

THE HISTORY OF AUDIO FORMATS

Lesson Plan by Joy Morin

Time: 30-45 minutes

Materials:

- Slides and projector/TV/computer
- Teacher notes for the slides
- Printed timeline for each student
- Printed “cutouts” page for each student (on cardstock paper)
- 2 sheets of black cardstock paper or construction paper for each student (for cutting out records)
- Scissors for students
- Crayons (optional, for coloring the cassette tape cutout)
- Props (optional): gramophone record, piano roll, vinyl record, 8-track, cassette, CD. If possible, demonstrate a record player or cassette player.

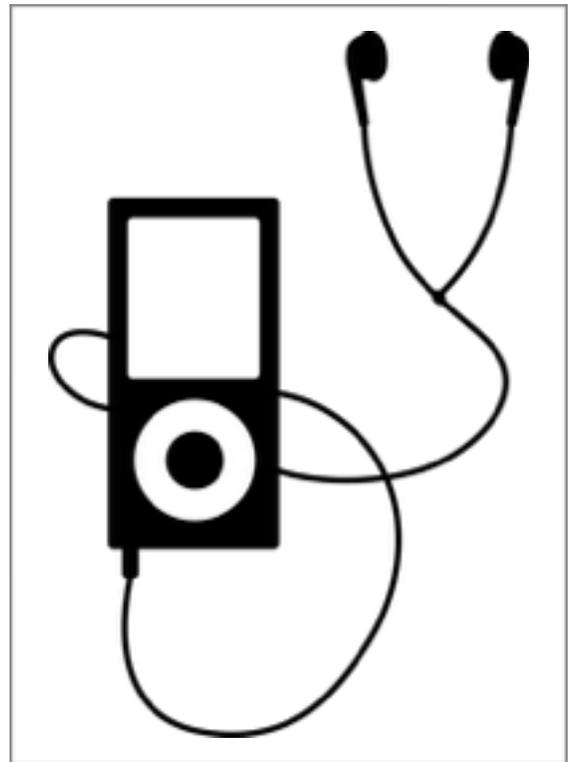
Objective: Students will be able to describe various audio formats used since the late 1800s and discuss what advantages each new format provided.

Plan:

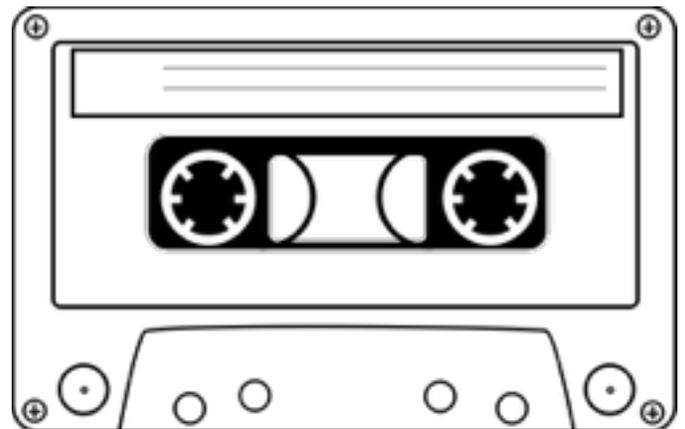
- 0:00 Pass out a printed timeline to each student. While showing each slide, the teacher should speak informally from the teacher notes and engage student in discussion about each audio format. Props may be carefully passed around the room and demonstrated if possible. Spend 5 minutes or less on each audio format. The first audio format is: Wax cylinders for the phonograph.
- 0:05 Gramophone records (or 78s) for the gramophone.
- 0:10 Piano rolls and player pianos.
- 0:15 Vinyl records for the record player. And 8-tracks.
- 0:20 Cassette tapes.
- 0:25 CDs.
- 0:30 mp3s.
- 0:35 **Craft activity:** To each student, pass out a pair of scissors, 2 sheets of black paper, and a printed “cutouts” page. Hold up examples of the completed cutouts and instruct students how to assemble their own. As students work, engage them using questioning to review the history of the audio file formats. Encourage students to talk with their parents at home about what they have learned and ask their parents if they own any records, 8-tracks, or cassettes.
- 0:45 END

Optional extension: Play prepared YouTube videos of music originating from various decades.

