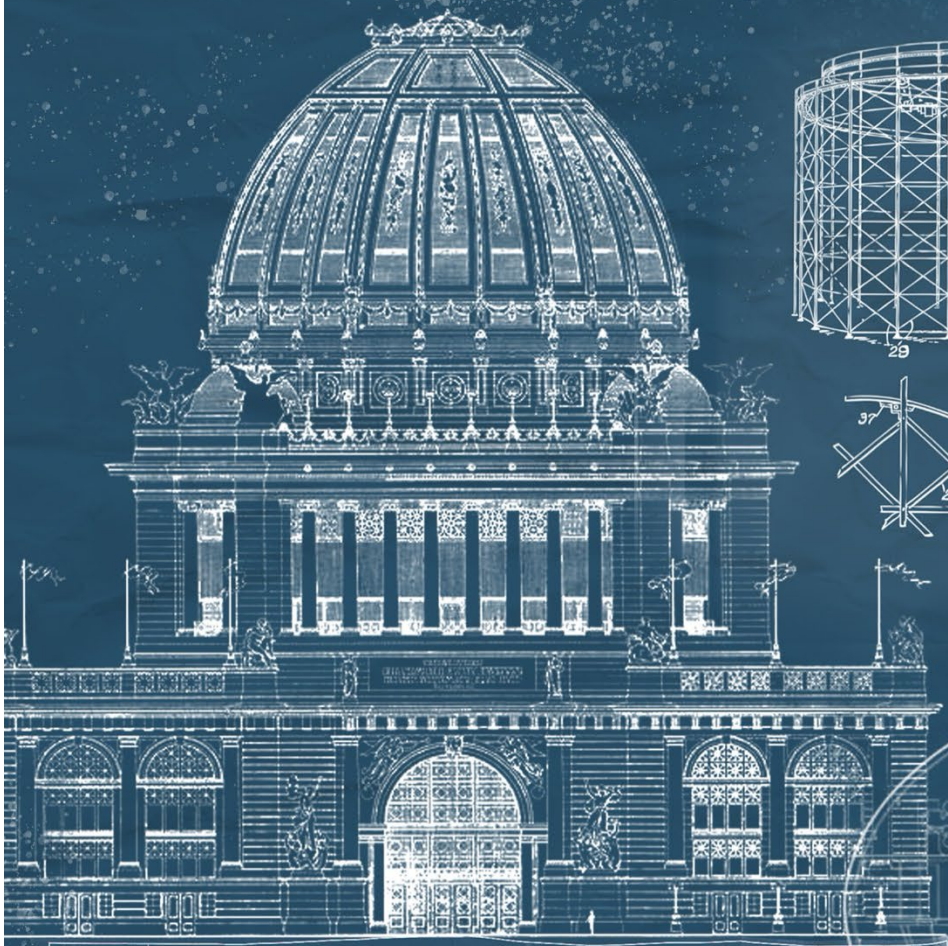
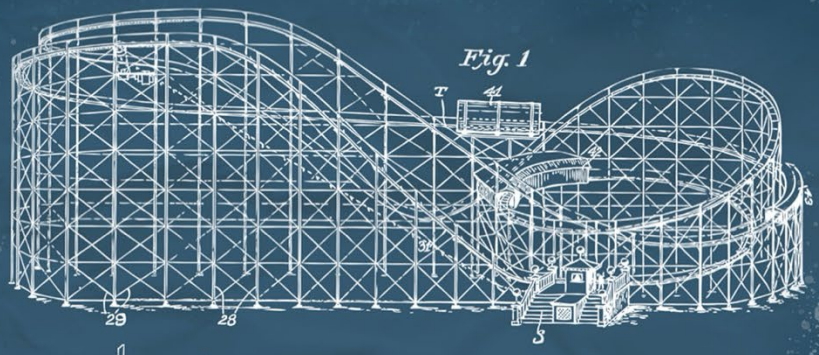
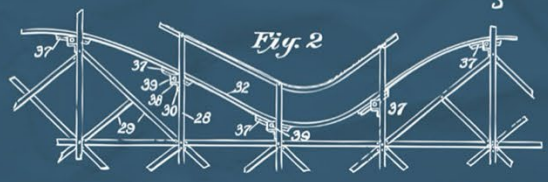
THEMED EXPERIENCE & ATTRACTIONS ACADEMIC SYMPOSIUM 2025 PROCEEDINGS







