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## Popularity of Virtual Reality Immersion in Theme Park Attractions of North America

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The University of Southern Mississippi

Popularity of Virtual Reality Immersion in Theme Park Attractions of North America

by

Jessica Jelinski

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Submitted to the Honors College of  
The University of Southern Mississippi  
in Partial Fulfillment  
of the Requirements for the Degree of  
Bachelor of Science  
in the Department of Architectural Engineering Technology

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Approved by

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## Abstract

Theme parks continually change to incorporate new technology. Since the development of virtual reality, designers of theme park attractions have utilized several different immersion technology systems. Most of the current attractions are based on the Head-Mounted Display system and the Cave Automatic Virtual Environment system. To date, few studies or papers have been published concerning the effect virtual reality and the accompanying immersion technology may have on theme park attractions.

One hundred and seventy-eight attractions from eight theme parks were categorized based on level of immersion and then analyzed for this study. Wait times for these attractions were used to determine the popularity of the attractions. A higher wait time indicated a greater amount of people willing to wait a longer amount of time for the ride. The results were intended to show whether virtual reality had affected the desire a theme park visitor feels towards themed attractions. From the statistical analyses, it was concluded that attractions with virtual content had higher wait times than non-virtual attractions. This study could benefit ride developers and designers as a basis for studies that are more specific or for consideration on the levels of virtual reality immersion in the development of future theme park attractions.

## Key Terms

Virtual Reality, Immersion Technology, Theme Parks, Design, CAVE, HMD, Disney, Universal Studios

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## **Chapter 1: Introduction**

### **1.1 Virtual Reality in Theme Parks**

Virtual reality and computer graphics have changed theme park attractions. As the technology has evolved, theme park attractions have also evolved to incorporate each new piece of technology. Virtual reality was initially designed for completely immersing someone into a computer-generated world. In the last couple of years, some have argued complete immersion is not necessary to make the consumer believe in the fictional experience (Bowman and McMahan 2007).

Developers of theme park attractions have tried several different approaches toward incorporating virtual technology into their attractions, experimenting with both full and partial immersion techniques. At The Wizarding World of Harry Potter in Universal Studios Orlando, Harry Potter and the Forbidden Journey combines virtual reality with animated puppetry, lighting effects, sound effects, and artificial fog (see Figure 1.1, pg. 2). King Kong 360 3-D at Universal Studios Hollywood is a 3D show projected onto screens arching over and under a motion simulator carrying the passengers (Studios 2011). Developers associated with the Walt Disney Company have incorporated several different attractions using virtual technology. These attractions range from DisneyQuest, an indoor interactive theme park; the Monsters Inc. Laugh Floor, where an animated character talks to visitors; Star Tours, a motion simulator ride; Toy Story Mania, an interactive arcade-style attraction; through to It's Tough to be a Bug and Mickey's PhilharMagic, 3-D movies with physical effects coordinated to virtual causes.

Understandably, some theme park attractions are more sought after by visitors than others. Knowing which attractions are more popular will allow developers to direct their attention towards designing the types of rides most sought after by guests.



Figure 1.1: Virtually Enhanced Video from Harry Potter and the Forbidden Journey  
(Harry Potter and the Forbidden Journey n.d.)

## **1.2 Methodology Overview**

A comparison study for the popularity of different levels of virtual immersion for several theme park rides was developed. My sample group consisted of the Walt Disney and Universal Studios theme parks, since these were the parks with the highest attendance rates for 2010 (Themed Entertainment Association; AECOM 2011) and these were the parks for which the data collected was readily available. After comparing different levels of virtual immersion present within the themed attractions, the park rides were categorized based on each ride's use of virtual reality, computer graphics, and virtual reality immersion technology. Three categories of virtual immersion were used -

Virtual Reality, Mixed Reality, and Non-Virtual. Several factors that may influence the study were accounted for, including the attraction's rider capacity, the park attendance for the day, and the year the ride debuted.

Wait times of attractions were studied to determine how popular each attraction is with guests. To do this, wait times were collected from several android applications created to report attraction wait times. What type of attraction is drawing the largest number of visitors should indicate the type of attraction visitors to the parks want to ride, which in turn determines the style of new rides to be built. A higher wait time indicated a greater number of guests willing to wait for a longer time to ride an attraction. Rides with a mixture of both real and virtual media, a Mixed Reality, were hypothesized to have the longest wait times, indicating they are the most sought-after attractions.

## Chapter 2: Literature Review

### 2.1 Introduction to Virtual Reality

The term *Virtual Reality* first appeared in a paper written by Ivan Sutherland in 1962, describing the effect he created using transparent displays to place simulations into his laboratory (Sutherland 1980). In 1994, Milgram and Kishino realized the need for a mixed reality taxonomy relating to virtual displays. They defined *Virtual Reality* as having the “conventionally held view . . . in which the participant-observer is totally immersed in, and able to interact with, a completely synthetic world.” *Mixed Reality* was given the definition of technologies that involve the merging of real and virtual worlds. Milgram and Kishino created what they called the *Virtuality Continuum*, which goes from a completely virtual environment on one side to a completely real environment on the other (see Figure 2.1). The term *Real Environment* was an environment “consisting solely of real objects.” “*Real objects* are objects that have an actual objective existence.” *Augmented Reality* depicted virtual objects in a real environment. *Augmented Virtuality* is used to describe real objects in a virtual environment, and a *Virtual Environment* was one “consisting solely of virtual objects.” “*Virtual objects* are objects that exist in essence or effect, but not formally or actually (Milgram and Kishino 1994).”

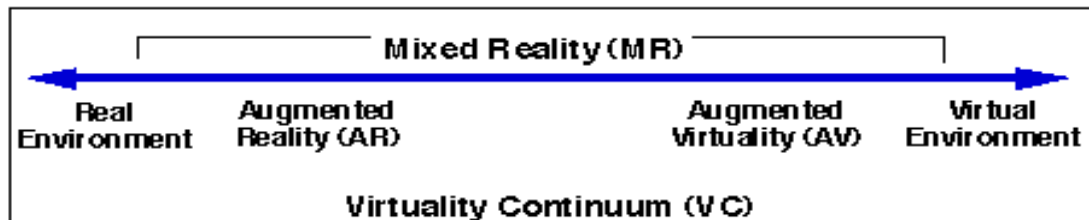


Figure 2.1: Virtual Reality Continuum (Milgram and Kishino 1994)

“Technology depends on our ability to make coherent space from sensory information (Narayan, et al. 2005).” In order for a virtual environment to be recognized as a real one, it needs to be grounded in something material, either physically presented or remembered. “Even imaginary architecture requires the brain and body of the imaginer (Anders 2008).” Around the middle of the virtual continuum, mixed reality reaches a point where a physical object is connected to a virtual object or environment in such a way that what happens in the real environment affects what happens in the virtual, and what happens in the virtual environment affects what happens in the real one. This augmented reality can include visual displays, sound, touch, and even smell, depending on the function (Anders 2008).

Humans connect with their environment using several senses simultaneously. If a viewed object makes a noise, the noise appears to the ears to come from the same place the eyes see the object. For virtual environments to be convincing, all of the sensory inputs must correlate. This correlation can be achieved partially through a virtual element being shaped by a physical outline or through a specific arrangement of the different manners through which an item is detected. The environment is then perceived either directly through sensory inputs, or virtually through the synthetic equivalents of the senses. Using the advantages of a virtual environment, an individual using a virtually immersive device can have their senses extended far beyond the user’s normal range (Anders 2008).

## 2.2 Virtual Immersion Technology

Several devices can immerse a user into a virtual environment, including two commonly used for theme park attractions. These two devices are the foundation for many of the attractions classified as augmented virtuality or virtual reality. The first is the Head-Mounted Display (HMD). This device is worn on the user's head and uses a system involving two miniature display screens to give the user a stereo view of the virtual environment (see Figure 2.2). A motion tracker is tied into the HMD so the images shown on the screens adjust as the user moves his head. This allows the user to move around and view different objects within his environment. The second commonly used immersive device is the Cave Automatic Virtual Environment (CAVE). The CAVE uses multiple screens, usually in the shape of a human-sized cube. Stereo images are projected onto the walls and floor of the cube where they can be observed by one or multiple individuals wearing lightweight stereo glasses (see Figure 2.3). Individuals can freely walk around the inside of the CAVE while a head-tracking system adjusts the projections to coincide with the viewpoint of the leading individual (Beier 2004).



Figure 2.2: HMD (K.-P.Beier 2008)

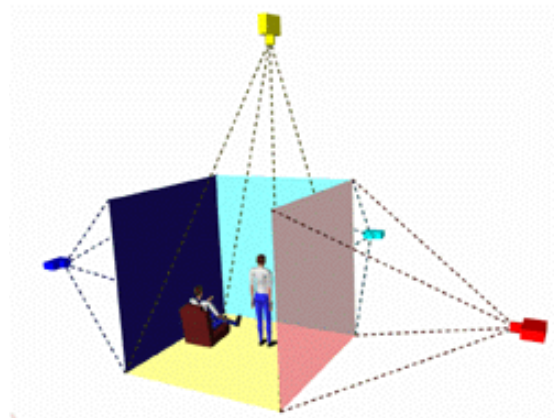


Figure 2.3: CAVE (K.-P.Beier 2008)

The term *Immersion* is defined as being a combination of the characteristics found when using physical immersion and when using head tracking. *Physical Immersion* is “the degree to which the virtual world surrounds the user in space (Raja, et al. 2004).” A virtual environment having a wide field of view in addition to a high degree of physical immersion can give a user the feeling he exists in the virtual environment. *Head Tracking* is “the measurement of the user’s head position and orientation, which is then used to render the world from the user’s point of view in space.” This method of rendering allows the user to intuitively move his view through various perspectives in the virtual environment. Head tracking used in conjunction with a HMD has been found to have lower disorientation and greater utility than when a stationary HMD is combined with hand controls (Raja, et al. 2004).

A sought after value of virtual reality environments is the ability for one user to sense what others on the same ride are feeling and experiencing. Narayan and his associates showed an increased level of immersion in a virtual environment can increase the usability of the environment when it is considered in a collaborative context. Collaborative Virtual Environments are virtual environments allowing multiple users to team up to work together through the scenario (Narayan, et al. 2005). The connection between users may be a physical one, such as in a CAVE, or a virtual one taking place in cyberspaces (Anders 2008).

### 2.3 Virtual Immersion Technology in Theme Parks

In 1992, the Walt Disney Company founded the Virtual Reality Studio to explore the possibility of incorporating virtual reality technology with theme park attractions. Theme park attractions are planned to correspond with the theme park as a whole so all of the settings and attractions relate to one subject (Anderson 2007). In 1998, Disney opened an indoor interactive theme park, DisneyQuest, focusing on the company's films. The Virtual Reality Studio developed three Collaborative Virtual Environments of the seven high-end virtual attractions created for the park: Aladdin's Magic Carpet Ride, Hercules in the Underworld, and Pirates of the Caribbean: Battle for Buccaneer Gold. Aladdin is an HMD based attraction. Hercules and Pirates were CAVE based attractions utilizing multi-screen immersive theaters, five and four screens respectively, and stereo glasses. Another attraction, Virtual Jungle Cruise (see Figure 2.4), utilized a different collaborative setup with a single screen in addition to a motion base (Mine 2003).



Figure 2.4: Virtual Jungle Cruise (Lam n.d.)



The attractions are considered short, each giving around a four to five minute experience. Because of the time restraint, users had very little time to learn the controls for the attraction. The Virtual Reality Studio solved this problem by making the controls both simple and intuitive to operate. Controls with a real-world counterpart are the easiest for users to learn, and interactive sequences within the attractions were usually limited to navigating the virtual environment and to targeting and shooting objects (Mine 2003).

For Aladdin's Magic Carpet Ride, four users sitting on motorcycle-like vehicles and wearing HMDs race through the world of Aladdin (see Figure 2.5). The current version had two predecessors. The first game was a prototype of a virtually immersive attraction. In that version, each user was made the main character of a personalized story. Different opportunities were provided to the user via a variety of random story elements. The second version of Aladdin debuted in 1996, expanding the environments available to the user and furthered the use of a non-linear narrative (Mine 2003).



Figure 2.5: Versions of Aladdin's Magic Carpet Ride (Wikipedia n.d.) (Kober 2011)

The current version of Aladdin’s Magic Carpet utilizes microphones and stereo headphones within the Head-Mounted Displays to encourage users to interact with each other and to share their experiences. A removable helmet liner combated operational and hygiene issues. The liner was adjusted to fit the user’s head while the user waited in line for the attraction. The liner could then be simply snapped into the display unit at the virtual reality station (see Figures 2.6, 2.7). For the ride, the users were grounded by the motorcycle-like vehicle, the shape of which cues the user to the attraction’s controls. An ability to roll the “carpet” was disabled after multiple users became disoriented with their position in the game or disoriented physically due to the effect. A proposed motion base was also eliminated after users experienced motion sickness (Mine 2003).



Figure 2.6: Adjustable HMD Liner (File:DisneyQuest Aladdin HMD mount.jpg 1999)



Figure 2.7: Adjustable HMD Liner with HMD (Disney Quest 2012)

Hercules in the Underworld and Pirates of the Caribbean: Battle for Buccaneer Gold are set up for four users to experience a 3D adventure. The attractions are housed in a hexagonally shaped immersive projection theater (IPT), with screens on five sides and an open sixth side to let users enter and exit the attraction. Guests wear stereo glasses with open sides to allow for peripheral cues. Head tracking is not used for these attractions. Instead, the images are rendered according to an ideal location in the center of the theater. This causes images to become distorted as the user moves away from the ideal viewpoint, but the distortion is often not even noticeable. For Hercules, only the front three screens of the theater are in stereo because of limitations with the silicon graphics it used. Since the rear screens are primarily for the peripheral cues and to provide a sense of immersion, this limitation did not detract from the attraction, particularly since users rarely turn to observe objects in the rear screens (Mine 2003).

In Hercules, the Virtual Reality Studio had to develop a way to maintain a single viewpoint for all four characters. In order to allow users to wander through the virtual environment, the area they could travel was limited by “buildings” on either side of the “street” the characters walked on. In addition, a “Pusher” was developed. This Pusher works as an invisible object to gently nudge users forward. The Pusher moves at a speed determined by the users’ avatars. A “Bubble” was also created to surround the avatars and to center the camera view over them. These combined limitations provided the designers with a fixed camera path to manipulate and develop. For each point along the path, the visible polygons were computed, allowing designers to create rich environments for all visible regions (Mine 2003).

For Pirates, a ship-themed motion platform is used in addition to the immersive theater. In addition, all of the screens for this game are viewed in stereo. The “ship” has a real steering wheel and six physical cannons that users can fire (see Figure 2.8). Four users work as the captain and cannoneers to collect gold and defeat Jolly Roger and his Ghost ship. Clear glass across the entrance to the theater allows users to preview the game and to learn the controls through observation. To make the game as engaging as possible, the attraction is designed for players to run back and forth across the ship to battle with obstacles on the screens (Mine 2003).



Figure 2.8: Pirates of the Caribbean: Battle for Buccaneer Gold (Disney n.d.)

Virtual reality technology, and how it is incorporated into themed attractions, continues to evolve. Attractions can now immerse users even more fully into a virtual environment and can also more completely combine the real and the virtual in mixed reality simulations. By 2003, designers at the Virtual Reality Studio were working to enhance physical roller coasters with virtual components and to utilize large scale immersive theaters to accommodate more users at one time (Mine 2003). By knowing how users prefer to interact with virtual reality in theme park attractions, developers can guide the developing ride platforms toward a style the users will prefer. It is believed park guests want both the nostalgia of the older park attractions along with the advantages found in the new virtual attractions. The results of the study are expected to reflect this, showing attractions with Mixed Reality as being the most popular among guests.

## **Chapter 3: Method**

### **3.1 Sample Selection**

To test the hypothesis of guests preferring mixed technologies, an observational study of the wait times for themed attractions was performed for eight different theme parks. Parks examined were chosen based on the 2010 Theme Index, which is produced by the Themed Entertainment Association and AECOM Technology Corporation. The Theme Index ranked theme parks according to the park attendance rates for the previous year. From the list of the “Top 20 amusement/theme parks in North America”, the top eight theme parks were Magic Kingdom of Walt Disney World, Disneyland Park of Disneyland, EPCOT of Walt Disney World, Disney’s Animal Kingdom of Walt Disney World, Disney’s Hollywood Studios of Walt Disney World Disney, California Adventure of Disneyland, Islands of Adventure of Universal Orlando, and Universal Studios of Universal Orlando (Themed Entertainment Association; AECOM 2011). Out of the forty North American Theme Parks identified through personal research, these eight parks were chosen for their high numbers of visitors as well as the availability of wait time data for them (see Figure 3.1, pg. 15 and Figure 3.2, pg. 15).

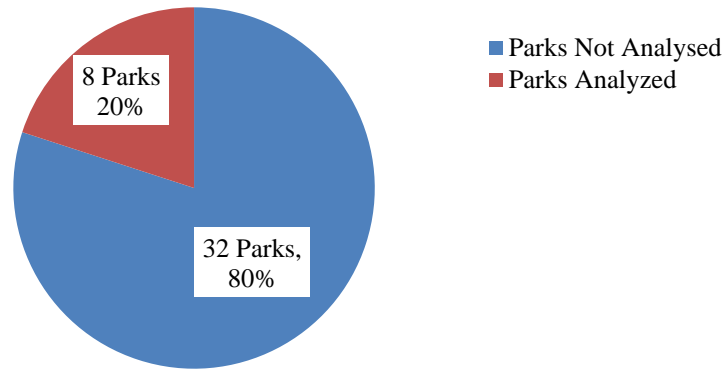


Figure 3.1: Theme Parks in North America

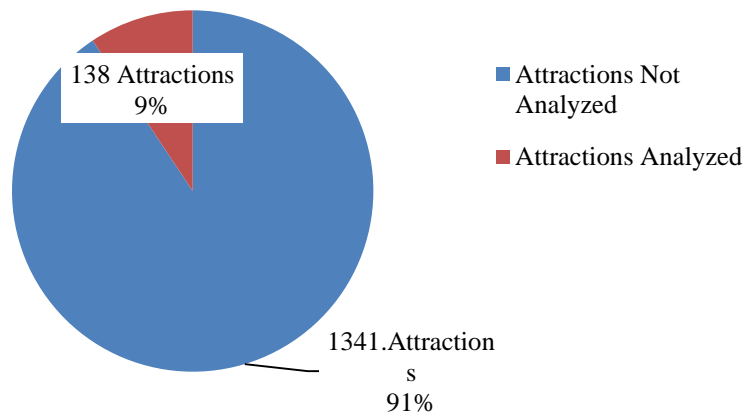


Figure 3.2: Themed Attractions in North America

### **3.2 Categorizing Attractions by Virtual Immersion**

Themed attraction rides were split into one of three groups – Conventional, Virtual, or Mixed. To divide the rides by level of immersion, a list of set characteristics categorized each attraction within the parks being studied (see Appendix A, pg. 58). A

Conventional ride did not contain any virtual characteristics or mixed characteristics. A Virtual ride was composed of only simulated sensations with no real objects present through the ride experience. Rides in this category did not have any mixed characteristics and had at least three of the virtual characteristics. A Mixed ride had at least two of the criteria from the virtual and mixed characteristics. A ride in this group could include both computer graphics and real world representations that guests may experience. Virtual characteristics included 3D computer generated imagery, simulated movement through a physical environment without physically moving between spaces, and the use of an immersive device, such as a HMD or CAVE. One example of a ride with virtual characteristics was Sum of All Thrills, a virtual roller coaster located in EPCOT, Walt Disney World.

Mixed characteristics contained 3D projections of real images, simulated movement through a projection of a real environment, use of a motion simulator, and physical effects coordinated with a virtual cause, such as water being sprayed. Some examples of commonly known mixed rides were It's Tough to Be a Bug in Animal Kingdom, Star Tours in Disney's Hollywood Studios, and Harry Potter and the Forbidden Journey in Islands of Adventure. Conventional rides do not have any of the above characteristics. Some examples included It's a Small World in the Magic Kingdom, Kali River Rapids in the Animal Kingdom, and Ellen's Energy Adventure in EPCOT. After the rides were categorized by level of immersion, they were further categorized as having either virtual or non-virtual characteristics (see Figure 3.3, Appendix A, pg. 58). This was



done because the number of virtual attractions was not large enough to constitute a separate category from the mixed attractions.

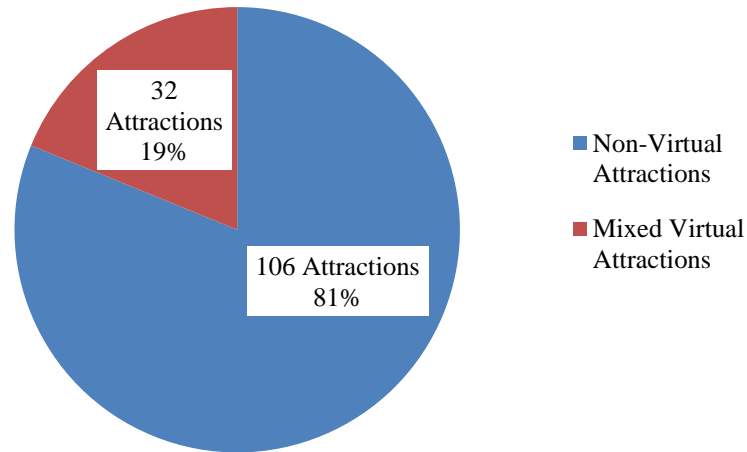


Figure 3.3: Virtual Immersion in Analyzed Themed Attractions

### **3.3 Measuring Attraction Popularity**

Wait times were used to determine the popularity of each ride. The ride type with the highest wait times would contain the most successful and sought after rides (see Appendix C, pg.102). Wait times were measured because an accurate way to measure a guest's like or dislike of an attraction was not available. Wait times were collected every day from February 8, 2012 up to May 1, 2012. Ride wait times were collected from seven android mobile applications - Ride Hopper Free (Ride Hopper 2011), Disney World Wait Times (Disney Wait Times 2011), Disneyland Wait Times (Disneyland Wait Times 2012), Universal Orlando Wait Times (Orlando Wait Times 2011), Disney World Lines (Disney World Lines 2012), Disneyland Lines (Disneyland Lines 2012), and Disneyland

Inside Out (Disneyland Inside Out 2012). All of these applications, or “apps”, were found doing a search for “Disney wait times” and “Universal wait times” in the Google app store. The wait times were collected three times a day at the same local time for each theme park, at 10:30 am, Morning; 1:30 pm, Afternoon; and 5:30 pm, Evening. These times were determined by the parks’ hours because measurements needed to be taken when all of the parks would be open (see Figure 3.4). The exceptions were Animal Kingdom and Universal Studios Orlando, which sometimes closed before 6:30 pm resulting in a missing data point. Since live data was taken, data collection could not conflict with every day constraints due to needing internet access for collection. Data was gathered at 9:30 am, 12:30 pm, and 4:30 pm local time for the Orlando parks, and at 12:30 pm, 3:30 pm, and 7:30 pm for the theme parks in California. To record the data, screen captures of the apps were taken with a Samsung Tablet (see Figure 3.5, pg.19). Sampling wait times throughout the day accounted for possible ride preference variations a guest may experience between morning, afternoon, and evening.

	Animal Kingdom	Epcot	Hollywood Studios	Magic Kingdom	Universal Studios Orlando	Islands of Adventure
Open	9:00 am	9:00 am	9:00 am	9:00 am	9:00 am	9:00 am
Closed	5:00 pm	9:00 pm	7:00 pm	9:00 pm	6:00 pm	7:00 pm

	Disneyland	California Adventure	Universal Studios Hollywood
Open	10:00 am	10:00 am	10:00 am
Closed	8:00 pm	8:00 pm	6:00 pm

Figure 3.4: Theme Park Hours (Ride Hopper 2011) (SanDiego.com n.d.)



Figure 3.5: Sample Images of Wait Time Applications

The applications used were designed to allow people in the parks to share current attraction wait times with each other. Because the wait times were user submitted, a large amount of error was anticipated. However, this was the best option, since it would be costly and time consuming to have volunteers physically collect wait times from the parks. To combat the anticipated error, wait times were taken from several applications and compared in order for a more accurate wait time to be used in the calculations. One application in particular was more reliable in this regard. “Lines”, which shows wait times for both Disney World and Disneyland, allowed application users to submit current wait times which were then supplemented with the “Lines” records of wait times from the past ten years to produce a more accurate estimated wait time. Because of this feature, the “Lines” application allowed viewing when the wait times were submitted. Times submitted over thirty minutes previous to the designated data collection hour were not used since they could skew results.

If a ride was listed as closed, it was counted as a missing value. Since it was closed, data could not be collected from it, resulting in a missing data point. A data case was not eliminated even if an application listed the ride as being closed because although one app states the ride as closed, other apps may list the ride as open. If the ride was listed as open, data could be gathered from it, even if only one application had wait times listed. A certain amount of error in the measurements was expected from this because, due to not being on site, it could not be determined whether a ride is truly closed or if the user entered incorrect information.

### **3.4 Data Analysis**

Several characteristics of the attractions were accounted for in order to normalize the data. The wait times of rides that run according to a predetermined schedule were excluded from the study; eliminating many of the attractions presented in the style of a theatrical show. To account for different rider capacities, the wait time was analyzed according to the number of riders able to experience the attraction in one hour. The age of the themed attraction also needed to be considered, since new rides might have attracted a higher amount of riders regardless of whether or not the ride is successful. Guests might have gravitated towards a new ride to try it out for themselves, especially if the ride did not have a known reputation. Other, older rides could have had longer wait times because they have nostalgic value for returning park guests.

Data was first entered into Microsoft Excel because of the program's familiarity (see Figure 3.6, pg. 22 and Appendix B, pg. 63). The data was transferred to IBM SPSS Statistics 20, an analysis program, by opening SPSS and then selecting 'Type in data', 'OK', 'File', 'Open', and 'Data' (see Figure 3.7, pg. 23). The data type was changed to excel and the file containing the data to import was selected from those shown.

A	B	C	D	E	F	G	H	I	J	K	L	M
Park Name	Ride Name		Ride Capacity	Year Opened	RideType	Date	Time	Ride Hopper Free	Wait Times Lines	Inside Out	MeanTime	
1	Animal Kingdom	Dinosaur	2468.571429	1998	0	2/8/2012	10:30	15.0	100	11.0	12.0	
2	Animal Kingdom	Expedition Everest	2720	2006	0	2/8/2012	10:30	35.0	15.0	5.0	18.3	
3	Animal Kingdom	It's Tough to Be a Bug!	3225	1998	1	2/8/2012	10:30	15.0	0.0	10.0	8.3	
4	Animal Kingdom	Kali River Rapids	2736	1999	0	2/8/2012	10:30	15.0	0.1	0.1	5.1	
5	Animal Kingdom	Kilimanjaro Safaris	4428	1998	0	2/8/2012	10:30	15.0	25.0	21.0	20.3	
6	Animal Kingdom	Primeval Whirl	1560	2002	0	2/8/2012	10:30	20.0	5.0	13.0	12.7	
7	Animal Kingdom	Triceratop Spin	1920	2001	0	2/8/2012	10:30	15.0	5.0	6.0	8.7	
8	Animal Kingdom	Wildlife Express Train	4285.714286	1998	0	2/8/2012	10:30	10.0	5.0	8.0	7.5	
9	Epcot	Captain EO	2011.764706	2010	1	2/8/2012	10:30	15.0	5.0	8.0	9.3	
10	Epcot	Circle of Life	1330.569948	1995	0	2/8/2012	10:30	10.0	6.0	6.0	8.0	
11	Epcot	Ellen's Energy Adventure	1620	1996	0	2/8/2012	10:30	10.0	0.0	13.0	7.7	
12	Epcot	GranFiesta Tour Starring the Three Caballeros	1860	2007	0	2/8/2012	10:30	5.0	5.0	0.1	3.4	
13	Epcot	Journey into Imagination with Figment	2240.00	2002	1	2/8/2012	10:30	5.0	0.0	3.0	2.7	
14	Epcot	Living with the Land	1440.00	1993	0	2/8/2012	10:30	15.0	5.0	7.0	9.0	
15	Epcot	Maelstrom	822.86	1988	0	2/8/2012	10:30	10.0	10.0	0.1	6.7	
16	Epcot	Mission: SPACE Green	1200.00	2003	1	2/8/2012	10:30	5.0	10.0	9.0	8.0	
17	Epcot	Mission: SPACE Orange	1200.00	2003	1	2/8/2012	10:30	10.0	10.0	13.0	11.0	
18	Epcot	Segway Central	80.00	2008	0	2/8/2012	10:30	5.0			5.0	
19	Epcot	Soarin'	1044.00	2005	0	2/8/2012	10:30	25.0	25.0	30.0	26.7	
20	Epcot	Spaceship Earth	2605.71	1982	1	2/8/2012	10:30	10.0	5.0	0.0	5.0	
21	Epcot	Sum of all Thrills	48.00	2005	1	2/8/2012	10:30	15.0	18.0	18.0	16.5	
22	Epcot	The Seas with Nemo & Friends	2712.00	2006	0	2/8/2012	10:30	10.0	5.0	4.0	6.3	
23	Epcot	Test Track	1152.00	1999	0	2/8/2012	10:30	25.0	10.0	28.0	21.0	
24	Hollywood Studios	The Great Movie Ride	1854.55	1989	0	2/8/2012	10:30	15.0	10.0	9.0	11.3	
25	Hollywood Studios	Muppet*Vision 3-D	1353.60	1991	1	2/8/2012	10:30	10.0	5.0	8.0	7.7	
26	Hollywood Studios	Rock 'n' Roller Coaster Starring Aerosmith	2215.38	2002	0	2/8/2012	10:30	30.0	10.0	23.0	21.0	
27	Hollywood Studios	Star Tours	2057.14	2011	1	2/8/2012	10:30	15.0	15.0	15.0	15.0	
28	Hollywood Studios	Studio Backlot Tour	685.71	1989	0	2/8/2012	10:30	15.0	5.0	5.0	8.3	
29	Hollywood Studios	Toy Story Mania!	1333.33	2008	1	2/8/2012	10:30	30.0	35.0	30.0	31.7	
30	Hollywood Studios	The Twilight Zone Tower of Terror	2880.00	1994	0	2/8/2012	10:30	20.0	40.0	25.0	28.3	
31	Hollywood Studios	Voyage of the Little Mermaid	1800.00	1992	0	2/8/2012	10:30	15.0	5.0	5.0	10.0	

Figure 3.6: Sample of Data in Excel

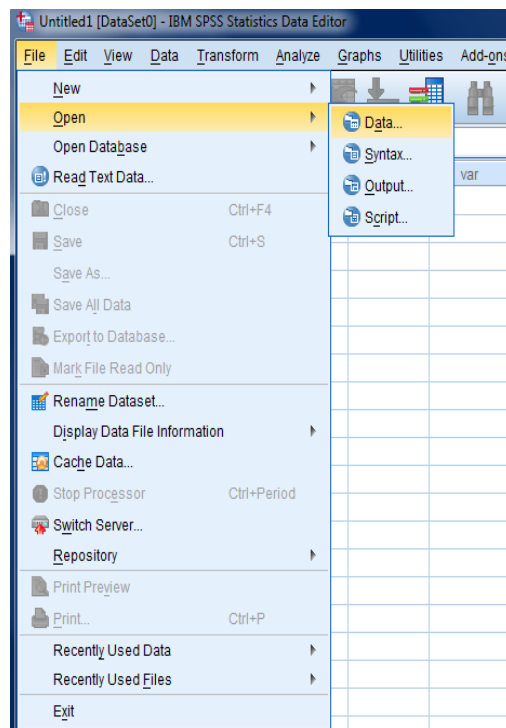
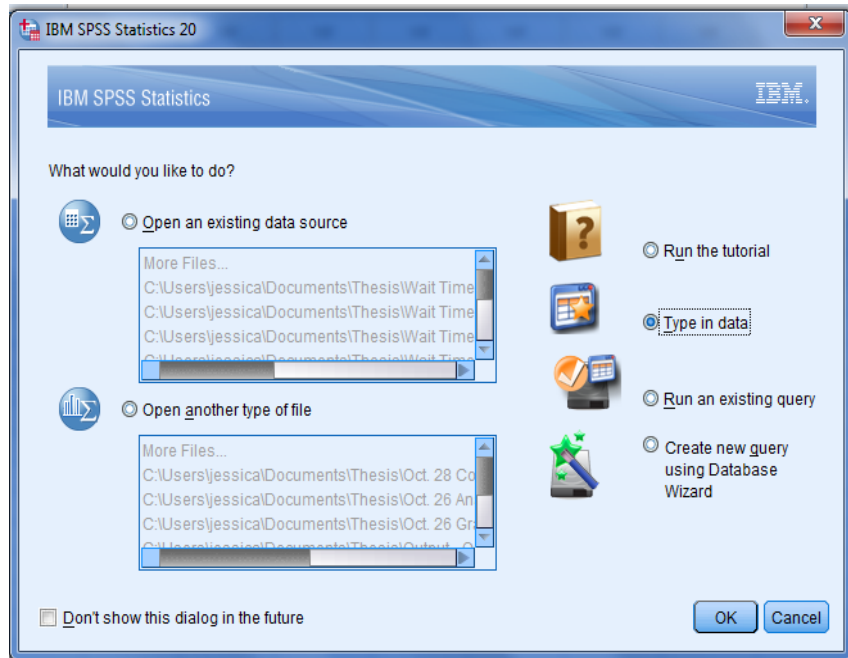


Figure 3.7: Data Imported in SPSS 20

Variable names in the program were listed across the top of the data chart while each recorded time was listed as an individual case, one per row (see Figure 3.8, pg. 25). Variables were configured based on the type of data they use, their values, and how they were measured (see Figure 3.9, pg. 26). Park Name and Ride Name were entered as string, nominal variables since they could be used to categorize data cases. Ride Capacity and Year Opened were numeric, scale variables. Ride Type was a numerical, nominal variable with Virtual and Mixed attractions given a value of 1 and Conventional attractions a value of 0. Date and Day of the Week were date, scale variables. Hour was a numeric, scale variable and described the time of day the data was collected with morning having a value of 1, afternoon a value of 2, and evening a value of 3. The wait times entered into the program were quantitative, and so were being measured on a scale. Mean Time was also numeric data measured on a scale, since it was the mean of the wait times measured for each case. Ride Age was a numeric, scale variable and derived by subtracting Year Opened from 2012. Weekday and Week Number were numeric data variables used to split the cases. Weekday split the data by weekdays and weekends, and Week Number split the data by how many weeks had passed since data sampling had started. The last variable was a filter, which changed depending on whether or not the data was being split by Ride Type or Hour, when it was split at all.



