instead of) artists
  - Newspaper and magazine began to contain pictures and photographs

The idea of halftone printing is due to William Henry Fox Talbot. In the early 1850s, he suggested using "photographic screens or veils" in connection with a photographic intaglio [an engraving or incised figure in stone or other hard material depressed below the surface so that an impression from the design yields an image in relief. i.e. the image is sunk below the surface of the printing plate] The first truly successful commercial method was patented by Frederic Ives of Philadelphia in 1881, although he did not make use of a screen. In 1882, the German George Meisenbach patented a halftone process that used single lined screens which were turned during exposure to produce cross-lined effects. He was the first to achieve any commercial success with relief halftones [In relief printing the areas of the matrix (plate or block) that are to show as printed are *on the original surface*; the parts of the matrix that are to be blank having been cut away, or otherwise removed. Printing the image is therefore a relatively simple matter of inking the face of the matrix and bringing it in firm contact with the paper] Shortly afterwards, Ives, this time in collaboration with Louis and Max Levy, improved the process further with the invention and commercial production of quality cross-lined screens. The relief halftone process proved almost immediately to be a success. The use of halftone blocks in popular journals became regular during the early 1890s

Effects of Photography - 1

- Along with color lithography and halftone printing, it allowed the cheap reproduction of all kinds of images
  - Any photograph or any painting could now be readily converted into an attractive half-tone illustration. This was a boon to advertisers, businesses, and home decorators
- Changed the concept of what constituted Art
  - Art was no longer an imitation of external objects; it was now the external manifestation of the artist's self-expressive creativity

Lithography – In this printing method, a smooth limestone or metal plate is coated with oil, fat, or gum arabic to divide the plate into hydrophobic regions which accept the ink and hydrophilic regions which reject it and thus become the background. Invented by Bavarian author Alois Senefelder in 1796, it can be used to print text or artwork onto paper or another suitable material. Most books, indeed all types of high-volume text, are now printed using offset lithography, the most common form of printing production.

Offset lithography - In offset lithography, the offset printing technique where the inked image is transferred (or "offset") from a plate to a rubber blanket, then to the printing surface is used in combination with the lithographic process, which is based on the repulsion of oil and water. The offset technique employs a flat (planographic) image carrier on which the image to be printed obtains ink from ink rollers, while the non-printing area attracts a water-based film (called "fountain solution"), keeping the non-printing areas ink-free. Ira Washington Ruble invented the first offset printing press in 1903 by accident When operating his lithographic press he noticed that if he failed to insert paper the stone plate would transfer its image onto the rubber impression cylinder. When he then placed paper into the machine it would have the image on two sides, one from the stone plate and one from the rubber impression cylinder. To Rubel's amazement, the image from the rubber impression cylinder was much clearer; the soft rubber was able to give a sharper look than the hard stone litho plate. Soon he created a machine that repeated this original "error".

New Concept of Art – As historian J.L. Talmon notes, all theories of art since Plato and Aristotle were based on the idea that the essence of art was the imitation of external objects, with due regard to the exigencies of theme, medium, and response of the audience. It was only in the 19th Century that writers began to apply the word expression to art, thinking solely of the artist's need for self-expression. To create was not to represent and describe, but to press out something from within

Effects of Photography - 2

- Pushed pictorial art into depictions that were impressionistic, abstract, and non-representational
- Created a new art form – the photograph
- Along with offset color lithography, helped make artist-signed lithographic copies of his original work a major element in both the art market and the modern art museum

Pushing art into non-representational forms - Photography was both a new art form for representing symbols and a major impact on traditional art. The effectiveness of the camera in reproducing images of the real or natural world made it seem superfluous for painting to pursue this task. The painter or sculptor was no longer called upon to illustrate scenes from life or the human face or body -- photographs could do it better and far more cheaply and rapidly than the artist. Thus, artists -- unless they were commercial illustrators -- felt increasingly impelled to make their mark by depicting a non-representational abstract world. Thus, we got the French Impressionists, the Cubists, the Abstract Expressionists, and the other types of modern art that often puzzle and irritate those of us who identify pictorial art (painting, sculpture, illustrations, etc) with the traditional concept that art should imitate external objects.

