CHAPTER 11
Breaking with The Past: New Materials in Traditional Formats

The late eighteenth and nineteenth centuries marked a major turning point in human history. Beginning in the United Kingdom and quickly spreading throughout Europe, North America, and elsewhere, the Industrial Revolution altered almost every aspect of daily life. Changes in agriculture, manufacturing, mining, transportation, and technology had a profound effect on global socioeconomic conditions. Advances in agricultural practices increased food supplies and raw materials. Steam-powered machines and improvements to iron-making processes fueled a dramatic increase in productivity and profits. The development of electricity responded to industrial needs. For the first time in history, the living standards of ordinary people underwent sustained growth, despite the fact that immediate prosperity affected only the upper and middle classes. With greater disposable income and adequate food supply, populations exploded. Travel became relatively inexpensive and the middle class seized new opportunities to visit faraway places.

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Learn more about the Industrial Revolution and child labor:
Turning Points in History: The Industrial Revolution
http://www.youtube.com/watch?v=3Efq-aNBkvc

<Insert QR Code 11.1>

Children of the Industrial Revolution
http://www.youtube.com/watch?v=E_tFFQyEu_Q&feature=related

<Insert QR Code 11.2>

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All of these conditions were interrelated; developments in one area spurred shifts in another. For example, improvements to iron-making processes not only increased the

availability of inexpensive raw materials for making steam engines but also revolutionized building practices. In the 1820s, the English had perfected a technique for rolling iron to produce wrought iron, which enhanced the **tensile strength** of the material (Fig. 11.1). Further improvements to the material's malleability led to the introduction of steel as a building material at the end of the century.

<Insert Figure 11.1>

Architects were quick to exploit the advantages of new building materials. Iron columns could carry more weight than their wooden or stone counterparts, and iron beams could span much larger areas than other more traditional building materials. Vast spaces uninterrupted by supports became a reality (Fig. 11.2). In traditional building practices, the weight of walls was carried to a wooden frame and then carried to the ground. Heights of buildings were limited by the thickness of the frame at ground level. Iron and steel, however, could support structures above the height of one hundred stories.

<Insert Figure 11.2>

One of the first persons to exploit the potential of iron frame architecture was Joseph Paxton. An amateur architect and engineer, Paxton (1803–1865) was head gardener at Chatsworth House (Figs. 11.3 and 11.4). There, his pioneering glass and iron greenhouses earned him the reputation as an innovative architect, landing him the commission for the Crystal Palace, an enormous building to house the Great Exhibition of the Works of Industry of All Nations, held in 1851, in London's Hyde Park (Figs. 11.5 and 11.6).

<Insert Figure 11.3>

<Insert Figure 11.4>

<Insert Figure 11.5>

<Insert Figure 11.6>

More than fourteen thousand exhibitors from France, northern Germany, Austria, Belgium, Russia, Turkey, Switzerland, the Netherlands, Egypt, Spain, Portugal, Brazil, Mexico, China, Arabia, Persia, the United States, India, and countries with recent Caucasian settlements such as Australia and New Zealand displayed the latest technological advancements to more than six million visitors (Fig. 11.7).

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Explore the Great Exhibitions
Virtual exhibitions in the Great Exhibition of 1851:

http://www.stanford.edu/group/ww1/spring2000/exhibition/start.html

<Insert QR Code 11.3>

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The most exciting exhibit was the Crystal Palace. Erected in a record nine months, the Crystal Palace was the largest building in the world, measuring 1,848 feet long (563 m), 456 feet wide (139 m), and soaring to a height of 135 feet (41 m). It covered eighteen acres of London's Hyde Park and enclosed twenty-one acres of exhibition space. Resembling the Great Conservatory that Paxton had built in Chatsworth, the Crystal Palace was a **modular** building made from iron, wood, and glass (Fig. 11.8). Much of it was prefabricated, manufactured in parts (Fig. 11.9). The components were transported to London where they were assembled on the construction site, making the Crystal Palace the first example of a massive prefabricated structure. The modular construction technique had a number of advantages over traditional building processes: it was inexpensive and easy to assemble and disassemble; the structure was light; plenty of sunlight poured through the glass; and no interior walls interrupted the vast space (Fig. 11.10). With its innovative glass skin stretched over the metal frame, the building's precision and clarity made it one of the first modern buildings.

<Insert Figure 11.8>

<Insert Figure 11.9>

<Insert Figure 11.10>

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3-D model of the Crystal Palace
http://www2.iath.virginia.edu/london/model/

<Insert QR Code 11.4>

Read: Primary sources on the Crystal Palace
http://www.victorianlondon.org/buildings/crystalpalace.htm

<Insert QR Code 11.5>

http://www.youtube.com/watch?v=aO3AW0JAHmU

<Insert QR Code 11.6>

Architecture: Crystal Palace
http://www.youtube.com/watch?v=Vqs8SGpN3aA

<Insert QR Code 11.7>

http://vimeo.com/14698631

<Insert QR Code 11.8>

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After the exhibition, the building was torn down and moved to Penge Place next to Sydenham Hill in an affluent part of London, where it was reconstructed. There it stood from 1854 to 1936, when it was destroyed by fire (Fig. 11.11). The conflagration was a surprise. Architects and engineers believed that since iron was fireproof, it was superior to other building materials. The truth is that extreme heat causes iron to warp and twist so that it loses its structural integrity. As a fireproofing precaution, builders in the latter part of the nineteenth century wrapped iron frames in masonry (Edward McWilliam's eyewitness account of the fire http://www.ric.edu/faculty/rpotter/eyewitness.html).

<Insert Figure 11.11>

So successful was the first world's fair that even before the London exhibition had closed, newspapers in America were demanding that the US host a second international exhibition, naming New York as the best location for the event. Just as the London fair, the New York Exhibition of the Industry of All Nations not only showcased recent technological developments but also celebrated the achievements of the young nation. For example, Elisha Graves Otis (1811–1861) risked his life to demonstrate the mechanism designed to halt his new invention, the elevator, in case of an emergency. Hired by the **impresario P. T. Barnum**, Otis slashed the elevator ropes. The contraption descended a few inches and stopped. The theatrical display was a **watershed** moment in the history of urban planning. Orders for Otis elevators poured in. The ability to transport people to great heights eventually transformed urban skylines into soaring citadels of glass.