Cut-Outs for Students



Cut out the circles above and glue each onto a large circle of black paper.



TIMELINE OF AUDIO FORMATS

Name: _____

1890s-1910s: Wax cylinders



1900s-1920s: Piano rolls



1930s-1980s: Vinyl records



1960s-1970s: 8-track tapes



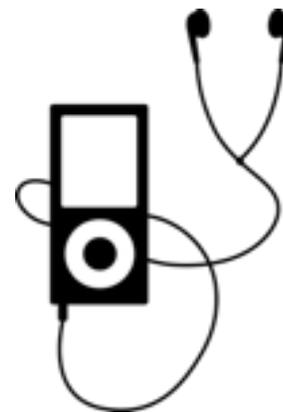
1990s-2010s: CDs

2000s-present: mp3s and other files

1900s-1930s: Gramophone records
("78s")



1970s-1990s: cassette tapes



The History of Audio Formats

Wax cylinders, records, CDs, and more

Imagine...

a world without
recorded sounds.

The Phonograph (1877)

Photo: Thomas Edison with his second phonograph (1878).



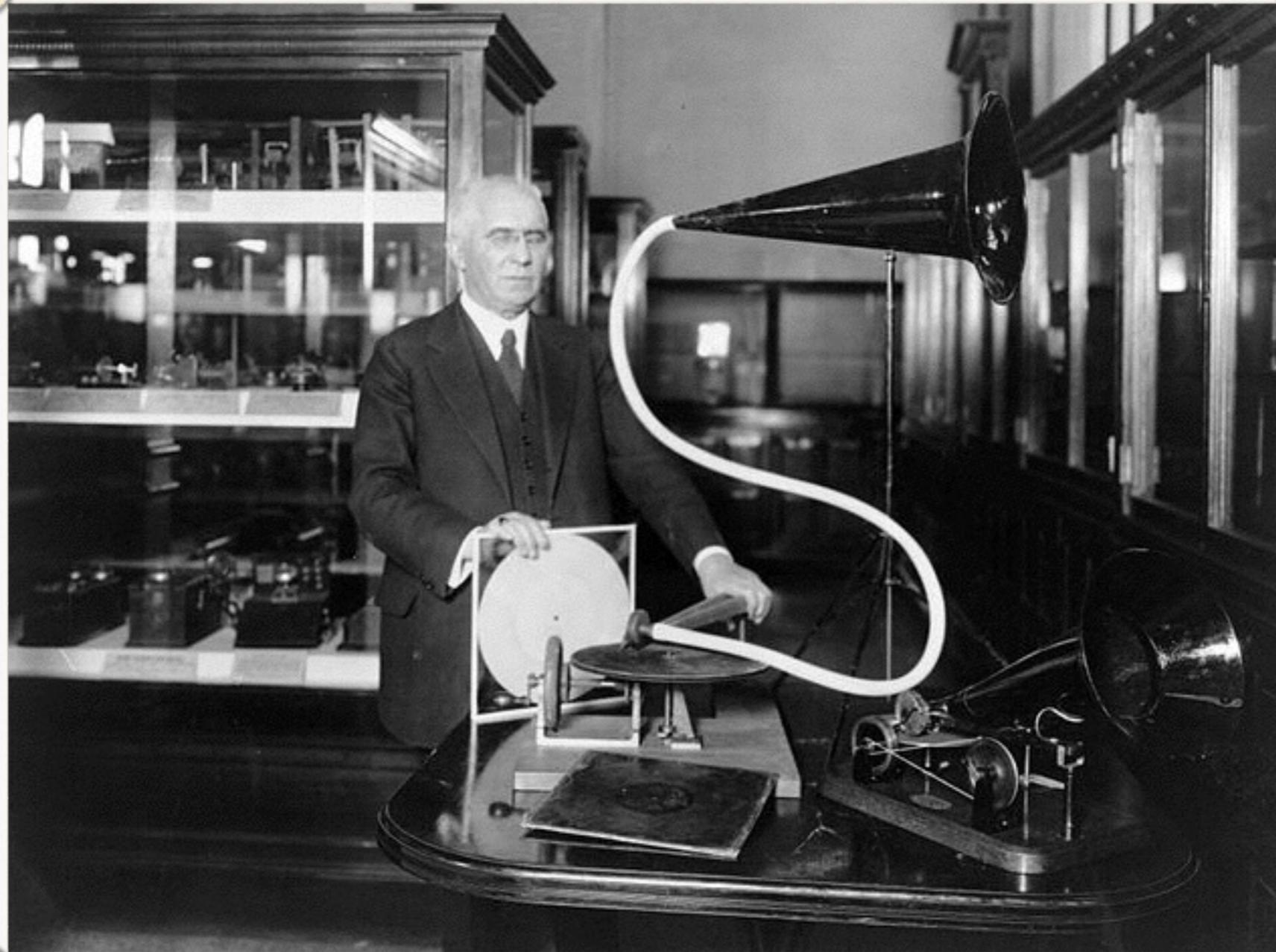
1890s-1910s

Phonograph with wax
cylinders.



1890s-1930s

Gramophone with lateral-cut disc records.



1900s-1930s

Gramophone records

(aka "78s").



1901

The Victor Talking Machine Company was founded by Emile Berliner and Eldridge Johnson. They produced gramophones, including the "Victrola."