Effects of Photography - 3

- Became a major tool of news reporting (including war reporting), crime investigation, and scientific research
- Led to the tabloid newspaper
- Along with the telegraph and the railroad, the photograph created the 'star' and the celebrity
- Turned the world into a "museum of known objects"

Reporting & investigating – The camera and the photographs it took became a major feature of news reporting. It now became mandatory that public events be photographed by newspaper and news magazine photographers. In 1861, only one photographer was present at Lincoln's inauguration and he had to be content with a peripheral vantage point. In 1901, a large platform is expressly built to give a whole battalion of press photographers an optimal viewpoint. Concerning crime, it became standard procedure for police to photograph the crime scene and take mug shots of all individuals arrested by them. Scientific researchers were quick to apply photography to the microscope to photograph bacteria and other microscopic life forms and to the telescope to photograph the stars. When combined with the spectroscope, telescopic photography enabled astronomers to make major advances in knowledge – e.g. that the universe is expanding and that Cepheid variable stars can be used as standard candles with which to measure the distances to astronomical objects – Since Cepheids vary in their brightness period according to the stars' intrinsic brightness, all one has to do is compare the observed brightness with the intrinsic brightness and then calculate how far away the observed object is. It was this that enabled astronomers to find out that there are galaxies other than our Milky Way.

Tabloid newspaper - The tabloids, starting with the *New York Daily News* in June 1919, were based on the realization that pictures packed more wallop than textual news -- 'The story that is told by a picture can be grasped initially **...,**" according to *Chicago Tribune* publisher Joseph Medill Patterson. According to editor Philip Payne of the *New York Daily Mirror,* 'Pictures are the very essence of tabloidism.'

Stars and celebrities - "*The stars could not be in all places at all times, but suddenly their images could. As the technology of photography and photographic reproduction advanced, they were swiftly put to the purpose of disseminating stars' pictures, particularly of their faces.* Photographs of baseball players and other sports figures were circulated widely in the 1880s and 1890s. Pictures of stage performers, especially actresses like Maude Adams and Ethel Barrymore, came into vogue at the same time.

Known objects – In the words of Marshall McLuhan in *Understanding Media*, "[With photography and video] the world itself becomes sort of a museum of objects that have been encountered before ... the tourist who arrives at the Leaning Tower of Pisa or the

The Typewriter

What Christopher Scholes &
Remington Wrought

Remington Typewriter

Typewriter - 1

- Invented by Christopher Sholes
  - Christopher Sholes:
    - Developed a workable typewriter in 1867,
    - Drew in some co-inventors to improve the device
    - Found a manufacturer in small-arms maker Remington
  - 1874 – First Remington typewriter
  - 1876 - Exhibited at the 1876 Centennial Exposition in Philadelphia
  - 1878 - Remington Model 2 typewriter – the manual typewriter as we remember it

Christopher Sholes - Christopher L. Sholes, a Milwaukee newspaperman, poet, and part-time inventor, was the main creator of this machine. The Sholes & Glidden typed only in capital letters, and it introduced the QWERTY keyboard, which is very much with us today. The keyboard was probably designed to separate frequently-used pairs of typebars so that the typebars would not clash and get stuck at the printing point. The S&G was a decorative machine, boasting painted flowers and decals. It looked rather like a sewing machine, as it was manufactured by the sewing machine department of the Remington arms company. The initial Sholes-Glidden-Soule design was inelegant. Users could not see their work as they typed. Typebars clashed frequently, having to be untangled. *{The need to prevent tangling of type bars led to the relatively inefficient QWERTY keyboard}* . Initially, the machine was limited to a single typeface. !! Nevertheless, the Sholes design triumphed for two major reasons. First, it could be steadily improved. Second, Sholes' associate, James Densmore found both a market for the typewriter in court reporters and a manufacturer -- the Remington Arms Company -- that was both looking for a product to manufacture and which had expert mechanics who were experienced in the advanced machine shop practice developed at the national armories.

