THE ROLE OF USER INTERACTIVITY WITHIN IMMERSIVE SPACES IN THEME PARKS

دور تفاعل المستخدم في الحيزات الاندماجية بالحدائق الترفيهية

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ABSTRACT

This research aims to evaluate the use of interactive techniques within immersive Theme Parks and its relation to the guest's immersive experience through the analysis of data collected from published research papers and articles. The scope of the research was set to include why, how, and when interactive techniques were utilized within currently running immersive Theme Parks located in North America and East Asia. Methodology of research was theoretical, it used a literature review approach by collecting past research data collected from published papers, books, and articles written by experts in the fields of Theme Park design and user experience techniques and published in accredited university journals, Theme Parks professional reviewers and manufacturing companies responsible for interactive techniques, that was then analyzed to reach a valid research conclusion. The findings of the research highlighted, firstly, the importance of the inclusion of interactivity to reach maximum guest immersion, secondly, how it should be done in a careful manner as it could be a positive addition to the space, but it can also break the guest's immersion and connection with the space and thirdly that original immersive Theme Parks like Disneyland didn't utilize virtual interactivity, so not to break the guest's connection with their physical surroundings. Thus, the conclusion reached was that the guest's immersion with their surrounding is the main goal and that interactivity should only be added if it fits the narrative and without breaking it or being heavily dependent on it.

KEYWORDS

Interactive ; Guest Immersion ; Theme Park Design

الملخص

يهدف هذا البحث الي تقييم استخدام تقنيات التفاعل داخل الحدائق الترفيهية الاندماجية وعلاقتها بالتجربة الاندماجية عند الزائر من خلال تحليل المعلومات المجمعة من الأبحاث المنشورة والمقالات. حدود البحث تم تحديدها لتشمل لماذا وكيف ومتى يمكن استخدام تقنيات التفاعل داخل الحدائق الترفيهية القائمة حاليا في أمريكا الشمالية وشرق آسيا. منهجية البحث كانت نظرية وتم استخدام نهج مراجعة الادبيات عن طريق تجميع معلومات بحثية سابقة مجمعة من ابحاث وكتب ومقالات منشورة من قبل خبراء في مجالات تصميمات الحدائق الترفيهية وتقنيات تجربة المستخدم والتي تم نشرها في المجلات الجامعية المعتمدة والناقدين المحترفين في مجال الحدائق الترفيهية والشركات المصنعة لتقنيات التجارب التفاعلية ثم تم تحليلها للوصول لاستنتاج صحيح للبحث. نتائج البحث أوضحت، أولا، أهمية وجود التفاعل للوصول لأكبر قدر من الاندماج للزائر، ثانيا، ضرورة الحرص في تطبيق الاندماج لإنه كما يمكن ان يكون إضافة ايجابية للحيز، من الممكن أيضا أن يكسر حالة اندماج الزائر وترابطه بالحيز وثالثا ان الحدائق الترفيهية الاندماجية الاصلية مثل ديزني لاند لم تشمل في حيزاتهم تفاعل افتراضي، حتى لا يتكسر ارتباط الزائر بالبيئة المحيطة الملموسة. وصولا للمستنتج من البحث ان اندماج الزائر في الحيزات المحيطة هو الهدف الأساسي وان التفاعل يجب إضافته فقط بطريقة تناسب السرد بدون أن يكسره، او أن يعتمد عليه الحيز بشكل كبير.

الكلمات المفتاحية

تفاعلي؛ اندماج الزائر ؛ تصميم الحدائق الترفيهية

1. INTRODUCTION

In the past 80 years, the rate of technological advancement was unprecedented, affecting all other industries consecutively. One of which is the Theme Park Industry, which with time encompassed hundreds of different disciplines and fields within it, resulting in the need to use the latest advancement in all of them, and sometimes even the park designers would need to invent or advance a material or technology for a specific use.

The rapid development in the field of Theme Park design and technology, created a common misconception concerning the relation between Interactivity and Immersion, thinking that they are one and the same, when in reality one can easily exist without the other. A space can be immersive without any use of interactive techniques simply by use of design elements and principles to create an Immersive space. On the other hand, it can be a completely interactive space, full of interactive elements and techniques, and not be immersive at all, focusing on entertaining the guests making them feel somewhere else for a short while, rather than connecting them to the space.

Research Goal is to increase knowledge about the use of interactivity within immersive Theme Parks by evaluating current used techniques and their effect on the immersive experience, to conclude whether using interactive techniques will enhance the guests' overall immersive experience or break it.

Research Scope targeted existing immersive Theme Parks located in North America and East Asia built in the last 70 years given that Disneyland and Disney World started Theme Park immersion , and as they gained popularity and a constant increase in their number of guests, they created the Asian versions of the parks, which then resulted in parts of the parks being copied as is and other parts were enhanced to include more interactivity, so both were needed to be studied to be compared and the differences analyzed and same with Universal Experiences which pretty much did the same as Disney. Also, some examples of purely interactive parks were researched to the techniques they utilized to understand their effect on the user's experience.

Research Methodology, a theoretical literature review was used to collect as much data - old and new - as possible to be able to compare the different educated and professional opinions on the subject, by collecting data from past research papers, books, and website articles that discussed interactivity and immersion and their relation to Theme Parks, then all data was analyzed and evaluated using thematic coding by categorizing the different types of interactive techniques to show in detail each techniques effect on the guests immersive experience within Theme Parks.

2. THEME PARKS

A Theme Park is defined by Merriam Webster as "an amusement park in which the structures and settings are based on a central theme," this was after Walt Disney opened Disneyland in 1955. But it is important to note that Theme Parks did exist before Disneyland, they just weren't as grand nor as immersive. Walt Disney's goal of creating a magical place only got achieved through the incredible amount of detailing and creativity that was put in the design. He created a new discipline in the Theme Parks industry called "Imagineering", making Disneyland designers "Imagineers", because not only do they have the 'Imagination' of artists, but also the know-how of 'Engineers'.