1900s-1920s

Piano rolls
and
player pianos



1930s-1980s

Vinyl records



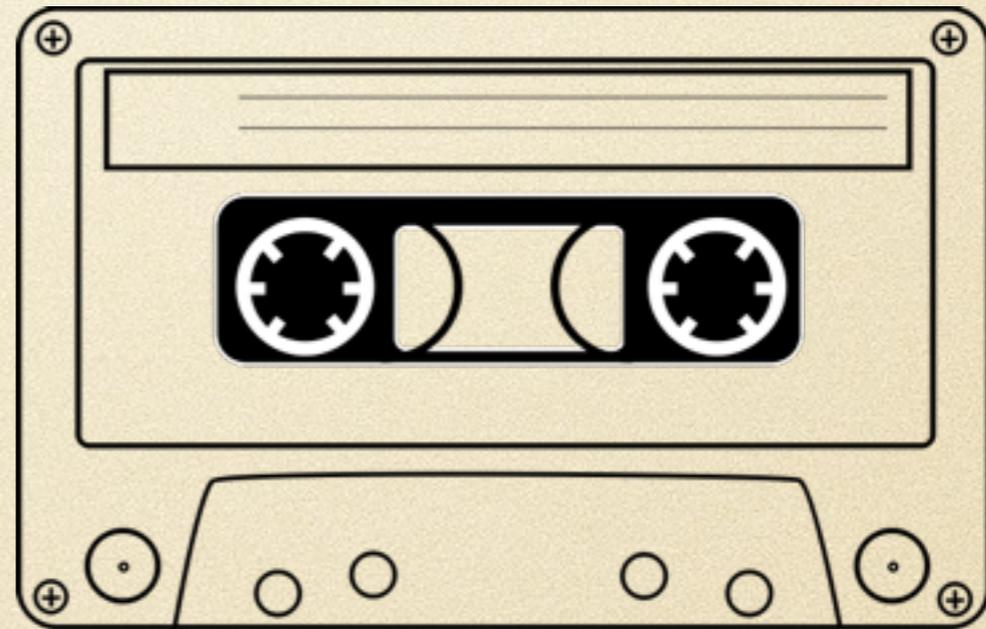
1960s to 1970s

8-track tapes



1970s-1990s

Cassette tapes



1990s-2010s

CDs

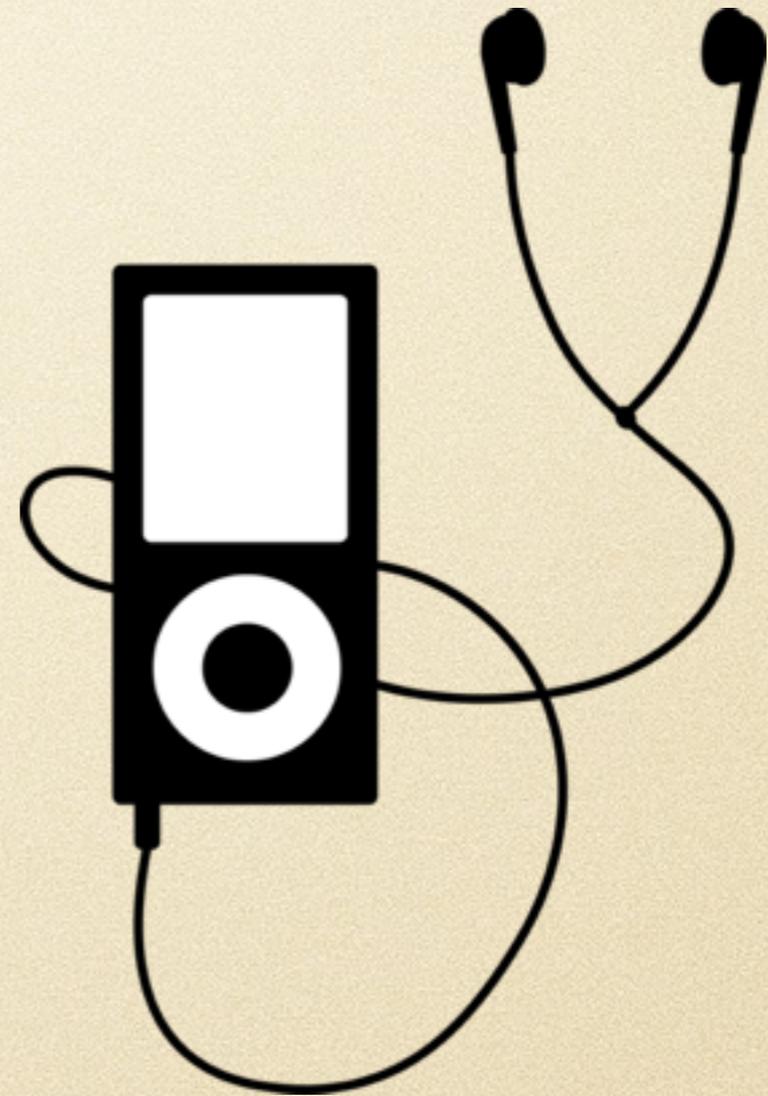
(compact discs)



2000s-present

Digital audio files:

- Uncompressed: WAV, AIFF, AU, PCM
- Compressed: MP3, AAC



Imagine...

the future?

The History of Audio Formats

Wax cylinders, records, CDs, and more

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[Teacher notes:] Inform students that we will be learning about the history of audio formats. It was not always possible to record sounds and play them back.



Imagine what it was once at a time when music recordings did not exist. If you wanted to hear music, what did you do? If you were going to entertain guests and you wanted to have background music, what did you do?

Inventors wanted to create a device that could record sound and play it back.

The Phonograph (1877)

Photo: Thomas Edison with his second phonograph (1878).



- The phonograph was invented in 1877 by Thomas Edison. A phonograph is a device for mechanical recording and reproduction of sound. While other inventors had produced devices that could record sounds, Edison's phonograph was the first to be able to reproduce the recorded sound.
- [Photo: Thomas Edison with his second phonograph, photographed by Mathew Brady in Washington, April 1878.]

