

History of Communications Media

Class 6

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What We Will Cover Today

- Radio
 - Origins
 - The Emergence of Broadcasting
 - The Rise of the Networks
 - Programming
 - The Impact of Television
 - FM
- Phonograph
 - Origins
 - Timeline
 - The Impact of the Phonograph

Origins of Radio

- James Clerk Maxwell's theory had predicted the existence of electromagnetic waves that traveled through space at the speed of light
 - Predicted that these waves could be generated by electrical oscillations
 - Predicted that they could be detected
- Heinrich Hertz in 1886 devised an experiment to detect such waves.

Origins of Radio - 2

- Hertz' experiments showed that the waves:
 - Conformed to Maxwell's theory
 - Had many of the same properties as light except that the wave lengths were much longer than those of light – several meters as opposed to fractions of a millimeter.

Origins of Radio - 3

- Edouard Branly & Oliver Lodge perfected a coherer
- Alexander Popov used a coherer attached to a vertical wire to detect thunderstorms in advance
- William Crookes published an article on electricity which noted the possibility of using “electrical rays” for “transmitting and receiving intelligence”

Origins of Radio - 4

- Guglielmo Marconi had attended lectures on Maxwell's theory and read an account of Hertz's experiments
 - Read Crookes article
 - Attended Augusto Righi's lectures at Bologna University on Maxwell's theory and Hertz's experiments
 - Read Oliver Lodge's article on Hertz's experiments and Branly's coherer

What Marconi Accomplished - 1

- Realized that Hertzian or radio waves had a practical use – they could be used to send and receive messages
- Devised a practical wireless telegraphy transmitter and receiver
- Visualized a market for the device
 - Navies and shipping companies that wanted to be able to communicate with their ships at sea

What Marconi Accomplished - 2

- Gradually improved his invention over time
 - In 1901, he actually transmitted a message from Cornwall in England to Newfoundland
 - This led to the discovery of the ionosphere since what Marconi accomplished was theoretically impossible if radio waves like light followed lines of sight.
- Established the Marconi Company which
 - Leased wireless sets to hundreds of naval and commercial vessels
 - Set up land stations worldwide to communicate messages to ships at sea

Wireless Telephony

- After Marconi created wireless telegraphy, scientists worked on wireless telephony
- Wireless telephony required overcoming various obstacles
 - Tuning of transmitters and receivers so that they stayed on one frequency
 - Generation of uniform high-frequency electrical waves
 - Modulating electrical waves in accordance with sound waves
 - Linking of wire and wireless telephones by means of suitable relays

Reginald Fessenden

- Fessenden and Ernst Alexanderson of GE developed a high-frequency alternator that allowed continuous wave transmission
 - This made possible voice and music radio transmission
- On December 24, 1906, Fessenden began transmitting voice and music from his experimental radio station in Plymouth MA.

Lee De Forest

- Invented the audion tube, which permitted the detection and amplification of radio signals and sound
- Started radio broadcasting of lectures and phonograph music by 1910
 - On January 12, 1910, he broadcast part of a live performance of *Tosca* and, the next day, a performance of the Italian tenor Enrico Caruso from the stage of the Metropolitan Opera House in New York City
- Invented the Phonofilm sound-on-film method of recording talking pictures

Effects of World War I

- Led to a government shutdown of non-governmental radio transmitting
- Sparked a huge demand for both wireless equipment and trained radio operators
 - Trained thousands of radio operators and familiarized them with the latest developments in radio technology
 - Led many of these new radio operators to become postwar amateur radio operators or hams.
 - Wartime desire to intercept German radio communications inspired Edwin Armstrong in 1918 to invent the superheterodyne circuit
- Laid the groundwork for the 1920s boom in radio and radio broadcasting

Frank Conrad

- Conrad was an amateur radio operator who was head of Westinghouse's radio operations
 - Regularly broadcast music from his home radio station
 - On September 20, 1920, the Joseph Horne Department Store ran an ad saying that their radios could receive Conrad's transmissions
- The ad triggered an epiphany in Westinghouse VP Harry Davis
 - Radio was a broadcast medium
 - There was money to be made in selling receiving sets