As put by John Hench about Theme Park design, "Our approach to designing themed environments in which every element contributes to tell stories derives mainly from cinema and theater, with this crucial difference: theme-park design is a three-dimensional storytelling art that places guests in the story environment." (Hench, 2003)

What made Theme Parks popular since they were first created was the "spectacle" they offered, something different than what their normal everyday lives would provide. They offered curious, dramatic, amazing, and shocking events to draw people in, and experience and witness these events up-close (Weinstein, 1992). For example, making Sleeping Beauty's castle as the park's entrance, made the guests know that, as they are stepping in the park, they are indeed going to have a special experience, see Figure 1. To this very day, Theme Park designers think the same way, but it became much more with the constant development of technologies and techniques. Now, there are huge advancements in immersion and interactivity techniques to ensure that the guest would have a unique experience even if they repeat it. The experience can never be the same, ensuring that the guests will always want to return.

2.1. Amusement Park Vs Theme Park

Most people confuse Amusement Parks with Theme Parks, not knowing that there's a very big difference between them, as explained by Arch. Christina Harris: "The term 'Amusement Park' means 'a place to be amused' whereas a 'Theme Park' means 'a place for stories. Generally, an Amusement Park has little or no theme and is simply a collection of rides, while a Theme Park is like a three-dimensional story, and its guests are active participants in the narrative." (Harris, 2002)

Amusement Parks are known to focus on high thrill rides and extreme coasters resulting in what's often referred to among designers as "steel parks", See Figure 2, because they rarely focus on story beyond the ride itself, only highlighting whatever can bring excitement to the guests. On the other hand, Theme Parks do want to entertain the guests, but within a theme or a story. So, they would hide the mechanics and anything relating to real life behind theme-appropriate elements, buildings, or facades. (Kischuk, 2008) For example, Disney Park's Main Street being designed in colonial style yet perfected so guests feel like they've entered a good version of the past, See Figure 3.

Both types of parks can benefit from the addition of Interactivity to their rides, but since Amusement Parks usually don't put much effort in their themes and characters, the guests may not be so excited to understand the narrative since they neither know, understand, nor are connected emotionally to the story they are supposed to interact with. As Designer Kirsten Kischuk explains, Theme Parks offer more to the guest, "Theme Parks present the guest with a narrative that they can participate in, and thus it makes sense to consider how interactivity might contribute to the guest's experience of the story."

Figure 2, Disneyland Florida - Sleeping Beauty Castle as Parks Entrance (Disneyland.disney.go.com)

Figure 2, Six Flags Magic Mountain Amusement Park, LA, California (Sixflags.com)

Figure 3, 20th Century Music Company, Disneylands Main Street, LA , California (Disneyland.disney.go.com)

2.2. Story, Storytelling and Narrative

Within Theme Park design, the story, storytelling, narrative, and even concept are almost synonyms with each other, with minimal differences between them. But they all revolve around the same point around which the theme will be based.

Story:

Story can be defined in so many ways depending on how it's going to be used. Objectively it's a way of organizing information and sharing it with others (Fiore & McDaniel, 2006), while poetically, it's the purposeful construction of data designed to evoke emotions (Jose & Brewer, 1984). Then there's the pragmatic explanation to the story, which describes it as a series of events, connected and presented by an author or a narrator (Worth, 2004)

Within Theme Parks, a Story can be used in all the fore-mentioned ways. A Story can help the guests understand the narrative of the attraction, evoke their emotions, help them get through the experience, and connect the guests to the events happening to and around them.

Storytelling:

"People will only remember the great times they had at a Theme Park if you offer storytelling attractions; they touch people's emotions." Bart Dohmen of BRC Imagination Arts, quoted by Juliana Koranteng (Koranteng, 2005, July 5). Further explaining that in order for an attraction with a story to resonate emotionally with the guest, it will depend on how it's going to be told.

Differentiating Story from Storytelling, Story being the info shared with the guest and the Storytelling is how that info is being shared, and to what scale is it going to affect the design and the environment around the guest within the park or attractions.

Narrative:

Considered as the wider scope of the Story that would give the sense of the environment revolving around it, giving it more context so the guest would be more able to get immersed within it. (Hench, 2003) Narrative for Theme Park designers can act like a concept would for any other type of design, since it would hold the larger picture making it the go-to for every design decision surrounding the design.

2.3. Attractions

The term 'Attractions' was first used within Theme Parks after the creation of Disneyland in 1955, after people kept saying the experience's name without being followed by 'ride'. Designers then knew that guests saw and felt a difference between the average Amusement Park rides, and what Walt Disney had done. So, designers decided to remove the word 'ride', and only used 'attraction', 'experience', and 'adventure' to describe the experience the guest is going to get. Explained by Marty Sklar at (Janzen & Janzen)

Even though the use of the word attractions started after the creation of Disneyland in 1955, the use of theming or narrative as the driving force for design started much earlier in the 1900s by LaMarcus Adna Thompson. He became known as the first to design an enclosed ride with surrounding building walls, so he could control lights, sounds, environment, climate, and set pieces, being the start of what we know now as "Dark Rides" (Brown, 2002)

Classic Dark Rides are known to be the ones enclosed within a defined space. But in reality, if the whole park or land is designed within one scope, theme, and design, that would make even the

open-air areas indoor attractions because of the level of detailing that the designers would need to accomplish, but with one difference, being the exclusion of the ceiling and having the light changing with the time of day. But everything else would be controlled like it would in a regular dark ride.

3. IMMERSION

Immersion describes the merge between attention, flow and many other components that yet need to be further explored, and because of its complex nature, it was only used to describe electronic interactions, whether to describe guests playing video games or VR experiences. Because that's their main appeal, immersing the guest in another world whether on a computer screen, or on a wearable one.