V1	ParkName	RideName	RideCapacity	YearOpened	RideType	Date	Hour	RideHopper Free	Wait Times	InsideOut	MeanTime	RideAge	Day_of_Week	Week day	Week Num
1	Animal Kingdom	Dinosaur	2469.0000	1998	0	08-Feb-2012	1.00	15.0	1	1	12.0	14.00	Wed	1	1
2	Animal Kingdom	Expedition Everest	2720.0000	2006	0	08-Feb-2012	1.00	35.0	1	5	18.3	6.00	Wed	1	1
4	Animal Kingdom	Kali River Rapids	2736.0000	1999	0	08-Feb-2012	1.00	15.0	0	0	5.1	13.00	Wed	1	1
5	Animal Kingdom	Kilimanjaro Safaris	4428.0000	1998	0	08-Feb-2012	1.00	15.0	2	2	20.3	14.00	Wed	1	1
6	Animal Kingdom	Primeval Whirl	1560.0000	2002	0	08-Feb-2012	1.00	20.0	5	1	12.7	10.00	Wed	1	1
7	Animal Kingdom	Triceratop Spin	1920.0000	2001	0	08-Feb-2012	1.00	15.0	5	6	8.7	11.00	Wed	1	1
8	Animal Kingdom	Wildlife Express Train	4285.0000	1998	0	08-Feb-2012	1.00	10.0	5	5	7.5	14.00	Wed	1	1
10	Epcot	Circle of Life	1331.0000	1995	0	08-Feb-2012	1.00	10.0	6	6	8.0	17.00	Wed	1	1
11	Epcot	Ellen's Energy Adventure	1620.0000	1996	0	08-Feb-2012	1.00	10.0	0	1	7.7	16.00	Wed	1	1
12	Epcot	GranFiesta Tour Starring the Three Caballeros	1860.0000	2007	0	08-Feb-2012	1.00	5.0	5	0	3.4	5.00	Wed	1	1
14	Epcot	Living with the Land	1440.0000	1993	0	08-Feb-2012	1.00	15.0	5	7	9.0	19.00	Wed	1	1
15	Epcot	Maelstrom	822.8571	1988	0	08-Feb-2012	1.00	10.0	1	0	6.7	24.00	Wed	1	1
18	Epcot	Segway Central	80.0000	2008	0	08-Feb-2012	1.00	5.0	5	5	5.0	4.00	Wed	1	1
19	Epcot	Soarin'	1044.0000	2005	0	08-Feb-2012	1.00	25.0	2	3	26.7	7.00	Wed	1	1
22	Epcot	The Seas with Nemo & Friends	2712.0000	2006	0	08-Feb-2012	1.00	10.0	5	4	6.3	6.00	Wed	1	1
23	Epcot	Test Track	1152.0000	1999	0	08-Feb-2012	1.00	25.0	1	2	21.0	13.00	Wed	1	1
24	Hollywood Studios	The Great Movie Ride	1854.5455	1989	0	08-Feb-2012	1.00	15.0	1	9	11.3	23.00	Wed	1	1
26	Hollywood Studios	Rock 'n' Roller Coaster Starring Aerosmith	2215.3846	2002	0	08-Feb-2012	1.00	30.0	1	2	21.0	10.00	Wed	1	1
28	Hollywood Studios	Studio Backlot Tour	685.7143	1989	0	08-Feb-2012	1.00	15.0	5	5	8.3	23.00	Wed	1	1
30	Hollywood Studios	The Twilight Zone Tower of Terror	2880.0000	1994	0	08-Feb-2012	1.00	20.0	4	2	28.3	18.00	Wed	1	1
31	Hollywood Studios	Voyage of the Little Mermaid	1800.0000	1992	0	08-Feb-2012	1.00	15.0	5	5	10.0	20.00	Wed	1	1
32	Magic Kingdom	Astro Orbiter	1280.0000	1974	0	08-Feb-2012	1.00	25.0	2	2	21.7	38.00	Wed	1	1
34	Magic Kingdom	Walt Disney's Carousel of Progress	4114.2857	1975	0	08-Feb-2012	1.00	5.0	5	5	5.0	37.00	Wed	1	1
35	Magic Kingdom	Country Bear Jamboree	1520.0000	1971	0	08-Feb-2012	1.00	10.0	7	7	8.5	41.00	Wed	1	1

Figure 3.8: Sample of Data in SPSS 20

Name	Type	Width	Decimals	Label	Values	Missing	Columns	Align	Measure	Role
V1	Numeric	12	0	Case Number	None	None	12	Right	Scale	Input
ParkName	String	27	0	Park Name	None	None	27	Left	Nominal	Input
RideName	String	45	0	Ride Name	None	None	45	Left	Nominal	Input
RideCapacity	Numeric	12	4	Ride Capacity	None	None	12	Right	Scale	Input
YearOpened	Numeric	12	0	Year Opened	None	None	12	Right	Scale	Input
RideType	Numeric	12	0	Non-Virtual or Mixed Virtual Immersion	{0, Non-Virt...	None	12	Right	Nominal	Input
Date	Date	11	0	Day Data Collected	None	None	11	Right	Scale	Input
Hour	Numeric	11	2	Hour Data Collected	{1.00, Morni...	None	11	Right	Scale	Input
RideHopper...	Numeric	12	1	Ride Hopper Free	None	None	12	Right	Scale	Input
WaitTimes	Numeric	3	0	Wait Times	None	None	1	Right	Scale	Input
Lines	Numeric	3	0	Lines	None	None	1	Right	Scale	Input
InsideOut	Numeric	12	1	Inside Out	None	None	12	Right	Scale	Input
MeanTime	Numeric	12	1	Mean of Measured Wait Times	None	None	12	Right	Scale	Input
RideAge	Numeric	8	2	Age of a Ride	None	None	8	Right	Scale	Input
Day_of_Week	Date	3	0	Day of the Week	None	None	3	Right	Scale	Input
Weekday	Numeric	3	0	Weekday or Weekend	{0, Weeken...	None	3	Right	Scale	Input
WeekNum	Numeric	11	0	Number of Weeks Collecting Data	None	None	11	Right	Scale	Input
filter_\$	Numeric	1	0	RideType=1 (FILTER)	{0, Not Sele...	None	10	Right	Nominal	Input

Figure 3.9: Variable View of Data in SPSS 20

After collecting the data and entering it into the SPSS program, a research analyst was consulted to ensure the correct analysis method was being used. Within the program, an Independent T-test was used to evaluate the statistical difference between Virtual and Non-Virtual wait times by selecting ‘Analyze’, ‘Compare Means’, and ‘Independent-Samples T Test’. Within the pop-up box, Mean Time was selected as the variable to be tested and Ride Type as the grouping variable. The groups were defined as 0, for non-virtual rides, and 1, for virtual rides (see Figure 3.10).

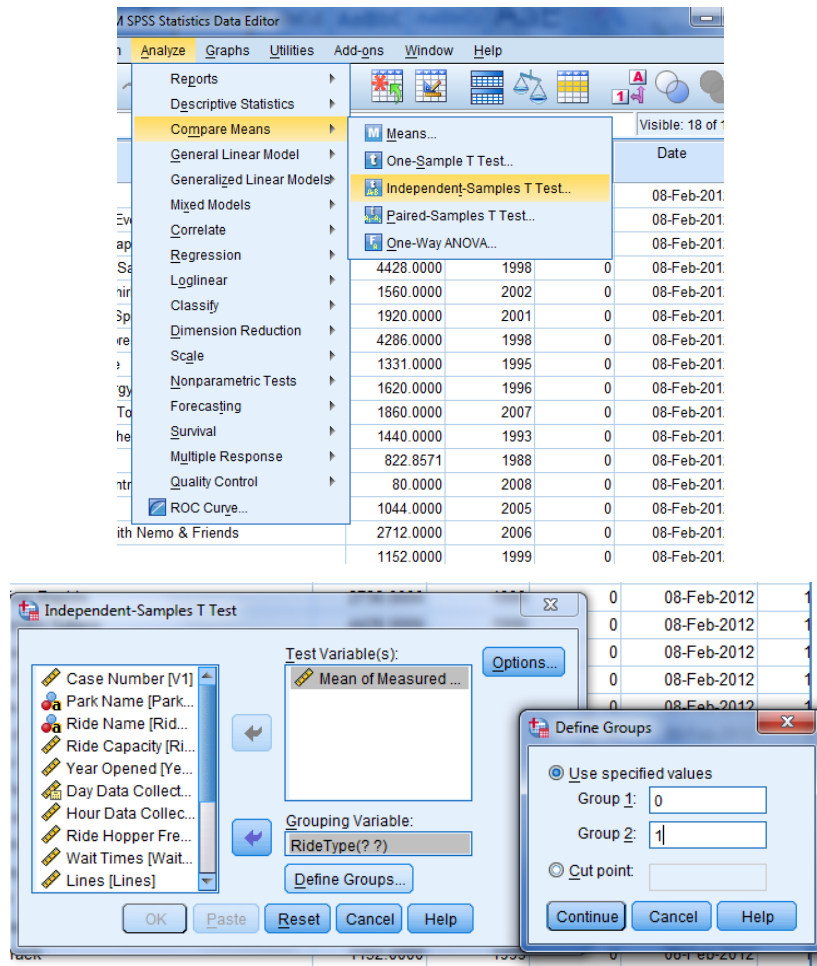


Figure 3.10: Independent T-test in SPSS 20

A Univariate Analysis determined if Ride Type, Mean Time, Day of the Week, and Hour had a significant relationship. A significant relationship can be reliably produced again and is not caused by chance. To determine if a variable was significant, the given number for significance was subtracted from a value of 1 to attain the percentage of the results that might not be due to chance. 95% significance and above is preferable, although lower percentages may be acceptable. The analysis was performed by selecting 'Analyze', 'General Linear Model', and 'Univariate'. Mean Time was listed as the dependent variable with Ride Type, Hour, and Day of the Week as fixed factors. Under 'Options', 'Descriptive statistics' was selected as well as the means for each variable to be displayed. The significance level was left as .05, with confidence interval as 95% (see Figure 3.11, pg. 29).

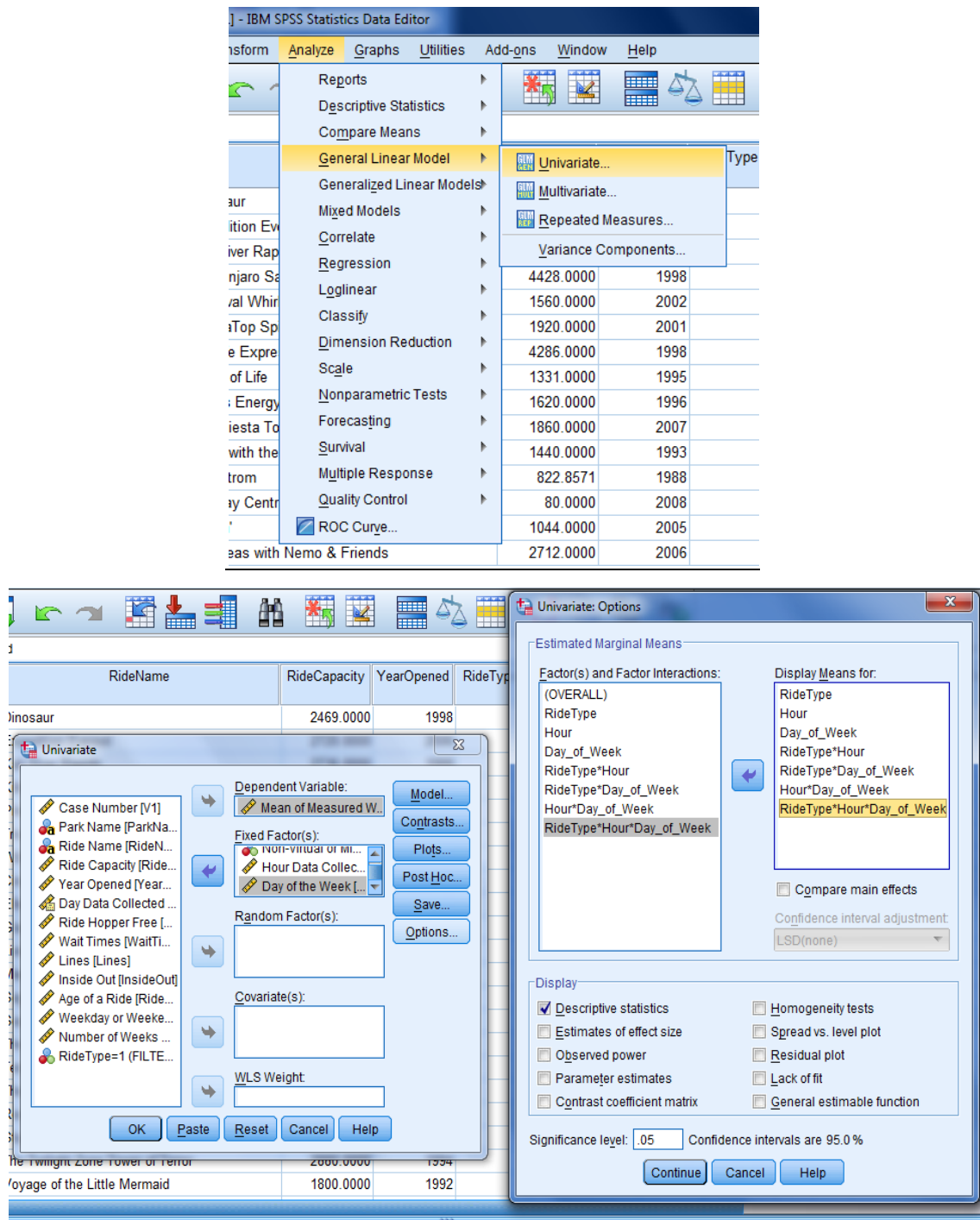


Figure 3.11: Univariate Analysis in SPSS 20

A second Univariate Analysis was used to determine if Ride Capacity affected wait times or the relationships between the variables. The same analysis set up as before was used with an addition of Ride Capacity as a covariate in the 'Univariate' window. In the first Univariate Analysis, the wait times are compared as though the ride capacity of each attraction is equal to all of the other attractions. With Ride Capacity as a covariate, the wait times were being analyzed with the attractions' different values for number of riders per hour (see Figure 3.12).

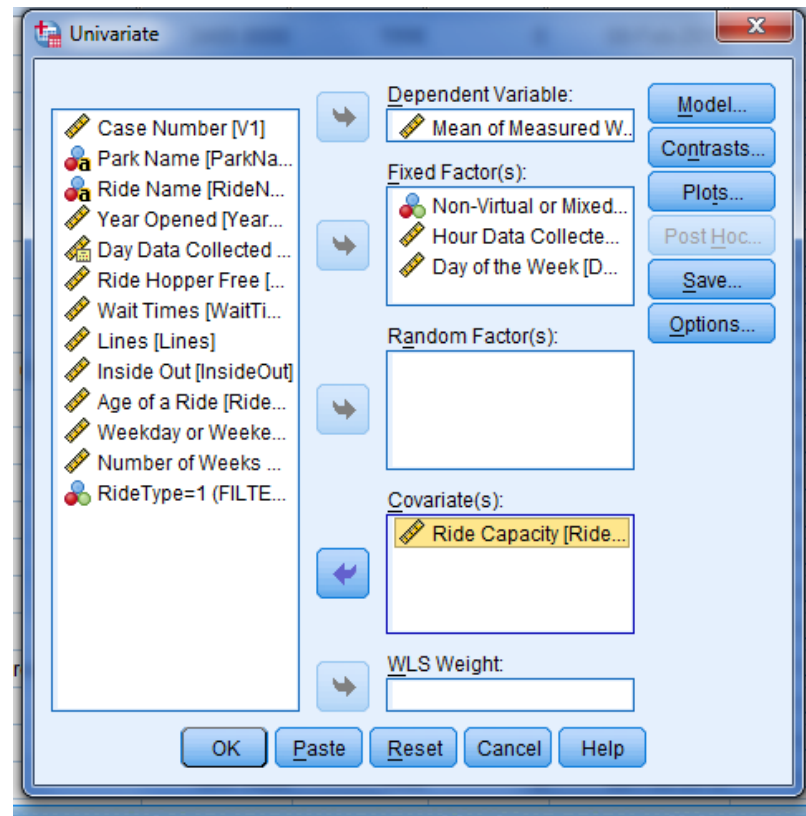
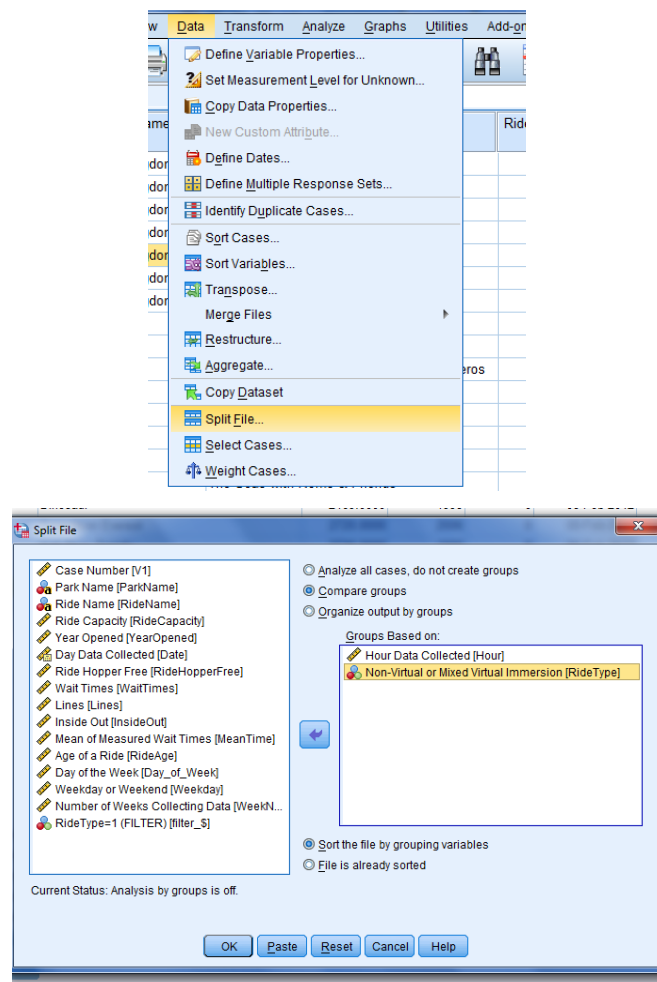


Figure 3.12: Univariate Analysis with Covariate in SPSS 20

Frequency graphs were used to visually display all wait times recorded in a histogram, so wait time distribution in relation to Ride Type and Hour could be seen. First, the data was split, by selecting ‘Data’, ‘Split File’, ‘Compare Groups’, and listing the variables Ride Type and Hour as the basis for groups (see Figure 3.13). Under ‘Analyze’, ‘Descriptive Statistics’ and ‘Frequencies’ were then selected. Then, Mean Time was designated the variable to be analyzed, and, under ‘Charts’, ‘Histograms’ and ‘Show normal curve’ were chosen (see Figure 3.14, pg. 32). This produced a frequency table along with a histogram graph for each hour and ride type combination.



**Figure 3.13: Split File in SPSS 20**

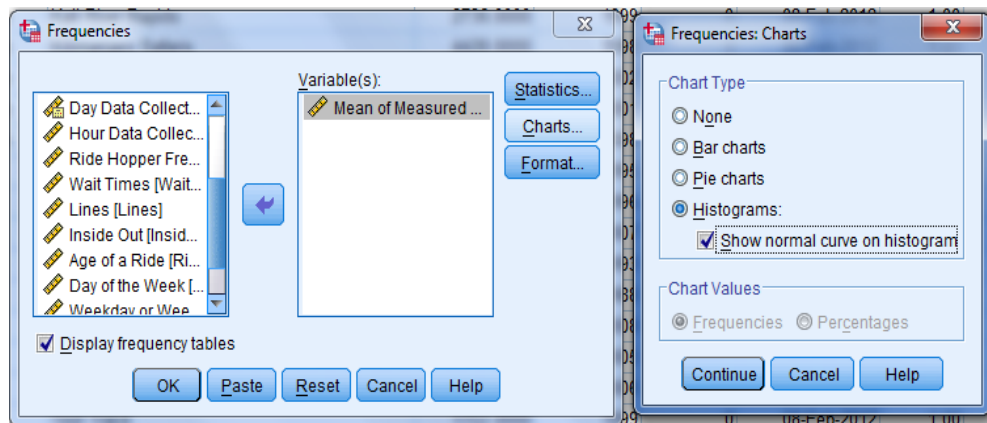
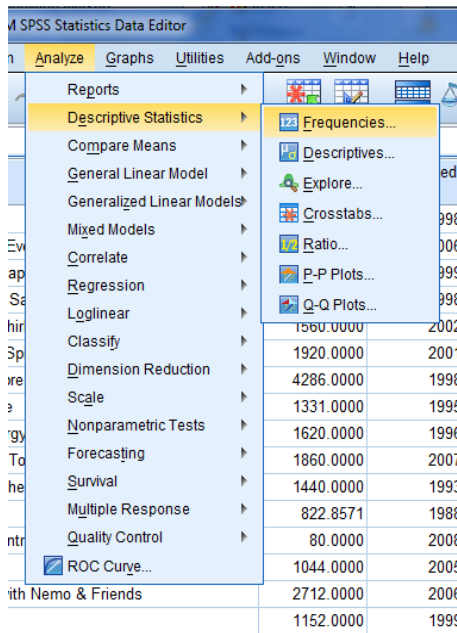


Figure 3.14: Frequency analysis in SPSS 20



Correlation analyses compared Ride Age with Mean Time and showed possible relations between them. Before analyzing, the Split File command was undone by selecting ‘Data’, ‘Split File’, and ‘Analyze all cases’. Then ‘Analyze’, ‘Correlate’, and ‘Bivariate’ were selected with Mean Time and Ride Age listed as variables (see Figure 3.15). The same analysis was then recreated with certain cases selected. This was done by selecting ‘Data’, ‘Select Cases’, ‘If condition is satisfied’, and listing the condition as Ride Type = 0 and then Ride Type =1(see Figure 3.16, pg. 34). This shows the effect Ride Age might have on Mean Time for all rides, virtual rides, or non-virtual rides.

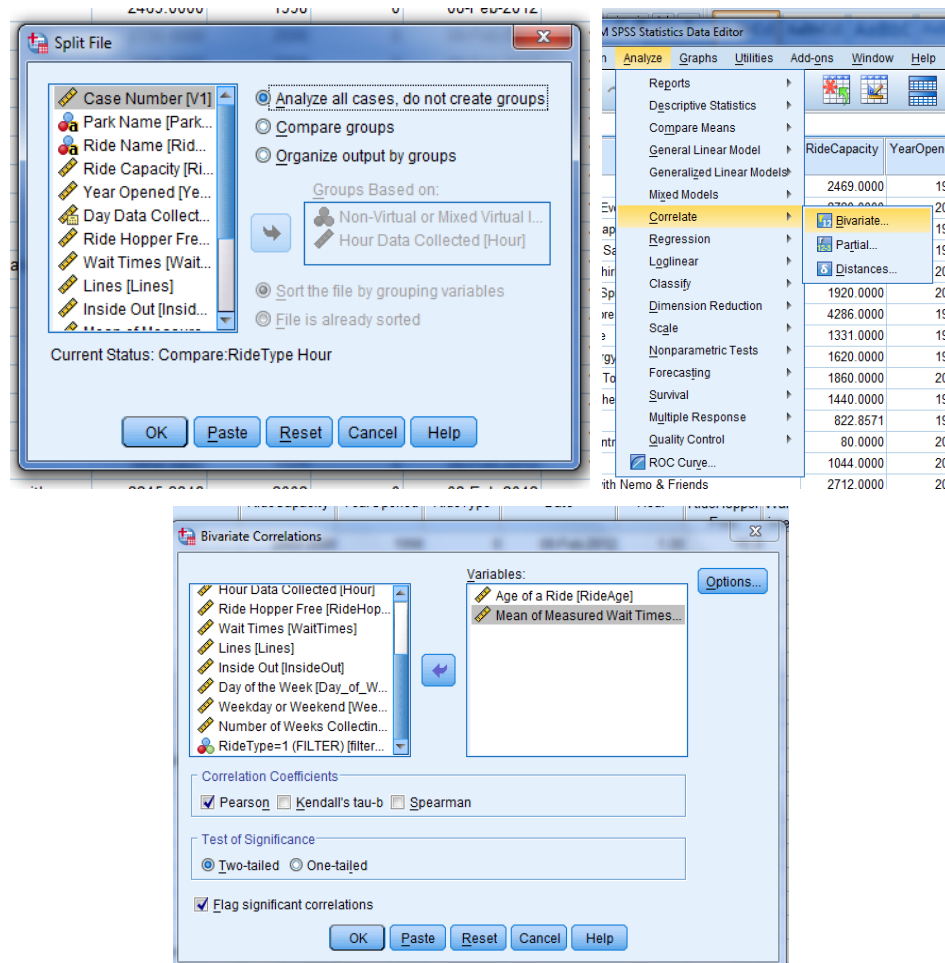


Figure 3.15: Correlation analysis in SPSS 20

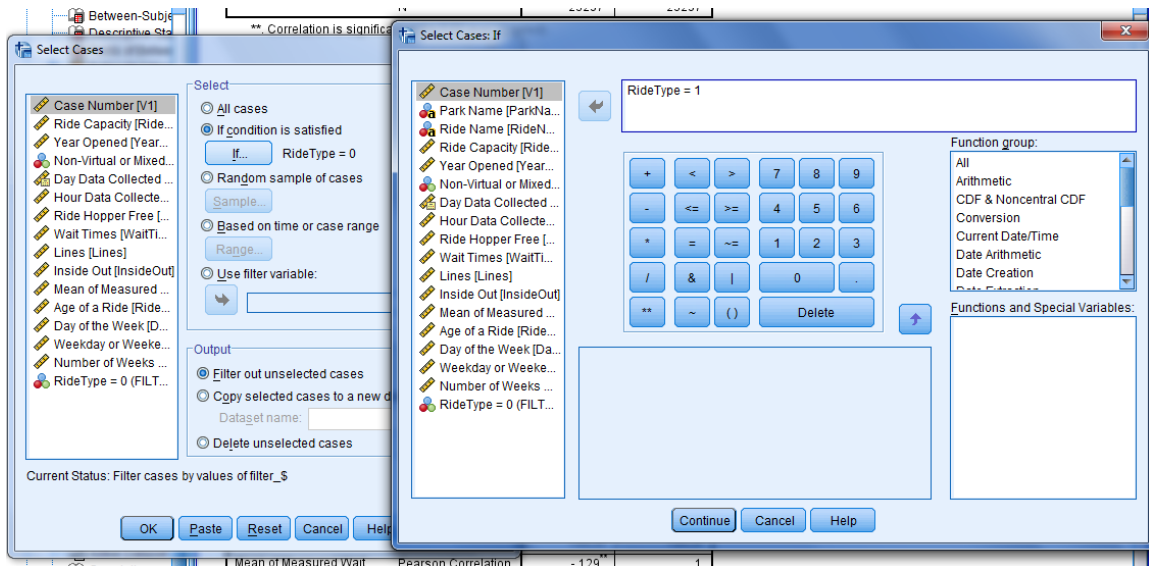
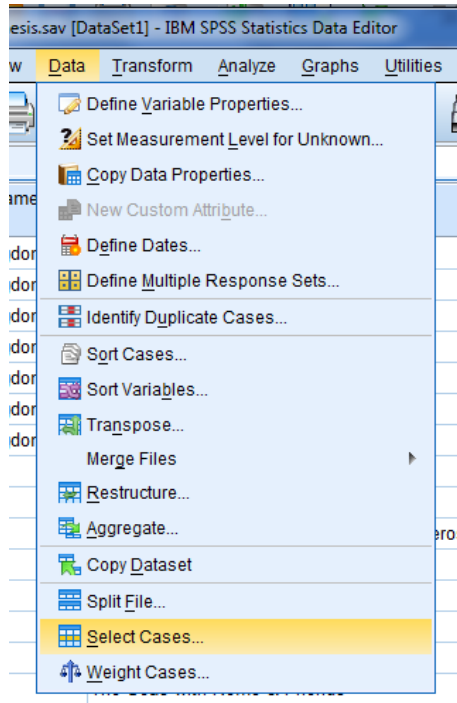


Figure 3.16: Select Cases in SPSS 20

SPSS Legacy Dialogs were used to visually compare the data. Under ‘Graphs’, a distribution of the wait times can be seen with the Legacy Dialogs and a layer option used to show how the distribution coincides with ride type (see Figure 3.17). Through descriptive graphs, a visible pattern of the interaction of Mean Time and Ride Type could be looked for over varying periods of time.

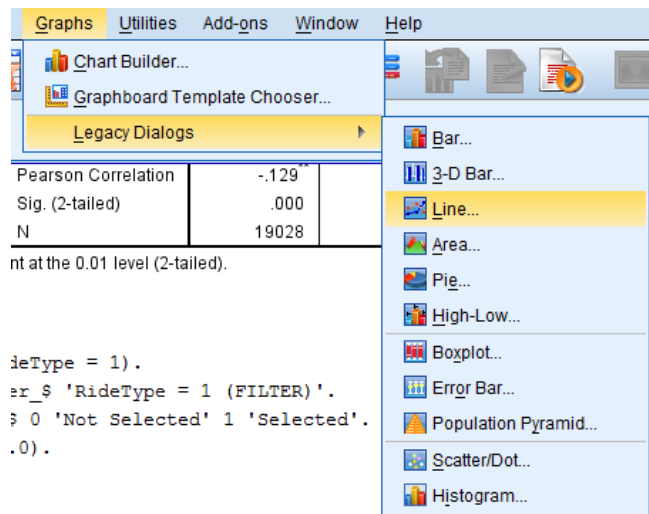


Figure 3.17: Descriptive Graphs in SPSS 20

To directly compare the means of different groups based on wait times, a Means analysis was performed by selecting ‘Analyze’, ‘Compare Means’, and ‘Means’. Mean Time was listed as the dependent variable and alternatively used Ride Type, Day of the Week and Hour as Independent variables (see Figure 3.18, pg. 36). Under ‘Options’, maximum and minimum were asked to be shown. In this way, the attraction type preferred by theme park guests could be shown numerically, indicating the desired amount of virtual reality used in theme park attractions.

