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Roller Coasters: Background and Design

Spring 2015

Week 3 Notes

### First Golden Age, Decline, and Revitalization

#### First Golden Age of Roller Coasters

- With the invention of John Miller's upstop wheel (patent issued in 1919 but it may have been used as early as 1912), a new age of roller coasters began. Coasters could now perform more extreme maneuvers while still remaining safe.
- The post WWI world entered a period known as the 'Roaring Twenties', a time of economic and urban growth, spread of new technology like the radio, the automobile, and electricity, and dynamic swings in culture. The wild feelings of the Roaring Twenties fit naturally with roller coasters.
- These two factors led to a period of massive roller coaster development (primarily in the USA) known as the First Golden Age of roller coasters, which lasted until roughly the Great Depression (see the End of the First Golden Age section for more details).
- During this time, around 2,000 roller coasters were constructed across the US
- There was heavy competition among parks for patrons, and the best way to attract visitors was through having the most thrilling, intense roller coasters.

#### Notable Roller Coasters of the First Golden Age

##### Coney Island Cyclone

- Arguably the most well-known roller coaster in the world
- Built in 1927 after similar rides were successful elsewhere in Coney Island
- Built by Harry Baker, who used to partner with John Miller
- 85' tall, 58 degree first drop, 60mph (probably not true), 2850' long, \$175,000
- Very popular ride which earned a sort of character; many legends about the ride
  - The most famous one involves a coal miner who went mute in a mine many years before hand. During the ride, he screamed down the first drop, and upon returning to the station said 'I feel sick'. He then fainted after realizing he had talked.
- Went into decline during the 1960s (along with the rest of Coney Island) and was almost destroyed in 1972 to make space for an aquarium. After a 'Save the Cyclone' campaign, the ride was saved and reopened in 1975.
- Is now a National Historical Landmark and a major part of Brooklyn / New York City culture (e.g. the Brooklyn Cyclones minor league baseball team)

##### Crystal Beach Cyclone

- Arguably the most intense coaster ever made
- Built by Harry Traver in 1926
  - Harry Traver was born in 1877. He invented the Circle Swing ride in 1901 and earned lots of money selling it to parks
  - He invented many other rides, like the Tumble Bug (one of which operates at Kennywood today)

- The Traver Engineering Company became the major manufacturer of the 1920s, producing many of the amusement rides of the time
- Built with two other clones at Palisades Park (near NYC) and Revere Beach in Massachusetts
- 96' tall, 3000' long, 60mph (probably not true); featured a steel support structure
- Ride featured sweeping drops, a high speed figure-8 section, and a section of 'trick-track'
- Forces on the riders were more than any other coaster at the time (4 or more Gs)
- Gained a sense of infamy due to its intensity; also gained notoriety after it killed a rider on the first day (which, in the 20s, was actually good press to have)
  - They kept a full time nurse in the station to tend to returning riders
- Over time, the ride deteriorated due to the high forces, requiring a major overhaul in 1938
- Closed in 1944; much of the structure reused for the Crystal Beach Comet in 1946 (now the Comet at The Great Escape in New York)

#### Fred Church's Coasters

- Frederick Church was a major coaster designer during the 1920s, famous for making rides with twisting drops, crossovers, and tangled layouts (as opposed to John Miller's simple camelback style)
- The Airplane Coaster at Playland Park (NYC) was built in 1928; featured 3 whirlpool elements and passed through the support structure often
- The Bobs at Riverview Park (Chicago) was built in 1924; steep drops with high banked turns, intense while not violent; same style copied in other coasters
- The Cyclone Racer at The Pike (LA) was built in 1930; somewhat similar layout to Coney Island Cyclone but with 2 tracks side by side; built out on a pier; featured in some old Hollywood films

#### Flying Turns

- Brainchild of Canadian Air Force pilot Norman Bartlett (collaborating with John Miller)
- Trains sit in trough made from laminated wood, akin to a bobsled run; as the cars navigate turns, they can swing inside the trough
- Often featured compact layouts with tight turns and typically no large drops or hills; usually themed like airplanes
- Not too many were built, and none lasted past the 1970s
- Knobels Amusement Park (PA) built their own version of the ride based on original plans from Bartlett and Miller. It opened in 2013 after 7 years of construction.