But lately, it has been used to describe physical experiences where the guest doesn't need electronic devices to get immersed, but instead, they would have architecture and interior elements recreated from an already familiar narrative that they want to see themselves in. "The pleasures of immersion stem from our being completely absorbed within the ebb and flow of a familiar narrative schema." (Douglas & Hargadon, 2000)

An important aspect of Immersion is "Flow", which is introduced by theorist Csikszentmihalyi describing it to be "a state of maximum enjoyment and absorption in a task". From this, we reach the conclusion that the merge between immersion and story-based theme parks would create a unique experience to the guests, where each guest is their own main character in their own story.

Table 1, How immersion is achieved using technology and how the same aspects can be used to achieve immersion in physical spaces (Sherry, 2004)

Technological Immersion	Physical Space Immersion
The guests should know the goals and rules to be followed before starting the experience.	Using Pre-shows and Exterior Design to inform the guests about the narrative of the experience to recollect on memories and knowledge.
The tasks/actions needed from the guest shouldn't be too simple and uninteresting, nor too difficult that they get frustrated and are unable to complete the challenge.	The space and the interactive elements (if there's any) shouldn't need much explanation and should add to the excitement.
The feedback of the guests' actions and how far they are from the goal should be clear.	The space or the device should make it clear for the guests if their interaction is being received and how far they are from the absolute goal.
The narrative and the action taken should be the only things the guest can focus on without distraction from unrelated nearby elements.	As long as there's action to be taken the guest should be immersed in the interaction needed to be done and not the non-themed distractions.

3.1.Immersive Spaces

Expanding on John Hench's approach to what Theme Parks truly are, it is clear that Theme Parks aim to immerse the guests in them as if they had stepped into a movie screen, and the characters

in the movie are not only interacting with the guests, but they acknowledge them as characters as well. Then, the guest is no longer just a spectator, but now they are in the middle of the action. (Kischuk, 2008)

Whether it's open-air or indoor spaces, the same immersion techniques could be applied with only one difference being the full-control an indoor space would offer. One of those techniques is interactivity. If done right, interactive elements can enhance the guest's immersion within a space because it adds to the already required sense of being involved in the action. But if done incorrectly, without putting the narrative into consideration when designing, it completely shatters the guest's immersion

A great example of immersive spaces is the Wizarding World of Harry Potter at Universal Orlando Resort which consists of two lands, Universal Orlando Resort – Hogsmeade, located in Universal Islands of Adventure, and Diagon Alley in Universal Studios Florida. Both lands were able to achieve immersion in indoor and outdoor spaces alike, seeing that their main defining factor in design is the movies, so the main concern and challenge was about making a livable movie set where the special effects done in movie are real effects the guests can see and feel. See Figure 4 for Outdoor Immersive experience offering the guests a real shopping experience in Diagon Alley and Figure 5 for Indoor Immersive experience offering a dining experience in the Leaky Cauldron. (Weinrich, 2019)

3.2. Immersive Experience

Immersive spaces in general can hold more than one immersive experience, and as the guest moves through the space, the sense that they have been transported somewhere else is intensified, making the guest forget the outside world completely, only focusing on the story they have become a part of. (Prince, 2019)

Immersive Experiences or attractions depend on heightening all the guests' senses. From the sight, making sure that everything the guest could see holds truth to the story, or to the taste of food and drinks they have only seen on screen imagining what they taste like, and much more.

(Craft Memorable Experiences with These 9 Theme Park Ideas, 2024)

A major technique to immerse the guest further in the experience is letting them take consequential actions while seeing the results of their choices. This makes them feel emotionally connected with their surroundings, which could be achieved through Interactivity.

All of the forementioned techniques was achieved recently in a number of Theme Park lands, whether it's in Disney, Universal, or Legoland, See Figures 6 & 7. Disney, holding the IP

Figure 4, Outdoor Immersive Space – Diagon Alley, in the Wizarding World of Harry Potter – Orlando, Florida (blog.discoveruniversal.com)

Figure 5, Indoor Immersive Space – The Leaky Cauldron, in the Wizarding World of Harry Potter – Orlando, Florida (blog.discoveruniversal.com)

Figure 6, Smugglers Run Attraction in Star Wars: Galaxy's Edge at Disney's Hollywood Studios – Orlando, Florida (www.disneyworld.eu)

Figure 7, Lego Pirate Playground at Legoland Resort – Germany (www.legoland.de)

(Intellectual Property) of their own animated movies, Marvel and Starwars, have a strong variety of options for lands and attractions, while Universal contains Minions and Spiderman attractions in addition to the Wizarding World of Harry Potter's two Lands, with two more lands opening next May, are becoming a strong competition to Disney's IPs. And then there's Legoland, which is a whole park of Lego themed exteriors, interiors, and experiences.

4. INTERACTIVITY

Due to the various uses of the word Interactivity, and its involvement in all types of scientific fields, it was defined more than once depending on the meaning it delivered within the scope of the discussed subject.

It is commonly defined as a communicative cycle between two entities. Because however it was put, it always discussed a model of communication involving an action and a reaction from both sides. This created the need to understand the different perspective on the definition as collected by (Kischuk, 2008)

Table 2, Variety of Interactivity definitions (Kischuk, 2008)

Author	Definition
(Crawford, 2005)	Interactivity is "a cyclic process between two or more active agents in which each agent alternatively listens, thinks, and speaks." (p. 29)
(Downes & McMillan, 2000)	"2000 Interactivity depends on different dimensions. For example, interactivity increases as participants find communication to be responsive." (p. 173)
(Jensen, 1998)	Interactivity is "a measure of media's potential ability to let the user exert influence on the content and/or form of the mediated communication." (p. 201)
(Kiousis, 2002)	Interactivity involves three factors: technological structure of the media, characteristics of communication settings, and the individuals' perceptions. (p. 379)
(Liu-Thompkins & Shrum, 2002)	Interactivity is: "The degree to which two or more communication parties can act on each other, on the communication medium, and on the messages..." (p. 54)
(Murray, Bogost, Mateas, & Nitsche, 2007)	Interactive "…environments must be meaningfully responsive to user input." (p. 42)

After understanding how the different researchers and designers thought about interactivity, it's important to acknowledge its significance in design. Interactivity can create the sense of involvement, if the guest is able to interact with their environment, they will feel in control, and then the sense of exploration and excitement will be heightened, making them want to see and do more. Then when time is not enough, they will want to come back, which means they are now emotionally invested, and the space will have an everlasting effect on them.