Radio Broadcasting

- Davis got Conrad to build a radio station at Westinghouse – KDKA – to transmit the 1920 election returns.
- Result – A splurge of radio broadcasting
- One broadcast that helped fuel the radio surge was the broadcast of the Dempsey-Carpentier heavyweight championship fight on July 2, 1921

Radio Sets

- 1920 – Most radios were homemade crystal sets with earphones
- 1922 – RCA Radiola
 - 6 tubes, amplifiers, and a superheterodyne tuner that required no external antenna and
 - Was simple to operate, but required a battery
- 1928 – Console radio
 - Had a large wooden cabinet with plug-in circuitry and loudspeakers that was sold as furniture
- 1928 – First car radio
- 1930 – Relatively inexpensive table model radios

Console Radio



Table Model Radio



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Early Radio Programming

- Music – both live performances and phonograph recordings – dominated programming
- Other programming consisted of
 - Election returns, political party conventions, and major sports events
 - Lectures, dramatic readings, and church services
- No regular news coverage
 - Newspapers refused to make wire service reports available to radio stations for broadcasting

Notes on Programming - 1

- Initially limited to the evening hours
- By the late-1920s, broadcasters realized that the right daytime programming might attract housewives
 - Result: serial romantic dramas, such as “Ma Perkins” and “The Romance of Helen Trent”
 - Termed soap operas because these programs were most often sponsored by laundry soap manufacturers

A Note on Sports Broadcasting

- The uncertainties of early radio required radio announcers who could fill airtime with a gift of gab if something went wrong
- Since many radio announcers lacked an athletic background, two or more announcers often teamed up to report a game
 - One described the play-by-play action and the other provided analysis, information on players, and ‘color’.
 - With football, there was three announcers – one for play-by-play description, one for color, and a spotter to identify the large and constantly shifting cast of players on the field.

Characteristics of Broadcast Radio

- In the 1920s, radio took on many of the characteristics that marked radio and later television during their heydays
 - Bandwidth & wattage allocations that favored well-heeled stations
 - Commercial advertising as a source of radio station revenue
 - Networks that provided programming to individual stations

Networks

- The 1920s and early-1930s saw the emergence of four networks – NBC Red (1926), NBC Blue (1928), CBS (1927), & Mutual (1934)
 - In 1943, NBC-Blue was sold off and became ABC
- Networks provided programming to the affiliated local stations
 - Programming was produced by the networks, individual sponsors, and increasingly over time by advertising agencies.
 - Networks gave advertisers access to a large national audience

Notes on Programming - 2

- By the early 1930s, morning programming focused on weather reports, recorded music, and talk a la “Don McNeill’s Breakfast Club”
- By 1930, evening programming focused on the radio genres with mass appeal
 - Domestic sitcoms
 - Crime, mystery, & detective shows
 - Comedy/Variety shows
 - Radio versions of plays and movies

Notes on Programming - 3

- By the late 1930s, most of the programs that would occupy the top broadcast ratings slots until television (i.e. the next ten years) had made their debut on the air.
- Only in the mid-1930s did radio networks begin to broadcast regular news programs
 - Prior to that, radio lacked the resources and incentive to gather news on its own
 - Rising international tensions made news programs popular
 - What Saddam Hussein did for CNN during the Gulf War, Adolf Hitler did for NBC and CBS News

Radio Penetration

- Radio quickly penetrated the American market
 - 1927 – 25% of all American households had a radio
 - 1929 - 1/3rd owned a radio
 - 1934 - 60% of all homes had a radio;
 - 1939 - 86% of all households owned at least one set. There were also 6.5 million radios in automobiles.