The fair featured its own Crystal Palace (Fig. 11.12). The exhibition catalogue emphasized the American building's debt to Paxton's immense hall. The appearance of the building, and the materials employed to construct it, echoed Paxton's Crystal Palace. The New York building's framework was a system of iron columns and girders. A glass skin covered the iron skeleton so that the edifice appeared light and airy. One innovation in the new structure was the glass. A type of enamel covered the glass surface. After the enameled glass was **fired**, the material vitrified to create a translucent coating that diffused the glare and heat caused by the rays of the sun.

<Insert Figure 11.12>

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Read more:

Full text of the the New York exhibition catalogue:

http://www.archive.org/stream/cu31924031227105/cu31924031227105_djvu.txt

<Insert QR Code 11.9>

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An iron framework supported one of the most ambitious sculptural projects of the nineteenth century, the Statue of Liberty, originally called Liberty Enlightening the World (Fig. 11.13). The colossal sculpture was a joint French/American project. France had supported US efforts to gain independence in the 1770s and, in turn, America had supported France during the Revolution. The French promised to create and assemble the sculpture in New York while the US was responsible for the pedestal and a site for the monument. Commissioned to design the statue, Frédéric Auguste Bartholdi (1834–1904) planned to finish it by 1876 to commemorate the **centennial** of the Declaration of Independence. Financial and political uncertainties, however, delayed the venture for a number of decades.

<Insert Figure 11.13>

Work on the statue began in 1870 when Bartholdi made a model of the sculpture followed by sketches produced during a trip to New York in 1871. During this voyage, Bartholdi suggested Bedloe's Island (now Liberty Island) as a suitable site for the effigy since the statue would welcome ships arriving in New York. By 1875, the French sculptor had produced a number of models and a year later he had finished the torch-bearing arm, which was exhibited in Philadelphia for the centennial exhibition (The International Exhibition of Arts, Manufactures and Products of the Soil and Mine; Figs. 11.14a and 11.14b). After the exhibition, the arm was transported to New York, where it was displayed in **Madison Square Park** for several years before it was returned to France. In 1877, Bartholdi completed the head, which was exhibited at the 1878 World Fair in Paris (Fig. 11.14c). The following year Bartholdi hired the structural engineer Alexandre-Gustave Eiffel to build an iron and steel **truss tower** as an armature for the **copper plates** forming the skin of Lady Liberty (Figs. 11.14d and 11.14e). Three years later, Eiffel erected one of the most widely recognized structures in the world, the Eiffel Tower in Paris (Fig. 11.14f).

<Insert Figure 11.14a – 11.14f here>

In 1881, Richard Morris Hunt (1827–1895) began the pedestal, a truncated pyramid loosely inspired by the Doric order (Fig. 11.15). A number of fundraising events were held to complete Liberty's base. An art auction generated the iconic lines "give me your tired, your poor/Your huddled masses yearning to breathe free," from the poem "The New Colossus" by **Emma Lazarus** (1849–1887). In 1903, the poem was engraved on a plaque and mounted on Liberty's pedestal.

<Insert Figure 11.15>

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Not like the brazen giant of Greek fame,
With conquering limbs astride from land to land;
Here at our sea-washed, sunset gates shall stand
A mighty woman with a torch, whose flame
Is the imprisoned lightning, and her name
Mother of Exiles. From her beacon-hand
Glows world-wide welcome; her mild eyes command
The air-bridged harbor that twin cities frame.

"Keep, ancient lands, your storied pomp!" cries she
with silent lips. "Give me your tired, your poor,
Your huddled masses yearning to breathe free,
The wretched refuse of your teeming shore.
Send these, the homeless, tempest-tossed to me,
I lift my lamp beside the golden door!"

Note: the brazen giant of Greek fame refers to the Colossus of Rhodes.
(cited from: http://xroads.virginia.edu/~cap/liberty/lazaruspoem.html)

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Together with the establishment of nearby Ellis Island as a federal immigration station in 1892, the sonnet transformed the colossal effigy from a simple symbol of liberty into a benevolent mother, a beacon of hope to dispossessed immigrants seeking a better life in the new world. The statue's maternal aspect was further enhanced by the model for Liberty's face: Bartholdi's own mother.

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Explore immigration and Ellis island.
Arrival at Ellis Island:
http://www.history.com/topics/ellis-island/videos#arrival-at-ellis-island

<Insert QR Code 11.10>

Interactive Tour of Ellis Island:
http://teacher.scholastic.com/activities/immigration/tour/

<Insert QR Code 11.11>

Ellis Island, activities, videos, and more on History Channel:
http://www.history.com/topics/ellis-island

<Insert QR Code 11.12>

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A fund drive sponsored by Joseph Pulitzer, publisher of the New York newspaper *The World*, promised to announce the names of all contributors to the Liberty statue. Children, widows, residents of a house for alcoholics donated what they could to help raise the effigy. Pulitzer's campaign sparked such great interest that when the French ship arrived with crates packed with fragments of the sculpture, approximately two hundred thousand people witnessed the event. In 1886, the statue was dedicated amid a celebration that brought anywhere from a few hundred thousand to a million celebrants to the city.

The iconography of the statue is traditional. Liberty's size, her location overlooking a harbor, and her radiate crown recall the Colossus of Rhodes, an enormous effigy of Apollo that protected ships sailing into the harbor at Rhodes (see Chapter 8). Bartholdi was also inspired by Egyptian colossi, which he photographed during one of his trips to Egypt, and another ancient wonder, the **Lighthouse at Alexandria** (Fig. 11.16a). These ancient quotations coalesced in a project Bartholdi proposed to the viceroy (*khedive*) of Egypt. Before embarking on the Statue of Liberty, Bartholdi designed a mammoth sculpture of an Egyptian female *fellah* (peasant) carrying a torch to function as a lighthouse at the entrance to the **Suez Canal.** Titled Egypt or Progress Carrying the Light to Asia, the colossus symbolized efforts to modernize Egypt. The Suez Canal project was never actualized. Nonetheless, its similarity to the future Liberty Enlightening the World is undeniable. Despite Bartholdi's protests to the contrary, the design for Egypt was recycled for the Statue of Liberty (Fig. 11.16b).