4.1. Interactivity History

Even if they didn't know that it will be called interactivity, or that it will be a defining factor in immersive Theme Parks, early Theme Park designers knew that they needed the rides to have a sense of participation for the guests. It didn't need to be a real participation, a simulated feeling of self-direction, control, and choice of movement makes for the best experiences. (Marling, 1998) Thus, making the guest a character in the story and a participant in the action happening around them.

4.2.Interactive Spaces

Interactive Spaces hold a number of interactive experiences so the guest can move from one action to the other to create a change and for the experience to progress (Prince, 2019)

In the past, Interactive experiences were simple point and shoot games found in theme and amusement parks in large numbers, because it was the strongest way to get the guest to be a participant in the action. Later on, with the rise of technology, it became more screen related with video and arcade games, until video games were found in almost all the homes across the world, making their presence in theme parks less exciting. Consequently, an upgrade was required, starting from VR rides and AR attractions, (Kischuk, 2008) which raised the question: is using interactivity within the Theme Park now a goal? Or should it only be a tool?

Within Theme Park borders, adults and children are expected to feel the same excitement and enjoyment because of a multitude of reasons. Starting from the goal they were created for by Walt Disney in the first place, "having a place where all the family could enjoy themselves together" (WaltDisney), which made Disneyland feel like an upgraded form of life, where everything is better and magical, making the adults feel lighter, completely forgetting real life problems. It helps them return to when life was simple, in other words it makes them feel like kids again, so now they can enjoy the park with everything it holds like a kid would, seeing a new place that they just want to explore and enjoy all of its corners.

With time, not only did the experiences get upgraded, but also the guests' expectations. Adults and kids alike now crave immersion and interactions to further ignite their imaginations, as well as having experiences they can't just have at home. So cutting-edge technologies must meet a playful design to create unique and unforgettable memories for the whole family. (Exploring the Thrilling World of Interactive Play Theme Parks for Kids, 2024)

Key Components of Interactive Spaces within Theme Parks:

- **Interactive Projection Systems:** Entire rooms can be transformed to dynamic playing fields using High-tech projectors which makes the walls and floors responsive to touch, movements, and even gestures.
- **Themed Environments:** Changing the complete surrounding of the guests making them feel like they're in an underwater city, other-worldly place, or a completely made-up universe.
- **Info-Driven Activities:** Educating the guests whilst having fun, creates excitement while gaining knowledge. It could be used in pre-shows where the guest must be presented with the narrative of the attractions instead of info-dumping.
- **Physical Elements:** In order to make the experience balanced between screens and physical action, physical themed elements could be added like slides, obstructions to avoid or climb, and other challenges that makes sense to be included within the story.

- **Safety and Security:** Due to the merger between projection and physical elements, accidents may occur, because the senses could confuse what's real with what's fake. So, safety measures should be taken.

4.2.1. Gamification of Attractions

The simplest and easiest way designers found to renew an existing attraction was to make it interactive. So, the ride the guest was already used to is now upgraded to involve their participation, making them feel they control the narrative, and for new guests, it's a video game that came alive, ending up with a fusion that's a total new experience, See Figure 8. (Hart, 2021) Making an attraction interactive, in turn, has transformed it into a game rather than a simple attraction where the guest is the spectator, even making a game like application specifically for the attraction or land it holds. So, it only made sense that the guest is now rewarded depending on how well they did, which can even be a change of the narrative of the attraction, where now the guest can truly change how the experience is going to go. (Kischuk, 2008)

This in turn made the guest want to ride the attraction more than once to try the other endings, again like a player would in a game. (Hart, 2021) Another way to make the guest want to re-ride the attraction is to make it score-based, and the more and better they play, the more they win points, and eventually trophies, See Figure 9.
Gamifying an attraction needs to be handled with care because as Mark Barret explains, "In a game, the player invests in their choices, where in a story the audience invests (Through sympathy and empathy) in the characters." (Barret, 2001) Making the device or the interactivity method crucial as an element of design that not only should be fused with the narrative of the attraction, but help connect the guest emotionally with the story, and that if it conflicts, it's now truly just a game, and not a gamified experience which should be the absolute goal. (Kischuk, 2008) For example, guests can choose their own avatar, selecting their favorite character of the story to represent them, validating the connection they already have with the theme and characters, See Figure 10.

4.2.2. Interactive Areas and Zones

Whether it's a Pre-show, Main attraction, or a whole land, designers have been able to successfully make areas, closed and open, feel like one where the guest can forget where and when they truly are. The spaces transfer them somewhere else, somewhere they can live within, meaning they

Figure 8, example of interactive play in Illumination's Villain Con, Minions Blast in Universal Studios Orlando Resort – Orlando Florida (UpgradedPoints.com: Chris Hassan, 2023)

Figure 9 & 10, Screenshots of Illumination's Villain-Con, Minions Blast Application– Orlando Florida (wdwnt.com: Shannen Ace, 2023)

Figures 11 & 12, Instructions to connect Illumination's Villain-Con, Minions Blast Application that lets the guest record their progress and be rewarded – Orlando Florida (wdwnt.com: Shannen Ace, 2023)

could take actions affecting their surrounding space, and the way the guests would see and feel that change would be through the use of interactivity.