Model 2 typewriter – Unlike the Model 1, the Model 2 allowed the typist to see what he/she typed. It It had a carriage return lever on the

Typewriter - 2

- Initially marketed to authors, lawyers, clergymen, and court reporters
  - Court reporters were the first major adopters of the typewriter
- Businessmen saw its commercial potential to speed up correspondence
  - The typewriter found large-scale popularity in the business office, then spread to government, and finally to individual authors and students

Business use of typewriter - As Frank H. Palmer noted in 1892, "With one of these machines, a businessman can dictate with ease, and his clerk can neatly print, 60 business letters in a day. It has been demonstrated by many tests that the typewriter, as compared with the pen, saves 40 minutes an hour, or five hours and 20 minutes in a business day. If 'time is money,' it is easy to calculate what kind of bargain one makes in purchasing one of these labor-saving machines."

Authors & students - The typewriter found its initial niche in the business office. It later spread to government offices and then to individual writers and students -- both of whom found that publishing houses and professors found it easier to read (and thus favored) typewritten as opposed to handwritten manuscripts. The typewriter remained an office fixture until the emergence of the personal computer/the computer printer/word processing software at which point it became relegated to the storeroom or unused desk for which it was used only to fill in forms and type in labels. When form-filling and labeling software became common, the typewriter vanished.

Effects of the Typewriter

- Created a demand for typists and stenographers
  - Feminized the clerical work force
    - Impacted upon female fashion
    - This opened up a new niche for women, but also confined them to a subservient status
- Led people to start composing documents on the typewriter
- Led to the photographic print with typed caption
  - Affected how photographs were stored and indexed

Women in the clerical work force - Since women were considered to have more nimble fingers and better memories than men, the typewriter opened up the formerly all-male office to women secretaries, stenographers, and clerk-typists. In 1870, 4.5% of clerks and stenographers were female. In 1930, 91.8% of typists and stenographers were female.

Female fashion – In the words of Marshall McLuhan, "The uniform ranks of fashionable female typists made possible a revolution in the garment industry What she wore, every farmer's daughter wanted to wear, for the typist was a popular figure of enterprise and skill. She was a style-maker who was also eager to follow styles." This was especially the case after Charles Gibson produced his famous illustrations of the Gibson Girls whose "ready-to-wear" clothes (which consisted of a blouse, called a shirt-waist and a skirt which were purchased separately) other women wanted to wear.

Female subservience – G.K. Chesterton pointed out both the new niche and the fact of female subservience in his famous comment - "women refused to be dictated to and went out and became stenographers."

The typewriter along with carbon paper revolutionized the office and office filing. It had the advantage of producing text that was more legible than almost all forms of handwriting and could, with carbon paper, produce multiple copies of the same document.

Office filing - Instead of incoming correspondence bound with red tape and copy or letter press books of outgoing correspondence, the typewriter made possible case files that combined all documents relating to a particular case, transaction, event, or person in which original incoming documents and carbon copies of outgoing documents were all interfiled -- case files that were easily retrievable by resort to typed index cards. Prior to the case file or project file, the typical office would have a file of incoming correspondence that was usually filed chronologically or alphabetically and a separate file of hand-copied or letterpress copies of outgoing correspondence together with an index book that listed the name & date of all incoming correspondence and the number or date of the related outgoing correspondence. In addition, the typewriter could easily be used to type data into forms to create uniform-type data for many types of transactions.

Records – One consequence of the typewriter and the case file was the proliferation of records, especially as carbon copies of outgoing correspondence were often circulated to higher levels or other offices dealing with the same subject. To take the Federal Government as an