<Insert Figure 11.16a and 11.16b here>

An attribute of Apollo, the classical solar deity, the seven light beams radiating from Liberty's crown represent the rays of the sun. The classical robe clothing the iron skeleton evokes the Roman *Libertas* (Liberty), while the chains at Lady Liberty's feet are obvious signifiers of freedom (Fig. 11.16c). Inscribed with the date "July IV MDCCLXXVI" (1776), the tablet of law in Liberty's right hand celebrates the nation's foundation on ideals of freedom. Even more striking is Liberty's resemblance to depictions of **Moses** with the **Ten Commandments** (Exodus 32:15; Fig. 11.17). Implied in the analogy is the concept that liberty is not a man-made construct but a divine law.

<Insert Figure 11.16c>

<Insert Figure 11.17>

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Explore the Statue of Liberty in popular culture:
http://en.wikipedia.org/wiki/Statue_of_Liberty_in_popular_culture

<Insert QR Code 11.13>

To consider: Why do you believe the Statue of Liberty is a national emblem?

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The construction of Lady Liberty was revolutionary. Four iron posts run from the base to the top of the sculpture to form a pylon, which carries the weight of the structure. From this central tower, a maze of smaller beams support the outer copper sheets (inside the statue: http://www.youtube.com/watch?v=gnEJUJg9TM0). Each copper plate is backed by an iron strap, which in turn is fastened to the framework. None of the copper sheets hang from the one above or is supported from the one below. Eiffel's armature is one of the earliest examples of curtain wall construction, a non-load-bearing external skin attached to a load-bearing support.

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Explore the history of Statue of Liberty
Sculpture: The Statue of Liberty
Ellis island, Statue of Liberty
http://www.youtube.com/watch?v=GFz_UVjygG4

<Insert QR Code 11.14>

http://www.youtube.com/watch?v=m0SDBm5HIF4&NR=1&feature=fvwp

<Insert QR Code 11.15>

earthcam: the Statue of Liberty:
http://www.earthcam.com/usa/newyork/statueofliberty/

<Insert QR Code 11.16>

Watch the video on the Eiffel Tower.
Eiffel Tower:
https://www.youtube.com/watch?v=r65KAj2sB0U

<Insert QR Code 11.17>

How are the Eiffel Tower and the Statue of Liberty similar, not only in engineering, but also in what they stand for historically?

How does the meaning of the two monuments shift because of their locations (Paris as opposed to New York)?

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Eiffel's curtain wall frame was a seminal development in architectural design. It coincided with Henry Bessemer's (1813–1898) process for converting **pig iron** into steel. Although the process was known in eleventh-century China, Bessemer's process produced great quantities of steel efficiently and inexpensively. With the technology to quickly produce great quantities of the raw material while decreasing labor costs, the foundation for the swift growth of the American steel industry was laid. Steel has a number of advantages over iron: it is strong; it does not twist or warp; it needs little maintenance; structures can be prefabricated in large sections and lifted into place relatively quickly; and it is flexible. Steel's versatility makes radical architecture such as Frank Gehry's Dancing House in Prague possible (Fig. 11.18).

<Insert Figure 11.18>

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Industrial Revelations: The Bessemer Process (Discovery)
http://www.youtube.com/watch?v=dypdoLm4Rn8&feature=related

<Insert QR Code 11.18>

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The Bessemer process was instrumental in forging the Brooklyn Bridge, which links Manhattan to Brooklyn in New York (Fig. 11.19a). Designed by John Roebling and finished by his son, Washington, and his son's wife, Emily, the Brooklyn Bridge is an engineering marvel. It was the first suspension bridge built in America, and after completion it was the longest bridge in the world, approximately 50 percent longer than any other bridge. At 1.1 miles (1.8 k), the length was the result of innovative materials and engineering. Instead of traditional iron, four woven steel cables suspended the bridge from two **neo-Gothic** towers (Fig. 11.19b). Earlier, steel had been used for building railroads but the material had not yet been tested in large structures. Roebling's deviation from tradition was motivated by the strength of steel and its ability to move in high winds without snapping.

<Insert Figure 11.19a>

<Insert Figure 11.19b>

To anchor the bridge's towers in the bedrock of the East River, **pneumatic** caissons were used to excavate the tons of silt covering the bedrock (Fig. 11.20). Resembling giant boxes,

the wooden caissons were assembled on land before being lowered into the river. They were then filled with compressed air to form airtight containers in which workers were able to clear away the mud and sediment at the bottom of the river. For the first time, **dynamite** was used to expedite the descent of the caissons.

<Insert Figure 11.20>

The effect of Roebling's design was resounding. Described as the **eighth wonder** of the world in 1883 when it opened, the bridge set the standard for bridge construction for decades to follow (Fig. 11.21). For New Yorkers, it was a sign of future greatness both of the city and also the country, a symbol of American ingenuity, invention, and industry, and a mark of individual creativity. After its construction, the population of Brooklyn and Manhattan boomed and real estate prices began to climb. Since the price of land was at a premium, architects began to build upward to conserve land. Born was the era of the skyscraper (primary source: Frank Harris's eyewitness account of the building of the Brooklyn Bridge http://www.eyewitnesstohistory.com/brooklynbridge.htm).