Pre-show Interactivity:

Pre-show area is the first zone the guests see when they enter an attraction, it's mainly there to inform the guest about the upcoming experience and give them narrative to the story they are about to embark on. (Younger, 2016)

Depending on how the pre-show area is designed, the guest can either feel bored and uninterested in the info being given to them, or actually enjoying their time, forgetting that they are indeed waiting for the actual action. Some of the solutions to make it a success is to incorporate interactive activities within them like games, trivia, and other engaging activities that are related to the story and the narrative, so they may not interact within the actual attraction, but they did in the beginning, which makes them feel it was all interactive since it's one big immersive experience. (Craft Memorable Experiences with These 9 Theme Park Ideas, 2024)

As an example of interactive pre-shows, designers were able to employ an escape room as the pre-show of the attraction. So, guests would have to solve puzzles and riddles (Similar to normal Escape rooms) to escape and enter the attractions loading station. (Hart, 2021) See Figure 13.

Land Interactivity:

Through recent years popular IP like Star Wars, Harry Potter, and Marvel were able to create completely immersive lands which wouldn't have been possible without the already established connection with the guests and the use of interactivity which made a lot of guest's dreams come true. They not only got to see how their favorite characters lived, but they also joined them in the action, which if you ask any true fan, they would tell you it's their favorite part; stepping in their favorite character's shoes or meeting them personally. (Hart, 2021)

What made interactivity such a success in these lands were the appropriate themed devices that not only enhanced the experience, but made interactivity feel like magic, which is exactly what the Wizarding World of Harry Potter did! Even though there were many ways these parks employed interactivity within them, this would be the absolute best. Magic wands were made to actually affect change in different locations within the park. The guests would know the locations using a map that's included in the box of the interactive wand when purchased, making the guest feel right at Hogwarts as they go to every location and see what their spells do within the park. (Weinrich, 2019), See Figures 14 & 15.

4.3.Types of Interactivities

Figure 13, A rendered image of guests in an Escape Game made to be the pre-show of a thrill interactive ride in Road Rage at Trans Studio Bali – Denpasar, Indonesia (www.legacyentertainment.com)

Figures 14, A guest waving their wand at Ollivander's so one of the wands on the shelves would choose them, in the Wizarding World of Harry Potter – Orlando, Florida (blog.discoveruniversal.com)

Figures 15, A map that contains the various spots where the interactive wands could affect change, in the Wizarding World of Harry Potter – Orlando, Florida (blog.discoveruniversal.com)

There are many types of interactions within a Theme Park that the guest can have with their surroundings. Whether it's with another human, a static object, or an electronic interface, making it a rich interactive space whether they are meant to simply transmit information or to deepen the guest's connection with the story and narrative. (Kischuk, 2008)

4.3.1. Human to Human

A very important element to make a space welcoming is the human interaction within it. Interactive spaces should not only offer restful spaces where the guests can cool off so they can get into the action again with full energy, but also bonding situations. These can be between family members going together for the purpose of enjoying their time, among other guests that also want to feel welcomed, and are most probably fans of the same stories so they have something in common to connect over, or even with a loved character being played by a trained performer that's behaving exactly like the character would in their story. (Kischuk, 2008)

Using live performers to enhance interactivity has always been a technique used in many applications like theatre and dance shows where the performers would leave the stage interacting with the audience to get them excited and included in the story. These are extremely fitting techniques to be used in theme parks. You have an audience (the guests) moving all over and they are looking forward to interacting with a character that they've only seen through the small or the big screen, which adds a thrilling, unique, and memorable experience for the guests. (Craft Memorable Experiences with These 9 Theme Park Ideas, 2024)

For example, In the Wizarding World of Harry Potter, when nightfall comes, actors dress up as dementor and come out to interact with the guests, who cast spells at them, trying to scare them away, like they would in the movies, See Figure 16. While Disney, being the friendliest place on earth went another direction, Avengers campus after opening by a year started including character meet and greet, where guests can take photos with all the Avengers members, See Figure 17. And then there's Star Wars Galaxy's Edge where guests can meet people and creatures from all over the Star Wars universe, some are natives to the land of Batuu (The name of the planet/land) and some are travelers from far-far-away (like the guest at the park would be), See Figure 18.

4.3.2. Human to Machine

A section that discusses all types of interactions between guests and electronic devices whether virtual or physical.

Virtual Interactivity

Figure 16, Live actors dressed up as Dementors interacting with guests at the Wizarding World of Harry Potter – Orlando, Florida (wdwnt.com: Malia Minckler, 2023)

Figure 17, Live actor dressed up as Spider-man interacting with guests at the Avengers Campus in Disney California Adventure – California, LA (wdwnt.com: Iain, 2022)

Figure 18, A server in Oga's cantina dressed up as a native in the planet Batuu in Starwars: Galaxy's Edge at Hollywood Studios in Disney World – Orlando, Florida (Disneyworld.disney.go.com)

Virtual Interactivity describes any interaction the guest would make with a virtual environment that the guests could actively participate in while witnessing an out of place experience which could be done through virtual reality, augmented reality, or mixed reality. (Technical Park: Amusement Rides and Fun Creators, n.d.)

Virtual Reality (VR):

Virtual Reality was the first technology to use immersion to describe the experience it offers, because it's able to completely immerse the guest by allowing them to take control of their visual and auditory senses, making them feel elsewhere completely. The technology depends on the use of headsets that covers the eyes and ears, so the guest is transported completely to a rendered experience that would defy the obvious limitations of the physical real world, adding new excitement and exhilaration to what would've been only a fun experience. (Technical Park: Amusement Rides and Fun Creators, n.d.)