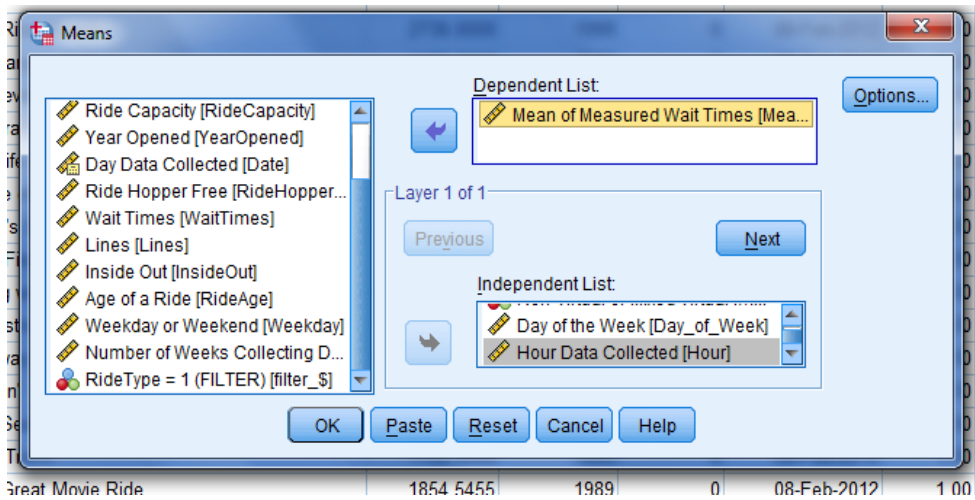
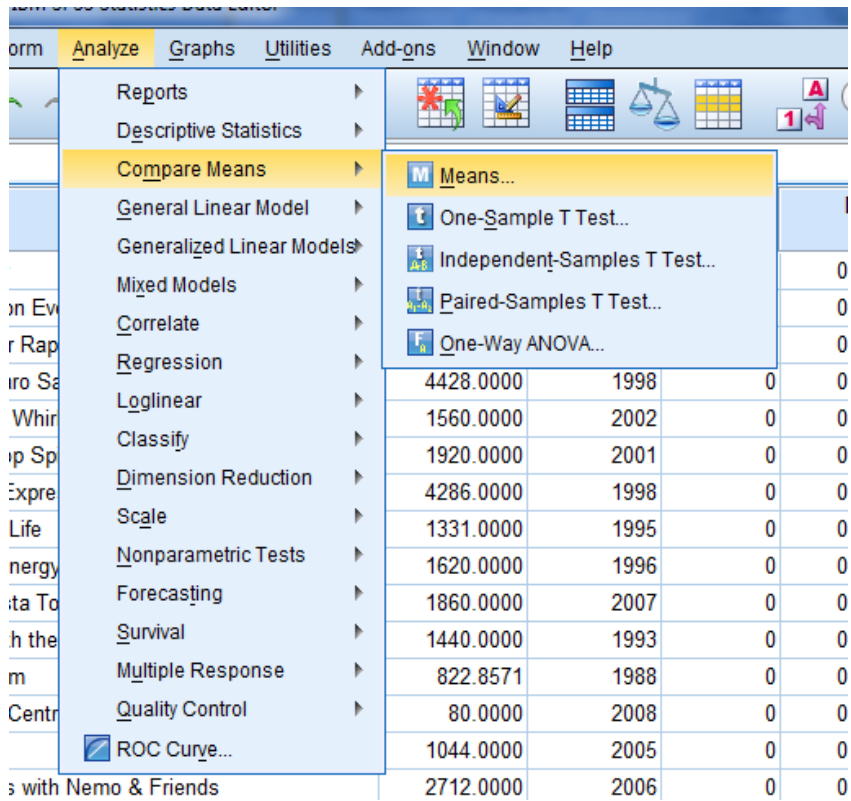


Figure 3.18: Compare Means in SPSS 20

## Chapter 4: Analysis

### 4.1 Data Collected

Through the research, 27,551 data cases were collected. Cases without values for wait time data and cases having a missing value for ride capacity were removed. This left 23,297 viable data cases of analyzable data. For each analysis, the variable N tells how many cases applied to that particular analysis or section of the analysis. The pertinent sections from the analyses are shown below with an extended version of the results found in Appendix C, starting on page 65.

### 4.2 Independent T-test

To evaluate the data, the Mean Time for each case was viewed as a factor of Ride Type, Day of the Week, and Hour that the data was taken. First, an Independent T-test was run comparing Mean Wait Time by just the Ride Type (See Figure 4.1). The Mean Time compared directly with Ride Type gives the mean wait time of virtual attractions as significantly higher than non-virtual attractions.

Group Statistics					
	Ride Type	N	Mean	Std. Deviation	Std. Error Mean
Mean of Measured Wait Times	Non-Virtual	18826	18.785	13.8136	.1007
	Mixed Virtual	4471	24.521	19.2254	.2875

Figure 4.1: Results of Independent T-test

### 4.3 Univariate Analysis without Ride Capacity

Next, a Univariate Analysis of variance examined Mean Time by Ride Type, Hour, and Day of the Week (See Figure 4.2). From the results, Ride Type, Hour, and Day of the Week were significant, and Ride Type in conjunction with Hour was slightly significant, indicating these variables affect each other and the correlation between the different groups is not due to chance.

**Tests of Between-Subjects Effects**

Dependent Variable: Mean of Measured Wait Times

Source	Type III Sum of Squares	df	Mean Square	F	Sig.
Corrected Model	507501.361 <sup>a</sup>	41	12378.082	59.282	.000
Intercept	6428813.236	1	6428813.236	30789.174	.000
RideType	107073.211	1	107073.211	512.800	.000
Hour	223892.174	2	111946.087	536.137	.000
Day_of_Week	4904.626	6	817.438	3.915	.001
RideType * Hour	762.741	2	381.371	1.826	.161
RideType * Day_of_Week	877.510	6	146.252	.700	.649
Hour * Day_of_Week	1861.824	12	155.152	.743	.710
RideType * Hour *	346.946	12	28.912	.138	1.000
Day_of_Week					
Error	4855669.433	23255	208.801		
Total	14575926.210	23297			
Corrected Total	5363170.794	23296			

a. R Squared = .095 (Adjusted R Squared = .093)

Figure 4.2: Selected Results from Univariate Analysis

To visually view the relationship between Hour, Mean Time, and Ride Type, the graph in Figure 4.3 was created. The graph plotted six points, three non-virtual and three mixed virtual immersion. Wait times are shown to be the longest in the afternoon and lowest in the morning. The lines between the points show the estimated wait time in between the data collection times.

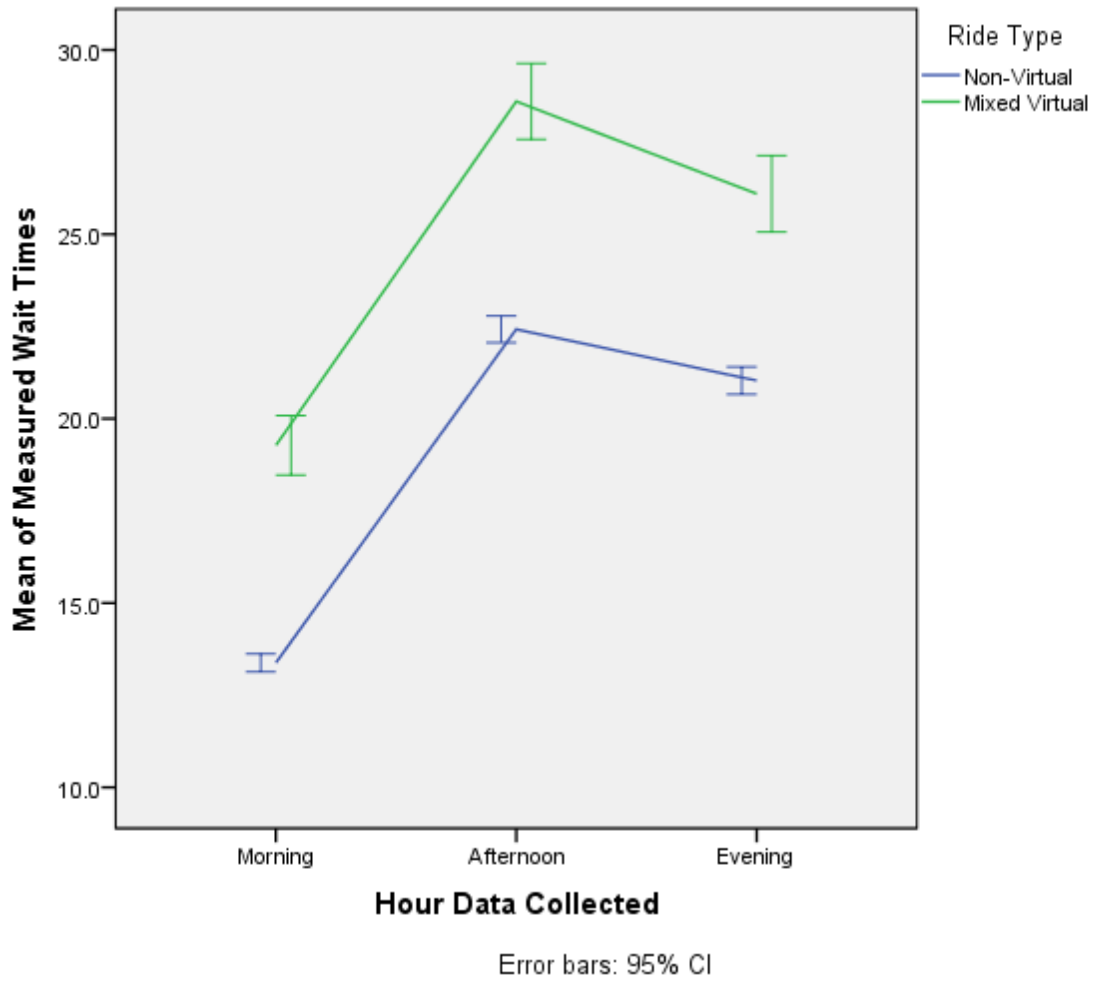


Figure 4.3: Mean of the Mean Time by Hour and Ride Type with Error Bars

#### 4.4 Univariate Analysis with Ride Capacity

Next, the same Univariate Analysis was performed with the additional factor of Capacity as a covariate in order to determine whether the capacity of an attraction affected its wait time (See Figure 4.4). The first analysis assumed all attractions have the same capacity. In this analysis, that assumption is corrected so any affect the capacity may have on wait times will be visible. The significant characteristics for this analysis were almost identical to the values from the previous Univariate Analysis, indicating Ride Capacity does not have a significant effect on wait time.

**Tests of Between-Subjects Effects**

Dependent Variable: Mean of Measured Wait Times

Source	Type III Sum of Squares	df	Mean Square	F	Sig.
Corrected Model	552721.193 <sup>a</sup>	42	13160.028	63.616	.000
Intercept	4393556.228	1	4393556.228	21238.713	.000
RideCapacity	45219.832	1	45219.832	218.595	.000
RideType	91840.719	1	91840.719	443.964	.000
Hour	223906.550	2	111953.275	541.189	.000
Day_of_Week	4891.228	6	815.205	3.941	.001
RideType * Hour	753.366	2	376.683	1.821	.162
RideType * Day_of_Week	893.713	6	148.952	.720	.633
Hour * Day_of_Week	1848.935	12	154.078	.745	.708
RideType * Hour * Day_of_Week	352.726	12	29.394	.142	1.000
Error	4810449.601	23254	206.865		
Total	14575926.210	23297			
Corrected Total	5363170.794	23296			

a. R Squared = .103 (Adjusted R Squared = .101)

Figure 4.4: Selected Results from Univariate Analysis with Capacity Covariate



## 4.5 Frequency Analysis

As further analysis of Wait Time by Hour when combined with Ride Type, graphs show the Mean Time frequencies when categorized by Ride Type and Hour along with the curve of a normal histogram (See Figures 4.5-4.10, pgs. 41-44). The wait times shown are measured in minutes. The graphs show the number of instances a particular wait times showed up for the scenario given. Larger views of the histogram graphs are contained within Appendix C on pages 75 - 80.

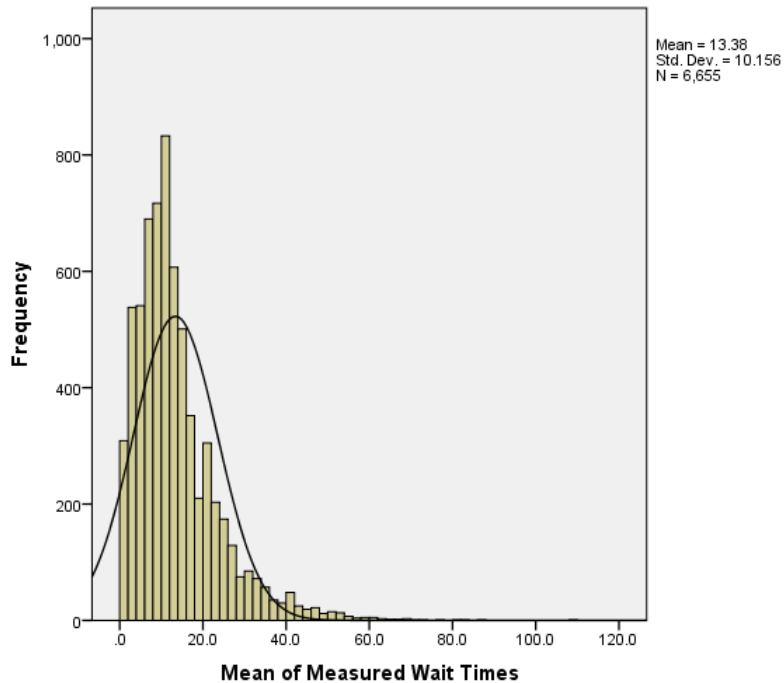


Figure 4.5: Frequencies Analysis with Ride Type = No VR, Hour = Morning

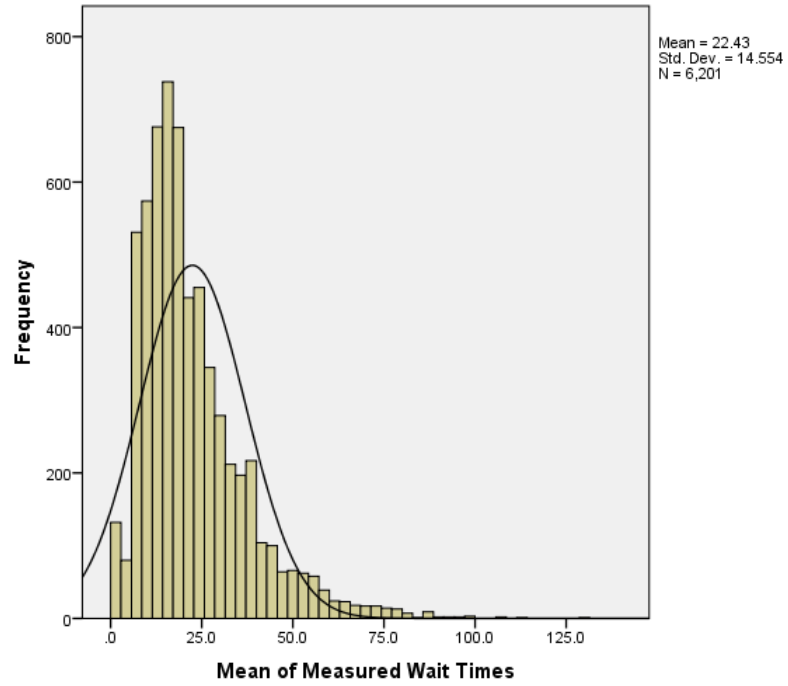


Figure 4.6: Frequencies Analysis with Ride Type = No VR, Hour = Afternoon

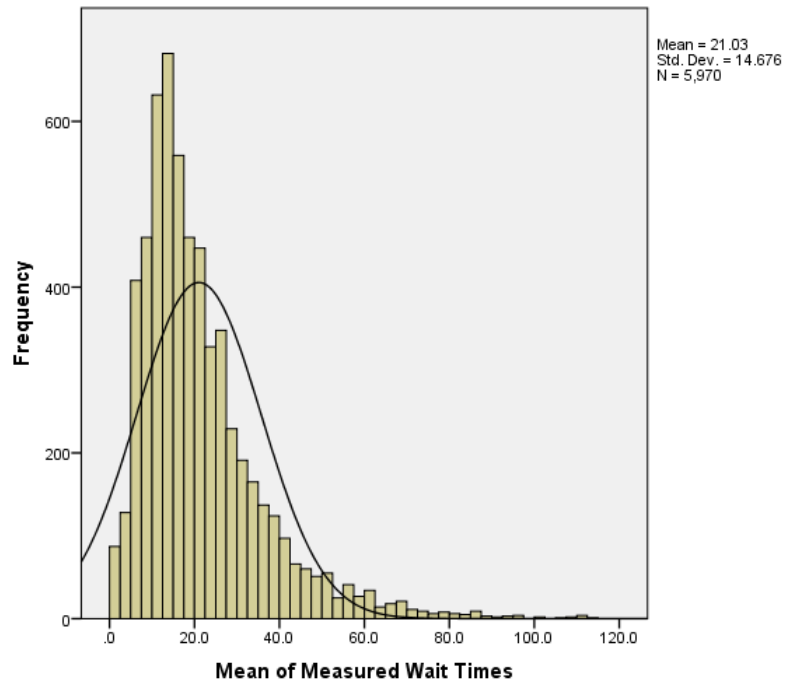


Figure 4.7: Frequencies Analysis with Ride Type = No VR, Hour = Evening

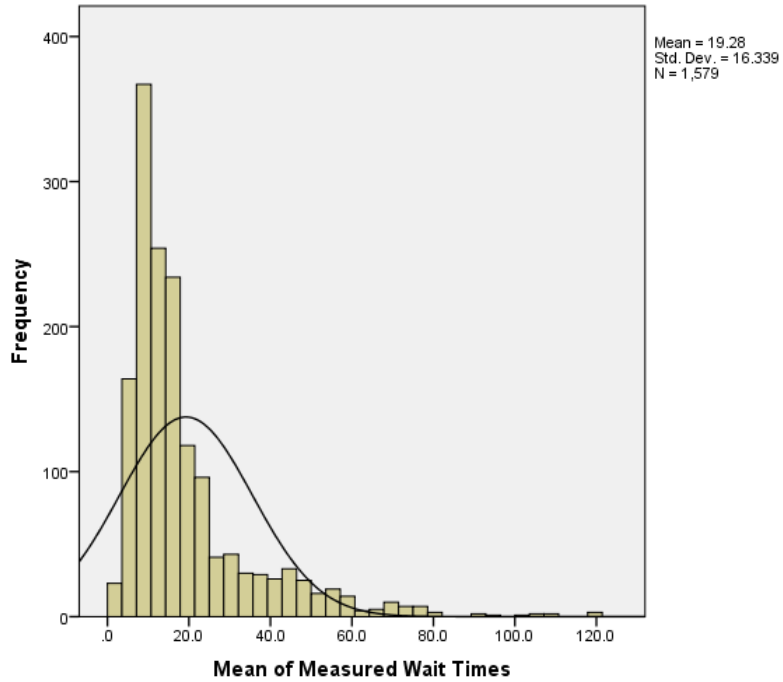


Figure 4.8: Frequencies Analysis with Ride Type = VR, Hour = Morning

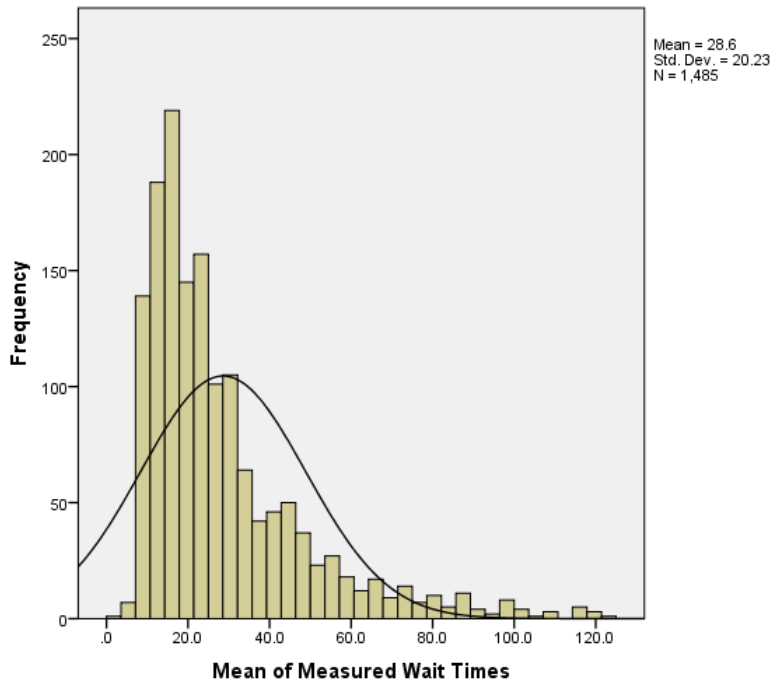


Figure 4.9: Frequencies Analysis with Ride Type = VR, Hour = Afternoon

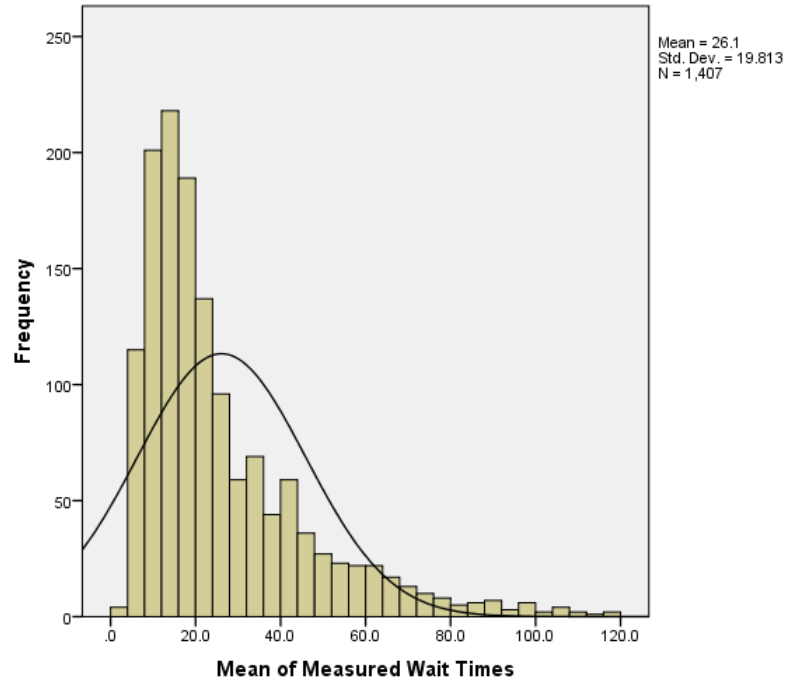


Figure 4.10: Frequencies Analysis with Ride Type = VR, Hour = Evening

#### 4.6 Correlation Analysis with Ride Age

A Correlations analysis was applied to Mean Time and Age of Ride to determine whether the age of a ride affects the mean wait time a guest is willing to wait (see Figure 4.11, pg. 45). Unlike Significance, a Pearson Correlation with a value close to one has a strong relationship between the variables being analyzed. The Pearson Correlations show a slight negative relationship between the wait time for a mixed virtual attraction and ride age, indicating these rides become less popular as they age. A virtual representation of this relationship was created in Figure 4.12 on page 46.

**Correlations**

		Mean of Measured Wait Times	Age of a Ride
Mean of Measured Wait Times	Pearson Correlation	1	<b>-.163**</b>
	Sig. (2-tailed)		.000
	N	23297	23297
Age of a Ride	Pearson Correlation	<b>-.163**</b>	1
	Sig. (2-tailed)	.000	
	N	23297	23297

\*\* . Correlation is significant at the 0.01 level (2-tailed).

**Correlations**

		Mean of Measured Wait Times	Age of a Ride
Mean of Measured Wait Times	Pearson Correlation	1	<b>-.105**</b>
	Sig. (2-tailed)		.000
	N	18826	18826
Age of a Ride	Pearson Correlation	<b>-.105**</b>	1
	Sig. (2-tailed)	.000	
	N	18826	18826

\*\* . Correlation is significant at the 0.01 level (2-tailed).

**Correlations**

		Mean of Measured Wait Times	Age of a Ride
Mean of Measured Wait Times	Pearson Correlation	1	<b>-.302**</b>
	Sig. (2-tailed)		.000
	N	4471	4471
Age of a Ride	Pearson Correlation	<b>-.302**</b>	1
	Sig. (2-tailed)	.000	
	N	4471	4471

\*\* . Correlation is significant at the 0.01 level (2-tailed).

Figure 4.11: Results of Correlations Analyses

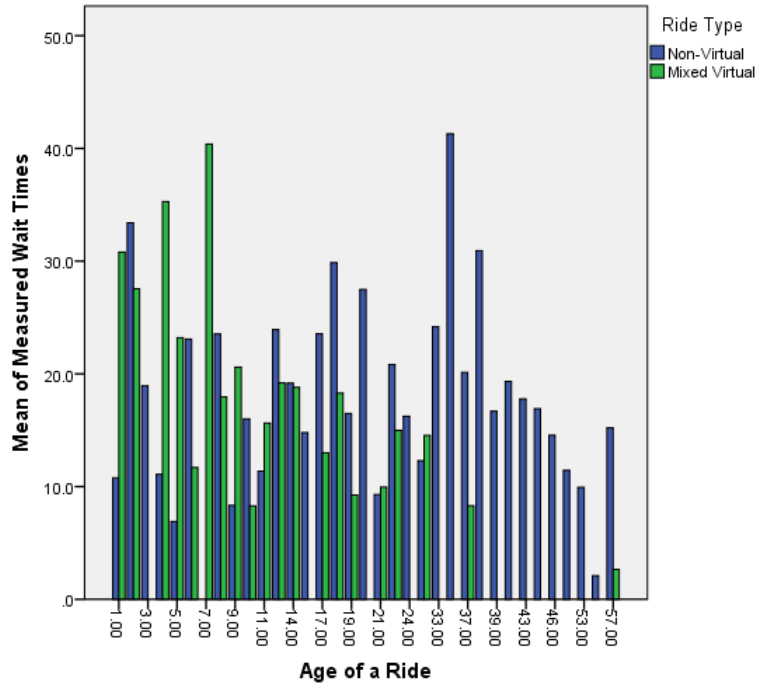


Figure 4.12: Correlations Analysis Wait Time with Ride Age

#### 4.7 Descriptive Analysis of Wait Time Trends

Descriptive Graphs were created using the Legacy Dialogs to describe Mean Time trends over varying periods of time (see Figures 4.12-4.16, pgs. 33-35). Larger versions of the graphs, additional graphs, and additional data from analyses may be found in Appendix C, starting on page 65.

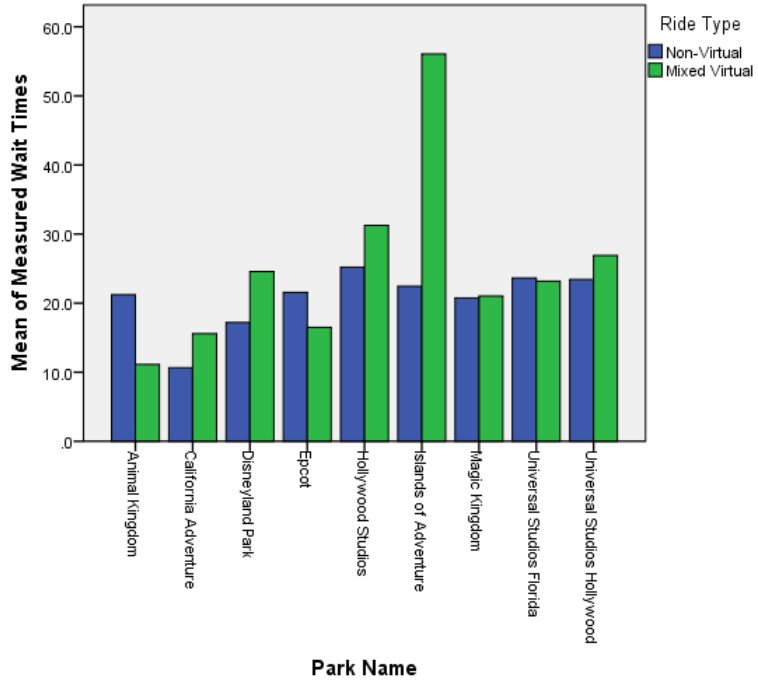


Figure 4.13: Means of Mean Times of Parks by Ride Type

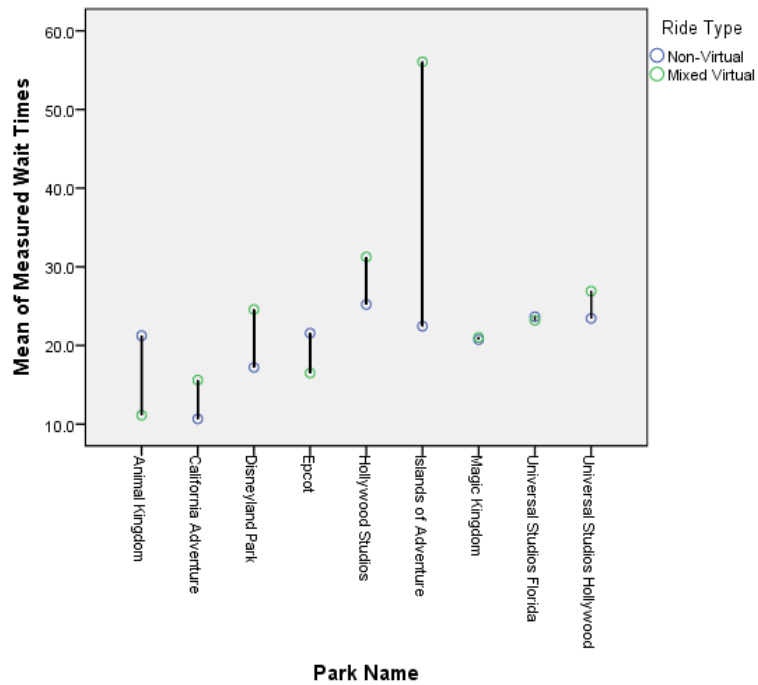


Figure 4.14: Means of Mean Times of Parks by Ride Type

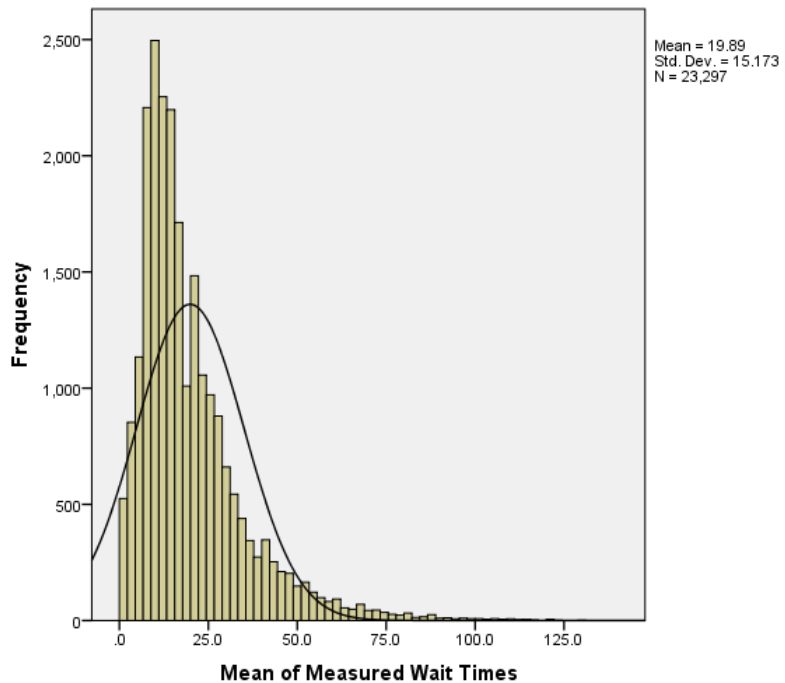


Figure 4.15: Frequency of Mean Times and Normal Curve

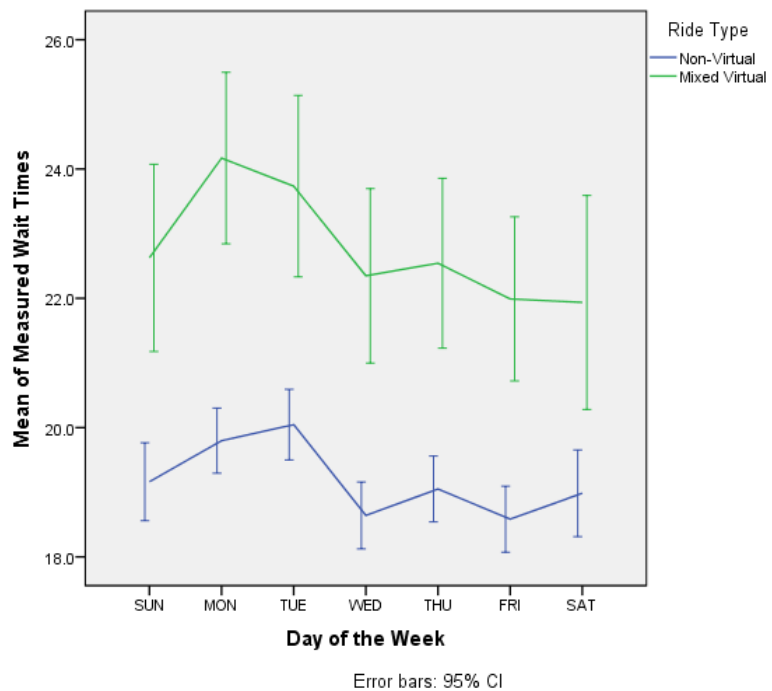


Figure 4.16: Means of Mean Times for Days of the Week by Ride Type with Error Bars



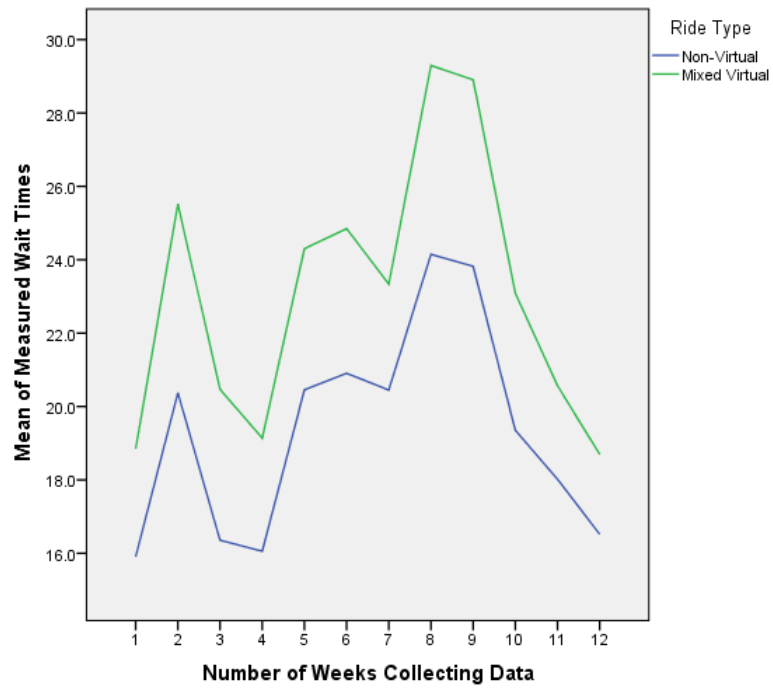


Figure 4.17: Means of Mean Times for Week Number by Ride Type

To directly compare the means of wait times numerically, analysis of Means was used (see Figures 4.18 – 4.20, pg. 50). From this, it is known that mixed virtual attractions have higher wait times than non-virtual; Tuesday has the highest wait times with Monday as a close second; and the afternoon has the highest mean wait time.