<Insert Figure 11.21>

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Explore
New York: Brooklyn Bridge
https://www.youtube.com/watch?v=i-dvOwseK84

<Insert QR Code 11.20>

https://www.youtube.com/watch?v=wy6ZTS8zsQM

<Insert QR Code 11.21>

http://www.history.com/topics/brooklyn-bridge/videos#statue-of-liberty-deconstructed

<Insert QR Code 11.22>

http://www.history.com/topics/brooklyn-bridge/videos#statue-of-liberty-unknown

<Insert QR Code 11.23>

http://www.history.com/topics/brooklyn-bridge/videos#the-statue-of-liberty

<Insert QR Code 11.24>

Golden Gate Bridge:
http://www.lib.berkeley.edu/news_events/bridge/

<Insert QR Code 11.25>

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The bridge's Gothic towers were the first New York skyscrapers. In 1883 they rose above the urban landscape, taller than any other building. Coined in the nineteenth century to describe buildings that literally seemed to "scrape the skies," skyscrapers became hallmarks of the American city (Fig. 11.22a). Lofty buildings sprung up in large urban centers such as Chicago (Home Insurance Building, 1884; the Tacoma Building, 1889), St. Louis, Missouri (Wainwright Building, 1890–1891), and in New York City (American Surety Building, 1894–1896) (Figs. 11.22b-11.22e).

<Insert Figure 11.22a-11.22e here>

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Explore the Empire State Building through the online interactive puzzle:
http://www.bestourism.com/medias/g1/4358

<Insert QR Code 11.26>

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Similar to the builders of Gothic cathedrals, developers competed against one another to produce the tallest buildings. In New York, the Empire State Building held the title of "world's tallest" for forty years only to be superseded by the World Trade Center towers (Figs. 11.23a and 11.23b). Within two years, the Sears Tower, now Willis Tower, in Chicago overtook the World Trade Center, followed by the Petronas Twin Towers in Kuala Lumpur in 1998 (Figs. 11. 23c and 11.23d). Ascending to a breathtaking 2,717 feet (828 m), Burj Khalifa in Dubai took the world record in 2010 (Fig. 11.23e). Today, most large cities are dominated by soaring towers of glass (Fig. 11.23f).

<Insert Figure 11.23a-11.23f>

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Explore soaring skyscrapers in the twenty-first century:
http://www.ctbuh.org/NewsMedia/PR_091117_ChangeHeightCriteria/tabid/1273/language/en-US/Default.aspx

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Many nineteenth-century buildings, including the Brooklyn Bridge and the Crystal Palace, were recorded in photographs. The desire to reproduce nature exactly had been the

goal of artisans for centuries. This fascination resonates with medieval *acheiropoieta*, miraculous images not made by human hands. *Acheiropoieta* had the extraordinary ability to generate copies of themselves. For example, later versions of the Mandylion legend relate how the miraculous imprint of Christ's face on a cloth reproduced itself after the bishop of Edessa had hidden the image behind a tile (Chapter 9, Fig. 9.9d). Each *acheiropoieton* not only had the power to duplicate itself but also copies could generate more copies.

It was not until the nineteenth century that the mechanical means for replicating nature were developed. Derived from the Greek words for light (*photo*) and writing (*graphia*), the term "photography" was coined by John Herschel in 1939. The mechanical and optical principles of photography were known in antiquity. The earliest machine for taking pictures was a pinhole camera, a type of *camera obscura*. Literally meaning dark room, a *camera obscura* consists of a box or room with a small hole on one side. Light passes through the hole and produces an upside down image on the wall (Fig. 11.24).

<Insert Figure 11.24>

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Assignments: Make a *camera obscura* from a room.
http://www.paintcancamera.com/cameraobscura.html

<Insert QR Code 11.28>

Less ambitious: Make a *camera obscura* from a Pringles can.
http://www.exploratorium.edu/science_explorer/pringles_pinhole.html

<Insert QR Code 11.29>

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The first mention of a *camera obscura* belongs to the Chinese philosopher Mo-Ti (470–390 BC). Approximately seventy years later, the Greek philosopher **Aristotle** (384–322 BC) viewed a partial solar eclipse through holes in a sieve. The polymath Alhazen (Ibn Al-Haytham) invented the first pinhole camera around 1000 AD, which he described in his *Book of Optics* (1021 AD). By the Renaissance, artists used the devices as drawing aids.

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Read more:
The History of the Discovery of Cinematography contains citations to primary sources describing all aspects of photography and cinema (primary sources):
http://www.precinemahistory.net/900.htm

<Insert QR Code 11.30>

The Camera Obscura from Aristotle to Zahn
http://blog.naver.com/PostView.nhn?blogId=cinemaorbit&logNo=90024572417&redirect=Dlog&widgetTypeCall=true

<Insert QR Code 11.31>

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Images caught in a *camera obscura* were **fugitive** and could only be preserved by manually tracing the image. A chemical process for fixing pictures was developed by the French inventor Nicéphore Niépce (1765–1833). Using materials that hardened on exposure to light, Niépce took the first-known photograph in 1827 from an upstairs window in his country home. Requiring an **exposure** of eight hours, his photograph is almost impossible to see (Fig. 11.25).

<Insert Figure 11.25>

In 1829, Niépce went into partnership with Louis Daguerre. Although their collaboration lasted only until Niépce's death four years later, Daguerre soon discovered a way of developing photographic plates that reduced exposure time. His photograph of the Boulevard du Temple in Paris inadvertently captured the first photographic images of people who remained still enough that they were not erased during the exposure time of more than ten minutes (Fig. 11.26).

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See website for Daguerre's announcement of discovery:

http://www.daguerreotypearchive.org/texts/M8380001_DAGUERRE_BROADSIDE_FR_1838.pdf

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Daguerre also discovered that salt arrested the photosensitive reaction so that the image was not obliterated from too much exposure to light. Naming the process after himself, the Daguerreotype, Daguerre publicly announced his discoveries on August 19, 1839. With promises that anyone "without any notion of drawing, without any knowledge of chemistry or physics" could reproduce exactly "a view of his chateau or his country house," Daguerreomania became an overnight sensation similar to the long lines that formed in 2007

when Apple's iPhone was released. One eyewitness, the photographer Marc Antoine Gaudin, described the avid interest in Daguerreotypes as follows:

> *Opticians' shops were crowded with amateurs panting for daguerreotype apparatus, and [soon] everywhere cameras were trained on buildings. Everyone wanted to record the view from his window, and he was lucky who at first trial got a silhouette of rooftops against the sky. He went into ecstasies over chimneys, counted over and over roof tiles and chimney bricks, was astonished to see the very mortar between the bricks—in a word, the technique was so new that even the poorest plate gave him indescribable joy*
> (http://www.camerakrewe.com/files/PhotographyHistory.pdf).