#### Outside the USA

- Most of the First Golden Age was restricted to the United States, although there were some signs of it in Europe
- England was the center of amusement park and coasters in Europe, including several American style amusement parks. Blackpool Pleasure Beach was considered the Coney Island of Europe.
- Coasters were spread to other parts of the world by the British Empire, although these were generally isolated developments
  - Africa's first coaster was in Egypt, controlled by the British
  - China's first coaster was in Hong Kong, a British port
  - Australia, a British dominion, saw coasters as early as 1912
  - South America's first coasters were in Argentina, a country full of European immigrants
- Coasters wouldn't take a foothold in the rest of the world until the invention of steel coasters

### End of the First Golden Age

- The Great Depression, which began in 1929, is generally considered the end of the First Golden Age, though it wasn't the only cause of the decline of roller coasters and amusement parks
- After 1929, few new roller coasters were built. Roller coaster manufacturers like the PTC stayed alive by working on refurbishing and maintaining old rides.
- Parks struggled to stay in business; began offering reduced ticket prices and additional features such as concerts and swimming pools
  - Even though the public had a hard time affording parks, they served as a good diversion from the general sadness and monotony of the Great Depression
- WWII caused a shortage of raw materials for coasters, which further stopped development and expedited the destruction of many rides

### The Decline of the Amusement Park (1950s – 1960s)

- After WWII, the country was jubilant and full of victorious feelings. The economy was on the rise and the population began to settle back into normalcy after a decade of depression and war. Amusement parks, however, didn't enjoy the same recovery.
- Alternative forms of entertainment, like the television, provided alternatives to visiting the local amusement park
- The mentality of the average American was much more conservative than their 20s counterpart; coasters were looked down upon
- Most amusement parks were built within cities
  - Suburbanization meant that cars were necessary to visit amusement parks. Most parks didn't have parking lots big enough to service this new number of automobiles
  - The economic class of most city dwellers lowered as the middle class went to suburbia
  - Most cities went through urban decay during this time, meaning where amusement parks were became run down and grungy; a place a typical suburban American wanted to avoid
  - Since many parks had a free entry / pay to ride system of payment, they became a hangout for unruly youths and other groups, who would go to parks but never ride anything. These groups often vandalized parks and rides and even ransacked and looted some parks
- These reasons led to the decline of the amusement park and thusly the roller coaster
- Some amusement parks, like Cedar Point, Kennywood, Hershey Park, and others survived this period, and some others were built like Disneyland and Six Flags Over Texas, but these were exceptions to the general trend
- Two main factors ended this period of decline: Disneyland and the Racer at Kings Island

### Disneyland

- In the mid-1950s, Walt Disney had already made a name for himself with major animated films like *Snow White and the Seven Dwarfs* and *Cinderella*. Many fans sent him letters requesting to visit his studio in Burbank, California (near LA). However, his studio couldn't handle the volume of requests
- Building off of an idea he had years prior, he decided to build an amusement park to showcase the Disney brand and create a family-friendly environment
  - The story goes that he was watching his daughters ride a merry-go-round and thought to himself how there should be a place with the same mentality of the amusement

parks he visited in the 1920s but much more family friendly and not based on cheap thrills

- An orange grove in Anaheim was purchased for the park and construction began in 1954 (the project cost \$17 million; \$150 million in today's dollars)
- A year later, on July 17<sup>th</sup> 1955, Disneyland opened with a special press preview event. It was a complete disaster
  - It was 101° F, unusually hot for Anaheim
  - While they had planned for 15,000 attendees and given out that many tickets, twice as many showed up, half of which had purchased counterfeit tickets
  - They event was televised on ABC live, but the anchors that were selected made several gaffs; also, many guest tripped over camera wires
  - The asphalt for the park had been poured that morning, and due to the excessive heat, many women's high heel shoes sunk into the pavement.
  - A plumber's union strike led to Disney having to choose between having running water for toilets or drinking fountains. Naturally picking toilets, many patrons thought the dry drinking fountains was a cruel ploy to force people to buy pop and other drinks
  - A gas leak in parts of the park force sections to closed early
- Despite the almost comically poor opening day, Disneyland learned from its mistakes and became an immensely popular amusement park
- Seeing Disneyland's success caused others the gain faith in the idea of amusement parks being successful. Over the next 10-15 years, several new amusement parks would be made mimicking the Disneyland formula, such as Six Flags Over Texas
  - Not all were successful though. Freedom Land USA, which opened in 1960 and was called the Disneyland of the East Coast, was a complete bust and closed after 4 years