**Report**

Mean of Measured Wait Times

Ride Type	Mean	N	Std. Deviation	Grouped Median	Minimum	Maximum
Non-Virtual	18.785	18826	13.8136	15.055	.0	130.0
Mixed Virtual	24.521	4471	19.2254	17.713	.1	123.0
Total	19.886	23297	15.1730	15.541	.0	130.0

Figure 4.18: Results of Means analysis with Ride Type as Independent

**Report**

Mean of Measured Wait Times

Day of the Week	Mean	N	Std. Deviation	Grouped Median	Minimum	Maximum
SUN	19.801	2431	14.1253	15.826	.0	110.0
MON	20.595	4249	15.9706	16.171	.0	130.0
TUE	20.719	3653	15.9210	16.483	.0	120.0
WED	19.317	3650	15.1404	15.078	.0	120.0
THU	19.686	3798	15.1541	15.288	.0	120.0
FRI	19.210	3339	14.1275	15.186	.0	120.0
SAT	19.539	2177	14.9549	15.199	.0	105.0
Total	19.886	23297	15.1730	15.541	.0	130.0

Figure 4.19: Results of Means analysis with Day of the Week as Independent

**Report**

Mean of Measured Wait Times

Hour Data Collected	Mean	N	Std. Deviation	Grouped Median	Minimum	Maximum
Morning	14.510	8234	11.8294	11.394	.0	120.0
Afternoon	23.619	7686	15.9957	19.798	.0	130.0
Evening	21.997	7377	15.9090	17.519	.0	117.7
Total	19.886	23297	15.1730	15.541	.0	130.0

Figure 4.20: Results of Means analysis with Hour as Independent

## **Chapter 5: Discussion**

### **5.1 Overview of Results and Errors**

From the analyses, theme park attractions with mixed virtual reality were shown to be more popular with guests than attractions with no virtual reality. Although correction or elimination of errors from analysis was attempted, the nature of the study facilitates a large amount of error. Because of limited resources and due to a remote location from the studied variables, all of the variables possibly affecting the wait times cannot be measured or analyzed. For example, the study does not take into account how cultural differences of international visitors affect ride preferences, nor does it account for ride preferences based on the age of the guest. In addition to unaccounted variables, a large portion of error may come from the data collection itself due to incorrect data input by application users or from missing values due to closed attractions.

Error within the data collection process can also be due to limited resources. Since the data was taken in real time and could not be accessed later, a connection to the internet was needed at the designated sampling times in order to collect data. Because of a few scheduling conflicts, access to the internet was not always available in order to perform data collection. Also due to limitations, the Ride Capacity could not be found for a few attractions, either explicitly or through calculation. To calculate Ride Capacity, a few factors were needed. These included the length of the ride, the number of ride vehicles in operation, and the number of passengers per vehicle. The length of the ride and the number of passengers per car could often be found, but not the number of ride

vehicles in operation. Because Ride Capacity was part of the second Univariate Analysis, these rides had to be left out of the data set.

## **5.2 Conclusions from Analyses**

When categorizing the data according to the level of virtual immersion, it was surprising to find none of the rides analyzed were completely virtual. All of the rides using virtual technology contained at least one mixed virtual immersion characteristic. This meant testing for a level of full immersion within an attraction could not be done, since not a one was completely immersive. However, using mixed virtual attractions and non-virtual attractions did provide a partial indication of whether or not virtual attractions would be desired by park visitors.

In the Univariate Analysis of variance, Hour was found to have a significant relationship with Mean Time. As a typical day progresses, more people were expected to be entering the theme parks causing the wait times to rise into the early afternoon. The decline of wait times in the evening, as seen in Figure 4.3 on page 39, may be caused by the guests who arrived early also leaving the park earlier than those who arrived later. If this were occurring, the afternoon wait times would see an overlap from those who arrived early and those who arrived later.

From the Univariate Analysis, the Day of the Week does not have a significant effect on Mean Time. This was surprising because the wait times were expected to be higher for the weekend than for the weekdays. However, Tuesdays were found to have the highest wait times of the week with Mondays' wait times a close second. From the graph in Figure 4.16 on page 48 and from the Means analysis in Figure 4.19 on page 50,

no discernible pattern was visible across the week as a whole. Monday and Tuesday may have had higher wait times due to park guests traveling during the weekends and visiting the parks during the week. This idea would infer wait times to decrease throughout the week. Conversely, Thursday wait times were much higher than those for Wednesday and Friday. Although an explanation for this was not readily available, the data reveals that Day of the Week did not affect wait times.

Ride Capacity could have also affected wait times, and, indeed, it was expected. A larger capacity would mean a faster moving line and park visitors would have to stand in line for a less amount of time for a set number of preceding guests. The first Univariate Analysis showed the data relationships as if all attractions had the same capacity. By using a second analysis with Ride Capacity as a covariate, the effect of capacity on wait time became evident. It showed attraction capacity did not significantly change the results. In the first Univariate Analysis, the data was examined as though all of the attractions possessed the same value for capacity. The minimal changes to the analysis output suggested the capacity of a ride, and the ability of a line to move quickly, was not as important as the predicted wait time when guests select attractions for which to stand in line.

A fourth variable tested for possibly influencing attraction wait times was the age of the ride. When the Ride Age value was related to the Mean Time value, this relationship indicated the age of an attraction could affect the desirability of the attraction. Although a correlation between a ride's age and its wait time was not found when looking at the data as a whole, it was found that older mixed virtual attractions

were less desirable than newer mixed virtual attractions (see Figure 4.11, pg. 46). However, the age of a ride did not significantly affect the wait times for non-virtual attractions. The affect of age on mixed virtual attractions may be linked to the rapidity with which virtual technology continues to evolve, and it may have been easier for guests to view an attraction containing older virtual technology as outdated.

The frequency with which each mean wait time occurs can be viewed in Figure 4.15 on page 48 and in the six histogram graphs in figures 4.5-4.10 on pages 41-44. The data from these along with the Independent T-test (see Figure 4.1, pg. 37), Analysis of Means (see Figure 4.18-4.20, pg. 50), and the descriptive graphs (see Figure 4.3, pg. 39; Figures 4.16, pg. 48) add weight to the conclusion that mixed virtual reality attractions were more popular. This is also shown to hold true for every week of data collection (see Figure 4.17, pg. 49). Although the recorded wait times increased in weeks eight through ten, possibly due to Spring Break, mixed virtual reality attractions were proven to be more desired than non-virtual attractions in theme parks by showing attractions with mixed virtual reality technology as having higher mean wait times than those with no virtual technology.

### **5.3 Significance of Results**

Knowing what level of virtual immersion is most popular will help designers of theme park attractions to better cater to their guests in the future. A good designer knows what his audience desires and uses those desires as the core in his designs. However, a theme park manager or designer would also have to consider the loss of popularity over

time for mixed virtual attractions as well as the cost of designing, building, and maintaining a mixed virtual attraction versus a non-virtual one.

Future studies may take attraction cost and maintenance factors into account. Researchers may also perform a study over a single year or several years to view seasonal trends, a study with more themed attractions from the North American theme parks, or a study of all theme parks worldwide to expand the data that can be sampled. Surveys and other media could be utilized for data collection within the parks in future studies to directly determine the most desired level of virtual immersion among theme park visitors. The data and analyses of this particular study successfully indicate theme park guests desire attractions with mixed virtual technology over non-virtual attractions.





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## **Appendix A: Ride Type Categorizations**

		Virtual Components				Mixed Reality Components				Virtual Reality? (Y/No/Mix)
		3D computer generated imagery	Simulated movement within a virtual environment, not physically simulated	Uses HMD	Uses CAVE	Experiences reacts to User Input	3D projection of real imagery	Motion Simulator	Physical effects coordinated w/ virtual cause	
Animal Kingdom	Dinosaur	n	n	n	n	n	n	n	n	No
Animal Kingdom	Expedition Everest	n	n	n	n	n	n	n	n	No
Animal Kingdom	It's Tough to be a Bug!	y	y	n	n	n	n	n	y	Mix
Animal Kingdom	Kali River Rapids	n	n	n	n	n	n	n	n	No
Animal Kingdom	Kilimanjaro Safaris	n	n	n	n	y	n	n	n	No
Animal Kingdom	Primeval Whirl	n	n	n	n	n	n	n	n	No
Animal Kingdom	Triceratops Spin	n	n	n	n	y	n	n	n	No
Animal Kingdom	Wildlife Express Train	n	n	n	n	n	n	n	n	No
Epcot	Captain EO	n	y	n	n	n	y	y	y	Mix
Epcot	Circle of Life	n	n	n	n	n	n	n	n	No
Epcot	Ellen's Energy Adventure	n	n	n	n	n	n	n	n	No
Epcot	GranFiesta Tour Starring the Three Caballeros	n	n	n	n	n	n	n	n	No
Epcot	Honey I shrunk the Audience	y	y	n	n	n	y	y	y	closed
Epcot	Impressions de Fance	n	n	n	n	n	n	n	n	
Epcot	Journey into Imagination with Figment	y	n	n	n	n	n	n	y	Mix
Epcot	Living with the Land	n	n	n	n	n	n	n	n	No
Epcot	Maelstrom	n	n	n	n	n	n	n	z	No
Epcot	Mission: SPACE Green	y	y	n	n	y	n	n	n	Mix
Epcot	Mission: SPACE Orange	y	y	n	n	y	n	n	n	Mix
Epcot	O Canada!	n	n	n	n	n	n	n	n	No
Epcot	Segway Central	n	n	n	n	y	n	n	n	No
Epcot	Reflections of China	n	n	n	n	n	n	n	n	No
Epcot	The Seas with Nemo & Friends	y	n	n	n	n	n	n	n	No
Epcot	Soarin'	n	y	n	y	n	n	y	y	Mix
Epcot	Sum of all Thrills	y	y	y	n	y	n	y	n	Mix
Epcot	Spaceship Earth	n	n	n	n	n	n	n	n	No
Epcot	Test Track	n	n	n	n	n	n	n	n	No
Epcot	Turtle Talk with Crush	y	n	n	n	y	n	n	n	Mix
Hollywood Studios	The Great Movie Ride	n	n	n	y	y	n	n	n	No
Hollywood Studios	Muppet*Vision 3D	y	y	n	n	n	y	n	y	Mix
Hollywood Studios	Rock 'n' Roller Coaster Starring Aerosmith	n	n	n	n	n	n	n	n	No
Hollywood Studios	Star Tours	y	y	n	n	n	n	n	n	Mix
Hollywood Studios	Studio Backlot Tour	n	n	n	n	y	n	n	n	No
Hollywood Studios	Toy Story Mania!	y	n	n	y	y	n	n	n	Mix
Hollywood Studios	The Twilight Zone Tower of Terror	n	n	n	n	n	y	n	n	No
Hollywood Studios	Voyage of the Little Mermaid	n	y	n	n	n	n	n	y	No
Hollywood Studios	Walt Disney One Man's Dream	n	n	n	n	n	n	n	n	No
Magic Kingdom	Astro Orbiter	n	n	n	y	y	n	n	n	No
Magic Kingdom	The Barnstormer at Goofy's Wiseacre Farm	n	n	n	n	n	n	n	n	closed
Magic Kingdom	Big Thunder Mountain Railroad	n	n	n	n	n	n	n	n	No
Magic Kingdom	Buzz Lightyear's Space Ranger Spin	n	n	n	y	y	n	n	n	Mix
Magic Kingdom	Walt Disney's Carousel of Progress	n	n	n	n	n	n	n	n	No
Magic Kingdom	Country Bear Jamboree	n	n	n	n	n	n	n	n	No
Magic Kingdom	Prince Charming's Regal Carousel	n	n	n	n	n	n	n	n	No
Magic Kingdom	Dumbo the Flying Elephant	n	n	n	y	y	n	n	n	No
Magic Kingdom	The Enchanted Tiki Room	n	n	n	n	n	n	n	n	No
Magic Kingdom	Hall of Presidents	n	n	n	n	n	n	n	n	No
Magic Kingdom	The Haunted Mansion	y	n	n	n	n	n	n	n	No
Magic Kingdom	It's a Small World	n	n	n	n	n	n	n	n	No
Magic Kingdom	Jungle Cruise	n	n	n	y	y	n	n	n	No
Magic Kingdom	Liberty Square Riverboat	n	n	n	n	n	n	n	n	No
Magic Kingdom	Mad Tea Party	n	n	n	n	y	n	n	n	No
Magic Kingdom	The Magic Carpets of Aladdin	n	n	n	y	y	n	n	n	No
Magic Kingdom	Mickey's PhilharMagic	y	y	n	n	n	n	n	y	Mix
Magic Kingdom	Monsters, Inc. Laugh Floor	y	y	n	y	y	n	n	n	Mix
Magic Kingdom	The Many Adventures of Winnie the Pooh	n	n	n	n	n	n	n	n	No
Magic Kingdom	Peter Pan's Flight	n	n	n	n	n	n	n	n	No
Magic Kingdom	Pirates of the Caribbean	y	n	n	n	n	n	n	n	No
Magic Kingdom	Snow White's Scary Adventures	n	n	n	n	n	n	n	n	No
Magic Kingdom	Space Mountain	n	n	n	n	n	n	n	n	No
Magic Kingdom	Splash Mountain	n	n	n	n	n	n	n	n	No
Magic Kingdom	Stitch's Great Escape	n	n	n	n	n	n	n	y	No
Magic Kingdom	Swiss Family Treehouse	n	n	n	n	n	n	n	n	No
Magic Kingdom	Tomorrowland Speedway	n	n	n	y	y	n	n	n	No
Magic Kingdom	Tomorrowland Transit Authority People Mover	n	n	n	n	n	n	n	n	No

		Virtual Components				Mixed Reality Components				Virtual Reality? (Y/No/Mix)
		3D computer generated imagery	Simulated movement within a virtual environment, not physically traveling from	Uses HMD	Uses CAVE	Experience reacts to User Input	3D projection of real imagery	Motion Simulator	Physical effects coordinated w/ virtual cause	
Disneyland Park	Alice in Wonderland	n	n	n	n	n	n	n	n	No
Disneyland Park	Astro Orbiter	n	n	n	n	n	n	n	n	No
Disneyland Park	Autopia	n	n	n	n	n	n	n	n	No
Disneyland Park	Big Thunder Mountain Railroad	n	n	n	n	n	n	n	n	No
Disneyland Park	Buzz Lightyear Blasters	n	n	n	y	y	n	n	n	Mix
Disneyland Park	Captain EO	n	y	n	n	n	y	y	y	Mix
Disneyland Park	Casey Jr. Circus Train	n	n	n	n	n	n	n	n	No
Disneyland Park	Davy Crockett's Canoes	n	n	n	n	y	n	n	n	No
Disneyland Park	Disneyland Monorail	n	n	n	n	n	n	n	n	No
Disneyland Park	Dumbo the Flying Elephant	n	n	n	y	y	n	n	n	No
Disneyland Park	Enchanted Tiki Room	n	n	n	n	n	n	n	n	No
Disneyland Park	Finding Nemo Submarine	y	n	n	y	n	n	n	y	Mix
Disneyland Park	Gadget's Go Coaster	n	n	n	n	n	n	n	n	No
Disneyland Park	Haunted Mansion	y	n	n	n	n	n	n	n	No
Disneyland Park	Indiana Jones Adventure	n	n	n	n	n	n	n	n	No
Disneyland Park	It's a Small World	n	n	n	n	n	n	n	n	No
Disneyland Park	Jungle Cruise	n	n	n	n	y	n	n	n	No
Disneyland Park	King Triton's Carousel	n	n	n	n	n	n	n	n	No
Disneyland Park	Mad Tea Party	n	n	n	n	y	n	n	n	No
Disneyland Park	Main Street Cinema	n	n	n	n	n	n	n	n	No
Disneyland Park	Main Street Vehicles	n	n	n	n	y	n	n	n	No
Disneyland Park	Many Adventures of Winnie the Pooh	n	n	n	n	n	n	n	n	No
Disneyland Park	Mark Twain Riverboat	n	n	n	n	n	n	n	n	No
Disneyland Park	Matterhorn Bobsleds	n	n	n	n	n	n	n	n	No
Disneyland Park	Mr. Toad's Wild Ride	n	n	n	n	n	n	n	n	No
Disneyland Park	Peter Pan's Flight	n	n	n	n	n	n	n	n	No
Disneyland Park	Pinocchio's Daring Journey	n	n	n	n	n	n	n	n	No
Disneyland Park	Pirate's Lair on Tom Sawyer Island	n	n	n	n	y	n	n	n	No
Disneyland Park	Pirates of the Caribbean	y	n	n	n	n	n	n	n	No
Disneyland Park	Disneyland Railroad	n	n	n	n	n	n	n	n	No
Disneyland Park	Roger Rabbit's Car Spin	n	n	n	n	y	n	n	n	No
Disneyland Park	Sailing Ship Columbia	n	n	n	n	n	n	n	n	No
Disneyland Park	Snow White's Adventures	n	n	n	n	n	n	n	n	No
Disneyland Park	Space Mountain	n	n	n	n	n	n	n	n	No
Disneyland Park	Splash Mountain	n	n	n	n	n	n	n	n	No
Disneyland Park	Star Tours	y	y	n	n	n	n	n	n	Mix
Disneyland Park	Storybook Land Boats	n	n	n	n	y	n	n	n	No
California Adventure	Ariel's Undersea Adventure	y	n	n	n	n	n	n	n	No
California Adventure	California Screamin'	n	n	n	n	n	n	n	n	No
California Adventure	Flik's Flyers	n	n	n	n	n	n	n	n	No
California Adventure	Francis' Ladybug Boogie	n	n	n	n	y	n	n	n	No
California Adventure	Golden Zephyr	n	n	n	n	y	n	n	n	No
California Adventure	Goofy's Sky School	n	n	n	n	n	n	n	n	No
California Adventure	Grizzly River Run	n	n	n	n	n	n	n	n	No
California Adventure	Heimlich's Chew Chew Train	n	n	n	n	n	n	n	n	No
California Adventure	Jumpin' Jellyfish	n	n	n	n	n	n	n	n	No
California Adventure	King Triton's Carousel	n	n	n	n	n	n	n	n	No
California Adventure	Mickey's Fun Wheel (Stationary Gondolas)	n	n	n	n	n	n	n	n	No
California Adventure	Mickey's Fun Wheel (Swinging Gondolas)	n	n	n	n	n	n	n	n	No
California Adventure	Monsters, Inc. Mike & Sulley to the Rescue	y	n	n	n	n	n	n	n	No
California Adventure	Silly Symphony Swings	n	n	n	n	n	n	n	n	No
California Adventure	Soarin' Over California	n	y	n	y	n	n	y	y	Mix
California Adventure	Toy Story Mania!	y	n	y	y	y	n	n	n	Mix
California Adventure	Tuck and Roll's Drive Em Buggies	n	n	n	n	y	n	n	n	No

		Virtual Components				Mixed Reality Components				Virtual Reality? (Y/No/Mix)
		3D computer generated imagery	Simulated movement within a virtual environment, not physically traveling from	Uses HMD	Uses CAVE	Experience reacts to User Input	3D projection of real imagery	Motion Simulator	Physical effects coordinated w/ virtual cause	
Universal Studios Orlando	Disaster!	n	n	n	n	y	y	y	n	Mix
Universal Studios Orlando	E.T. Adventure	n	n	n	n	n	n	n	n	No
Universal Studios Orlando	Hollywood Rip Ride Rockit	n	n	n	n	y	n	n	n	No
Universal Studios Orlando	MEN IN BLACK Alien Attack	n	n	n	n	y	n	n	y	Mix
Universal Studios Orlando	Revenge of the Mummy	y	n	n	n	n	n	n	n	No
Universal Studios Orlando	Shrek 4-D	y	y	n	y	n	n	y	y	Mix
Universal Studios Orlando	The Simpsons Ride	y	y	n	y	n	n	y	n	Mix
Universal Studios Orlando	TWISTER . . . Ride it Out	y	n	n	y	n	n	y	y	Mix
Universal Studios Orlando	Woody Woodpecker's Nuthouse Coaster	n	n	n	n	n	n	n	n	No
Islands of Adventure	The Amazing Adventures of Spider-Man	y	n	n	y	n	n	y	y	Mix
Islands of Adventure	Caro-Seuss-el	n	n	n	n	n	n	n	n	No
Islands of Adventure	The Cat in the Hat	n	n	n	n	n	n	n	n	No
Islands of Adventure	Doctor Doom's Fearfall	n	n	n	n	n	n	n	n	No
Islands of Adventure	Dragon Challenge	n	n	n	n	n	n	n	n	No
Islands of Adventure	Dudley Do-Right's Ripsaw Falls	n	n	n	n	n	n	n	n	No
Islands of Adventure	Flight of the Hippogriff	n	n	n	n	n	n	n	n	No
Islands of Adventure	Harry Potter and the Forbidden Journey	y	n	n	y	n	n	y	y	Mix
Islands of Adventure	The High in the Sky Seuss Trolley Train Ride!	n	n	n	n	n	n	n	n	No
Islands of Adventure	The Incredible Hulk Coaster	n	n	n	n	n	n	n	n	No
Islands of Adventure	Jurassic Park River Adventure	n	n	n	n	n	n	n	n	No
Islands of Adventure	One Fish, Two Fish, Red Fish, Blue Fish	n	n	n	n	n	n	n	n	No
Islands of Adventure	Popeye & Bluto's Bilge-Rat Barges	n	n	n	n	n	n	n	n	No
Islands of Adventure	Pteranodon Flyers	n	n	n	n	n	n	n	n	No
Islands of Adventure	Storm Force Accelerator	n	n	n	n	y	n	n	n	No
Universal Studios Hollywood	Jurassic Park- The Ride	n	n	n	n	n	n	n	n	No
Universal Studios Hollywood	Studio Tour with King Kong 360 3-D	y	n	n	y	n	n	y		Mix
Universal Studios Hollywood	Revenge of the Mummy - The Ride	y	n	n	n	n	n	n	n	No
Universal Studios Hollywood	Shrek 4-D	y	y	n	y	n	n	y	y	Mix
Universal Studios Hollywood	Special Effects Stage	y	y	n	y		y	y	y	Mix
Universal Studios Hollywood	Terminator 2: 3-D	y	y	n	y	y	n	y	y	Mix

## Appendix B: Data from the First Day

Ride Name	Ride Capacity	Year Opened	RideType	Date	Time	Ride Hopper Free	Wait Times	Lines	Inside Out
Dinosaur	2468.57	1998	No VR	2/8/2012	10:30	15.0	10.0	11.0	
Expedition Everest	2720.00	2006	No VR	2/8/2012	10:30	35.0	15.0	5.0	
It's Tough to Be a Bug!	3225.00	1998	Mix VR	2/8/2012	10:30	15.0	0.0	10.0	
Kali River Rapids	2736.00	1999	No VR	2/8/2012	10:30	15.0	Closed	Closed	
Kilimanjaro Safaris	4428.00	1998	No VR	2/8/2012	10:30	15.0	25.0	21.0	
Primeval Whirl	1560.00	2002	No VR	2/8/2012	10:30	20.0	5.0	13.0	
TriceraTop Spin	1920.00	2001	No VR	2/8/2012	10:30	15.0	5.0	6.0	
Wildlife Express Train	4285.71	1998	No VR	2/8/2012	10:30	10.0		5.0	
Captain EO	2011.76	2010	Mix VR	2/8/2012	10:30	15.0	5.0	8.0	
Circle of Life	1330.57	1995	No VR	2/8/2012	10:30	10.0		6.0	
Ellen's Energy Adventure	1620.00	1996	No VR	2/8/2012	10:30	10.0	0.0	13.0	
GranFiesta Tour Starring the Three Caballeros	1860.00	2007	No VR	2/8/2012	10:30	5.0	5.0	Closed	
Journey into Imagination with Figment	2240.00	2002	Mix VR	2/8/2012	10:30	5.0	0.0	3.0	
Living with the Land	1440.00	1993	No VR	2/8/2012	10:30	15.0	5.0	7.0	
Maelstrom	822.86	1988	No VR	2/8/2012	10:30	10.0	10.0	Closed	
Mission: SPACE Green	1200.00	2003	Mix VR	2/8/2012	10:30	5.0	10.0	9.0	
Mission: SPACE Orange	1200.00	2003	Mix VR	2/8/2012	10:30	10.0	10.0	13.0	
Segway Central	80.00	2008	No VR	2/8/2012	10:30	5.0			
Soarin'	1044.00	2005	Mix VR	2/8/2012	10:30	25.0	25.0	30.0	
Spaceship Earth	2605.71	1982	Mix VR	2/8/2012	10:30	10.0	5.0	0.0	
Sum of all Thrills	48.00	2005	Mix VR	2/8/2012	10:30	15.0		18.0	
The Seas with Nemo & Friends	2712.00	2006	No VR	2/8/2012	10:30	10.0	5.0	4.0	
Test Track	1152.00	1999	No VR	2/8/2012	10:30	25.0	10.0	28.0	
The Great Movie Ride	1854.55	1989	No VR	2/8/2012	10:30	15.0	10.0	9.0	
Muppet*Vision 3-D	1353.60	1991	Mix VR	2/8/2012	10:30	10.0	5.0	8.0	
Rock 'n' Roller Coaster Starring Aerosmith	2215.38	2002	No VR	2/8/2012	10:30	30.0	10.0	23.0	
Star Tours	2057.14	2011	Mix VR	2/8/2012	10:30	15.0	15.0	15.0	
Studio Backlot Tour	685.71	1989	No VR	2/8/2012	10:30	15.0	5.0	5.0	
Toy Story Mania!	1333.33	2008	Mix VR	2/8/2012	10:30	30.0	35.0	30.0	
The Twilight Zone Tower of Terror	2880.00	1994	No VR	2/8/2012	10:30	20.0	40.0	25.0	
Voyage of the Little Mermaid	1800.00	1992	No VR	2/8/2012	10:30	15.0	5.0		
Astro Orbiter	1280.00	1974	No VR	2/8/2012	10:30	25.0	20.0	20.0	
Buzz Lightyear's Space Ranger Spin	2666.67	1998	Mix VR	2/8/2012	10:30	1.0	10.0	6.0	
Walt Disney's Carousel of Progress	4114.29	1975	No VR	2/8/2012	10:30	5.0	5.0	5.0	
Country Bear Jamboree	1520.00	1971	No VR	2/8/2012	10:30	10.0		7.0	
Prince Charming's Regal Carrousel	4050.00	1971	No VR	2/8/2012	10:30	5.0	0.0		
Enchanted Tiki Room	1000.00	2011	No VR	2/8/2012	10:30	10.0	0.0	Closed	
Hall of Presidents	2100.00	1971	No VR	2/8/2012	10:30	5.0		11.0	
The Haunted Mansion	3272.73	1971	No VR	2/8/2012	10:30	10.0	5.0	7.0	
It's a Small World	3272.73	1971	No VR	2/8/2012	10:30	10.0	5.0	5.0	
Jungle Cruise	2066.67	1971	No VR	2/8/2012	10:30	15.0	10.0	9.0	
Liberty Square Riverboat	1600.00	1971	No VR	2/8/2012	10:30	5.0			
Mad Tea Party	1097.14	1971	No VR	2/8/2012	10:30	10.0	5.0	2.0	
The Magic Carpets of Aladdin	1920.00	2001	No VR	2/8/2012	10:30	15.0	5.0	6.0	
Monsters, Inc. Laugh Floor	1840.00	2007	Mix VR	2/8/2012	10:30	15.0	5.0	7.0	
The Many Adventures of Winnie the Pooh	960.00	1999	No VR	2/8/2012	10:30	10.0	20.0	18.0	
Peter Pan's Flight	1090.91	1971	No VR	2/8/2012	10:30	25.0	20.0	25.0	
Pirates of the Caribbean	2300.00	1973	No VR	2/8/2012	10:30	10.0	5.0	2.0	
Snow White's Scary Adventures	960.00	1971	No VR	2/8/2012	10:30	15.0	15.0	6.0	
Space Mountain	3744.00	1975	No VR	2/8/2012	10:30	25.0	20.0	15.0	
Splash Mountain	2640.00	1992	No VR	2/8/2012	10:30	25.0	15.0	7.0	
Stitch's Great Escape	1920.00	2004	No VR	2/8/2012	10:30	15.0	5.0	9.0	
Tomorrowland Speedway	3504.00	1971	No VR	2/8/2012	10:30	10.0	15.0	10.0	
Tomorrowland Transit Authority People Mover	18000.00	1975	No VR	2/8/2012	10:30	5.0	5.0		
Hollywood Rip Ride Rockit	2880.00	2009	No VR	2/8/2012	10:30	20.0	10.0		
Revenge of the Mummy	1200.00	2004	No VR	2/8/2012	10:30	35.0	5.0		
The Simpsons Ride	1920.00	2008	Mix VR	2/8/2012	10:30	20.0	10.0		
Woody Woodpecker's Nuthouse Coaster	1280.00	1999	No VR	2/8/2012	10:30	10.0	0.0		
Caro-Seuss-el	2430.00	1999	No VR	2/8/2012	10:30	15.0	0.0		
The Cat in the Hat	1800.00	1999	No VR	2/8/2012	10:30	15.0	0.0		
Doctor Doom's Fearfall	1280.00	1999	No VR	2/8/2012	10:30	20.0	5.0		
Dragon Challenge	5120.00	1999	No VR	2/8/2012	10:30	20.0	0.0		
Flight of the Hippogriff	1900.99	2010	No VR	2/8/2012	10:30	35.0	5.0		
Harry Potter and the Forbidden Journey	2256.00	2010	Mix VR	2/8/2012	10:30	35.0	20.0		
The High in the Sky Seuss Trolley Train Ride!	1280.00	2006	No VR	2/8/2012	10:30	15.0	5.0		
The Incredible Hulk Coaster	2560.00	1999	No VR	2/8/2012	10:30	35.0	10.0		
Jurassic Park River Adventure	3000.00	1999	No VR	2/8/2012	10:30	15.0	5.0		
One Fish, Two Fish, Red Fish, Blue Fish	440.00	1999	No VR	2/8/2012	10:30	20.0	0.0		
Popeye & Bluto's Bilge-Rat Barges	2400.00	1999	No VR	2/8/2012	10:30	10.0	5.0		
Pteranodon Flyers	800.00	1999	No VR	2/8/2012	10:30	15.0	5.0		
Storm Force Acceleratron	2057.14	2009	No VR	2/8/2012	10:30	15.0	5.0		
Autopia	1368.00	1955	No VR	2/8/2012	10:30	5.0	15.0	7.0	0.0
Big Thunder Mountain Railroad	2571.43	1979	No VR	2/8/2012	10:30	15.0	10.0	7.0	5.0
Buzz Lightyear Blasters	2400.00	2004	No VR	2/8/2012	10:30	5.0	10.0	1.0	0.0
Captain EO	2029.41	2010	Mix VR	2/8/2012	10:30	5.0		10.0	0.0
Casey Jr. Circus Train	4320.00	1955	Mix VR	2/8/2012	10:30	5.0		1.0	0.0
Disneyland Monorail	1740.00	1959	No VR	2/8/2012	10:30			10.0	0.0
Dumbo the Flying Elephant	1280.00	1955	No VR	2/8/2012	10:30	10.0	10.0	3.0	5.0
Enchanted Tiki Room	811.76	1963	No VR	2/8/2012	10:30	5.0		9.0	0.0
Finding Nemo Submarine	1280.00	2007	No VR	2/8/2012	10:30	10.0	15.0	5.0	5.0
Gadget's Go Coaster	1280.00	1993	Mix VR	2/8/2012	10:30	5.0	5.0	Closed	0.0
Haunted Mansion	2245.71	1969	No VR	2/8/2012	10:30	10.0	10.0	1.0	5.0
Indiana Jones Adventure	3600.00	1995	No VR	2/8/2012	10:30	10.0	35.0	3.0	5.0
It's a Small World	2571.43	1966	No VR	2/8/2012	10:30	10.0	0.0	2.0	0.0
Jungle Cruise	2194.29	1955	No VR	2/8/2012	10:30	10.0	15.0	2.0	5.0
King Arthur Carrousel	3000.00	1955	No VR	2/8/2012	10:30	5.0		1.0	0.0
Mad Tea Party	2880.00	1955	No VR	2/8/2012	10:30	5.0		1.0	0.0
Main Street Cinema	6000.00	1956	No VR	2/8/2012	10:30			0.0	0.0
Main Street Vehicles	2700.00	1956	No VR	2/8/2012	10:30			5.0	0.0
Many Adventures of Winnie the Pooh	3360.00	2003	No VR	2/8/2012	10:30	5.0	10.0	0.0	0.0
Mark Twain Riverboat	2000.00	1955	No VR	2/8/2012	10:30	5.0		7.0	0.0