Merging VR headsets, handheld devices, or both with a moving ride added new dimensions to the experience. Not only can the attraction be customized to offer a unique experience for every guest depending on where they are sitting, but guests can now move and interact through a certain narrative being completely immersed. (Craft Memorable Experiences with These 9 Theme Park Ideas, 2024) Also, the guest can create a unique experience every time they ride the attraction by changing the difficulty and storyline while in a customized avatar that they made themselves. (Technical Park: Amusement Rides and Fun Creators, n.d.)

Immersive theme parks that rely on heavy narrative theming didn't embrace VR rides, because they would rather depend on physical real-life immersion to create an everlasting connection with the guests, connections that virtual experiences just don't achieve to the same extent. So, VR is commonly used in Amusement parks, since they hold excitement as a determining factor for their rides which VR can easily supply.

Augmented Reality (AR):

Unlike virtual reality, augmented reality doesn't take the guest away from their actual physical presence in a space, but instead aims to enhance it and give it more possibilities but in the virtual sense. Through AR, the guest can experience endless new interactions in their physical surroundings, making it the perfect tech to be used in Immersive Theme Parks.

AR functions by superimposing digital graphics on the built environments. The graphics are seen using smart devices like smart phones and tablets through specific apps that can recognize the physical object, and in turn show the guest specific information regarding the object it recognized. This adds a new layer of magic to their surroundings, since the graphics could be interactions from the object, games, or puzzles that could be shared with other members, making the static physical objects through the park actually interactive. (Technical Park: Amusement Rides and Fun Creators, n.d.)

Figure 19, The Starwars: Datapad being used to hack a droid in Starwars: Galaxy's Edge at Hollywood Studios in Disney World– Orlando, Florida (Disneyworld.disney.go.com)

Figure 20, The app's interface while being used to Hack Droids, Scan Barcodes, Translate Alien Writing and Tune to nearby radio frequencies in Starwars: Galaxy's Edge at Hollywood Studios in Disney World – Orlando, Florida (Disneyworld.disney.go.com)

Disneyland's Star Wars: Galaxy's Edge (Planet Batuu) managed to make the whole land interactive using AR. Through their app, guests can access Star Wars: Datapad which gives the guests many ways to interact with the variety of objects in the park, ranging from translating alien language written on the wall and signs, to speaking with static droids, and even completing missions by finding virtual cargos hidden all around the land. This makes the whole experience unique and special for every guest living as a resident on the land. (Star Wars: Datapad on Play Disney Parks Mobile App, n.d.), See Figures 19 and 20.

Mixed Reality (MR):

Mixed Reality or Extended Reality uses both VR and AR to create an extremely immersive experience. While wearing VR gear, the physical surrounding is made to support what the guests are seeing through the headset, creating the opportunity for real interactions with physical props and interactive elements within a completely made-up world, resulting in an unparalleled level of engagement and immersion, See Figure 21. (Technical Park: Amusement Rides and Fun Creators, n.d.)

Animatronics Interactivity

The term animatronics consists of the combination of both words Animated and Electronics defined by Cambridge as "the use of machines controlled by computers to make puppets and models move in a natural way in films and other types of entertainment" (Meaning of Animatronics in English, n.d.).

Figure 21, The First mixed reality experience in Hysteria in Boothill at PortAventura World (PortAventura World: Know-Article, 2024)

Animatronics started with the invention of clocks, but it's use to animate figures started with Walt

Figure 22, The Vyloo, an Autonomous character developed by Walt Disney Imagineering (Walt Disney Imagineering: Autonomous Characters)

Figure 23, The Automatronic Robot developed by Walt Disney Imagineering (Walt Disney Imagineering: Autonomous Characters)

Disney wanting to attract people's attention at the world fair, so with his "Imagineers", they were able to create a dancing 9-inch man that succeeded in capturing people's interest, making them want to see more. (The History Of Animatronics, 2015). So, when Walt began designing Disneyland, he knew he had to use animatronics since they are reliable, manageable, and looked real enough – from a specific distance – that the guests would only care about the story and not if the figure they are seeing was a real person or not. Besides that, Designer Marc Davis's realization that the animatronics only needs to be moving as if they are doing the action required without actually doing it because then they will be extremely expensive, and the technology hadn't reached that level then. (Younger, 2016). And after the creation of some, it was easy enough to do more and more. Now, almost all Disney attractions include animatronics, and lots of them, creating the need to be constantly advanced through the years. Thus, reaching the creation of Autonomous Characters and Automatronics. (Autonomus Charecters, n.d.)

Autonomous Characters:

The first autonomous characters to be created were the Vyloo, tiny alien-looking creatures made to react in specific ways through programming. So, when that programming is connected through sensors, they can each decide on how to interact with their surroundings, making each one has a distinct personality, See Figure 22. (Autonomus Charecters, n.d.)

Automatronics:

Walt Disney's Imagineering was able to create animatronics that can move freely through the park using Lidar scanners, depth cameras, ultrasonic sensors, inertial measurement unit (IMU), rotary encoders, and light-based range finder. All that combined would make the robot able to decide where to go and how to interact with other people and objects, in addition to making it weather-proof and durable, See Figure 23. (Automatronics, 2016)

Physical Props

Physical Props describe any physical device the guests will interact with physically, whether they will touch, hold, or even move with it. This includes VR gear and AR devices (whether it's the guest's or ones offered by the space), but since they were discussed earlier and serve a specific purpose, this section will focus on the devices offered by Theme Parks in order to enhance interactivity within the scope of the narrative. So not only will the prop add interactivity, but will also strengthen the guest's connection to the story. (Kischuk, 2008)

The more the prop can complement the environment rather than take center stage, the more successful the prop is in making the guest be part of the story, since they can control of the action without feeling pushed into it. Another aspect would be how easy it is to be used and handled because the attraction time is usually very limited and won't allow time for a learning session, so the prop needs to be simple, self-explanatory, intuitive, or simply something the guests naturally comes in contact with in their daily lives. (Heeter, 2000)