1890s-1910s



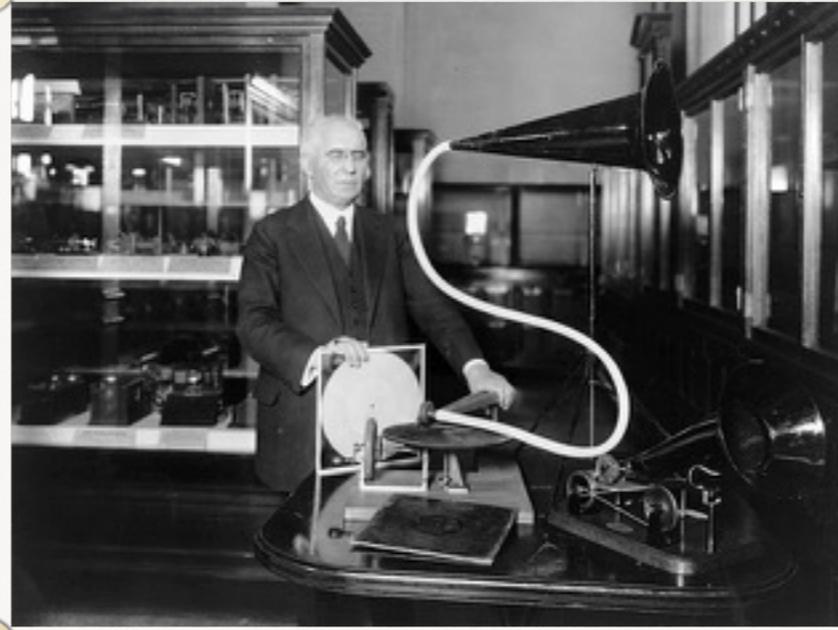
Phonograph with wax cylinders.

Phonographs were most popular from around 1896–1915. Phonographs recorded onto wax cylinders — hollow cylindrical objects with the audio recording engraved on the outside surface.

Photo: Edison Home Phonograph, Suitcase-Model.

1890s-1930s

Gramophone with lateral-cut disc records.



Lateral-cut disc records were developed in the United States by Emile Berliner, who named his system the "gramophone", distinguishing it from Edison's wax cylinder "phonograph" and Columbia's wax cylinder "graphophone". Berliner's earliest discs, first marketed in 1889, but only in Europe, were 5 inches (13 cm) in diameter, and were played with a small hand-propelled machine. Both the records and the machine were adequate only for use as a toy or curiosity. In the United States in 1894, under the Berliner Gramophone trademark, Berliner started marketing records with somewhat more substantial entertainment value, along with somewhat more substantial gramophones to play them. Berliner's records had poor sound quality compared to wax cylinders, but his manufacturing associate Eldridge R. Johnson eventually improved them. Abandoning Berliner's "Gramophone" trademark for legal reasons, in 1901 Johnson's and Berliner's separate companies reorganized to form the Victor Talking Machine Company, whose products would come to dominate the market for many years.

In 1901, 10-inch disc records were introduced, followed in 1903 by 12-inch records. These could play for more than three and four minutes respectively, while contemporary cylinders could only play for about two minutes. In an attempt to head off the disc advantage, Edison introduced the Amberol cylinder in 1909, with a maximum playing time of 4 1/2 minutes (at 160 rpm), which in turn were superseded by Blue Amberol Records, which had a playing surface made of celluloid, a plastic, which was far less fragile. Despite these improvements, during the 1910s discs decisively won this early format war, although Edison continued to produce new Blue Amberol cylinders for an ever-dwindling customer base until late in 1929. By 1919 the basic patents for the manufacture of lateral-cut disc records had expired, opening the field for countless companies to produce them. Analog disc records would dominate the home entertainment market until they were gradually supplanted by the digital compact disc, introduced in 1983.

1900s-1930s

Gramophone records
(aka "78s").



Gramophone records held 3-4 minutes of music and are stiff but somewhat fragile.

They are sometimes called "78s," named after the 78 rpm (rotations per minute) required for playback.

What is the advantage of gramophone records versus wax cylinders?

1901

The Victor Talking Machine Company was founded by Emile Berliner and Eldridge Johnson. They produced gramophones, including the "Victrola."



1901: The Victor Talking Machine Company is founded by Emile Berliner and Eldridge Johnson. A portrait of Nipper the dog (1884–1895) was used for the logo.

Photo: Enrico Caruso with a "Victrola" brand phonograph.