Many Adventures of Winnie the Pooh	3360.00	2003	No VR	2/8/2012	10:30		5.0	10.0	0.0	0.0
Mark Twain Riverboat	2000.00	1955	No VR	2/8/2012	10:30		5.0		7.0	0.0
Mr. Toad's Wild Ride	480.00	1955	No VR	2/8/2012	10:30		5.0	15.0	2.0	0.0
Peter Pan's Flight	630.00	1955	No VR	2/8/2012	10:30		10.0	20.0	8.0	5.0
Pirates of the Caribbean	3795.00	1967	No VR	2/8/2012	10:30		10.0	0.0	5.0	5.0
Disneyland Railroad	5475.00	1955	No VR	2/8/2012	10:30				10.0	0.0
Roger Rabbit's Car Toon Spin	308.57	1994	No VR	2/8/2012	10:30		5.0	20.0	Closed	5.0
Snow White's Adventures	960.00	1955	No VR	2/8/2012	10:30		5.0		2.0	0.0
Space Mountain	2160.00	1977	No VR	2/8/2012	10:30		15.0	5.0	5.0	5.0
Splash Mountain	1800.00	1989	No VR	2/8/2012	10:30		15.0	35.0	0.0	5.0
Star Tours	1371.43	2011	No VR	2/8/2012	10:30		10.0	15.0	15.0	5.0
Storybook Land Boats	2340.00	1955	Mix VR	2/8/2012	10:30		5.0		5.0	0.0
California Screamin'	1800.00	2001	No VR	2/8/2012	10:30		10.0	55.0	7.0	0.0
Flik's Flyers	1280.00	2002	No VR	2/8/2012	10:30		5.0	10.0	1.0	0.0
Francis' Ladybug Boogie	1280.00	2002	No VR	2/8/2012	10:30		5.0	10.0	1.0	0.0
Golden Zephyr	1200.00	2001	No VR	2/8/2012	10:30		5.0	15.0	1.0	0.0
Heimlich's Chew Chew Train	480.00	2002	No VR	2/8/2012	10:30		5.0	10.0	1.0	0.0
Jumpin' Jellyfish	720.00	2001	Mix VR	2/8/2012	10:30		5.0		1.0	0.0
King Triton's Carousel	2520.00	2001	No VR	2/8/2012	10:30		5.0		1.0	0.0
Mickey's Fun Wheel (Stationary Gondolas)	288.00	2009	No VR	2/8/2012	10:30		5.0	15.0	2.0	0.0
Mickey's Fun Wheel (Swinging Gondolas)	576.00	2009	No VR	2/8/2012	10:30		5.0	5.0	3.0	0.0
Muppet*Vision 3-D	1353.60	2001	No VR	2/8/2012	10:30		5.0		8.0	0.0
Silly Symphony Swings	2880.00	2001	Mix VR	2/8/2012	10:30		10.0	20.0	1.0	0.0
Soarin' Over California	2088.00	2001	Mix VR	2/8/2012	10:30		10.0	25.0	20.0	0.0
Tuck and Roll's Drive Em Buggies	560.00	2002	Mix VR	2/8/2012	10:30		5.0			0.0
Twilight Zone Tower of Terror	1890.00	2004	No VR	2/8/2012	10:30		10.0	60.0	6.0	0.0
Juassic Park - The Ride	3000.00	1996	No VR	2/8/2012	10:30		15.0			
Revenge of the Mummy - The Ride	1200.00	2004	No VR	2/8/2012	10:30		20.0			
The Simpsons Ride	1920.00	2008	Mix VR	2/8/2012	10:30		15.0			
Dinosaur	2468.57	1998	Mix VR	2/8/2012	13:30		25.0	15.0	16.0	
Expedition Everest	2720.00	2006	No VR	2/8/2012	13:30		45.0	20.0	3.0	
It's Tough to Be a Bug!	3225.00	1998	No VR	2/8/2012	13:30		25.0	5.0	20.0	
Kali River Rapids	2736.00	1999	Mix VR	2/8/2012	13:30		25.0	Closed	Closed	
Kilimanjaro Safaris	4428.00	1998	No VR	2/8/2012	13:30		25.0	15.0	14.0	
Primeval Whirl	1560.00	2002	No VR	2/8/2012	13:30		30.0	5.0	17.0	
Triceratop Spin	1920.00	2001	No VR	2/8/2012	13:30		25.0	15.0	0.0	
Wildlife Express Train	4285.71	1998	No VR	2/8/2012	13:30		15.0		5.0	
Captain EO	2011.76	2010	No VR	2/8/2012	13:30		30.0	10.0	8.0	
Circle of Life	1330.57	1995	Mix VR	2/8/2012	13:30		20.0		6.0	
Ellen's Energy Adventure	1620.00	1996	No VR	2/8/2012	13:30		20.0	5.0	13.0	
GranFiesta Tour Starring the Three Caballeros	1860.00	2007	No VR	2/8/2012	13:30		15.0	5.0	5.0	
Journey into Imagination with Figment	2240.00	2002	No VR	2/8/2012	13:30		15.0	10.0	5.0	
Living with the Land	1440.00	1993	Mix VR	2/8/2012	13:30		30.0	10.0	8.0	
Maelstrom	822.86	1988	No VR	2/8/2012	13:30		20.0	5.0	6.0	
Mission: SPACE Green	1200.00	2003	No VR	2/8/2012	13:30		15.0	10.0	11.0	
Mission: SPACE Orange	1200.00	2003	Mix VR	2/8/2012	13:30		20.0	10.0	11.0	
Segway Central	80.00	2008	Mix VR	2/8/2012	13:30		15.0			
Soarin'	1044.00	2005	Mix VR	2/8/2012	13:30		45.0	35.0	42.0	
Spaceship Earth	2605.71	1982	No VR	2/8/2012	13:30		20.0	10.0	7.0	
Sum of all Thrills	48.00	2005	Mix VR	2/8/2012	13:30		30.0		21.0	
The Seas with Nemo & Friends	2712.00	2006	Mix VR	2/8/2012	13:30		20.0	10.0	5.0	
Test Track	1152.00	1999	No VR	2/8/2012	13:30		45.0	40.0	37.0	
The Great Movie Ride	1854.55	1989	No VR	2/8/2012	13:30		25.0	15.0	14.0	
Muppet*Vision 3-D	1353.60	1991	No VR	2/8/2012	13:30		15.0	5.0	8.0	
Rock 'n' Roller Coaster Starring Aerosmith	2215.38	2002	Mix VR	2/8/2012	13:30		45.0	20.0	20.0	
Star Tours	2057.14	2011	No VR	2/8/2012	13:30		20.0	15.0	11.0	
Studio Backlot Tour	685.71	1989	Mix VR	2/8/2012	13:30		25.0	15.0	5.0	
Toy Story Mania!	1333.33	2008	No VR	2/8/2012	13:30		45.0	40.0	53.0	
The Twilight Zone Tower of Terror	2880.00	1994	Mix VR	2/8/2012	13:30		30.0	15.0	10.0	
Voyage of the Little Mermaid	1800.00	1992	No VR	2/8/2012	13:30		25.0	5.0	7.0	
Astro Orbiter	1280.00	1974	No VR	2/8/2012	13:30		45.0	20.0	26.0	
Buzz Lightyear's Space Ranger Spin	2666.67	1998	No VR	2/8/2012	13:30		20.0	10.0	11.0	
Walt Disney's Carousel of Progress	4114.29	1975	Mix VR	2/8/2012	13:30		15.0	5.0	5.0	
Country Bear Jamboree	1520.00	1971	No VR	2/8/2012	13:30		20.0		7.0	
Prince Charming's Regal Carousel	4050.00	1971	No VR	2/8/2012	13:30		10.0	5.0	5.0	
Enchanted Tiki Room	1000.00	2011	No VR	2/8/2012	13:30		20.0	5.0	7.0	
Hall of Presidents	2100.00	1971	No VR	2/8/2012	13:30		15.0		11.0	
The Haunted Mansion	3272.73	1971	No VR	2/8/2012	13:30		20.0	20.0	21.0	
It's a Small World	3272.73	1971	No VR	2/8/2012	13:30		20.0	15.0	10.0	
Jungle Cruise	2066.67	1971	No VR	2/8/2012	13:30		30.0	25.0	20.0	
Liberty Square Riverboat	1600.00	1971	No VR	2/8/2012	13:30		10.0		8.0	
Mad Tea Party	1097.14	1971	No VR	2/8/2012	13:30		20.0	5.0	8.0	
The Magic Carpets of Aladdin	1920.00	2001	No VR	2/8/2012	13:30		30.0	10.0	13.0	
Monsters, Inc. Laugh Floor	1840.00	2007	No VR	2/8/2012	13:30		30.0	10.0		
The Many Adventures of Winnie the Pooh	960.00	1999	Mix VR	2/8/2012	13:30		20.0	40.0	30.0	
Peter Pan's Flight	1090.91	1971	No VR	2/8/2012	13:30		45.0	35.0	33.0	
Pirates of the Caribbean	2300.00	1973	No VR	2/8/2012	13:30		20.0	10.0	11.0	
Snow White's Scary Adventures	960.00	1971	No VR	2/8/2012	13:30		30.0	10.0	14.0	
Space Mountain	3744.00	1975	No VR	2/8/2012	13:30		45.0	5.0	19.0	
Splash Mountain	2640.00	1992	No VR	2/8/2012	13:30		45.0	Closed	25.0	
Stitch's Great Escape	1920.00	2004	No VR	2/8/2012	13:30		30.0	10.0	9.0	
Tomorrowland Speedway	3504.00	1971	No VR	2/8/2012	13:30		20.0	20.0	18.0	
Tomorrowland Transit Authority People Mover	18000.00	1975	No VR	2/8/2012	13:30		15.0	0.0		
Disaster!	480.00	2008	No VR	2/8/2012	13:30		25.0	5.0		
Hollywood Rip Ride Rockit	2880.00	2009	No VR	2/8/2012	13:30		30.0	10.0		
Revenge of the Mummy	1200.00	2004	No VR	2/8/2012	13:30		45.0	10.0		
The Simpsons Ride	1920.00	2008	Mix VR	2/8/2012	13:30		30.0	10.0		
Woody Woodpecker's Nuthouse Coaster	1280.00	1999	No VR	2/8/2012	13:30		15.0	5.0		
Caro-Seuss-el	2430.00	1999	No VR	2/8/2012	13:30		25.0	5.0		
The Cat in the Hat	1800.00	1999	No VR	2/8/2012	13:30		25.0	5.0		
Doctor Doom's Fearfall	1280.00	1999	No VR	2/8/2012	13:30		30.0	5.0		
Dragon Challenge	5120.00	1999	No VR	2/8/2012	13:30		30.0	5.0		
Flight of the Hippogriff	1900.99	2010	No VR	2/8/2012	13:30		45.0	5.0		
Harry Potter and the Forbidden Journey	2256.00	2010	Mix VR	2/8/2012	13:30		45.0	15.0		
The High in the Sky Scuss Trolley Train Ride!	1280.00	2006	No VR	2/8/2012	13:30		25.0	5.0		
The Incredible Hulk Coaster	2560.00	1999	No VR	2/8/2012	13:30		45.0	10.0		
Jurassic Park River Adventure	3000.00	1999	No VR	2/8/2012	13:30		25.0	10.0		
One Fish, Two Fish, Red Fish, Blue Fish	440.00	1999	No VR	2/8/2012	13:30		30.0	5.0		
Popeye & Bluto's Bilge-Rat Barges	2400.00	1999	No VR	2/8/2012	13:30		15.0	5.0		
Pteranodon Flyers	800.00	1999	No VR	2/8/2012	13:30		25.0	10.0		
Storm Force Accelerator	2057.14	2009	No VR	2/8/2012	13:30		25.0	5.0		
Astro Orbiter	1280.00	1998	No VR	2/8/2012	13:30		45.0	10.0	11.0	15.0
Autopia	1368.00	1955	No VR	2/8/2012	13:30		15.0	20.0	18.0	15.0
Big Thunder Mountain Railroad	2571.43	1979	No VR	2/8/2012	13:30		45.0	10.0	13.0	25.0
Buzz Lightyear Blasters	2400.00	2004	Mix VR	2/8/2012	13:30		20.0	5.0	7.0	15.0
Captain EO	2029.41	2010	Mix VR	2/8/2012	13:30		20.0		10.0	10.0



Captain EO	2029.41	2010	Mix VR	2/8/2012	13:30				20.0			10.0	10.0
Casey Jr. Circus Train	4320.00	1955	No VR	2/8/2012	13:30				15.0			4.0	10.0
Disneyland Monorail	1740.00	1959	No VR	2/8/2012	13:30							10.0	10.0
Dumbo the Flying Elephant	1280.00	1955	No VR	2/8/2012	13:30				30.0	20.0		13.0	15.0
Enchanted Tiki Room	811.76	1963	No VR	2/8/2012	13:30				20.0			9.0	10.0
Finding Nemo Submarine	1280.00	2007	Mix VR	2/8/2012	13:30				30.0	15.0		17.0	30.0
Gadget's Go Coaster	1280.00	1993	No VR	2/8/2012	13:30				15.0	10.0		9.0	10.0
Haunted Mansion	2245.71	1969	No VR	2/8/2012	13:30				30.0	5.0		11.0	20.0
Indiana Jones Adventure	3600.00	1995	No VR	2/8/2012	13:30				30.0	20.0		15.0	40.0
It's a Small World	2571.43	1966	No VR	2/8/2012	13:30				30.0	20.0		7.0	15.0
Jungle Cruise	2194.29	1955	No VR	2/8/2012	13:30				15.0	10.0		5.0	20.0
King Arthur Carrousel	3000.00	1955	No VR	2/8/2012	13:30				15.0			3.0	10.0
Mad Tea Party	2880.00	1955	No VR	2/8/2012	13:30				15.0			4.0	10.0
Main Street Cinema	6000.00	1956	No VR	2/8/2012	13:30							0.0	0.0
Main Street Vehicles	2700.00	1956	No VR	2/8/2012	13:30							5.0	0.0
Many Adventures of Winnie the Pooh	3360.00	2003	No VR	2/8/2012	13:30				20.0	10.0		5.0	5.0
Mark Twain Riverboat	2000.00	1955	No VR	2/8/2012	13:30				15.0			7.0	10.0
Mr. Toad's Wild Ride	480.00	1955	No VR	2/8/2012	13:30				15.0	10.0		20.0	15.0
Peter Pan's Flight	630.00	1955	No VR	2/8/2012	13:30				30.0	20.0		28.0	20.0
Pirates of the Caribbean	3795.00	1967	No VR	2/8/2012	13:30				30.0	5.0		9.0	20.0
Disneyland Railroad	5475.00	1955	No VR	2/8/2012	13:30							10.0	5.0
Roger Rabbit's Car Toon Spin	308.57	1994	No VR	2/8/2012	13:30				15.0	15.0		16.0	20.0
Snow White's Adventures	960.00	1955	No VR	2/8/2012	13:30				15.0		Closed		10.0
Space Mountain	2160.00	1977	No VR	2/8/2012	13:30				45.0	20.0	Closed		40.0
Splash Mountain	1800.00	1989	No VR	2/8/2012	13:30				45.0	15.0		21.0	30.0
Star Tours	1371.43	2011	Mix VR	2/8/2012	13:30				30.0	25.0		26.0	35.0
Storybook Land Boats	2340.00	1955	No VR	2/8/2012	13:30				15.0			16.0	10.0
California Screamin'	1800.00	2001	No VR	2/8/2012	13:30				30.0	10.0		8.0	5.0
Flik's Flyers	1280.00	2002	No VR	2/8/2012	13:30				15.0	5.0		6.0	0.0
Francis' Ladybug Boogie	1280.00	2002	No VR	2/8/2012	13:30				15.0	5.0		4.0	0.0
Golden Zephyr	1200.00	2001	No VR	2/8/2012	13:30				15.0	5.0		4.0	0.0
Heimlich's Chew Chew Train	480.00	2002	No VR	2/8/2012	13:30				15.0	5.0		5.0	0.0
Jumpin' Jellyfish	720.00	2001	No VR	2/8/2012	13:30				15.0			5.0	0.0
King Triton's Carousel	2520.00	2001	No VR	2/8/2012	13:30				15.0			3.0	0.0
Mickey's Fun Wheel (Stationary Gondolas)	288.00	2009	No VR	2/8/2012	13:30				20.0	5.0		10.0	5.0
Mickey's Fun Wheel (Swinging Gondolas)	576.00	2009	No VR	2/8/2012	13:30				20.0	10.0		15.0	5.0
Muppet*Vision 3-D	1353.60	2001	Mix VR	2/8/2012	13:30				15.0			8.0	0.0
Silly Symphony Swings	2880.00	2001	No VR	2/8/2012	13:30				30.0	5.0		5.0	0.0
Soarin' Over California	2088.00	2001	Mix VR	2/8/2012	13:30				30.0	20.0		28.0	5.0
Tuck and Roll's Drive Em Buggies	560.00	2002	No VR	2/8/2012	13:30				15.0				0.0
Twilight Zone Tower of Terror	1890.00	2004	No VR	2/8/2012	13:30				30.0	15.0		18.0	5.0
Jurassic Park - The Ride	3000.00	1996	No VR	2/8/2012	13:30				30.0				
Revenge of the Mummy - The Ride	1200.00	2004	Mix VR	2/8/2012	13:30				45.0				
The Simpsons Ride	1920.00	2008	Mix VR	2/8/2012	13:30				30.0				
Dinosaur	2468.57	1998	No VR	2/8/2012	17:30	Closed				15.0		12.0	
Expedition Everest	2720.00	2006	No VR	2/8/2012	17:30	Closed				20.0		17.0	
It's Tough to Be a Bug!	3225.00	1998	Mix VR	2/8/2012	17:30	Closed				10.0		5.0	
Kali River Rapids	2736.00	1999	No VR	2/8/2012	17:30	Closed				Closed	Closed		
Kilimanjaro Safaris	4428.00	1998	No VR	2/8/2012	17:30	Closed				20.0		21.0	
Primeval Whirl	1560.00	2002	No VR	2/8/2012	17:30	Closed				10.0		15.0	
TriceraTop Spin	1920.00	2001	No VR	2/8/2012	17:30	Closed				10.0		6.0	
Wildlife Express Train	4285.71	1998	No VR	2/8/2012	17:30	Closed						8.0	
Captain EO	2011.76	2010	Mix VR	2/8/2012	17:30				25.0		10.0	5.0	
Circle of Life	1330.57	1995	No VR	2/8/2012	17:30				20.0			6.0	
Ellen's Energy Adventure	1620.00	1996	No VR	2/8/2012	17:30				20.0	5.0		13.0	
GranFiesta Tour Starring the Three Caballeros	1860.00	2007	No VR	2/8/2012	17:30				10.0	5.0		10.0	
Journey into Imagination with Figment	2240.00	2002	Mix VR	2/8/2012	17:30				10.0	5.0		4.0	
Living with the Land	1440.00	1993	No VR	2/8/2012	17:30				25.0	5.0		5.0	
Maelstrom	822.86	1988	No VR	2/8/2012	17:30				20.0	10.0		11.0	
Mission: SPACE Green	1200.00	2003	Mix VR	2/8/2012	17:30				10.0	20.0		9.0	
Mission: SPACE Orange	1200.00	2003	Mix VR	2/8/2012	17:30				20.0	20.0		8.0	
Segway Central	80.00	2008	No VR	2/8/2012	17:30				10.0				
Soarin'	1044.00	2005	Mix VR	2/8/2012	17:30				35.0	40.0		44.0	
Spaceship Earth	2605.71	1982	Mix VR	2/8/2012	17:30				20.0	5.0		2.0	
Sum of all Thrills	48.00	2005	Mix VR	2/8/2012	17:30				25.0			13.0	
The Seas with Nemo & Friends	2712.00	2006	No VR	2/8/2012	17:30				20.0	10.0		2.0	
Test Track	1152.00	1999	No VR	2/8/2012	17:30				35.0	40.0		38.0	
The Great Movie Ride	1854.55	1989	No VR	2/8/2012	17:30				20.0	15.0		13.0	
Muppet*Vision 3-D	1353.60	1991	Mix VR	2/8/2012	17:30				5.0			10.0	8.0
Rock 'n' Roller Coaster Starring Aerosmith	2215.38	2002	No VR	2/8/2012	17:30				60.0	25.0		25.0	
Star Tours	2057.14	2011	Mix VR	2/8/2012	17:30				20.0	20.0		11.0	
Studio Backlot Tour	685.71	1989	No VR	2/8/2012	17:30				20.0	10.0		5.0	
Toy Story Mania!	1333.33	2008	Mix VR	2/8/2012	17:30				30.0	45.0		57.0	
The Twilight Zone Tower of Terror	2880.00	1994	No VR	2/8/2012	17:30				25.0	20.0		15.0	
Voyage of the Little Mermaid	1800.00	1992	No VR	2/8/2012	17:30				20.0	10.0		7.0	
Astro Orbiter	1280.00	1974	No VR	2/8/2012	17:30				35.0	25.0		30.0	
Buzz Lightyear's Space Ranger Spin	2666.67	1998	Mix VR	2/8/2012	17:30				20.0	10.0		9.0	
Walt Disney's Carousel of Progress	4114.29	1975	No VR	2/8/2012	17:30				10.0	5.0		5.0	
Country Bear Jamboree	1520.00	1971	No VR	2/8/2012	17:30				20.0			7.0	
Prince Charming's Regal Carrousel	4050.00	1971	No VR	2/8/2012	17:30				10.0	5.0		5.0	
Enchanted Tiki Room	1000.00	2011	No VR	2/8/2012	17:30				20.0	5.0		7.0	
Hall of Presidents	2100.00	1971	No VR	2/8/2012	17:30				10.0			11.0	
The Haunted Mansion	3272.73	1971	No VR	2/8/2012	17:30				20.0	15.0		16.0	
It's a Small World	3272.73	1971	No VR	2/8/2012	17:30				20.0	5.0		12.0	
Jungle Cruise	2066.67	1971	No VR	2/8/2012	17:30				25.0	25.0		20.0	
Liberty Square Riverboat	1600.00	1971	No VR	2/8/2012	17:30				10.0			8.0	
Mad Tea Party	1097.14	1971	No VR	2/8/2012	17:30				20.0	5.0		10.0	
The Magic Carpets of Aladdin	1920.00	2001	No VR	2/8/2012	17:30				25.0	15.0		12.0	
Monsters, Inc. Laugh Floor	1840.00	2007	Mix VR	2/8/2012	17:30				25.0	10.0		7.0	
The Many Adventures of Winnie the Pooh	960.00	1999	No VR	2/8/2012	17:30				20.0	30.0		29.0	
Peter Pan's Flight	1090.91	1971	No VR	2/8/2012	17:30				35.0	40.0		41.0	
Pirates of the Caribbean	2300.00	1973	No VR	2/8/2012	17:30				20.0	10.0		8.0	
Snow White's Scary Adventures	960.00	1971	No VR	2/8/2012	17:30				35.0	20.0		11.0	
Space Mountain	3744.00	1975	No VR	2/8/2012	17:30				25.0	10.0		21.0	
Splash Mountain	2640.00	1992	No VR	2/8/2012	17:30				35.0	Closed		28.0	
Stitch's Great Escape	1920.00	2004	No VR	2/8/2012	17:30				25.0		10.0	10.0	
Tomorrowland Speedway	3504.00	1971	No VR	2/8/2012	17:30				25.0	50.0		16.0	
Tomorrowland Transit Authority People Mover	18000.00	1975	No VR	2/8/2012	17:30				10.0	5.0			
Disaster!	480.00	2008	Mix VR	2/8/2012	17:30				15.0	10.0			
Hollywood Rip Ride Rockit	2880.00	2009	No VR	2/8/2012	17:30				25.0	25.0			
Revenge of the Mummy	1200.00	2004	No VR	2/8/2012	17:30				25.0	5.0			
The Simpsons Ride	1920.00	2008	Mix VR	2/8/2012	17:30				25.0	30.0			
Woody Woodpecker's Nuthouse Coaster	1280.00	1999	No VR	2/8/2012	17:30				5.0	10.0			
Caro-Seuss-el	2430.00	1999	No VR	2/8/2012	17:30				15.0	5.0			
The Cat in the Hat	1800.00	1999	No VR	2/8/2012	17:30				15.0	20.0			
Doctor Doom's Fearfall	1280.00	1999	No VR	2/8/2012	17:30				25.0	15.0			

Doctor Doom's Fearfall	1280.00	1999	No VR	2/8/2012	17:30	25.0	15.0		
Dragon Challenge	5120.00	1999	No VR	2/8/2012	17:30	25.0	15.0		
Flight of the Hippogriff	1900.99	2010	No VR	2/8/2012	17:30	25.0	25.0		
Harry Potter and the Forbidden Journey	2256.00	2010	Mix VR	2/8/2012	17:30	25.0	45.0		
The High in the Sky Seuss Trolley Train Ride!	1280.00	2006	No VR	2/8/2012	17:30	15.0	15.0		
The Incredible Hulk Coaster	2560.00	1999	No VR	2/8/2012	17:30	25.0	20.0		
Jurassic Park River Adventure	3000.00	1999	No VR	2/8/2012	17:30	15.0	15.0		
One Fish, Two Fish, Red Fish, Blue Fish	440.00	1999	No VR	2/8/2012	17:30	25.0	10.0		
Popeye & Bluto's Bilge-Rat Barges	2400.00	1999	No VR	2/8/2012	17:30	5.0	15.0		
Pteranodon Flyers	800.00	1999	No VR	2/8/2012	17:30	15.0	40.0		
Storm Force Accelerator	2057.14	2009	No VR	2/8/2012	17:30	15.0	15.0		
Astro Orbiter	1280.00	1998	No VR	2/8/2012	17:30	35.0	5.0	15.0	15.0
Autopia	1368.00	1955	No VR	2/8/2012	17:30	10.0	10.0	21.0	15.0
Big Thunder Mountain Railroad	2571.43	1979	No VR	2/8/2012	17:30	35.0	10.0	13.0	25.0
Buzz Lightyear Blasters	2400.00	2004	Mix VR	2/8/2012	17:30	20.0	5.0	5.0	15.0
Captain EO	2029.41	2010	Mix VR	2/8/2012	17:30	20.0		10.0	10.0
Casey Jr. Circus Train	4320.00	1955	No VR	2/8/2012	17:30	10.0		6.0	10.0
Disneyland Monorail	1740.00	1959	No VR	2/8/2012	17:30			10.0	10.0
Dumbo the Flying Elephant	1280.00	1955	No VR	2/8/2012	17:30	25.0	15.0	18.0	15.0
Enchanted Tiki Room	811.76	1963	No VR	2/8/2012	17:30	20.0		9.0	10.0
Finding Nemo Submarine	1280.00	2007	Mix VR	2/8/2012	17:30	5.0	15.0	22.0	30.0
Gadget's Go Coaster	1280.00	1993	No VR	2/8/2012	17:30	10.0	10.0	25.0	10.0
Haunted Mansion	2245.71	1969	No VR	2/8/2012	17:30	25.0	5.0	12.0	20.0
Indiana Jones Adventure	3600.00	1995	No VR	2/8/2012	17:30	25.0	15.0	25.0	40.0
It's a Small World	2571.43	1966	No VR	2/8/2012	17:30	25.0	10.0	17.0	15.0
Jungle Cruise	2194.29	1955	No VR	2/8/2012	17:30		10.0	7.0	20.0
King Arthur Carousel	3000.00	1955	No VR	2/8/2012	17:30	10.0		4.0	10.0
Mad Tea Party	2880.00	1955	No VR	2/8/2012	17:30	10.0		6.0	10.0
Main Street Cinema	6000.00	1956	No VR	2/8/2012	17:30			0.0	0.0
Main Street Vehicles	2700.00	1956	No VR	2/8/2012	17:30			5.0	0.0
Many Adventures of Winnie the Pooh	3360.00	2003	No VR	2/8/2012	17:30	20.0	5.0	7.0	5.0
Mark Twain Riverboat	2000.00	1955	No VR	2/8/2012	17:30	10.0		7.0	10.0
Mr. Toad's Wild Ride	480.00	1955	No VR	2/8/2012	17:30	10.0	5.0	16.0	15.0
Peter Pan's Flight	630.00	1955	No VR	2/8/2012	17:30	25.0	20.0	30.0	20.0
Pirates of the Caribbean	3795.00	1967	No VR	2/8/2012	17:30	25.0	0.0	10.0	20.0
Disneyland Railroad	5475.00	1955	No VR	2/8/2012	17:30			10.0	5.0
Roger Rabbit's Car Toon Spin	308.57	1994	No VR	2/8/2012	17:30	10.0	10.0	16.0	20.0
Snow White's Adventures	960.00	1955	No VR	2/8/2012	17:30	10.0		Closed	10.0
Space Mountain	2160.00	1977	No VR	2/8/2012	17:30	5.0	20.0	23.0	40.0
Splash Mountain	1800.00	1989	No VR	2/8/2012	17:30	35.0	10.0	34.0	30.0
Star Tours	1371.43	2011	Mix VR	2/8/2012	17:30	25.0	20.0	34.0	40.0
Storybook Land Boats	2340.00	1955	No VR	2/8/2012	17:30	10.0		22.0	10.0
California Screamin'	1800.00	2001	No VR	2/8/2012	17:30	25.0	15.0	10.0	10.0
Flik's Flyers	1280.00	2002	No VR	2/8/2012	17:30	10.0	5.0	6.0	5.0
Francis' Ladybug Boogie	1280.00	2002	No VR	2/8/2012	17:30	10.0	5.0	5.0	5.0
Golden Zephyr	1200.00	2001	No VR	2/8/2012	17:30	10.0	5.0	4.0	5.0
Heimlich's Chew Chew Train	480.00	2002	No VR	2/8/2012	17:30	10.0	5.0	5.0	5.0
Jumpin' Jellyfish	720.00	2001	No VR	2/8/2012	17:30	10.0		5.0	5.0
King Triton's Carousel	2520.00	2001	No VR	2/8/2012	17:30	10.0		3.0	0.0
Mickey's Fun Wheel (Stationary Gondolas)	288.00	2009	No VR	2/8/2012	17:30	20.0	5.0	10.0	5.0
Mickey's Fun Wheel (Swinging Gondolas)	576.00	2009	No VR	2/8/2012	17:30	20.0	10.0	15.0	5.0
Muppet*Vision 3-D	1353.60	2001	Mix VR	2/8/2012	17:30	10.0		8.0	5.0
Silly Symphony Swings	2880.00	2001	No VR	2/8/2012	17:30	25.0	10.0	5.0	5.0
Soarin' Over California	2088.00	2001	Mix VR	2/8/2012	17:30	25.0		30.0	15.0
Tuck and Roll's Drive Em Buggies	560.00	2002	No VR	2/8/2012	17:30	10.0			5.0
Twilight Zone Tower of Terror	1890.00	2004	No VR	2/8/2012	17:30	25.0	5.0	23.0	10.0
Jurassic Park - The Ride	3000.00	1996	No VR	2/8/2012	17:30	Closed			
Revenge of the Mummy - The Ride	1200.00	2004	Mix VR	2/8/2012	17:30	Closed			
The Simpsons Ride	1920.00	2008	Mix VR	2/8/2012	17:30	Closed			