Notes About the Radio Medium - 1

- With radio, the speaker addressed an audience that was invisible and unknown
- Radio allowed millions to hear the same program at the same time
 - It provided a speaker with an audience that dwarfed any audience that could fit in an auditorium or theater
 - Along with the phonograph, it gave any song, symphony, or opera more listeners than any theater or symphony hall

Notes About the Radio Medium - 2

- Radio leads people to create images in their mind to provide a picture background for the actions and dialog that they are hearing in the broadcast
- Radio is a medium that allows people to do other things while they are listening
- Radio fostered the creation of “imagined communities” of people who never met but of which we were a part – E.g. sports fans, Fred Allen fans, rock 'n' rollers, ham operators, Dittoheads

Impact of TV on Radio - 1

- Before television, radio was a centralizing medium because of both its expense and its broadcasting nature
- After television, radio became:
 - A narrowcasting medium that appealed to specific niches of listeners through specific types of content – specific forms of music, all news, conservative talk shows, etc., and/or
 - Audio wallpaper that served as background while doing other things at home or in the car

Impact of TV on Radio - 2

- Radio networks broke down and local stations found themselves on their own
 - Rise of music format stations with disc jockeys
 - Later AM radio became dominated by all news and talk/call-in shows as music migrated to FM
- Decline of advertising on radio
 - From a high of \$133 million in 1948, advertising time sales on network radio dropped to \$35 million in 1960.

FM Radio - 1

- In 1933, Edwin Armstrong patented Frequency Modulation radio
 - Superior to AM since it eliminated static, provided a wider range of sound, and used spectrum more efficiently
- FM did not take off until the late-1960s due largely to opposition from RCA
 - RCA saw FM as a rival to television for investment capital and available spectrum
 - FM threatened to undermine the position of NBC, an RCA subsidiary

FM Radio - 2

- After the mid-1960s, FM radio took off. There were several reasons for this:
 - FM radio offered a more lucrative investment opportunity than network-dominated TV and the overcrowded AM band
 - The arrival of stereo and high fidelity
 - Increased advertising on FM as advertisers discovered the quality of its listening demographics
 - AM-FM radio sets become commonplace
 - An FCC decision in 1964 that AM and FM stations owned by the same company could not duplicate more than 50% of their programs on both bands simultaneously

Effects of Radio - 1

- By broadcasting the same content to a vast audience at the same time, radio created a shared simultaneity and unity of experience
 - This led to both a standardization of culture and also of speech
- It led people to focus on and know about what was happening at the national and international level as distinct from the local community level
 - Thanks to radio and later TV, we now have people who are well-informed about what is going on in Washington or in the Middle East, but who have no idea of who their local mayor or city council representative is

Effects of Radio - 2

- Along with the movies, led to the rise of a popular entertainment industry geared to the mass market
 - Reduced traditional forms of high art to elite ghettos of the well-to-do and the highly educated
- Radio made music a more integral, structuring part of everyday life and individual identity.
 - Fostered an interest in classical music – especially live performance due to the poor sound quality of early radio
 - Fostered an interest in country/western music and jazz

Effects of Radio - 3

- The concept of the audience led to the concept of the average American
 - This provoked an interest in ratings, audience demographics, and the tastes and attitudes of the presumed average America
 - What was the average American listening to? Or buying? Who was listening to *Our Miss Brooks* or *The Shadow*?
- Radio adversely affected the advertising revenues of newspapers and magazines

Effects of Radio - 4

- The technical limitations of early radio:
 - Precluded use of very high or very low frequency musical instruments – cello, oboe, violin
 - Favored use of certain musical instruments - piano, clarinet, and saxophone
 - Led to the use of crooning as a singing technique
 - Favored jazz despite its frequent association with prohibition-era speakeasies and its black roots

Effects of Radio - 5

- Radio and WWI led to code encryption and code breaking
- Radio paved the way for radar, TV, and cellular telephony
- Radio made music an acceptable endeavor for men
- Radio led people to match their personal schedules to the schedules of the broadcast day

Effects of Radio - 6

- Revolutionized advertising
 - Radio enabled the advertiser to reach into the home
 - Radio helped create the celebrity product endorser
 - This promoted an ethic of consumption, by encouraging people to buy the product or service that a psychologically-significant person endorsed
 - Radio enabled sponsors to identify their products with certain lifestyles and demographic groups
 - E.g. the Lucky Strike campaign which popularized smoking by women
 - Sponsors often became identified with the programs they sponsored