1900s-1920s

Piano rolls and player pianos



Around the same time that the phonograph was developing, player pianos were becoming popular. A player piano (also known as pianola) is a self-playing piano, containing a mechanism that operates the piano action via pre-programmed music recorded on perforated paper. There were hundreds of companies worldwide producing rolls during the peak period of their popularity (1900–1927).

Today, it is possible to buy pianos with modern “player piano” features. These operate using more modern implementations such as MIDI-encoded music stored on floppy disks or CDs.

1930s-1980s

Vinyl records



Later records were made out of 30 cm diameter flexible plastic, with a duration of about ten minutes playing time per side. They are unbreakable in normal use, however, they are easier to scratch or gouge and much more prone to warping compared to most 78 rpm records.

What is the advantage of vinyl records versus 78s?

1960s to 1970s

8-track tapes

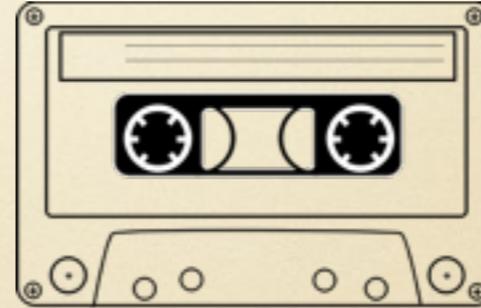


“8-track tape” is a magnetic tape sound recording technology popular in the United States from the mid-1960s to the late-1970s. Aside from a brief early period of moderate popularity in the UK, the format was relatively unknown outside the United States and Canada. Most 8-tracks hold around 46 minutes of audio. 8-tracks were used especially in cars.

What is the advantage of 8-tracks versus vinyl records?

1970s-1990s

Cassette tapes



The compact cassette is a magnetic tape recording format for audio recording and playback. Cassettes consist of two miniature spools, between which a magnetically coated plastic tape is passed and wound. These spools and their attendant parts are held inside a protective plastic shell. Cassettes held typically 30 or 45 minutes of audio per side.

What is the advantage of cassettes versus 8-tracks?

1990s-2010s

CDs
(compact discs)



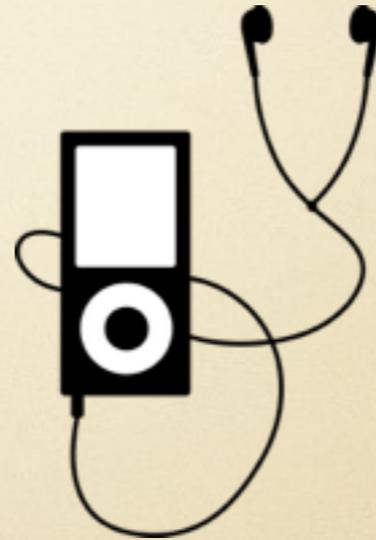
A compact disc (CD) is a digital optical disc data storage format. Standard CDs have a diameter of 4.7 inches and can hold up to about 80 minutes of uncompressed audio or about 700 MiB of data. At the time of the technology's introduction, an individual CD had greater capacity than a typical personal computer hard drive. CDs are still popular today.

What is the advantage of CDs versus cassettes?

2000s-present

Digital audio files:

- Uncompressed: WAV, AIFF, AU, PCM
- Compressed: MP3, AAC

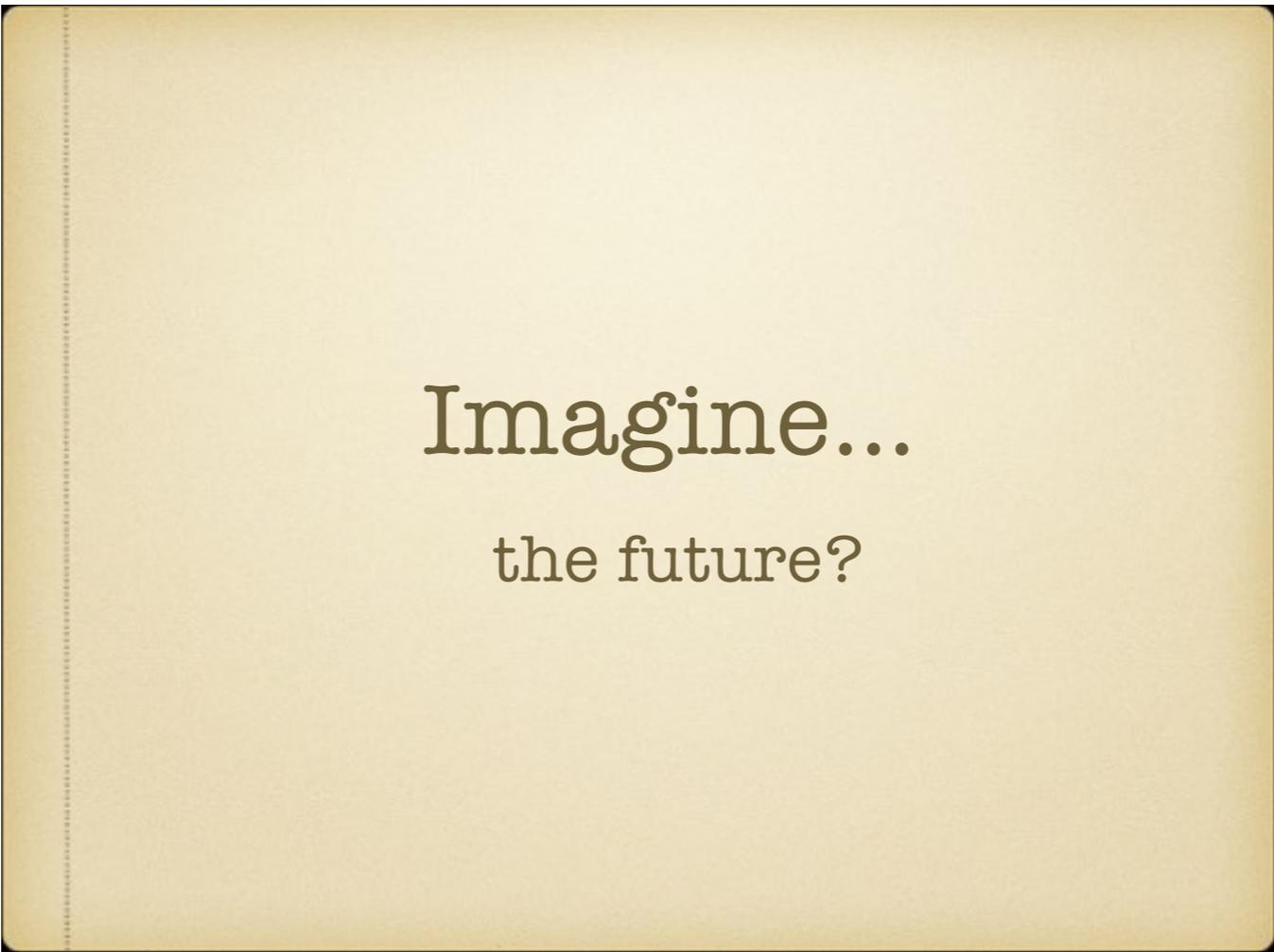


Mp3, first introduced in 1995, is an audio coding format for digital audio which uses a form of lossy data compression. It is a common audio format for consumer audio streaming or storage, as well as a standard of digital audio compression for the transfer and playback of music on most digital audio players.

The use of lossy compression is designed to greatly reduce the amount of data required to represent the audio recording and still sound like a faithful reproduction of the original uncompressed audio for most listeners. An MP3 file that is created using the setting of 128 kbit/s will result in a file that is about 1/11 the size of the CD file created from the original audio source. The compression works by reducing accuracy of certain parts of sound that are considered to be beyond the auditory resolution ability of most people.

CDs generally contain either WAV or AIFF files, which are uncompressed file formats. Uncompressed file formats are superior to compressed file formats because they do not throw away audio information. Even the best uncompressed file formats of today, however, do not compare to the audio quality of records or vinyl.

What is the advantage of buying digital audio files versus CDs?



Imagine...
the future?

What do you think will happen in the future to audio file formats?