## Appendix C: Data from Analyses

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### C.1 Independent T-test

**Group Statistics**

	Ride Type	N	Mean	Std. Deviation	Std. Error Mean
Mean of Measured Wait Times	Non-Virtual	18826	18.785	13.8136	.1007
	Mixed Virtual	4471	24.521	19.2254	.2875

**Independent Samples Test**

		t-test for Equality of Means		
		df	Sig. (2-tailed)	Mean Difference
Mean of Measured Wait Times	Equal variances assumed	23295	.000	-5.7361
	Equal variances not assumed	5613.253	.000	-5.7361

**Independent Samples Test**

		t-test for Equality of Means		
		Std. Error Difference	95% Confidence Interval of the Difference	
			Lower	Upper
Mean of Measured Wait Times	Equal variances assumed	.2496	-6.2254	-5.2468
	Equal variances not assumed	.3046	-6.3333	-5.1389

## C.2 Univariate Analysis: Ride Type by Hour and Day of the Week

**Between-Subjects Factors**

		Value Label	N
Ride Type	0	Non-Virtual	18826
	1	Mixed Virtual	4471
Hour Data Collected	1.00	Morning	8234
	2.00	Afternoon	7686
	3.00	Evening	7377
	SUN		2431
	MON		4249
Day of the Week	TUE		3653
	WED		3650
	THU		3798
	FRI		3339
	SAT		2177

**Tests of Between-Subjects Effects**

Dependent Variable: Mean of Measured Wait Times

Source	Type III Sum of Squares	df	Mean Square	F	Sig.
Corrected Model	507501.361 <sup>a</sup>	41	12378.082	59.282	.000
Intercept	6428813.236	1	6428813.236	30789.174	.000
RideType	107073.211	1	107073.211	512.800	.000
Hour	223892.174	2	111946.087	536.137	.000
Day_of_Week	4904.626	6	817.438	3.915	.001
RideType * Hour	762.741	2	381.371	1.826	.161
RideType * Day_of_Week	877.510	6	146.252	.700	.649
Hour * Day_of_Week	1861.824	12	155.152	.743	.710
RideType * Hour * Day_of_Week	346.946	12	28.912	.138	1.000
Error	4855669.433	23255	208.801		
Total	14575926.210	23297			
Corrected Total	5363170.794	23296			

a. R Squared = .095 (Adjusted R Squared = .093)

**Descriptive Statistics**

Dependent Variable: Mean of Measured Wait Times

Ride Type	Hour Data Collected	Day of the Week	Mean	Std. Deviation	N
Non-Virtual	Morning	SUN	13.017	8.8506	667
		MON	13.309	9.8547	1146
		TUE	14.035	10.8872	993
		WED	13.281	10.3098	1006
		THU	13.433	11.0377	1050
		FRI	13.149	9.7514	1012
		SAT	13.301	9.7446	781
		Total	13.378	10.1563	6655
	Afternoon	SUN	22.474	13.6448	667
		MON	23.035	15.1609	1147
		TUE	23.368	15.3822	1010
		WED	21.501	14.4633	994
		THU	21.960	14.3042	1012
		FRI	21.882	13.6307	824
		SAT	22.705	14.6329	547
		Total	22.425	14.5537	6201
	Evening	SUN	20.827	14.0696	628
		MON	21.691	15.3089	1145
		TUE	21.391	15.2023	952
		WED	19.963	14.4187	953
		THU	20.749	14.4825	1011
		FRI	20.473	13.5318	861
		SAT	22.971	15.6609	420
		Total	21.031	14.6763	5970
	Total	SUN	18.732	13.0540	1962
		MON	19.345	14.3361	3438
		TUE	19.595	14.5370	2955
		WED	18.204	13.6571	2953
THU		18.648	13.8658	3073	
FRI		18.155	12.8900	2697	
SAT		18.567	13.8045	1748	
Total		18.785	13.8136	18826	

**Descriptive Statistics**

Dependent Variable: Mean of Measured Wait Times

Ride Type	Hour Data Collected	Day of the Week	Mean	Std. Deviation	N	
Mixed Virtual	Morning	SUN	18.434	13.4548	158	
		MON	20.023	18.1469	270	
		TUE	20.598	17.6656	232	
		WED	18.857	16.7557	241	
		THU	19.020	16.3816	246	
		FRI	18.709	14.4000	242	
		SAT	18.914	15.9774	190	
		Total	19.279	16.3391	1579	
	Afternoon	SUN	28.592	17.7631	158	
		MON	29.961	21.7487	272	
		TUE	29.512	20.9816	242	
		WED	28.317	20.6310	233	
		THU	27.624	19.9409	241	
		FRI	28.108	19.3543	199	
		SAT	27.269	19.6992	140	
		Total	28.603	20.2304	1485	
	Evening	SUN	25.841	18.5649	153	
		MON	27.670	20.9445	269	
		TUE	26.176	20.5475	224	
		WED	25.149	20.0872	223	
		THU	25.731	19.7954	238	
		FRI	25.151	18.4689	201	
		SAT	26.965	19.1683	99	
		Total	26.096	19.8131	1407	
		Total	SUN	24.272	17.2375	469
			MON	25.892	20.7568	811
			TUE	25.479	20.1110	698
			WED	24.032	19.5758	697
THU	24.083		19.0965	725		
FRI	23.639		17.7817	642		
SAT	23.498		18.4295	429		
Total	24.521		19.2254	4471		

**Descriptive Statistics**

Dependent Variable: Mean of Measured Wait Times

Ride Type	Hour Data Collected	Day of the Week	Mean	Std. Deviation	N
	Morning	SUN	14.054	10.1171	825
		MON	14.589	12.1717	1416
		TUE	15.278	12.7113	1225
		WED	14.359	12.0275	1247
		THU	14.494	12.4201	1296
		FRI	14.222	11.0193	1254
		SAT	14.399	11.4482	971
		Total	14.510	11.8294	8234
	Afternoon	SUN	23.646	14.7106	825
		MON	24.362	16.8404	1419
		TUE	24.555	16.7791	1252
		WED	22.796	16.0352	1227
		THU	23.049	15.6983	1253
		FRI	23.093	15.1086	1023
		SAT	23.635	15.8883	687
		Total	23.619	15.9957	7686
Total	Evening	SUN	21.809	15.1740	781
		MON	22.828	16.6870	1414
		TUE	22.302	16.4534	1176
		WED	20.946	15.7739	1176
		THU	21.699	15.7477	1249
		FRI	21.358	14.6997	1062
		SAT	23.733	16.4429	519
		Total	21.997	15.9090	7377
	Total	SUN	19.801	14.1253	2431
		MON	20.595	15.9706	4249
		TUE	20.719	15.9210	3653
		WED	19.317	15.1404	3650
		THU	19.686	15.1541	3798
		FRI	19.210	14.1275	3339
		SAT	19.539	14.9549	2177
		Total	19.886	15.1730	23297



### C.3 Univariate Analysis with Ride Capacity Covariate

**Between-Subjects Factors**

		Value Label	N
Ride Type	0	Non-Virtual	18826
	1	Mixed Virtual	4471
Hour Data Collected	1.00	Morning	8234
	2.00	Afternoon	7686
	3.00	Evening	7377
	SUN		2431
	MON		4249
Day of the Week	TUE		3653
	WED		3650
	THU		3798
	FRI		3339
	SAT		2177

**Tests of Between-Subjects Effects**

Dependent Variable: Mean of Measured Wait Times

Source	Type III Sum of Squares	df	Mean Square	F	Sig.
Corrected Model	507501.361 <sup>a</sup>	41	12378.082	59.282	.000
Intercept	6428813.236	1	6428813.236	30789.174	.000
RideType	107073.211	1	107073.211	512.800	.000
Hour	223892.174	2	111946.087	536.137	.000
Day_of_Week	4904.626	6	817.438	3.915	.001
RideType * Hour	762.741	2	381.371	1.826	.161
RideType * Day_of_Week	877.510	6	146.252	.700	.649
Hour * Day_of_Week	1861.824	12	155.152	.743	.710
RideType * Hour * Day_of_Week	346.946	12	28.912	.138	1.000
Error	4855669.433	23255	208.801		
Total	14575926.210	23297			
Corrected Total	5363170.794	23296			

a. R Squared = .095 (Adjusted R Squared = .093)

**Descriptive Statistics**

Dependent Variable: Mean of Measured Wait Times

Ride Type	Hour Data Collected	Day of the Week	Mean	Std. Deviation	N
Non-Virtual	Morning	SUN	13.017	8.8506	667
		MON	13.309	9.8547	1146
		TUE	14.035	10.8872	993
		WED	13.281	10.3098	1006
		THU	13.433	11.0377	1050
		FRI	13.149	9.7514	1012
		SAT	13.301	9.7446	781
		Total	13.378	10.1563	6655
	Afternoon	SUN	22.474	13.6448	667
		MON	23.035	15.1609	1147
		TUE	23.368	15.3822	1010
		WED	21.501	14.4633	994
		THU	21.960	14.3042	1012
		FRI	21.882	13.6307	824
		SAT	22.705	14.6329	547
		Total	22.425	14.5537	6201
	Evening	SUN	20.827	14.0696	628
		MON	21.691	15.3089	1145
		TUE	21.391	15.2023	952
		WED	19.963	14.4187	953
		THU	20.749	14.4825	1011
		FRI	20.473	13.5318	861
		SAT	22.971	15.6609	420
		Total	21.031	14.6763	5970
	Total	SUN	18.732	13.0540	1962
		MON	19.345	14.3361	3438
		TUE	19.595	14.5370	2955
		WED	18.204	13.6571	2953
THU		18.648	13.8658	3073	
FRI		18.155	12.8900	2697	
SAT		18.567	13.8045	1748	
Total		18.785	13.8136	18826	

**Descriptive Statistics**

Dependent Variable: Mean of Measured Wait Times

Ride Type	Hour Data Collected	Day of the Week	Mean	Std. Deviation	N	
Mixed Virtual	Morning	SUN	18.434	13.4548	158	
		MON	20.023	18.1469	270	
		TUE	20.598	17.6656	232	
		WED	18.857	16.7557	241	
		THU	19.020	16.3816	246	
		FRI	18.709	14.4000	242	
		SAT	18.914	15.9774	190	
		Total	19.279	16.3391	1579	
	Afternoon	SUN	28.592	17.7631	158	
		MON	29.961	21.7487	272	
		TUE	29.512	20.9816	242	
		WED	28.317	20.6310	233	
		THU	27.624	19.9409	241	
		FRI	28.108	19.3543	199	
		SAT	27.269	19.6992	140	
		Total	28.603	20.2304	1485	
	Evening	SUN	25.841	18.5649	153	
		MON	27.670	20.9445	269	
		TUE	26.176	20.5475	224	
		WED	25.149	20.0872	223	
		THU	25.731	19.7954	238	
		FRI	25.151	18.4689	201	
		SAT	26.965	19.1683	99	
		Total	26.096	19.8131	1407	
		Total	SUN	24.272	17.2375	469
			MON	25.892	20.7568	811
			TUE	25.479	20.1110	698
			WED	24.032	19.5758	697
THU	24.083		19.0965	725		
FRI	23.639		17.7817	642		
SAT	23.498		18.4295	429		
Total	24.521		19.2254	4471		

**Descriptive Statistics**

Dependent Variable: Mean of Measured Wait Times

Ride Type	Hour Data Collected	Day of the Week	Mean	Std. Deviation	N
Total	Morning	SUN	14.054	10.1171	825
		MON	14.589	12.1717	1416
		TUE	15.278	12.7113	1225
		WED	14.359	12.0275	1247
		THU	14.494	12.4201	1296
		FRI	14.222	11.0193	1254
		SAT	14.399	11.4482	971
		Total	14.510	11.8294	8234
	Afternoon	SUN	23.646	14.7106	825
		MON	24.362	16.8404	1419
		TUE	24.555	16.7791	1252
		WED	22.796	16.0352	1227
		THU	23.049	15.6983	1253
		FRI	23.093	15.1086	1023
		SAT	23.635	15.8883	687
		Total	23.619	15.9957	7686
	Evening	SUN	21.809	15.1740	781
		MON	22.828	16.6870	1414
		TUE	22.302	16.4534	1176
		WED	20.946	15.7739	1176
		THU	21.699	15.7477	1249
		FRI	21.358	14.6997	1062
		SAT	23.733	16.4429	519
		Total	21.997	15.9090	7377
	Total	SUN	19.801	14.1253	2431
		MON	20.595	15.9706	4249
		TUE	20.719	15.9210	3653
		WED	19.317	15.1404	3650
THU		19.686	15.1541	3798	
FRI		19.210	14.1275	3339	
SAT		19.539	14.9549	2177	
Total	19.886	15.1730	23297		

**C.4 Frequencies**

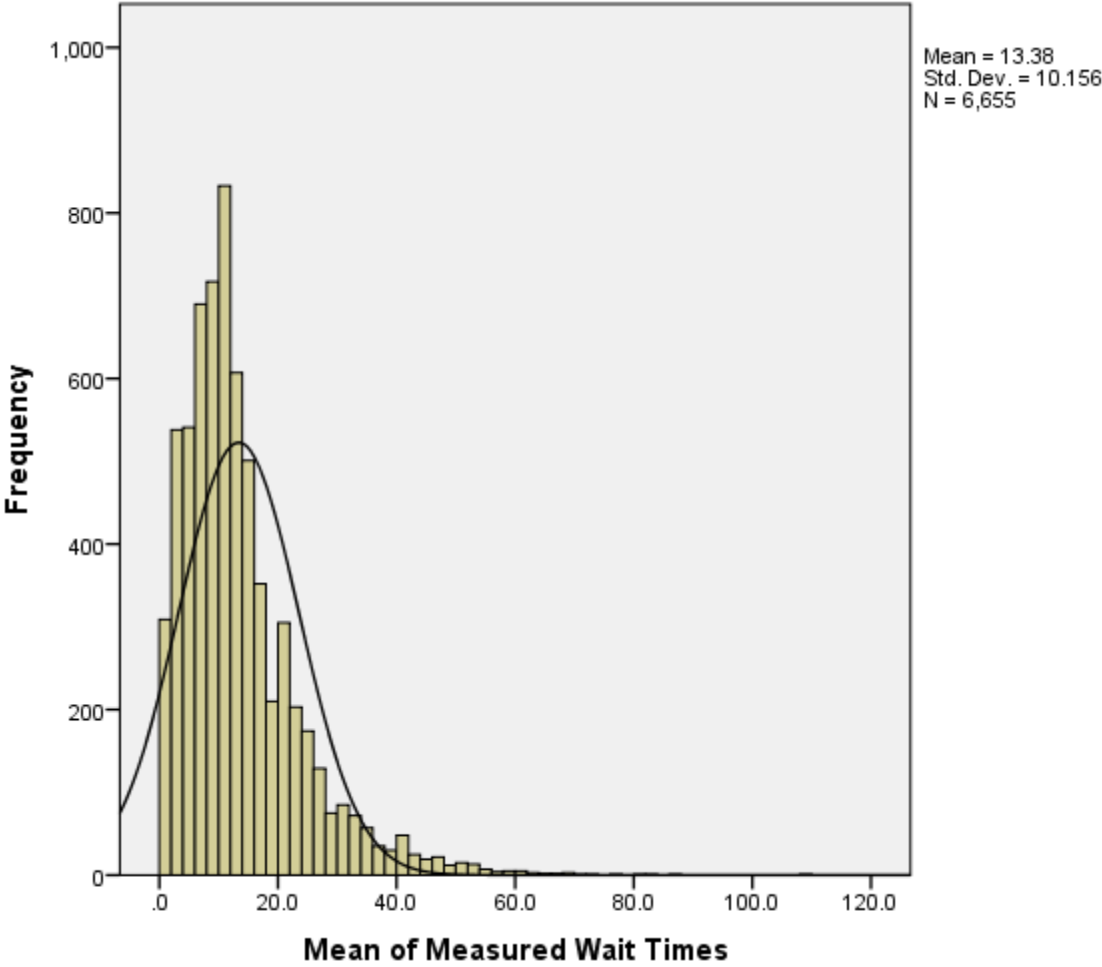


Figure C.4.1: Frequencies Analysis with Ride Type = No VR, Hour = Morning

**Statistics<sup>a</sup>**

Mean of Measured Wait Times

N	Valid	6655
	Missing	0

a. Ride Type = Non-Virtual, Hour  
Data Collected = Morning

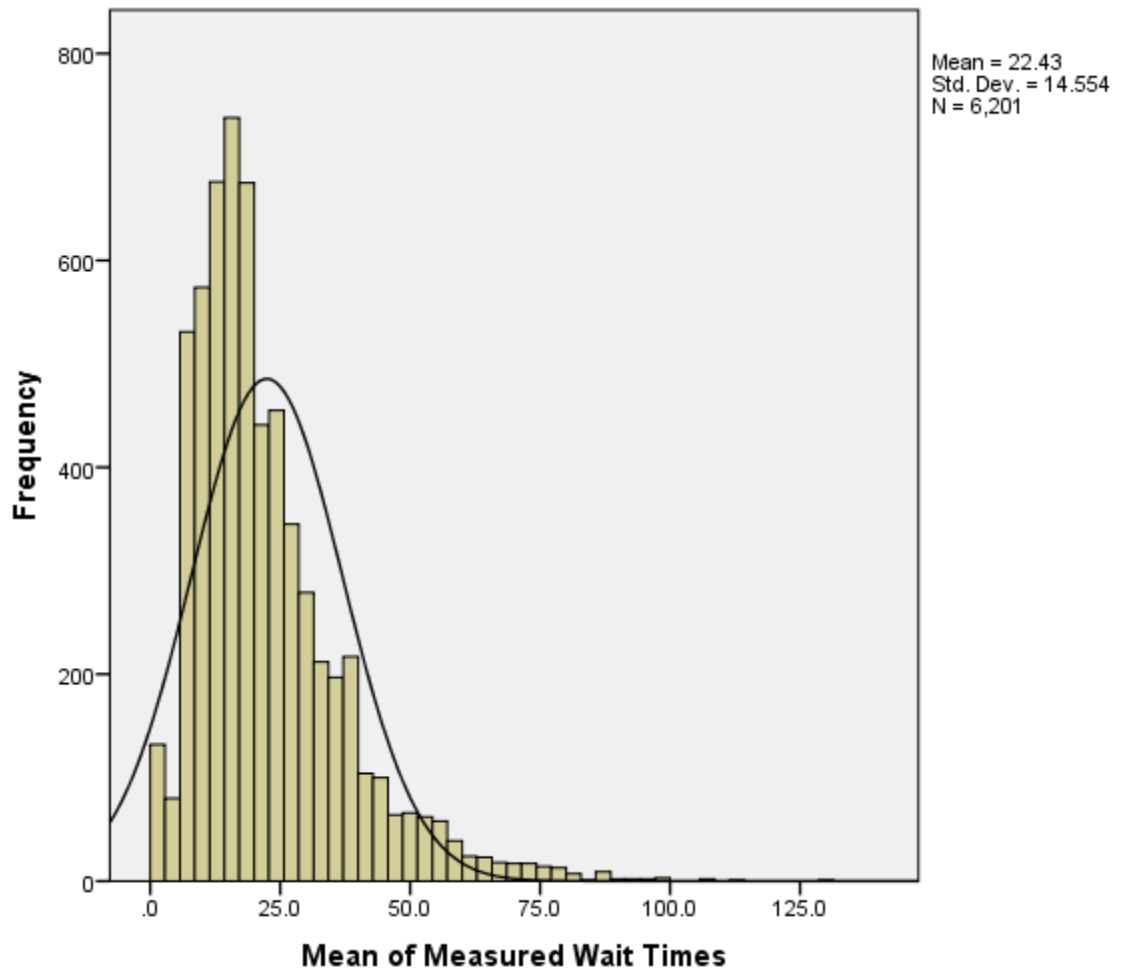


Figure C.4.2: Frequencies Analysis with Ride Type = No VR, Hour = Afternoon

**Statistics<sup>a</sup>**

Mean of Measured Wait Times

N	Valid	6201
	Missing	0

a. Ride Type = Non-Virtual, Hour

Data Collected = Afternoon

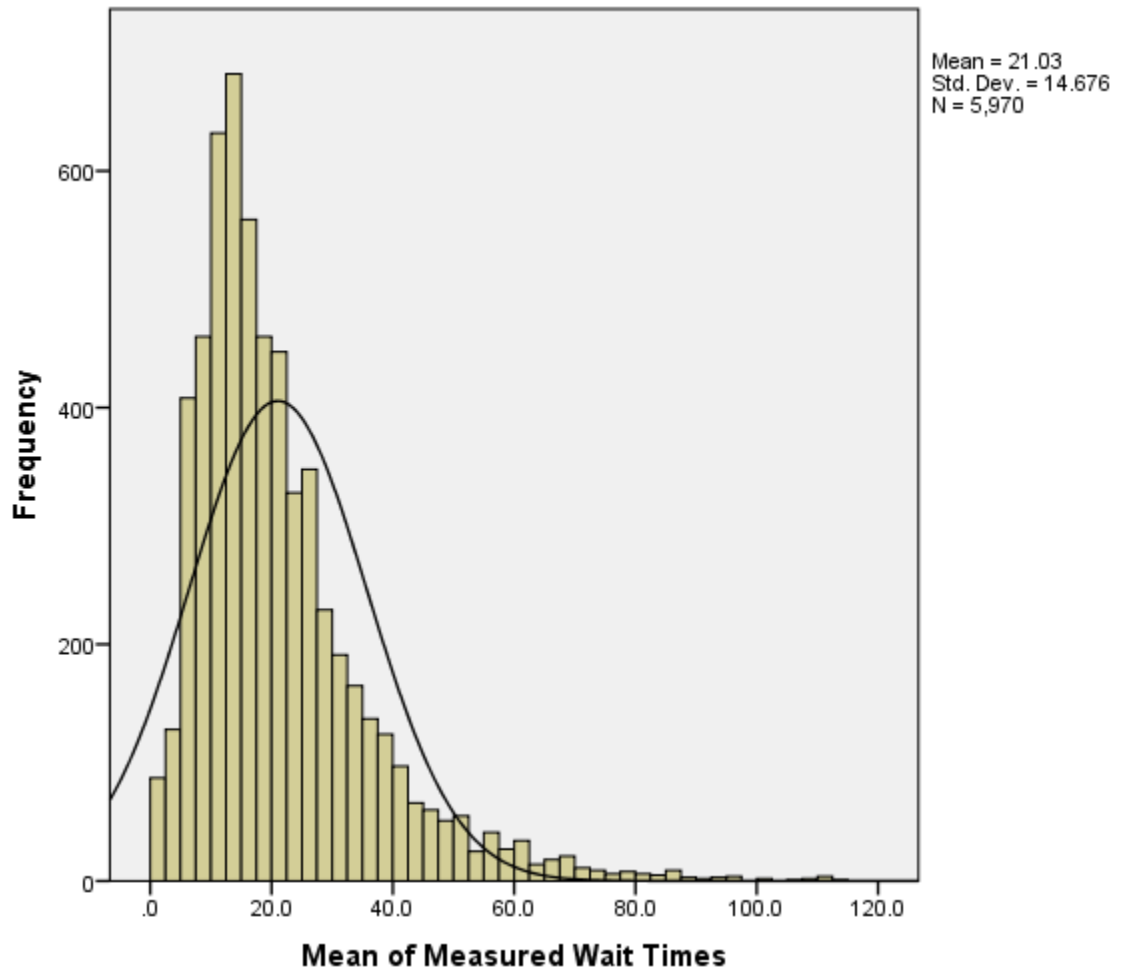


Figure C.4.3: Frequencies Analysis with Ride Type = No VR, Hour = Evening

**Statistics<sup>a</sup>**

Mean of Measured Wait Times

N	Valid	5970
	Missing	0

a. Ride Type = Non-Virtual, Hour

Data Collected = Evening

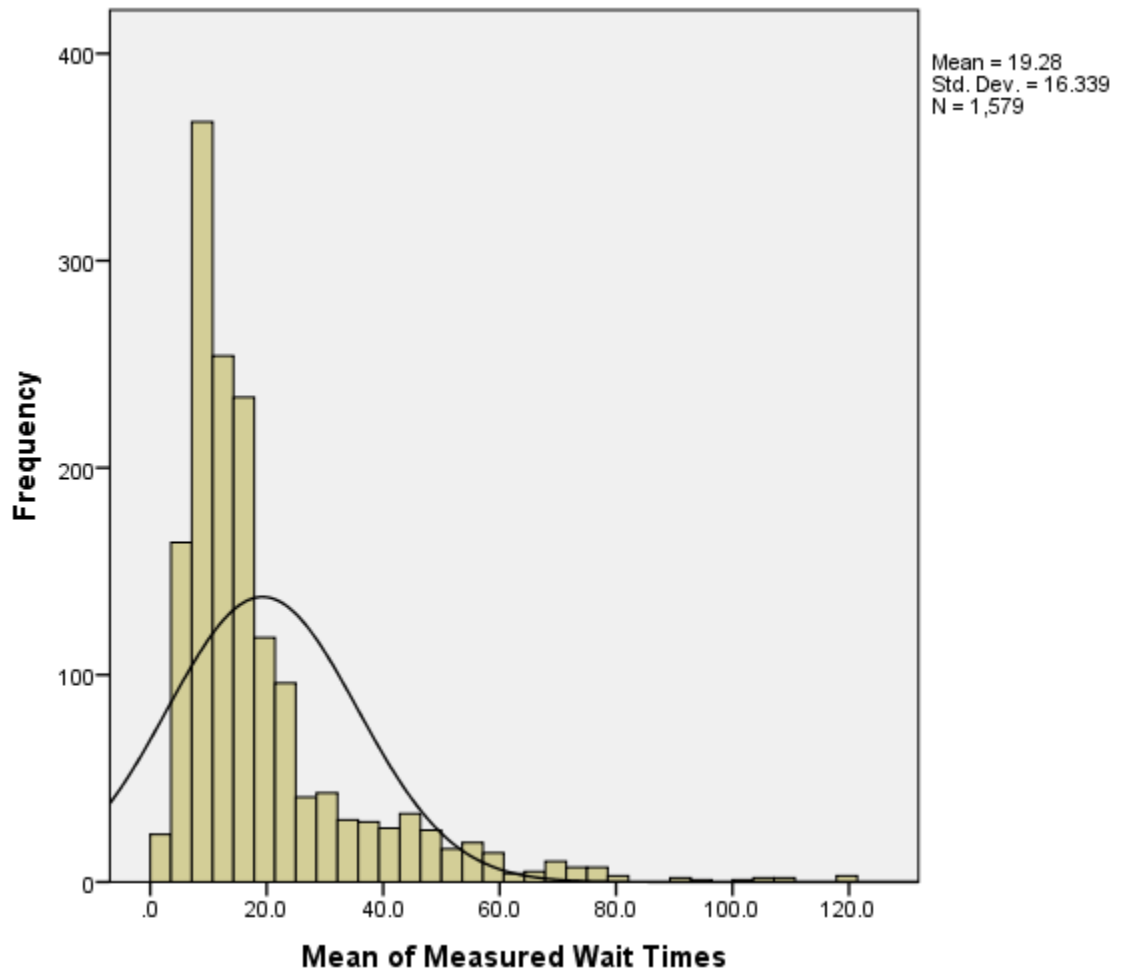


Figure C.4.4: Frequencies Analysis with Ride Type = Mix VR, Hour = Morning

**Statistics<sup>a</sup>**

Mean of Measured Wait Times

N	Valid	1579
	Missing	0

a. Ride Type = Mixed Virtual,  
Hour Data Collected = Morning



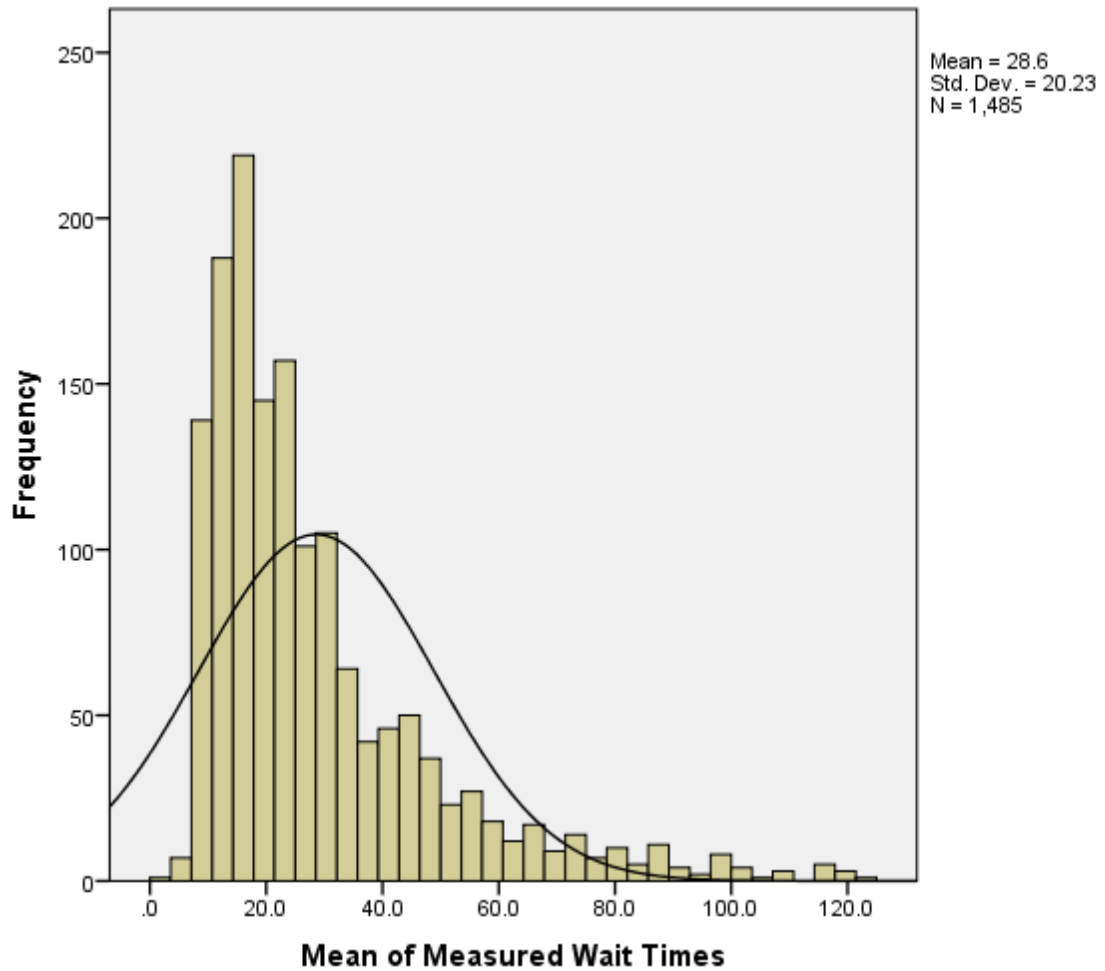


Figure C.4.5: Frequencies Analysis with Ride Type = Mix VR, Hour =Afternoon

**Statistics<sup>a</sup>**

Mean of Measured Wait Times

N	Valid	1485
	Missing	0

a. Ride Type = Mixed Virtual,  
Hour Data Collected = Afternoon

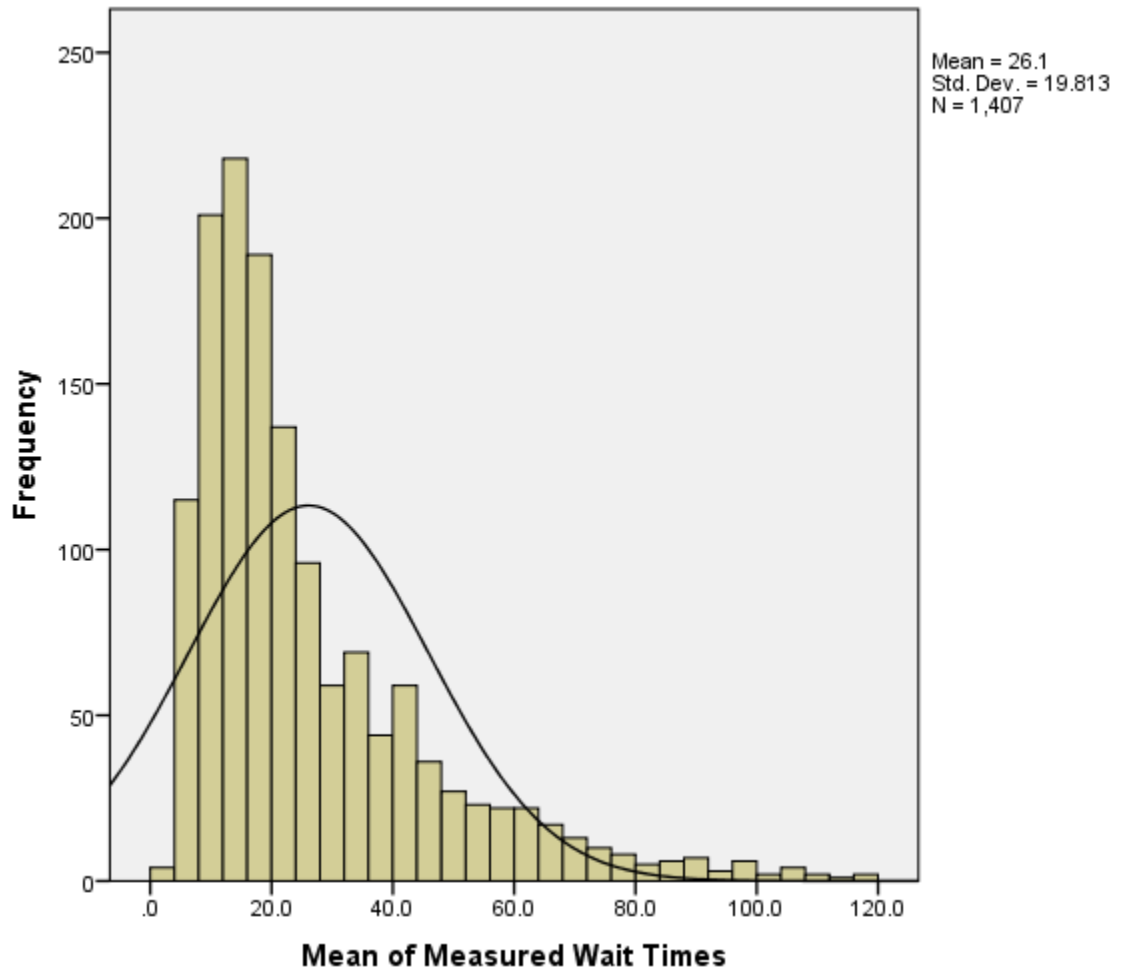


Figure C.4.6: Frequencies Analysis with Ride Type = Mix VR, Hour = Afternoon

**Statistics<sup>a</sup>**

Mean of Measured Wait Times

N	Valid	1407
	Missing	0

a. Ride Type = Mixed Virtual,  
Hour Data Collected = Evening

### C.5 Correlations with Ride Age

#### Correlations

		Mean of Measured Wait Times	Age of a Ride
Mean of Measured Wait Times	Pearson Correlation	1	-.163**
	Sig. (2-tailed)		.000
	N	23297	23297
Age of a Ride	Pearson Correlation	-.163**	1
	Sig. (2-tailed)	.000	
	N	23297	23297

\*\* . Correlation is significant at the 0.01 level (2-tailed).