Within a year of disclosure, enhancements to the optical apparati and to the chemistry not only improved the quality of images but also lowered the cost of photographs. Invented by William Henry Fox Talbot in 1835, the calotype was the earliest negative-positive photographic process, in which a paper negative could yield an unlimited number of positive prints. With the advent of the **collodion** process in 1851 came the mass production of relatively inexpensive, clear, sharp photographic prints that could be widely reproduced. In the twentieth century, photography experienced another significant revolution; it was digitized. **Digital** photography uses light sensors to capture images through a lens. The image is stored as a data file on a computer or cell phone and can be viewed, printed, or enhanced by software programs without the chemical processes of traditional photography.

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Learn more about early photographic processes:
The Making of a Daguerreotype
http://www.youtube.com/watch?v=lco8vsJGQUA

<Insert QR Code 11.32>

Collodion process
http://www.youtube.com/watch?v=mzCCjlubQ2o&feature=related

<Insert QR Code 11.33>

Nineteenth century photographic processes:
http://www.youtube.com/watch?v=W0mfwOICYxs

<Insert QR Code 11.34>

The Calotype Process
http://www.youtube.com/watch?v=oD30ajWuHUI

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Today, it is difficult to imagine photography's profound impact on society, the sciences, and the arts. The accessibilty of visual documents recording personal and public history in the nineteenth century greatly altered people's perception of history, time, and identity, and sowed the seeds for a burgeoning global visual culture. Photographs became records of personal existence and family continuity. Until the mid-nineteenth century, paintings preserved ancestral lines and genealogical identities. Not only did paintings take a long time to execute but they also were cost prohibitive, afforded only by the upper classes. Quick and relatively inexpensive, photographs opened the art market to a growing middle class.

The most popular type of photograph was a small **albumen** print mounted on a standard two-and-a-half by four-inch card known as a *carte de visite* (calling card). Relatives and friends exchanged portraits either through the mail or in person. Similar to social networking sites such as Facebook, *carte de visites* were so popular that by 1863 **Oliver Wendell Holmes** remarked: "card portraits, as everybody knows, have become the social currency, the 'green-backs' of civilization" ("The Impact of Early Photography" — Infoplease.com, n. pag. http://www.infoplease.com/ce6/ent/A0860368.html#ixzz1b08gVUtB).

The growth of photographic establishments in the middle to late nineteenth centuries attests to the social effect of photography. From a handful of studios in the 1840s the number had multiplied to sixty-six in 1855 and to one hundred forty-seven two years later. In 1850 there were seventy-seven photographic galleries in New York alone. One of the most celebrated photographers was Mathew B. Brady (ca. 1822–1896). Lauded as the father of **photojournalism** for his images of the Civil War (Fig. 11.27), Brady photographed many notable celebrities, including Abraham Lincoln. On February 27, 1860, Lincoln stopped into Brady's studio to sit for a *carte de visite* (Fig. 11.28). The sitting was a momentous event. That evening, Lincoln spoke to the **Republicans** at the **Copper Union** in New York. The speech was received with unbridled enthusiasm. Newspapers and magazines published detailed accounts of the event. Inspired by Brady's photo, ***Harper's Weekly*** and Frank Leslie's ***Illustrated Weekly*** published full-page **woodcut** reproductions of Lincoln's *carte de visite* to accompany articles about the speech and election. Demand for Lincoln's portrait was so high that Brady sold hundreds of copies. After Lincoln secured the Republican nomination and the presidency, he gave credit to his Cooper Union speech and portrait, saying, "Brady and the Cooper Institute made me President." The publicity generated by the photo ushered in the era of political photography (American Museum of Photography http://photographymuseum.org/histsw.htm).

<Insert Figure 11.27>

<Insert Figure 11.28>

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Full text of Lincoln's Cooper Union speech:
http://showcase.netins.net/web/creative/lincoln/speeches/cooper.htm

<Insert QR Code 11.36>

Read more: http://blog.classyarts.com/category/carte-de-visite/

<Insert QR Code 11.37>

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A growing fascination with other cultures and the wonders of the world, coupled with affordable train travel, marked the creation of a global visual culture. Photographers traveled to exotic locations, recording foreign lands and their marvelous monuments. Professional photographic studios appeared not only in Europe and the United States but in Greece, Egypt, India, the Middle East, and Asia. Early travel photographers published their photos, which spurred travel to the Orient, a term traditionally used to describe the Middle East, South Asia, and East Asia, and inspired **Grand Tour** travelers to revisit ancient and medieval masterpieces.

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Slide show of nineteenth century travel photographs:
http://web.princeton.edu/sites/Archaeology/rp/globalviews/gv1.html

<Insert QR Code 11.38>

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Some of these photographers exposed the horrible living conditions of the poor. Photographic social documentary appeared in the late nineteenth century as a response to organized social reform movements, including **abolitionism**, the women's **suffrage movement**, **Prohibition**, and the **public education reform movement** (Fig. 11.29). The police reporter Jacob Riis published bleak unforgiving images of the New York slums hoping to improve the lives of immigrants. Prey to social Darwinism, the belief that poverty and other social ills are the result of character flaws such as laziness, immigrants to the United States often lived in squalid environments. To challenge this conviction, Riis's socially ethical photographs depicted marginalized people as victims rather than sinners (Fig. 11.30). Following Riis's example in the early twentieth century, Lewis Hines focused on poorly paid workers and child labor in mechanized factories (Fig. 11.31). By 1907, nearly 50 percent of cotton mill workers averaged ten years of age. Hines's mission was to expose the myth of the **American Dream** by recording unfair and brutal labor practices.