Some physical props are integral to interactivity, and some are simply added to create the feeling of interaction with the story. The first are normal interactive VR and AR rides where the guest can shoot a gun, use a laser pointer, and even a hold a flashlight to point at characters during the ride, see Figure 24. (Hart, 2021) While the second, would explain fake interactivity where the guest would push buttons or steer a wheel that wouldn't really accomplish or affect the action, but are there to make the guest feel included. (Younger, 2016)

RFID Wristbands:

Another form of physical props is the RFID (Radio Frequency Identification Device) Wristbands, which allow the guests to interact with a multitude of items throughout the park with endless possibilities. They can collect data, tokens, track progress, make cashless transactions, and many more. (Craft Memorable Experiences with These 9 Theme Park Ideas, 2024) Since the bands are almost seamless, like wearing a watch, see Figure 25, they have minimal intrusion to the immersive experience since they don't have buttons or screens, and they could even be further enhanced by becoming part of the story being themed appropriately to fit into the narrative of the park while the guests are able to choose from a large number of options. (How Interactive Technology is Revolutionizing Theme Park Experiences, n.d.)

Figure 24, Monsters, Inc. Ride & Go Seek Attraction at Tokyo Disneyland – Tokyo, Japan (Walt Disney Imagineering: Autonomous Characters)

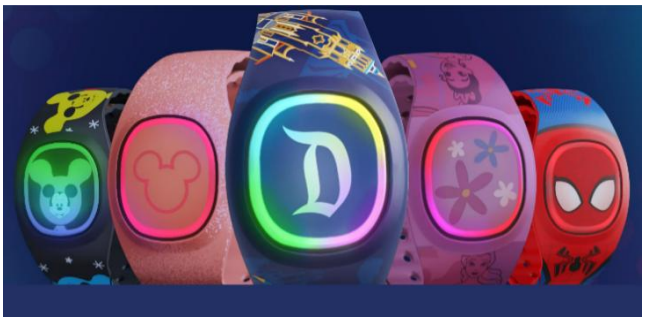

Figure 25, Disney's Magic Band+ developed by Walt Disney Imagineering to be purchased and used by the guests throughout the park (Disneyworld.disney.go.com: Magic Band+)

5. CONCLUSIONS

Immersive Theme Parks' main goal is to immerse the guests within it and its many forms of experiences and connect them to the space emotionally to leave an aftereffect that stays with them after leaving the parks gates.

Theme Parks as an industry depend on the guests wanting to return and for the rides to be exciting enough to be re-ridden over and over and one of the ways they were able to that with some of the attractions was through making their pre-shows interactive, so, the experience the guests go through is always different.

1. Interactive devices when themed appropriately the guests were found to be excited to use them and not pushed forcibly to interact.
2. Even spaces with minimal to no interactivity, like fake interactivity where the guests' actions didn't affect change were found very immersive because of how other design disciplines and techniques were utilized.
3. If an interactive device is used, the guests were found more pleased that it was easy to handle and use and that's why designers opted to use self-explanatory objects the guests were already familiar with operating like guns, flashlights and laser pointers.
4. The guests seeking interactivity were displeased to find the interactivity activity was too easy, simple or non-interesting or completely the opposite, it being too hard and confusing to solve. And the most successful were the interactivity that provided a challenge appropriate to the time they have in the park and made them actually excited while reaching their goal.
5. To get the best result from using interactivity to enhance immersion is by ensuring that the interaction between the interactive objects and guests' interaction are narrative based and are able to blend in with the story being told in the space, or else they will disturb the overall immersive experience.

6. RECOMMONDATIONS

Recommendations reached by the research target designers of each of the following professions, Theme Park Designers, Immersive Design Specialists and Interactive Spaces Designer whether it's to aid in further studies or for real-life applications in the forementioned fields.

The use of Interactive media within Immersive spaces depends entirely on how the designer decides to employ it. And it all begins with understanding the main use or purpose of the space and the requirements needed to fulfill that use and how it should affect the user.

Thus, the reached recommendations have been prioritized and categorized into 3 categories that discuss Narrative, Usability and Sensory Engagement, each category is then internally prioritized from highest to lowest ability to achieve harmonious interactivity that only enhances the guest's immersion within the Theme Park.

1. **Narrative Design Implementations:**
   - The experience as a total should relate to the guests on a social/human interaction level so they are more engaged to participate and connect with the space emotionally and on a deep level.

- The guest should know the goal and the narrative of the challenges they are about to face so they understand the feedback they will receive which adds to the excitement knowing they achieved the result they hoped for.
- The guest will only believe that they affected the narrative if the reaction to their action makes sense and feel as real as possible making them the hero of their story.
- Physical Props should be themed according to the narrative it belongs to in order to enhance the overall immersive experience, making the prop an object in the world they are in and not the main concern.

2. **Usability and User Experience Implementations:**
   - The Theme Park as a whole shouldn't depend on interactivity to be enjoyed, but rather it should be an additional choice for guests who want to interact, giving the choice for guests to be only a spectator if they want to without ruining their experience.
   - The Physical Prop should not take center stage and obstruct the guests from getting immersed in the narrative, whether it's the user using the prop or the other guests trying to get immersed in the environment as well.
   - If the interactive experience depends on both virtual and physical aspects, they should be perfectly synchronized so as to not break or disturb the immersion of the guest.
   - Interactive devices, whether they're for a Virtual experience or a Physical prop, should be intuitive and easy to use without needing to be taught.

3. **Sensory-based Design Implementations:**
   - The Interactive device's feedback should be compelling to the guest's five senses (Sight, Sound, Taste, Touch, and Smell) as long as it fits the narrative and without affecting performance.
   - The devices' reaction to the guest's action should be varied with every time the guest goes on the ride, making the guest want to re-ride it over and over again, which will get them interested to see what else can happen, while feeling its resemblance to a natural interaction.