#### Correlations

		Mean of Measured Wait Times	Age of a Ride
Mean of Measured Wait Times	Pearson Correlation	1	-.105**
	Sig. (2-tailed)		.000
	N	18826	18826
Age of a Ride	Pearson Correlation	-.105**	1
	Sig. (2-tailed)	.000	
	N	18826	18826

\*\* . Correlation is significant at the 0.01 level (2-tailed).

#### Correlations

		Mean of Measured Wait Times	Age of a Ride
Mean of Measured Wait Times	Pearson Correlation	1	-.302**
	Sig. (2-tailed)		.000
	N	4471	4471
Age of a Ride	Pearson Correlation	-.302**	1
	Sig. (2-tailed)	.000	
	N	4471	4471

\*\* . Correlation is significant at the 0.01 level (2-tailed).

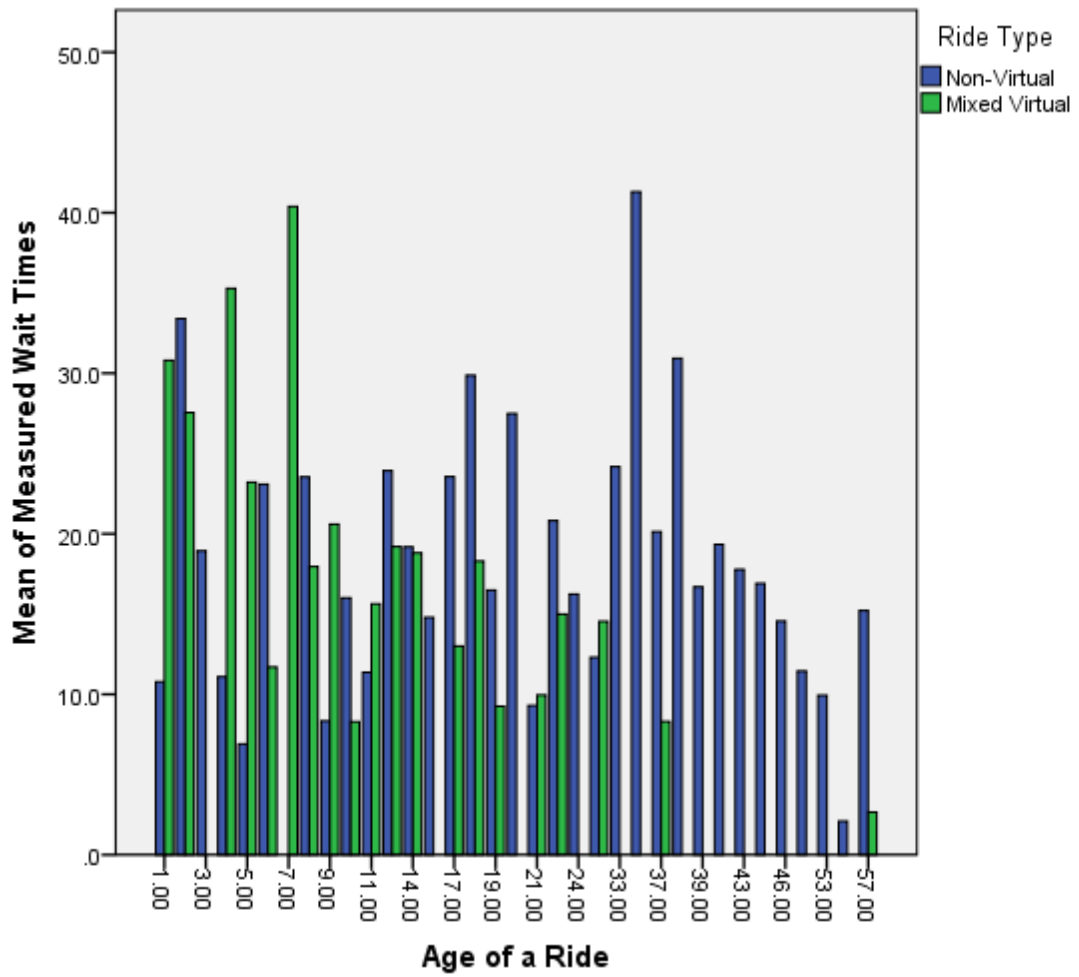


Figure C.5.1: Correlations Analysis Wait Time with Ride Age

## C.6 Compare Means

### Case Processing Summary

	Cases					
	Included		Excluded		Total	
	N	Percent	N	Percent	N	Percent
Mean of Measured Wait Times * Ride Type	23297	100.0%	0	0.0%	23297	100.0%

### Report

#### Mean of Measured Wait Times

Ride Type	Mean	N	Std. Deviation	Grouped Median	Minimum	Maximum
Non-Virtual	18.785	18826	13.8136	15.055	.0	130.0
Mixed Virtual	24.521	4471	19.2254	17.713	.1	123.0
Total	19.886	23297	15.1730	15.541	.0	130.0

### Case Processing Summary

	Cases					
	Included		Excluded		Total	
	N	Percent	N	Percent	N	Percent
Mean of Measured Wait Times * Hour Data Collected	23297	100.0%	0	0.0%	23297	100.0%

### Report

#### Mean of Measured Wait Times

Hour Data Collected	Mean	N	Std. Deviation	Grouped Median	Minimum	Maximum
Morning	14.510	8234	11.8294	11.394	.0	120.0
Afternoon	23.619	7686	15.9957	19.798	.0	130.0
Evening	21.997	7377	15.9090	17.519	.0	117.7
Total	19.886	23297	15.1730	15.541	.0	130.0

**Case Processing Summary**

	Cases					
	Included		Excluded		Total	
	N	Percent	N	Percent	N	Percent
Mean of Measured Wait Times * Day of the Week	23297	100.0%	0	0.0%	23297	100.0%

**Report**

Mean of Measured Wait Times

Day of the Week	Mean	N	Std. Deviation	Grouped Median	Minimum	Maximum
SUN	19.801	2431	14.1253	15.826	.0	110.0
MON	20.595	4249	15.9706	16.171	.0	130.0
TUE	20.719	3653	15.9210	16.483	.0	120.0
WED	19.317	3650	15.1404	15.078	.0	120.0
THU	19.686	3798	15.1541	15.288	.0	120.0
FRI	19.210	3339	14.1275	15.186	.0	120.0
SAT	19.539	2177	14.9549	15.199	.0	105.0
Total	19.886	23297	15.1730	15.541	.0	130.0

## C.7 Descriptive Graphs

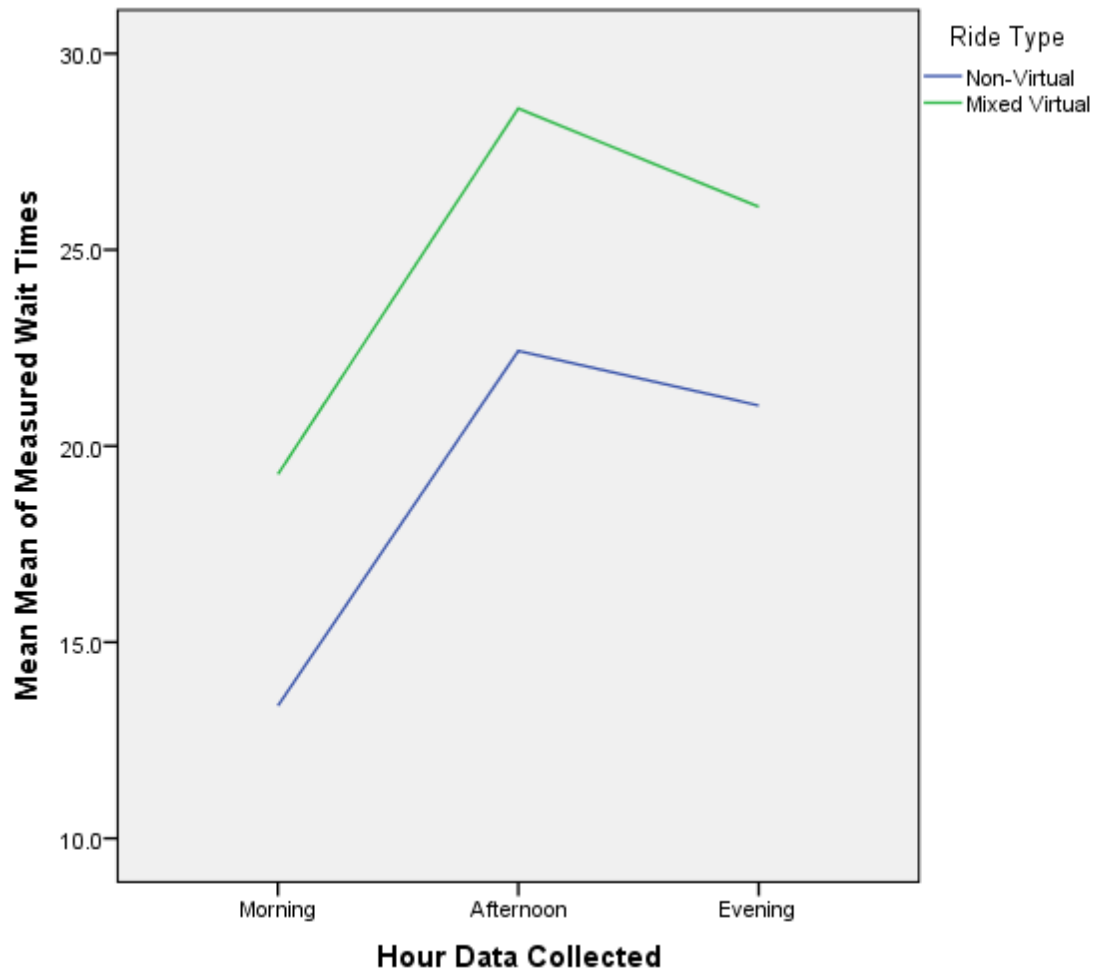


Figure C.7.1: Mean of the Mean Time by Hour and Ride Type

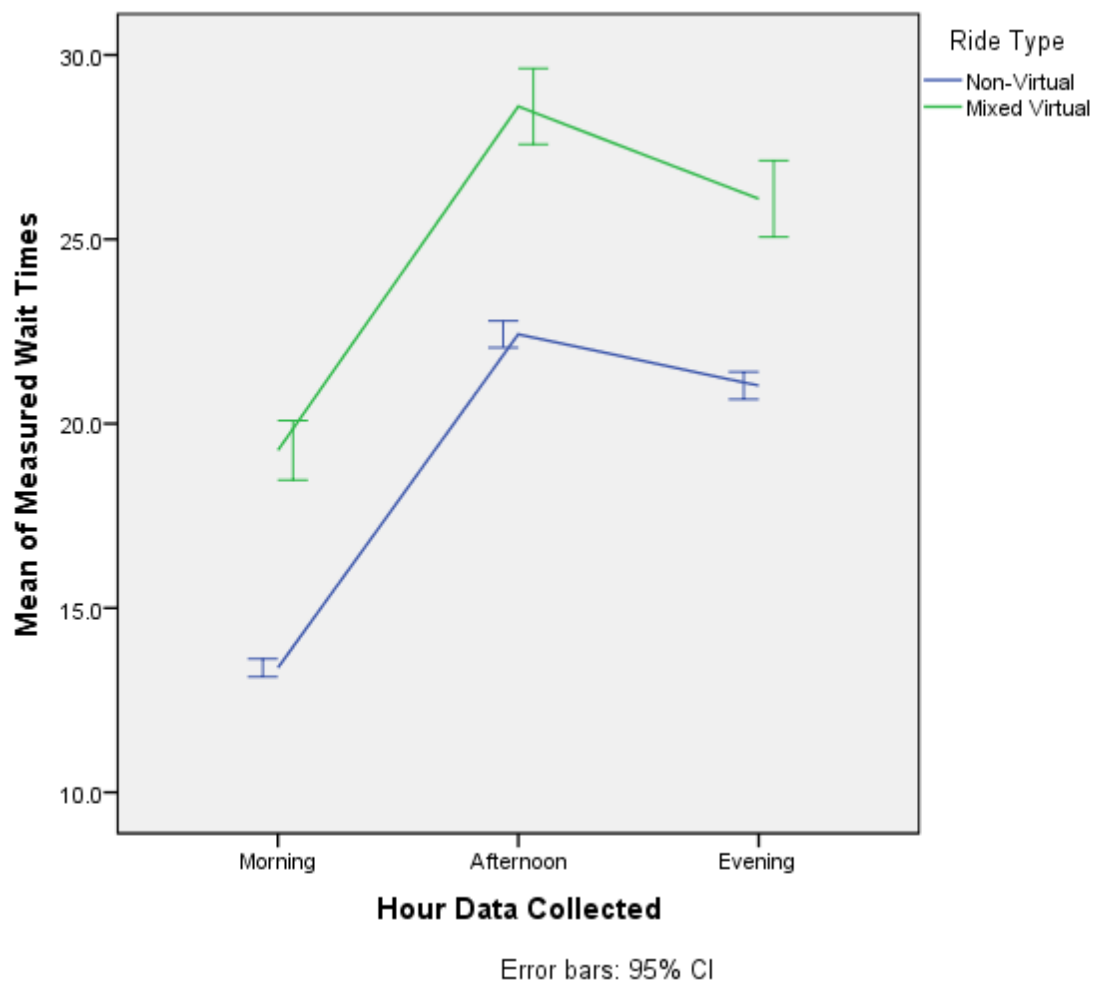


Figure C.7.2: Mean of the Mean Time by Hour and Ride Type with Error Bars



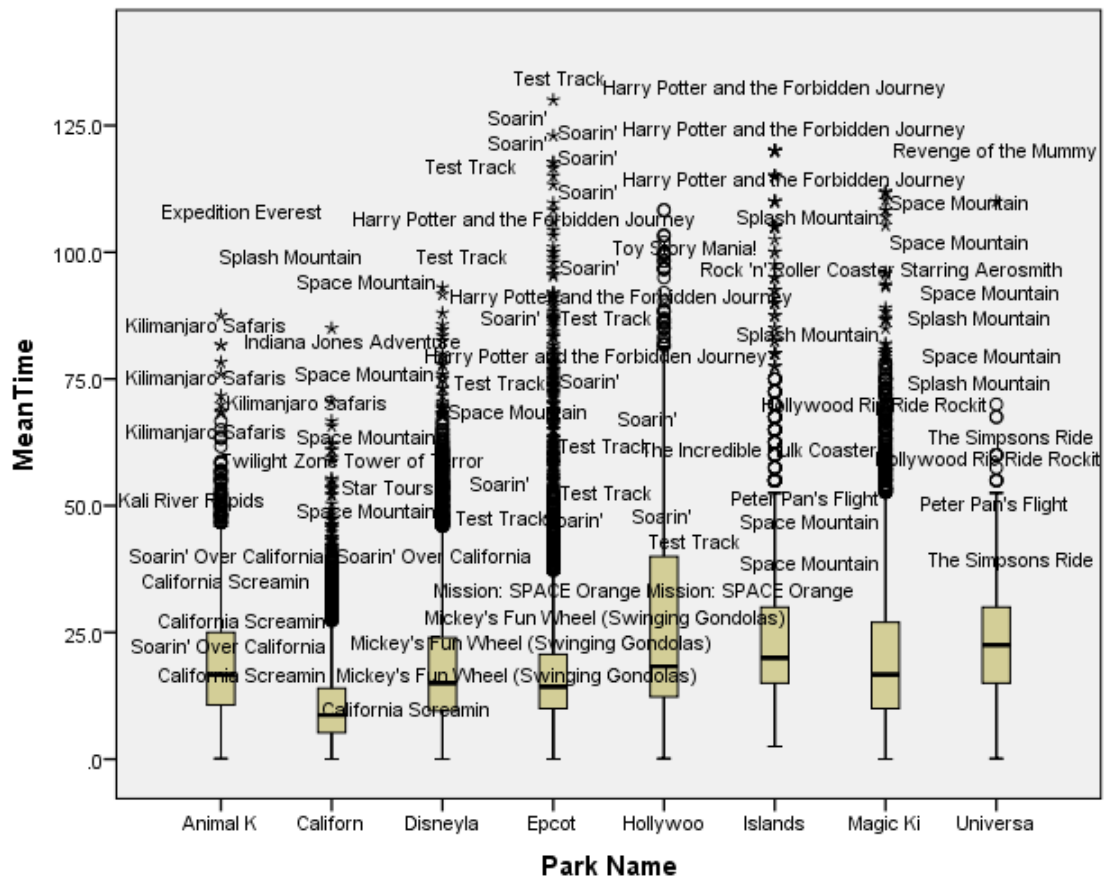


Figure C.7.3: Distribution of Mean Time by Park and Ride Name

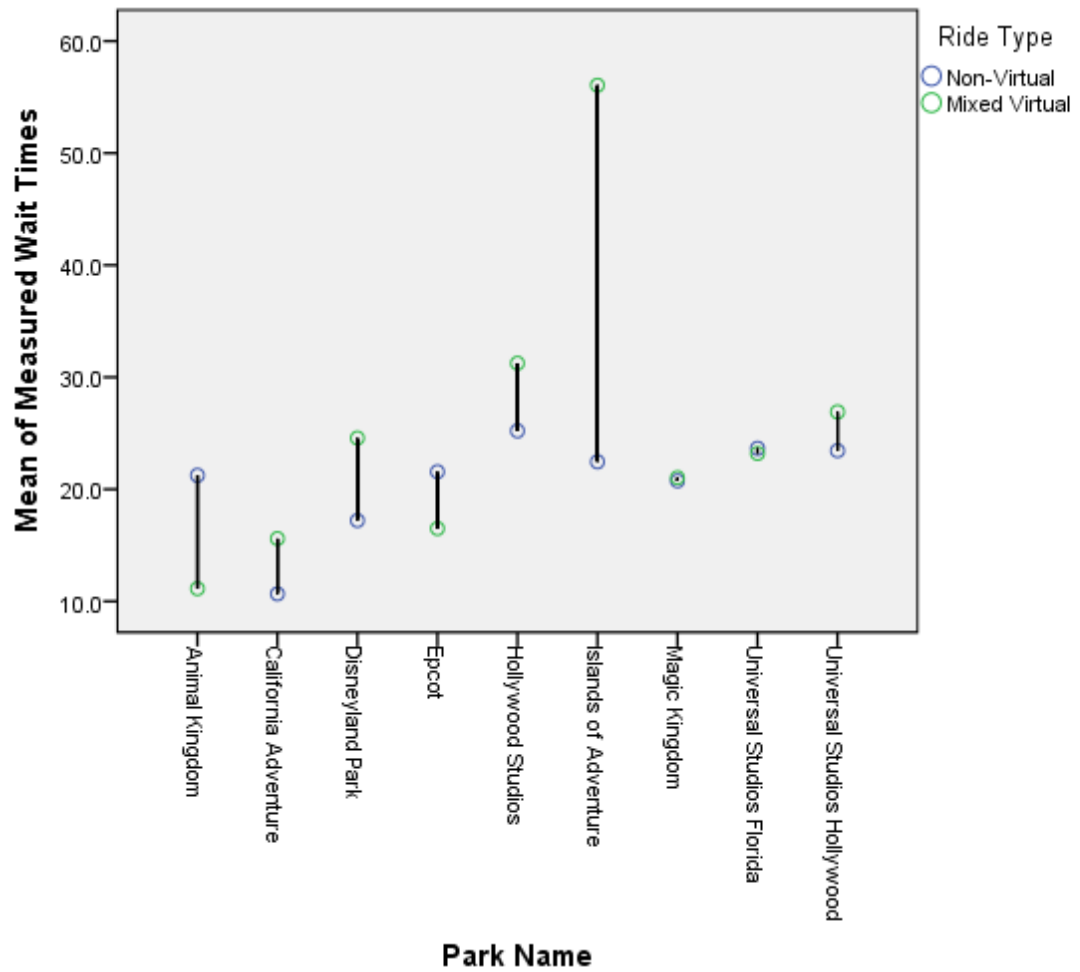


Figure C.7.4: Means of Mean Times of Parks by Ride Type

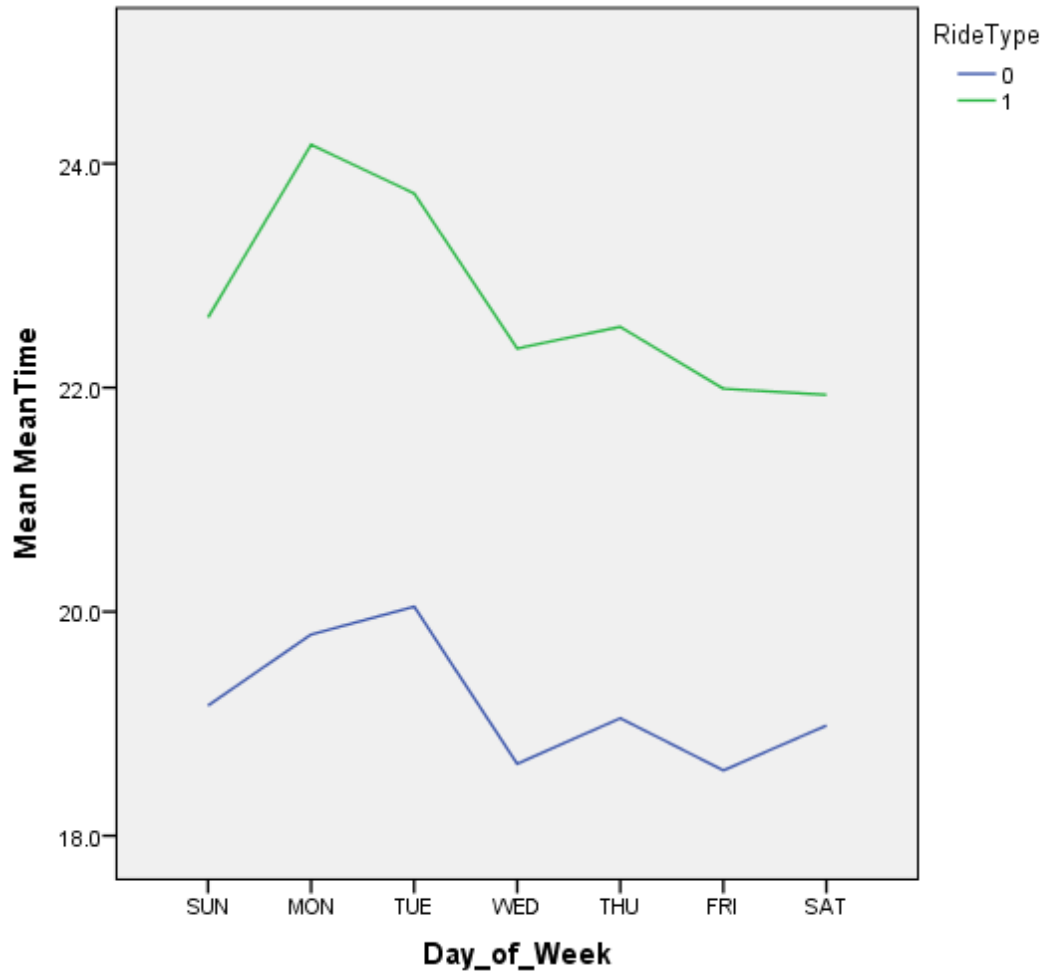


Figure C.7.5: Means of Mean Times for Days of the Week by Ride Type

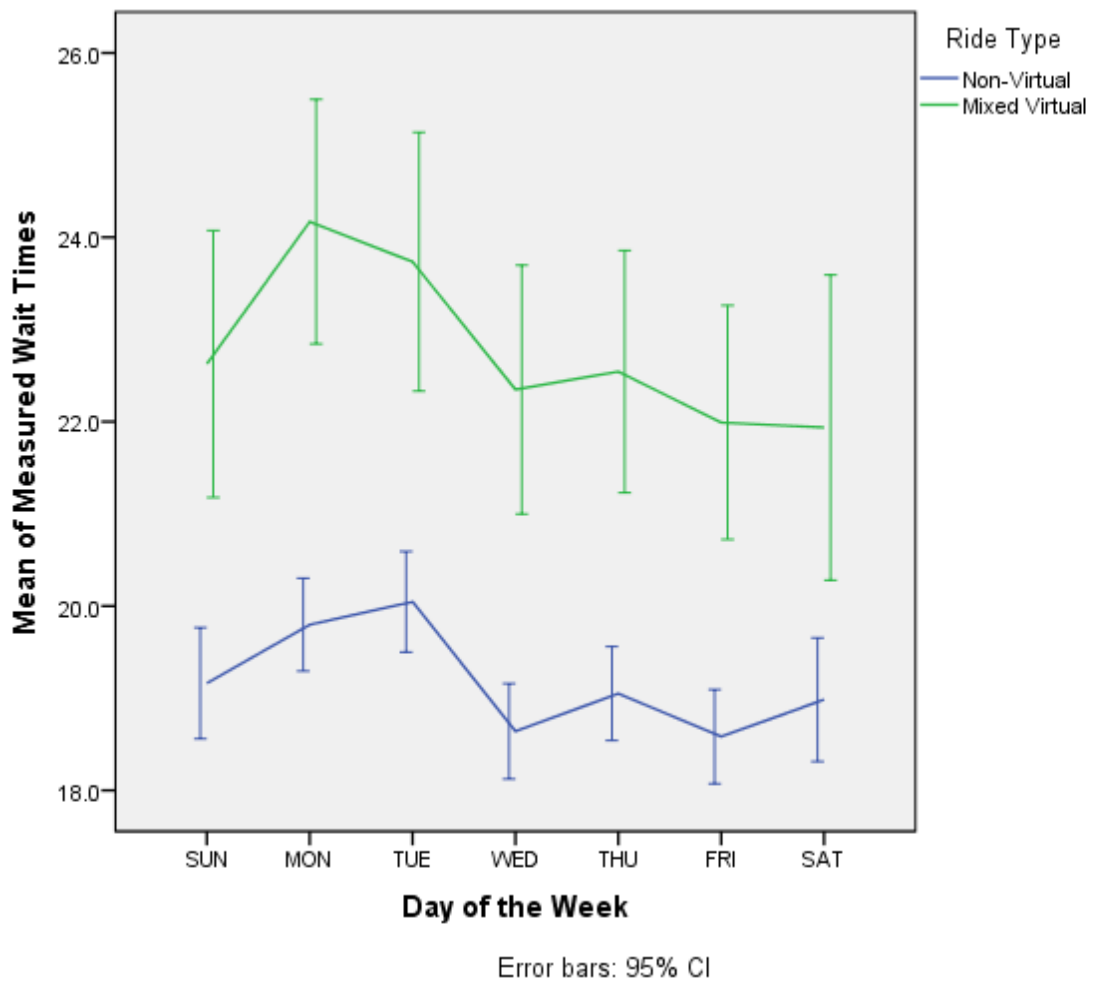


Figure C.7.6: Means of Mean Times for Days of the Week by Ride Type with Error Bars