#### The Racer at Kings Island

- With the closure of Cincinnati's Coney Island amusement park in 1971, their owners Taft Broadcasting were looking to make a new amusement park in its place
- They devised Kings Island, an amusement park with a similar structure to Disneyland; themed areas positioned around a central hub (in this case a 300ft tall replica of the Eiffel Tower)
- They wanted the centerpiece of the park to be a roller coaster, akin to the parks of the 1920s
- They approached John Allen of the Philadelphia Toboggan Company to build a wooden roller coaster for them. Having been trying to retire for years, he refused.
  - So they took Allen to a bar, bought him a few beers, and got him to sign a contract to build a wooden coaster for the park
- The coaster became known as the Racer and opened in 1972. It featured two identical tracks placed side by side in a mirrored pattern. It was 88 feet tall and had an out-and-back layout.
- The ride was a major success and is credited with re-fueling the fire of roller coaster development by showing an amusement park's strongest component was its roller coasters.
- Its opening in 1972 marks the beginning of the Second Golden Age of roller coasters, which is still going on today
  - I personally do not think that the Racer was the cause of the Second Golden Age; I give credit to the invention of the steel roller coaster in 1959 and the general return of the amusement park.
  - However, this course will consider the Racer to be the cause of the Second Golden Age since it is the most widely accepted view.

## The Invention of the Steel Coaster

- Up until the 1950s, roller coaster had been exclusively 'wooden' coasters, meaning they used track made of wood
- The idea for using steel rails arose around the 1950, with wild mouse coasters
  - Though there is a quote from John Allen stating that the Philadelphia Toboggan Company (PTC) had considered the idea as early as the 1930s
- These wild mouse coasters (usually called 'Mad Mouse'; search rddb for pictures) were small and had simple layouts with no big drops. They had issues with the steel wheels on the cars creating too rough of a ride
- In 1958, Walt Disney was planning to add a roller coaster to Disneyland themed around a mountain. However, the current wooden coaster technologies made this nearly impossible, because such technologies wouldn't allow for the sharp curves necessary for the coaster to navigate a mountain.
- They approached Arrow Dynamics who had already made many of the rides at Disneyland and asked them to solve the problem.
- They decided to use tubes of steel bent into the right shape as the rails. This allowed for much easier track shaping and much smaller turn radii
- They also used polyurethane wheels, which created a much smoother ride than steel wheels would have since they are a softer material
- This culminated in the Matterhorn Bobsleds, which opened in 1959 and is considered the first modern steel roller coaster
  - A two tracked roller coaster around 80ft tall with 2 Yeti encounters and a splash-down finale
- It would be another 7 years before Arrow made another steel coaster (Runaway Mine Train @ Six Flags Over Texas), but the idea had gotten out, and the era of the steel coaster had begun

## First Modern Inversions

- Recall that while vertical loops had existed since 1846, they were often violent and injured riders with their massive forces
  - Development of other kinds of inversions like corkscrews and barrel rolls was prevented by limitations of wooden coasters as well as lack of safety features like the upstop wheel
- With the steel roller coaster, more dynamic designs and elements could be created. Inversions are a natural addition to steel roller coasters in a way unique from wooden coasters
- Arrow Dynamics, the innovators of the steel coaster, were also the first to successfully go upside down. They decided to start out with a less severe element than a vertical loop and went with a large rolling-over element called a corkscrew.
- The first modern looping coaster was the Corkscrew at Knott's Berry Farm in CA, which was 70ft tall and featured a double corkscrew
- The next year, Arrow put a vertical loop in the Corkscrew at Cedar Point, but Schwarzkopf them to the successful vertical loop mark with the Revolution at Six Flags Magic Mountain