7. REFERENCES

Automatronics. (2016). Retrieved from Robots: https://robotsguide.com/robots/automatronics

Autonomus Charecters. (n.d.). Retrieved from Walt Disney Imagineering: https://sites.disney.com/waltdisneyimagineering/autonomous-characters/

Barret, M. (2001). *Creating emotional involvement in interactive entertainment.* San Jose, CA: Game Developer's Conference.

Brown, B. J. (2002). Landscapes of Theme Park Rides: Media, Modes, Messages. In T. Young, & R. Riley, *Theme Park Landscapes: Antecedents and Variations* (pp. 235-268). Washington, DC: Dumbarton Oaks Research Library and Collection.

Craft Memorable Experiences with These 9 Theme Park Ideas. (2024, January 15). Retrieved from Roller: https://www.roller.software/blog/theme-park-ideas

Crawford, C. (2005). *Chris Crawford on interactive storytelling.* Berkeley, CA: New Riders.

Douglas, Y., & Hargadon, A. B. (2000). The pleasure principle: Immersion, engagement, flow. *Proceedings of the eleventh ACM on Hypertext and hypermedia.* San Antonio, TX.

Downes, E. J., & McMillan, S. J. (2000). Defining Interactivity: A Qualitative Identification of Key Dimensions. *New Media & Society*, 157-179.

Exploring the Thrilling World of Interactive Play Theme Parks for Kids. (2024, February 7). Retrieved from One Craze Media: https://onecrazemedia.com/interactive-play-theme-parks-for-kids-games/2/

Fiore, S. M., & McDaniel, R. (2006). Building Bridges: Connecting Virtual Teams Using Narrative and Technology. *Journal of Technology, Humanities, Education and Narrative*.

Harris, C. R. (2002). *Out of this world :the amusement landscape and our escape to elsewhere : a practicum.* Manitoba, Canada: Master's thesis, University of Manitoba.

Hart, L. (2021, February 11). *Ready player one? The rise of theme park gamification*. Retrieved from Blooloop: https://blooloop.com/theme-park/opinion/gamifying-theme-parks/

Heeter, C. (2000). Interactivity in the context of designed experiences. *Journal of Interactive Advertising*, 1(1), 75-89.

Hench, J. (2003). *Designing Disney: Imagineering and the art of show.* New York: Disney Enterprises, Inc. .

How Interactive Technology is Revolutionizing Theme Park Experiences. (n.d.). Retrieved from Peach Prime Consultancy: https://www.peachprime.in/interactive-technology/

Janzen, L., & Janzen, J. (n.d.). *The E Ticket*, pp. #30, p. 6.

Jensen, J. F. (1998). Interactivity: Tracking a new concept in media and communication studies. *Nordicom Review*, 19, 185-204.

Jose, P., & Brewer, W. F. (1984). Development of Story Liking: Character Identification, Suspense, and Outcome Resolution. *Developmental Psychology 20(5)*, 911-924.

Kiousis, S. (2002). Interactivity: A concept explication. *New Media & Society*, 4(3), 355-383.

Kischuk, K. (2008). *A Prototype For Narrative-based Interactivity In Theme Parks.* Florida, USA: Master's thesis, University of Central Florida.

Koranteng, J. (2005, July 5). Emotional Rescue. *Amusement Business; New York*, 34.

Liu-Thompkins, Y., & Shrum, L. J. (2002). What Is Interactivity and Is It Always Such a Good Thing? *Journal of Advertising; Winter 2002*, 31(4), 53-65.

Marling, K. A. (1998). *Designing Disney's Theme Parks: The Architecture of Reassurance.* New York: Flammarion.

Meaning of Animatronics in English. (n.d.). Retrieved from Cambridge Dictionary: https://dictionary.cambridge.org/dictionary/english/animatronics

Murray, J., Bogost, I., Mateas, M., & Nitsche, M. (2007). Game Design Education: Integrating Computation and Culture. *Computer*, 39(6):43 - 51.

Prince, K. (2019, January 14). *Interactivity and Immersion and Storytelling.* Retrieved from Theme Park Concepts: https://www.themeparkconcepts.com/2019/01/14/interactivity-immersion-storytelling/

Sherry, J. L. (2004). Flow and Media Enjoyment. *Communication Theory*, 14(4), 328-347.

Star Wars: Datapad on Play Disney Parks Mobile App. (n.d.). Retrieved from Walt Disney World: https://disneyworld.disney.go.com/attractions/hollywood-studios/star-wars-galaxys-edge-play-app/

Technical Park: Amusement Rides and Fun Creators. (n.d.). *Revolutionizing Park Experiences - The Era of Virtual Interactivity in Amusement Rides*. Retrieved from Technical Park: Amusement Rides and Fun Creators: https://www.technicalpark.com/news/revolutionizing-park-experiences-the-era-of-virtual-interactivity-in-amusement-rides/

The History Of Animatronics. (2015, July 23). Retrieved from Stan Winston: School of Charecter Art: https://www.stanwinstonschool.com/blog/animatronics-world-review#The%20History%20of%20Animatronics

Weinrich, K. (2019, February 1). *The Complete Guide to the Wizarding World of Harry Potter at Universal Orlando Resort*. Retrieved from Discover Universal Blog: https://blog.discoveruniversal.com/guides-and-tips/ultimate-guide-wizarding-world-harry-potter-universal-orlando-resort/

Weinstein, R. M. (1992). Disneyland and Coney Island: Reflections on the evolution of the. *The Journal of Popular Culture 26(1)*, 131-164.

Worth, S. E. (2004). Narrative Understanding and Understanding Narrative. *Contemporary Aesthetics*, 1.

Younger, D. (2016). *Theme Park Design & The Art of Themed Entertainment.* Inklingwood Press.