Effects of Radio - 7

- Revolutionized politics
 - Enabled politicians to go over the heads of both the press and the political party, thus weakening their relative power
 - Helped set the national agenda on significant issues and events
 - Created an ‘imagined community’ of like-minded listeners who could be politically mobilized

Phonograph

The Phonograph is an instrument for reproducing sounds (normally music) by means of the vibration of a stylus or needle following a spiral groove on a revolving disc or cylinder

Before the Phonograph

- Before the Phonograph, the piano
 - 1855 – The Steinway cast-iron frame piano
 - 1890s – Mass production and the upright made the piano generally affordable to the middle class
 - 1890 – 32,000 pianos produced
 - 1914 – 374,000 pianos produced
 - By 1920, about 25% of American homes had a piano
 - 1900s – Player piano

Invention of the Phonograph

- Edison invented the phonograph in 1877 because of concern that the high cost of telephones would limit their use
 - Edison had two concepts as to how the phonograph would be used
 - A person would record a spoken message and then take the record to a central station which it could be transmitted to an addressee over a telephone
 - A businessman would use it as either a dictating device to a secretary or as a device to record his phone conversations

Emile Berliner

- 1887 – Replaces the Edison wax cylinder with a flat disc (initially glass) & invents the gramophone to play it
 - Simplified both the recording and reproduction process
- Berliner saw the gramophone as a music player
 - He persuaded popular artists such as Enrico Caruso and Nellie Melba to record music on his system
 - Created the trademark of “His Master’s Voice”
 - Licensed the Victor Talking Machine Company (later acquired by RCA) to use his patents and trademark
- 1906 – the Victor Talking Machine Company creates the Victrola – a phonograph that is also a piece of stylish furniture

The Victrola



Phonograph Timeline - 1

- Mid-1890s - An Edison subsidiary developed phonographs for public nickel-in-the-slot operations that played musical selections. Such prototype jukeboxes were soon installed in neighborhood soda fountains and saloons
- Mid-1920s – Electrical recording using microphones and acetate records replaces acoustic recording
- Radio initially has a depressing impact on phonograph sales but later serves to popularize records sales
 - Quality of radio music was superior to that of phonograph music
 - 78 rpm records could contain only 4 minutes of music

Phonograph Timeline - 2

- 1948 - The 33-1/3 long-playing record (LP) and 45-rpm single were introduced
 - Unlike the earlier 78 format, these were vinyl rather than glass or metal coated with shellac
 - This paved the way for both high fidelity recordings and
- 1950s – High Fidelity recordings
 - Created the audiophile
- 1958 - The first stereophonic phonograph discs made available to the general public in 1958.
- 1961 - The FCC announces stereo FM technical standards

Phonograph Timeline - 3

- 1961 - Licensed regular stereophonic FM radio broadcasting begins
- 1960s – Dolby stereo recording
- 1963 – Introduction of the audio cassette
- 1971 – Quadraphonic sound
 - Led the way to the surround sound systems of today
- 1982 – Dolby surround sound
- 1985 – “Yellow Book” standard for CD-ROMs published
 - Meant that CD-ROMs could hold either music or data

Impact of the Phonograph - 1

- Along with radio, made music an major part of people's lives
 - Before the phonograph (and radio), hearing music required the presence of musicians, singers, or a player piano
 - Made listening to music a passive experience
- Provided much of the broadcasting content for both early radio and current FM radio
 - Fostered the development of FM radio

Impact of the Phonograph - 2

- Gave rise to the juke-box (and the teenage hangout)
- Fostered the development of portable music media
 - The record gave way to the 8-track, then the audio cassette, and finally the CD-ROM and iPod.
- Provided through the sale of records (and related media) a major source of income for musicians, singers, opera companies, choruses, and others involved with music

Impact of the Phonograph - 3

- In the form of the audio cassette and its related player-recorder
 - It gave Third World peoples a relatively cheap and easy technology by which they could make audiotapes of whatever they wanted to hear -- their native music, stories, myths, chants, prayers, sermons, and speeches. Their impact has frequently been revolutionary.
 - It permitted the survival and even the renaissance of many forms of local music and stories that were in danger of dying out
 - It facilitated the cross-cultural dissemination of musical forms and styles