

# 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

# RCA Radiola





# Console Radio



# Table Model Radio



radi02s [www.fotosearch.com](http://www.fotosearch.com)

# 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 - 1/3<sup>rd</sup> 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