<Insert Figure 11.29>

<Insert Figure 11.30>

<Insert Figure 11.31>

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Read more:
Jacob Riis:
http://www.history.com/topics/brooklyn-bridge/videos#jacob-riis

<Insert QR Code 11.39>

Lewis Hines: Progressive Movement
http://www.youtube.com/watch?v=USL86CLKgnw

<Insert QR Code 11.40>

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The earliest war photographs were taken by an anonymous correspondent who produced daguerreotypes of the **Mexican-American** conflict in 1847 (Fig. 11.32). Shortly thereafter a number of European and British photographers recorded the **Crimean War** (1853–1856), while in the United States Brady and Gardener documented the Civil War (Fig. 11.33). During World War I, very few photographers were given access to the front. Consequently a limited number of combat photos survive. In contrast, both World War II and the Vietnam War were extensively documented (Fig. 11.34). Pictures of dead soldiers, their enemies, and collaterally damaged civilians appeared frequently in the news.

<Insert Figure 11.32 - 11.34 here>

No story about battles, the dead, and the wounded possesses the raw emotional power of a photograph. The bloated corpses captured by Brady after **Antietam**, the heaps of skeletal **concentration camp** victims being bulldozed into mass graves at the end of World War II, remain etched in our memories. With their focus on shattered human bodies strewn through empty fields, battle photographs erode popular support for war. Indeed, the plethora of gruesome images from the Vietnam War was partially responsible for the public outcry that swept through the world. For this reason, US authorities censored the **Persian Gulf** and **Iraq wars**. Although President Barack Obama lifted George Bush's ban against photographing the coffins of dead US troops returning home in 2007, soldiers reluctant to exploit the suffering of compatriots, respect for families wishing for privacy during tragic

events, and North Americans' fear of death have limited the number of photographs of the troops killed in Iraq published in the US press.

<start boxed text>

Crimean War photos:
http://www.old-picture.com/crimean-war-index-002.htm

<Insert QR Code 11.41>

Discussion: Do you believe that war images should be censored? Support your position through further research.

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Photography proved to be a useful tool for a number of burgeoning scientific fields such as criminology, physiognomic studies, and medicine. The French criminologist, Alphonse Bertillon (1853–1914), used photography to create the science of anthropometry, an identification system derived from measurements of a face. He was the father of the mug shot and crime-scene photography (Fig. 11.35). His contemporary, Francis Galton, developed the science of fingerprinting, which arose from his inquiries into the possibility that mental characteristics left an impression on facial features.

<Insert Figure 11.35>

Influenced by physiognomic studies, Duchenne du Boulogne (1806–1875) photographed his subjects while applying electrical probes to his patients. Electrical charges triggered grotesque, distorted muscular contractions, which he recorded with the camera and published in 1862 in *The Mechanism of Human Physiognomy* (*Mecanisme de la physionomie Humaine*; Figs. 11.36a–11.36c). His experiments were aimed at determining the physical mechanisms that linked muscles to facial expressions and, in turn, to the human soul. Dufrenne attempted to codify these artificially induced emotions into **taxonomies** of inner states of being (http://www.artifacial.org/).

<Insert Figure 11.36a – 11.36c here >

The British psychiatrist and photographer, Hugh Welch Diamond (1806–1886), investigated the impression mental illness left on the physical body. A doctor by profession, Diamond was fascinated by the application of photography to both diagnose and treat psychiatric ailments. In 1843, Diamond became superintendent of the women's ward in the **Surrey County Lunatic Asylum**. There, he systematically documented his patients in photos. His picture of a woman in a straw hat is not only poignant but also mysterious (Fig. 11.37). Bemused, the woman cradles a dead bird. Her ambiguous expression is open to interpretation: Is she mourning the bird, or did she kill it? Is the death of the bird the cause

of her ailment or its product?

<Insert Figure 11.37>

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See website for description of the fifteen-year-old Jane Avril's stay at the Salpêtrière from December 28, 1882, until July 11, 1884. Jane was hospitalized to protect her from her abusive mother.

http://www.janeavril.net/life-at-the-salpecirctriegravere.html

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Not all of photography's applications were benign. As a scientific tool, photographs sometimes became visual proofs for theories that negatively influenced social groups. For example, the photographic documents of neurologist Jean-Martin Charcot (1825–1893), Duchenne's star pupil, helped shape the conception of hysteria as a female disease, thus sowing the seeds for modern media portrayals of women as overly emotional. Commonly attributed to **Hippocrates**, the term referred to female disorders of the uterus until the seventeenth century. Charcot rehabilitated the word to signify psychological trauma that manifested itself in apparent physical disorders in females. Faintness, insomnia, seizures, nervousness, fluid retention, irritability, loss of appetite, physical tics, shortness of breath, headaches, double vision, abdominal pains were but a few of an expanding list of hysterical symptoms. Through stimulations such as genital manipulation and electroshock, female patients of the notorious Parisian insane asylum, the ***Salpêtrière***, performed hysterical symptoms for fear of losing the special status they were accorded for their participation in Charcot's experiments, to the delight and astonishment of the crowds that gathered for Charcot's Tuesday lectures. The neurologist's numerous photographs of his patients were intended to demonstrate hysteria's infinite physical manifestations (Figs. 11.38 and 11.39). A treatment that temporarily alleviated the symptoms of the chronic disease was widely available. Women could visit medical practitioners for pelvic massages that climaxed in hysterical paroxysms (Fig. 11.40). By 1870, physicians used vibrators to induce the paroxysms.

<Insert Figure 11.38 – 11.40 here >

In 1850 the celebrity scientist Louis Agassiz commissioned J. T. Zealy to produce a series of daguerreotypes of partially nude African-born plantation slaves from South Carolina (Figs. 11.41a and 11.41b). The photographs were Agassiz's visual proof for polygenesis, the hypothesis that different ethnic groups have separate origins and therefore are different

species, a proposition that rationalized racial inequality and slavery. Although the individuals portrayed in the daguerreotypes are accompanied by the standard props of commercial photographic establishments, the attributes that defined Brady's sitters as heroic, noble, are absent in Zealy's portraits. Posed as biological specimens, the sitters' partial nudity casts viewers in the role of **voyeurs**. Stripping the sitters of their humanity, expressed by their partial nudity, Zealy's pictures attempted to prove the obscene beliefs that categorized African Americans as subhuman. The pictures have the opposite effect. Each individual's eyes engage ours frankly in a dialogue of shared humanity.