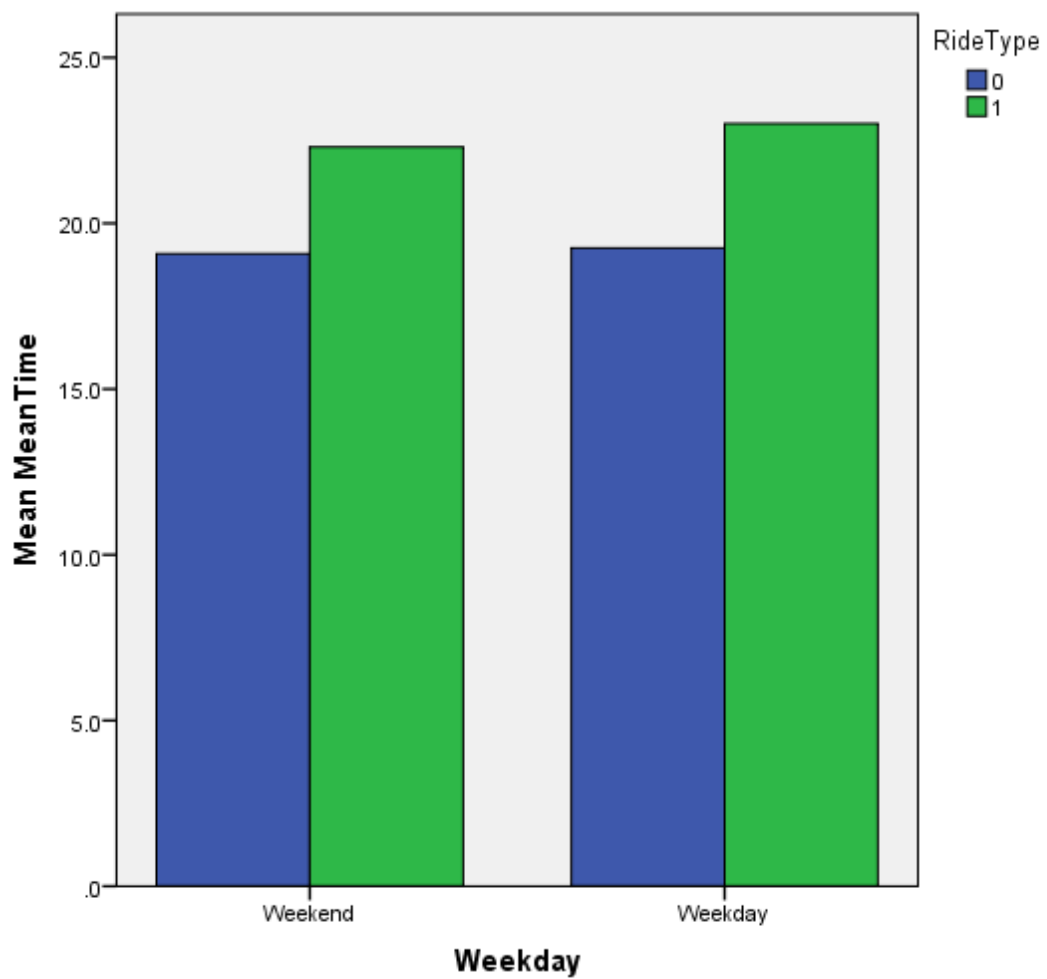


Figure C.7.7: Distribution of Mean Times by Weekday or Weekend and Ride Type

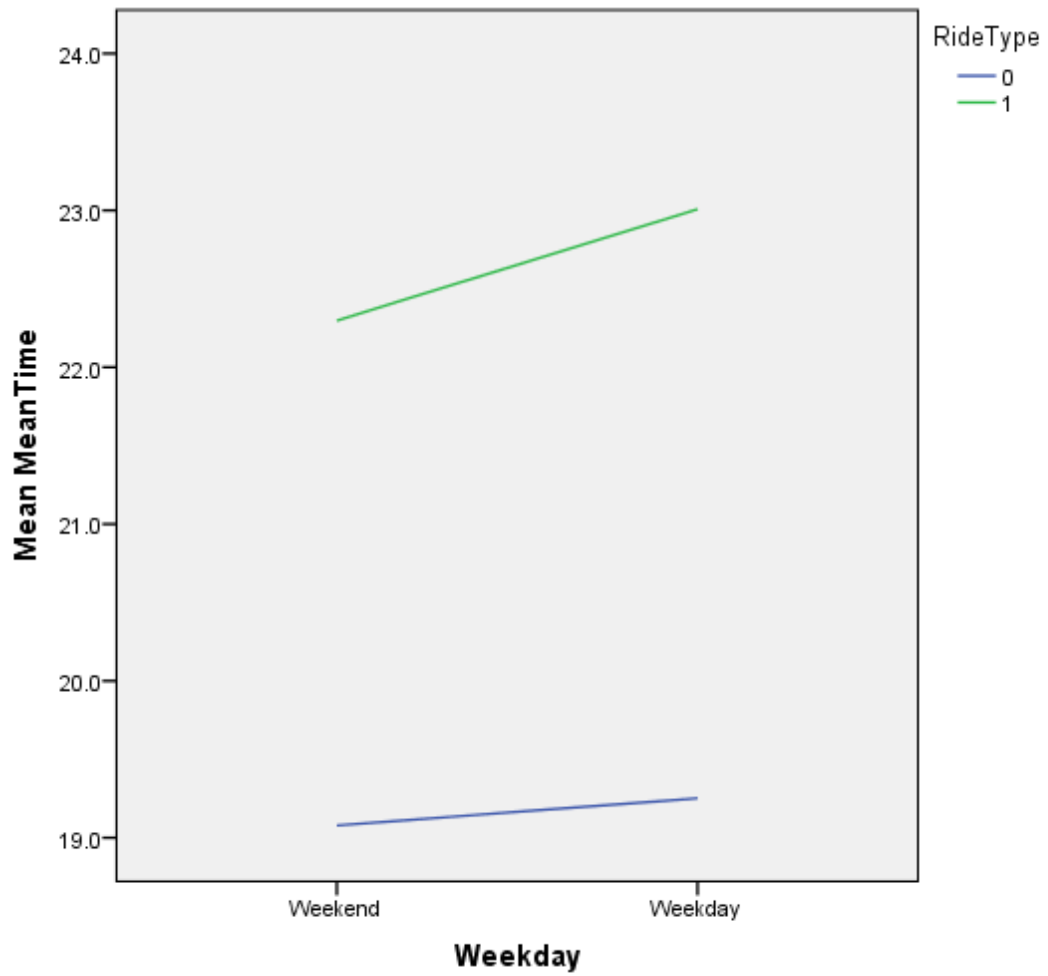


Figure C.7.8: Relationship of Mean Times by Weekday or Weekend and Ride Type

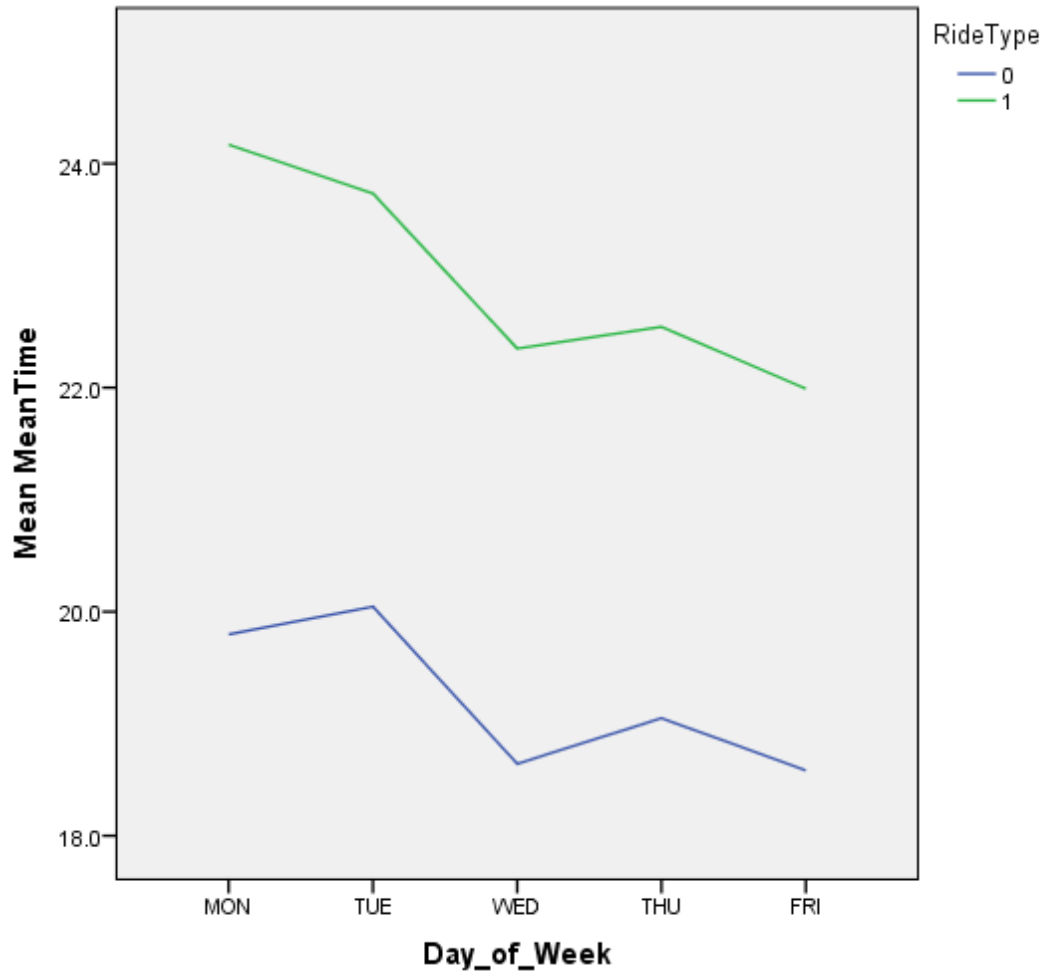


Figure C.7.9: Relationship of Mean Times by Weekday and Ride Type

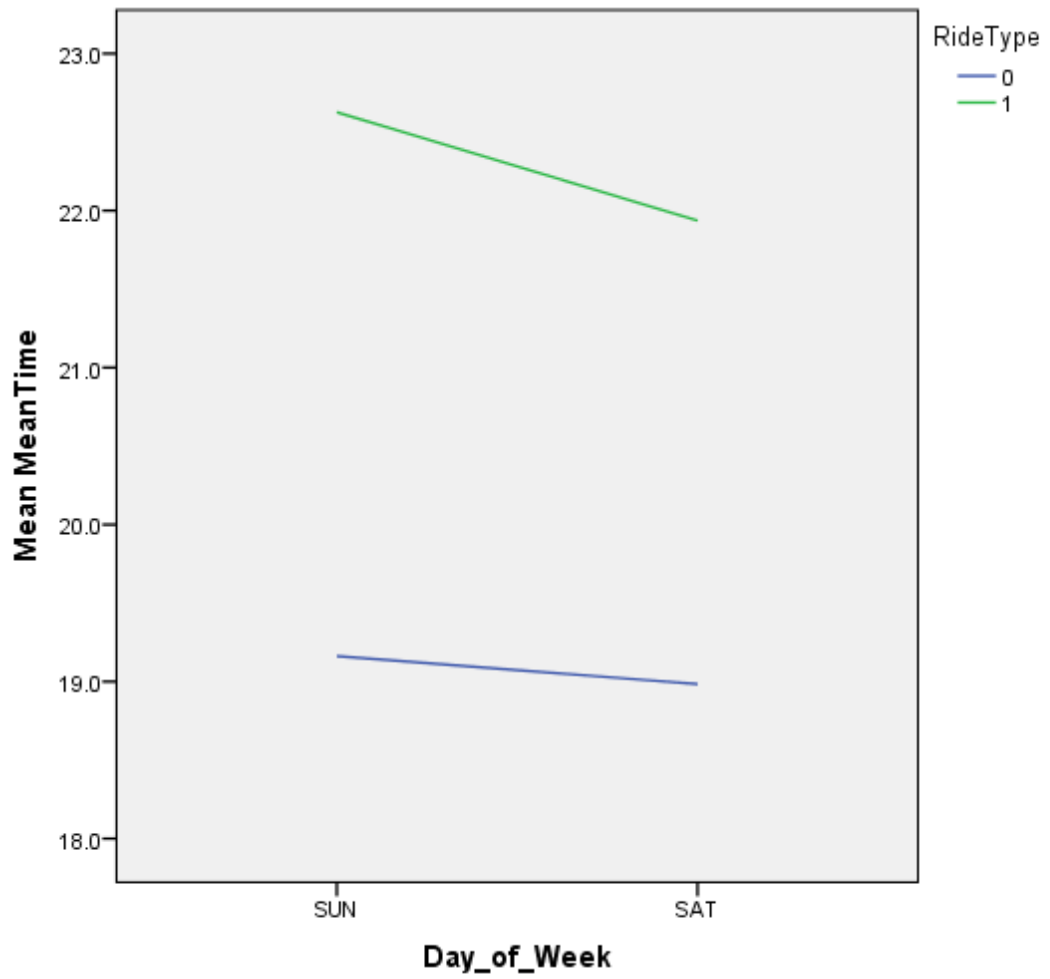


Figure C.7.10: Relationship of Mean Times by Weekend Day and Ride Type



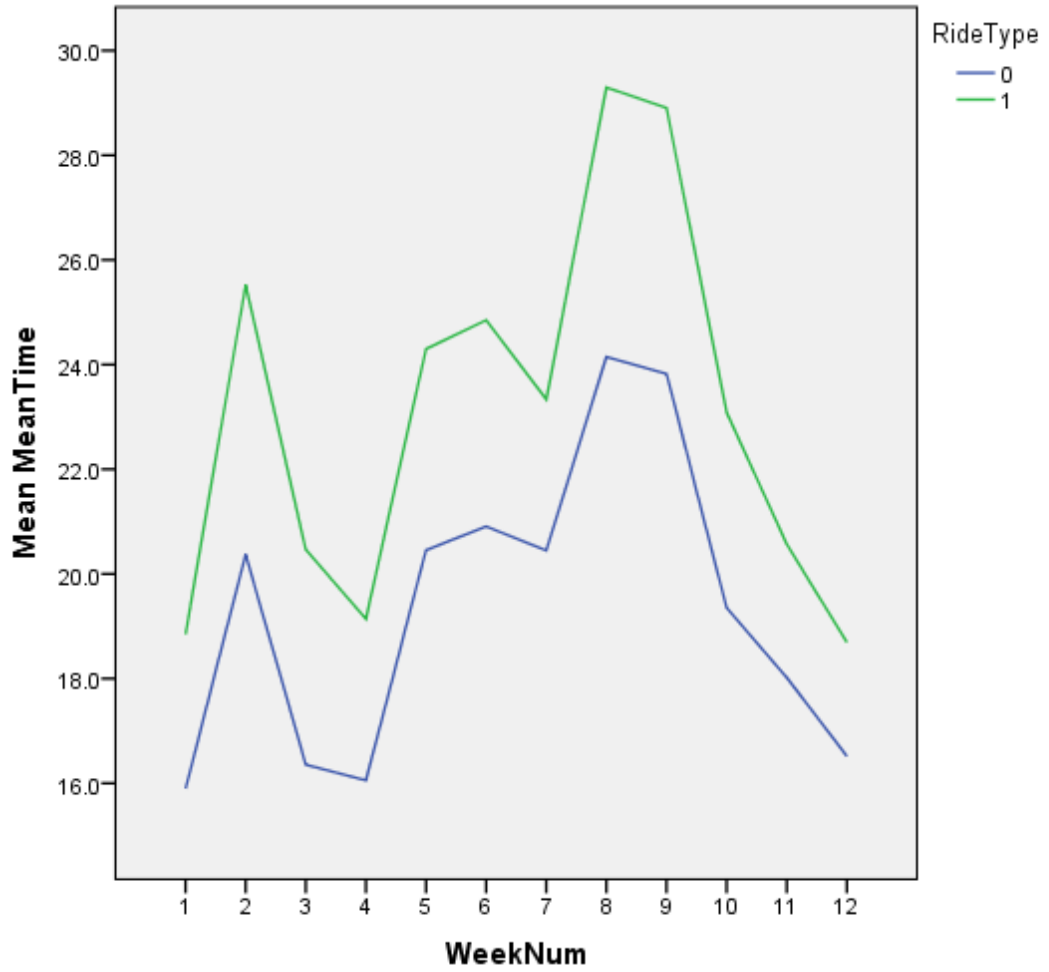


Figure C.7.11: Means of Mean Times for Week Number by Ride Type

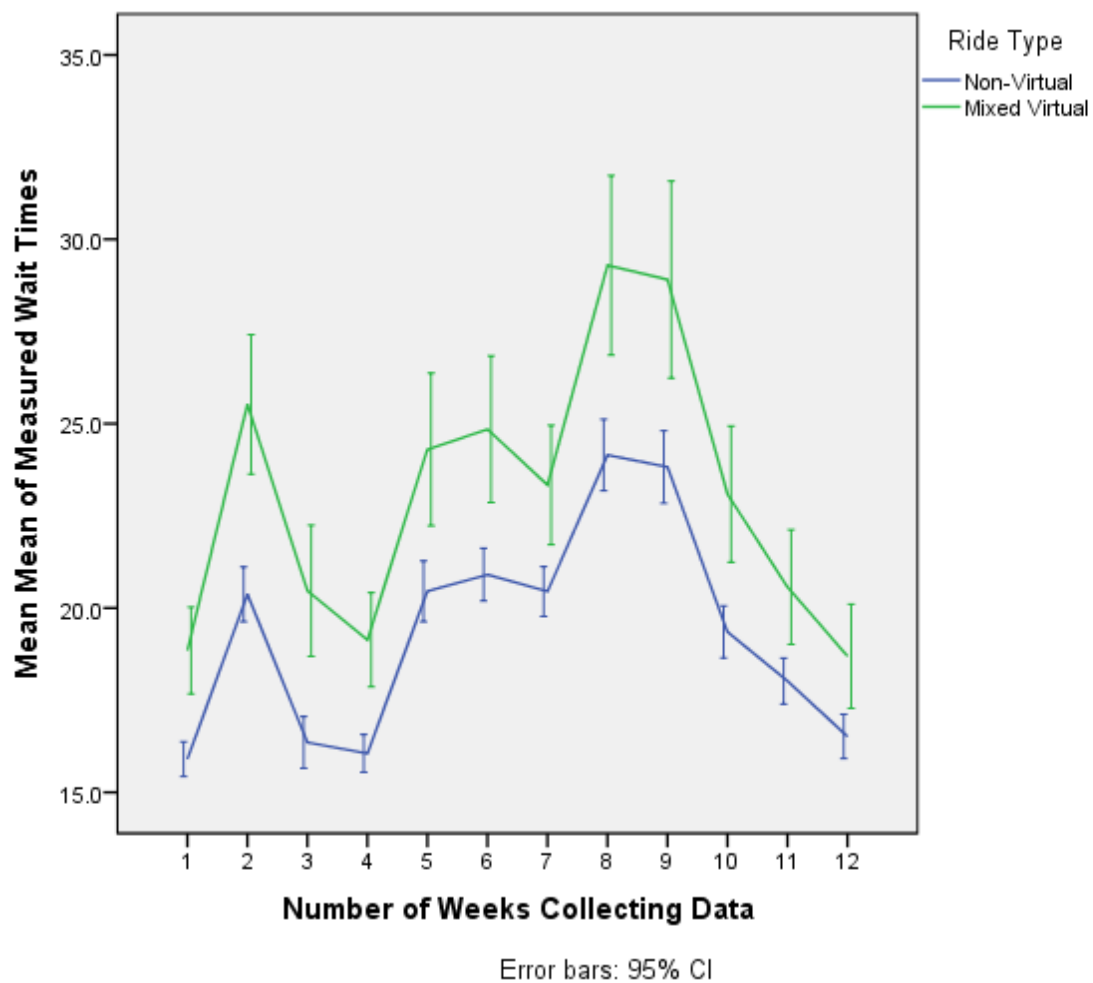


Figure C.7.12: Means of Mean Times for Week Number by Ride Type with Error Bars

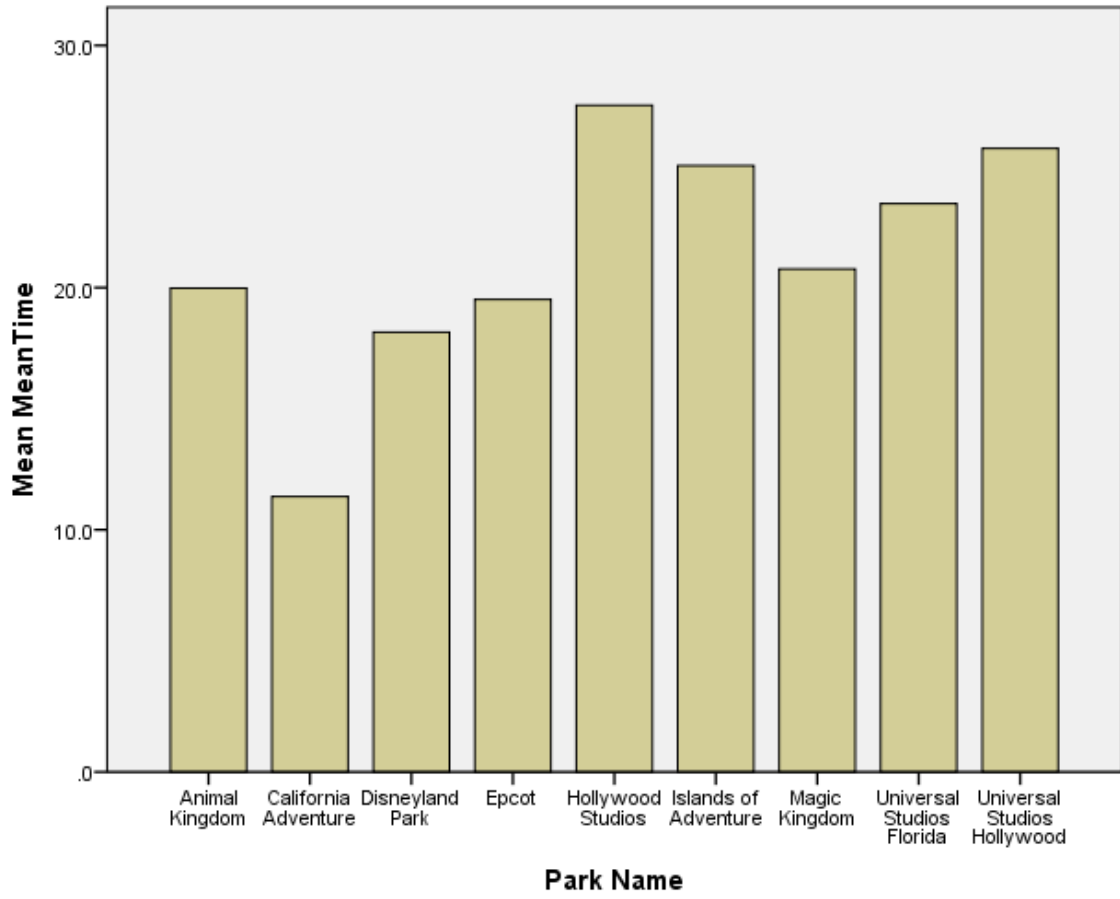


Figure C.7.13: Means of Mean Times of Parks

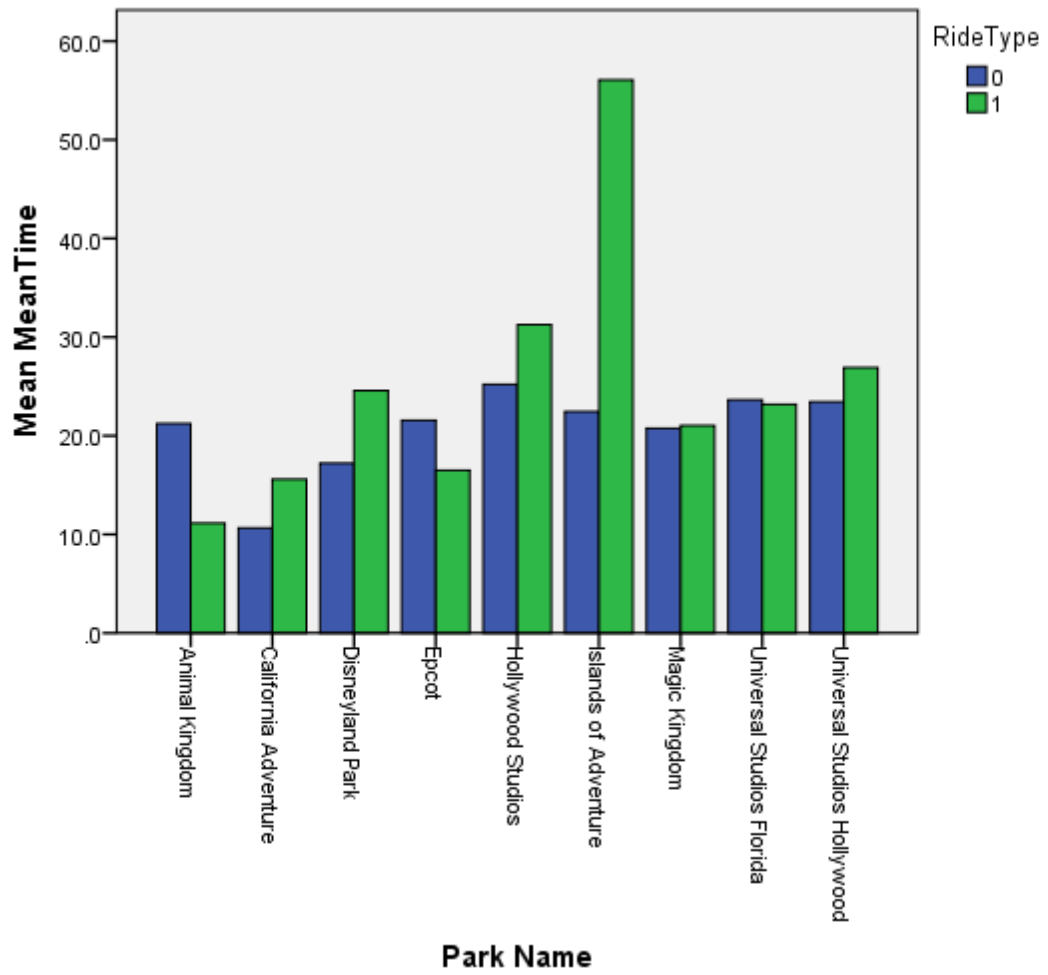


Figure C.7.14: Means of Mean Times of Parks by Ride Type

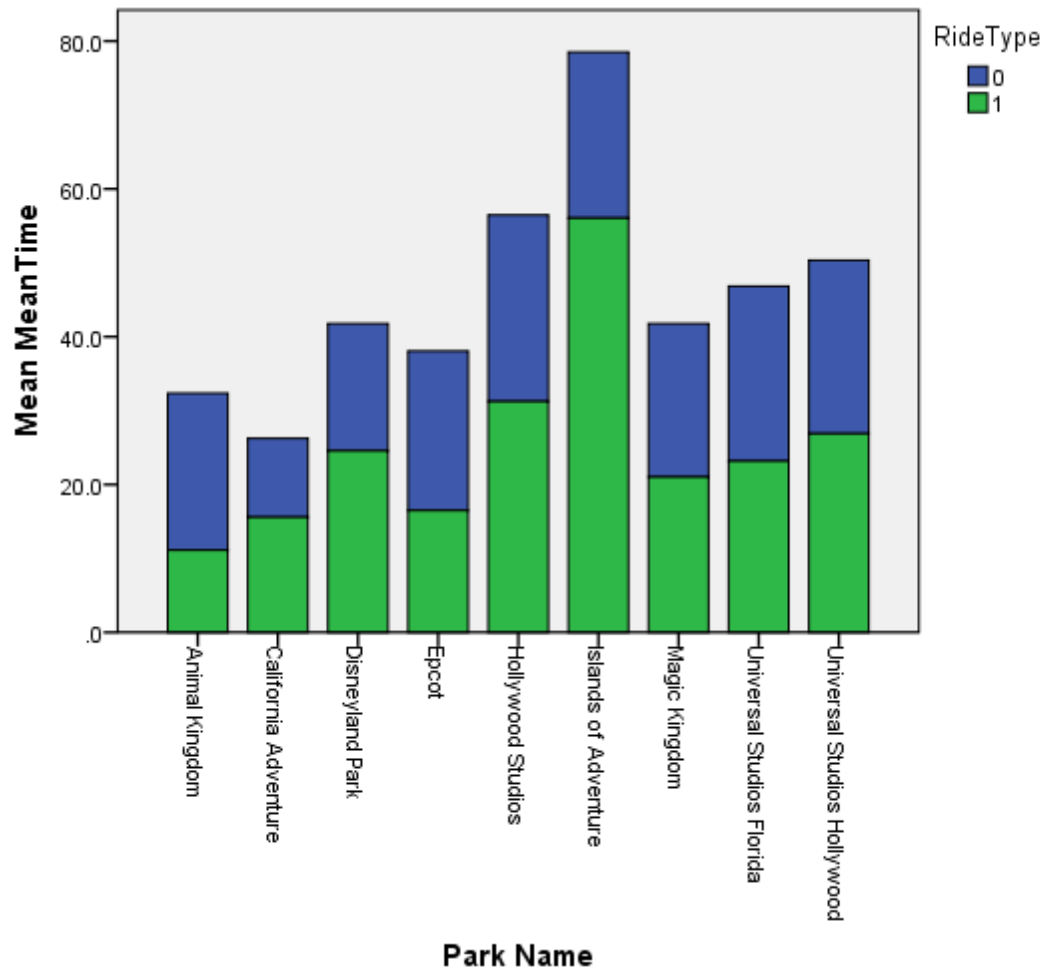


Figure C.7.15: Means of Mean Times of Parks by Ride Type

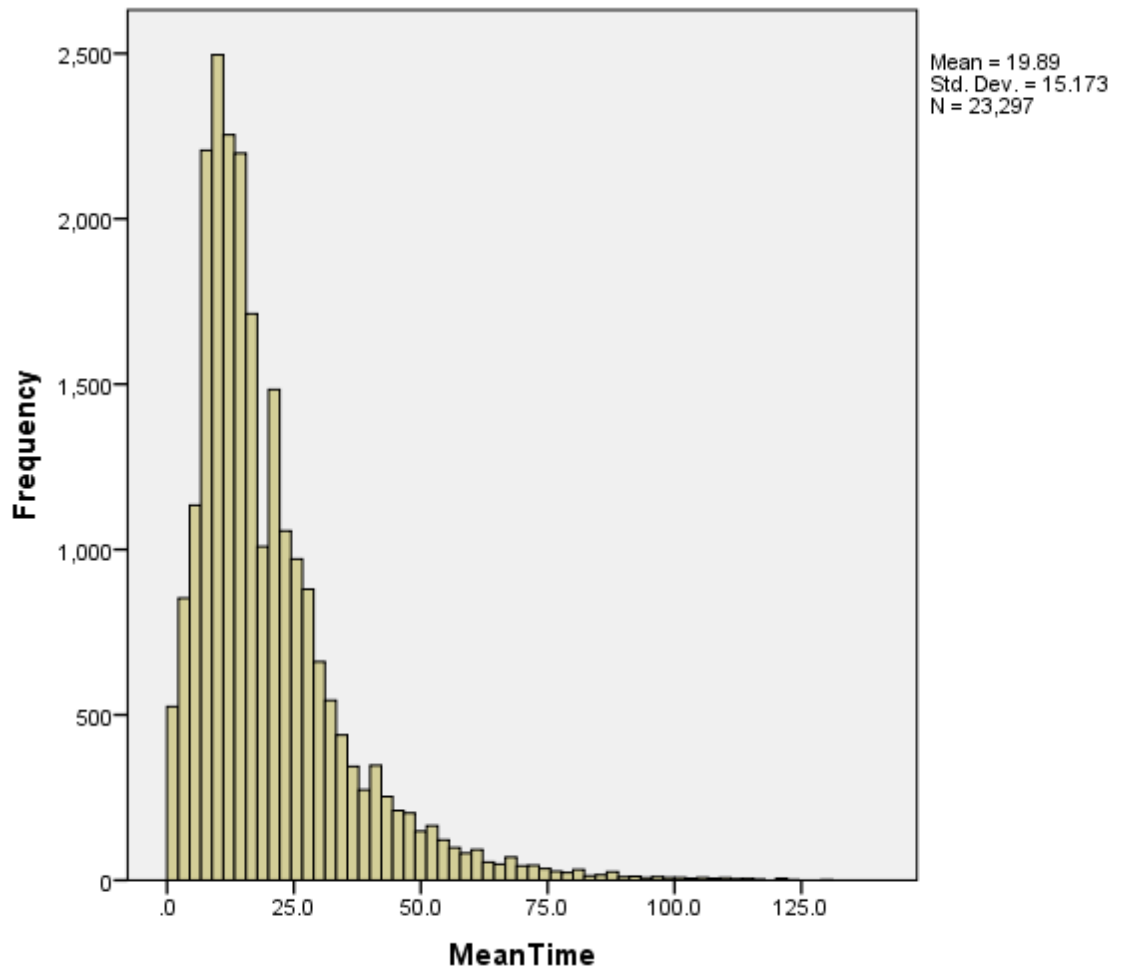


Figure C.7.16: Frequency of Mean Times and Normal Curve

## C.8 – 20 Attractions with Highest and Lowest Wait Times

Times are listed by the Highest or Lowest Data Case for each attraction and not the average of wait times for the attraction from the whole study.

### Attractions with Highest Wait Times

	Attraction Name	Park Name	Wait Time (min.)	Ride Type
1	Test Track	Epcot	130	Mix
2	Soarin'	Epcot	123	Mix
3	Harry Potter and the Forbidden Journey	Islands of Adventure	120	Mix
4	Splash Mountain	Magic Kingdom	112	Non
5	Revenge of the Mummy	Universal Studios Florida	110	Non
6	Twilight Zone Tower of Terror	Hollywood Studios	108.3	Non
7	Space Mountain	Magic Kingdom	108.3	Non
8	Toy Story Midway Mania!	Hollywood Studios	108.3	Mix
9	Rock 'n' Roller Coaster Starring Aerosmith	Hollywood Studios	98.3	Non
10	Splash Mountain	Disneyland Park	93	Non
11	The Incredible Hulk Coaster	Islands of Adventure	92.5	Non
12	Space Mountain	Disneyland Park	88	Non
13	Expedition Everest	Animal Kingdom	87.5	Non
14	Indiana Jones Adventure	Disneyland Park	85.7	Non
15	Twilight Zone Tower of Terror	California Adventure	85	Non
16	Dragon Challenge	Islands of Adventure	82.5	Non
17	Jurassic Park River Adventure	Islands of Adventure	82.5	Non
18	Kali River Rapids	Animal Kingdom	81.7	Non
19	Kilimanjaro Safaris	Animal Kingdom	81.7	Non
20	Star Tours	Disneyland Park	79.3	Mix

### Attractions with Lowest Wait Times

	Attraction Name	Park Name	Wait Time (min.)	Ride Type
1	Main Street Cinema	Disneyland Park	0	Non
2	Tomorrowland Transit Authority People Mover	Magic Kingdom	0	Non
3	Heimlich's Chew Chew Train	California Adventure	0	Non
4	Tuck and Roll's Drive 'Em Buggies	California Adventure	0	Non
5	Disneyland Monorail	Disneyland Park	0.1	Non
6	GranFiesta Tour Starring the Three Caballeros	Epcot	0.1	Non
7	Jurassic Park - The Ride	Universal Studios Hollywood	0.1	Non
8	Revenge of the Mummy – The Ride	Universal Studios Hollywood	0.1	Mix
9	The Simpsons Ride	Universal Studios Hollywood	0.1	Mix
10	Mark Twain Riverboat	Disneyland Park	0.1	Non
11	Studio Backlot Tour	Hollywood Studios	0.1	Non
12	Dumbo the Flying Elephant	Magic Kingdom	0.1	Non
13	Hollywood Rip Ride Rocket	Universal Studios Florida	0.1	Non
14	King Arthur Carrousel	Disneyland Park	0.1	Non
15	Storybook Land Boats	Disneyland Park	0.1	Non
16	Buzz Lightyear Blasters	Disneyland Park	0.1	Mix
17	Big Thunder Mountain Railroad	Disneyland Park	0.1	Non
18	Space Mountain	Disneyland Park	0.1	Non
19	Indiana Jones Adventure	Disneyland Park	0.1	Non
20	Kali River Rapids	Animal Kingdom	0.1	Non