<Insert Figure 11.41a – 11.41b >

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Assignments:
Compare Zealy's portraits of African-born slaves with portraits of contemporary Caucasian sitters. How do Zealy's artworks strip the sitters of their identities to transform them into scientific specimens? Compare the Zealy photographs with other images of African American slaves
(http://www.photographymuseum.com/faceof.html).
How does the cultural practice of photography create inequality?
Abu Graib photographs on display:
Do two Google searches using the terms:
Abu Graib photographs
Abu Graib photographs exhibition
Discuss the photographs of Muslim prisoners. To help you with your discussion, keep in mind the following questions:
How are Muslims portrayed in these photos?
How are visual strategies used to create a stereotype of Muslims?
Are these images related in any way to Zealy's portraits of African Americans in the nineteenth century? How? Be specific.
Since these photographs have been exhibited, the question arises: Is this art? How does exhibiting the images in a gallery setting change their meaning?

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Moving images emerged almost simultaneously with photography. Capturing movement has fascinated mankind since prehistory. In Paleolithic caves, artisans tried to portray the rapid motion of animals through repetition and other visual conventions (Chapter 4, Fig. 4.8). These early attempts were superseded by instruments capable of

creating illusions of movement: magic lanterns, zoopraxiscopes, phenakistoscopes, stroboscopes, zoetropes, among other mechanical devices. The contraptions took advantage of the effect known as the persistence of vision, the capacity to hold the memory of an image for approximately one twenty-fifth of a second after the initial stimulus disappears.

Modern **cinematography** depends on this optical effect. Films are composed of a series of still images that change slightly from one frame to another. As a film is passed through a projector, the individual frames follow one another rapidly enough to produce an illusion of continuous motion. We interpret motion as low as ten frames per second or slower, but flicker caused by the shutter of a film projector is distracting below sixteen frames per second. Modern films, whether digital or not, are projected at twenty-four frames per second.

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Experience after images through these interactive online programs:
http://www.funny-city.com/1941/

<Insert QR Code 11.42>

http://faculty.washington.edu/chudler/after.html

<Insert QR Code 11.43>

<end boxed text>

The principles of afterimage were known to the ancients, who developed machines to capture movement. Magic lanterns were the forerunners of projectors (Fig. 11.42). The device consists of a number of components. A reflector directs light from a lamp toward a lens, which focuses the light onto a hand-painted or photographic slide. A lens tube magnifies the illuminated slide, sometimes as large as twelve times the original picture. Important for the evolution of slide and motion picture projectors, magic lanterns not only screened still pictures but also moving images.

<Insert Figure 11.42>

The earliest mention of a magic lantern (*laterna magica*) was in the fifteenth century when the Venetian engineer Giovanni Fontana projected an ethereal picture of a demon, much to his audience's consternation. By the seventeenth, eighteenth, and nineteenth centuries, conjurors frequently used magic lanterns to project ghostly images of dead people and demonic creatures. One of the most famous nineteenth-century magicians was Etienne-Gaspard Robert (1763–1837), a physicist specializing in optics, whose phantasmagoric demonstrations awed Parisian audiences. Toward the end of his career, Robert's conjuring tricks attained the heights of illusion; his murky theater seemed to be occupied by large,

indistinct shadows supernaturally floating through space.

<start boxed text>

Experience magic lantern shows:
http://www.galanteeshow.be/laternad.html

<Insert QR Code 11.44>

http://www.magic-lantern.eu/index-1.html

<Insert QR Code 11.45>

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Magic lanterns were the foundation for the phenakistoscope, **Edward Mybridge**'s zoopraxiscope, the stroboscopic disk, and the zoetrope. These devices relied on revolving disks or drums with a series of images that corresponded to frames of animation (Figs. 11.43a and 11.43b). The optical and mechanical principles of these machines were known to the Greek mathematician Euclid (ca. 300 BC), the Chinese inventor Ding Huan, and the English physicist, mathematician, and astronomer Isaac Newton (1642–1727). Ding Huan produced the earliest zoetrope in China around 180 AD. Known as The Pipe Which Makes Fantasies Appear, it consisted of a device hung over a lamp. Heated air turned vanes hung with translucent paper painted with pictures that appeared to move.

<Insert Figure 11.43a>

<Insert Figure 11.43b>

<start boxed text>

Try some of these interactive online experimental machines that used afterimage to suggest movement:
Optical toys with interactive demonstrations:
http://courses.ncssm.edu/gallery/collections/toys/opticaltoys.htm

<Insert QR Code 11.46>

How to make your own praxinoscope:
http://www.randommotion.com/html/prax2.html

<Insert QR Code 11.47>

Build your own zoetrope:
http://www.groeg.de/puzzles/zoetrope.html

<Insert QR Code 11.48>

Make a myriorama:
http://www.mediatinker.com/blog/upload/2007/04/myriorama-tutorial.pdf

<Insert QR Code 11.49>

Make your own flip-book:
https://www.youtube.com/watch?v=Njl-uqnmBGA

<Insert QR Code 11.50>

Make a zoetrope:
https://www.wikihow.com/Make-a-Zoetrope

<Insert QR Code 11.51>

Early visual media:
http://www.visual-media.be/

<Insert QR Code 11.52>

Zooapraxiscope in action:
http://en.wikipedia.org/wiki/File:Zoopraxiscope_16485d.gif

<Insert QR Code 11.53>

Phenakistoscope in action: Muybridge, couple waltzing:
http://en.wikipedia.org/wiki/File:Phenakistoscope_3g07690b.gif

<Insert QR Code 11.54>

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From novelties projected in special venues such as **vaudeville** theaters and carnivals, motion pictures blossomed into the most powerful medium of mass communication and entertainment in the twentieth and twenty-first centuries. It is impossible to pinpoint the inventor of modern motion pictures. In the late nineteenth century, competing researchers were experimenting with moving pictures more or less simultaneously. Nonetheless, many film historians consider the French inventor Louis Aimé Augustin Le Prince (1841–1890?), who mysteriously disappeared in 1890, to be the father of cinematography. In 1888, Le Prince produced two moving picture sequences, *Roundhay Garden Scene*, and traffic crossing the Leeds Bridge, using a single-lens camera and paper film. The first to design a successful camera, called the Kinetograph, was W. K. L. Dickson (patented 1891). The camera could take successive images onto photographic film with an emulsion coated onto a **celluloid** strip. To view the resulting film strip, Dickson created a viewing device called a Kinetoscope. Consisting of a box with a peephole, the Kinetiscope allowed only one person

at a time to view the film. Almost concurrently, the French Lumière brothers, Louis and Auguste, invented the portable motion picture camera, and the Cinématographe, a film processing unit that printed and projected film. For the first time, motion pictures became available to a relatively large audience.

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Watch the short early experiments in motion:
Le Prince: Roundhay Garden Scene, 1888
http://www.youtube.com/watch?v=F1i40rnpOsA

<Insert QR Code 11.55>

Le Prince: Traffic Crossing Leed's Bridge, 1888
http://www.youtube.com/watch?v=L7saH58usq4

<Insert QR Code 11.56>

Lumière Brothers, 1895
Exiting the factory
http://www.youtube.com/watch?v=4nj0vEO4Q6s

<Insert QR Code 11.57>

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These early pioneers set the stage for one of the most significant developments in industrialized societies over the twentieth century, the global expansion of mass media. As an ever-growing list of communication technologies have saturated our personal and public environments, media has become inextricably interwoven with our personal, social, and political identities—in short, all aspects of contemporary life. After more than a century of media technology, we have extended ourselves to embrace the world. No longer do we depend on time and space to gather information. With just the touch of a keyboard we can travel to any place, download information, and communicate with acquaintances.

But with the many advantages, there are drawbacks to media technologies. The most dangerous is that photographs, newscasts, and documentaries are considered to be incontestable proofs of events and experiences. We forget that between the viewer and image stand a number of technicians and power brokers who have a hand in shaping what we see: the photographer or filmmaker, producer, network, director, writer, and so on. Public media are more about this complex web of relations than about objective reality. What a photographer or filmmaker chooses to record or to omit is a subjective decision. For example, the bodies strewn through Brady's Civil War photographs were moved by the photographer to stage a pleasing composition (Fig. 11.46).

Propaganda films and newscasts are the most insidious form of visual manipulation. Propaganda purports to objectively report events so as to convince viewers of a specific political idea or influence the beliefs and behaviors of groups of people, often by providing deliberately misleading content. The 1930s and 1940s, which marked World War II, were arguably the Golden Age of Propaganda. In the United States, war films were made to instill patriotism and self-sacrifice in American viewers. Many of the movies stereotyped the enemy. Japanese people were portrayed as bloodthirsty, bumbling, barbarians attacking an innocent, righteous nation. Even cartoons were enlisted to serve in the war effort. The Warner Brothers animated *Looney Tunes* and *Merrie Melodies* starring a beloved cast of characters, including Porky Pig (introduced in 1935), Daffy Duck (in 1937), and Bugs Bunny (in 1940), reduced Japanese and Germans to subhuman status. Shocking to contemporary audiences, the portrayal of enemies as less than human is a common and effective strategy employed by all cultures during wartime. It is easier to attack someone who is not only the Other, different than ourselves, but also is portrayed as a rapacious monster.

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Watch some of the propaganda cartoons.
Banned Looney Toons World War II cartoon making fun of Nazis and Japan:
http://www.youtube.com/watch?v=pjLfyooJQEc

<Insert QR Code 11.58>

Top 10 World War II Propaganda Cartoons:
https://www.youtube.com/watch?v=qTvuX9iV6aw

<Insert QR Code 11.59>

The Ducktators—American World War II propaganda:
https://www.youtube.com/watch?v=KsBG34TSJJ4

<Insert QR Code 11.60>

Daffy the Commando :
https://www.youtube.com/watch?v=0ngETXxI5pg

<Insert QR Code 11.61>

Discussion: How are non-Americans stereotyped in the cartoons?
Why employ cartoons to vilify non-American soldiers?
Is the strategy effective?
Find some Japanese and German World War II propaganda cartoons on YouTube.
How are Americans and non-native races portrayed in those cartoons?

Are the strategies of American and non-American cartoons similar. How?

<end boxed text>

While cartoons can be dismissed as light entertainment, newscasts are often seen as the purveyors of unadulterated truth. This is not necessarily the case. For example, after 9/11, CNN aired a short snippet of Palestinians celebrating in Jerusalem following the destruction of the Twin Towers. The commentary stated that the jubilant Muslims in the film footage were overjoyed at the attack on the World Trade Center. Shortly after the broadcast, the veracity of the clip was challenged by a number of people, most notably Annette Krüger Spitta of ARD's TV magazine *Panorama* (September 20, 2001). Although a celebration is in progress, there is nothing to indicate the source of the revels. Spitta further observed that before the impromptu festivities, unaired footage showed quiet streets. Apparently a man in a white T-shirt gathered people together for the shot, inciting children with promises of sweets. Nawa Abdel Fatah, the woman seen cheering, later stated that she was offered cake to rejoice on camera and was terrified after she saw the television broadcast.

<start boxed text>

Watch the video
Palestinians after 9/11:
http://www.youtube.com/watch?v=KrM0dAFsZ8k

<Insert QR Code 11.62>

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CNN has vehemently denied these charges. Some of the claims against the media giant were fabricated. Nonetheless, this case demonstrates that what we see in newspapers, on film, or television can be easily manipulated. With the media's power to shape public opinion, the only defense is a critical understanding that mass media does not always convey the unadulterated truth. It is as much of a subjective medium as other visual arts.

Further Reading

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