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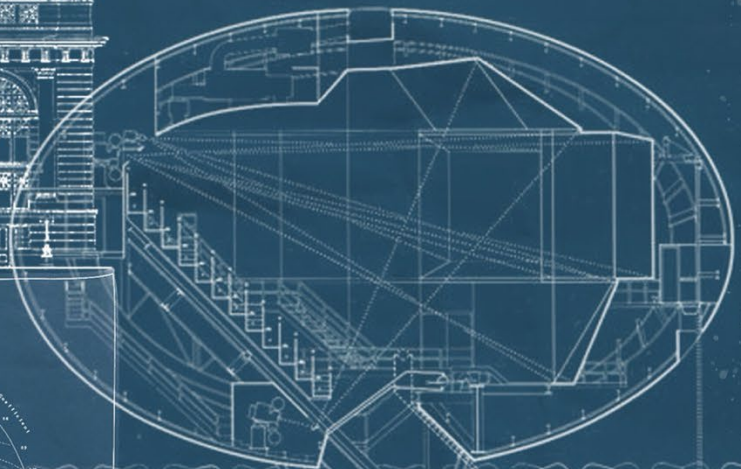

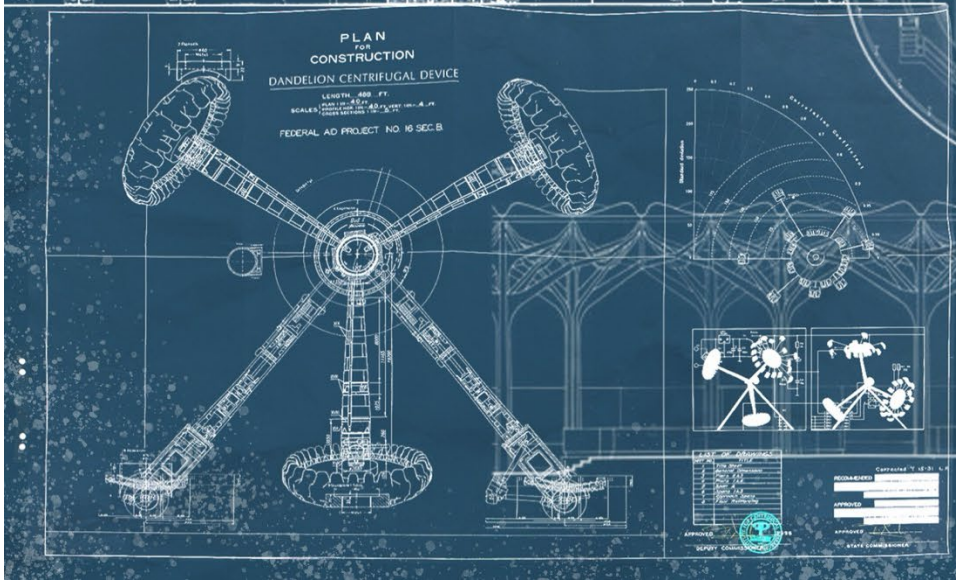

TEAAS2025

THEMED EXPERIENCE AND ATTRACTIONS ACADEMIC SYMPOSIUM

Table of Contents

Keynotes

Morning Keynote: Molly Murphy (President, Universal Creative)

Afternoon Keynote: Bob Weis (Author, Former President Walt Disney Imagineering)

Invited Guest Speaker: Jason Surrell (Author, Formerly Walt Disney Imagineering and Universal Creative)

Poster Presentations

Staged Realities: Measuring cultural representation in culturally themed parks
Adelynn Beery (Vicksburg (MS) HS)

Architectural Design in Tabletop Role-Playing Games: How can different depictions of architectural elements influence group dynamics, navigational play, and co-design?
Brittany Benjelloun (University of Florida)

Open-World and the User Experience: How Do Open-World Video Games Establish Immersion and Creativity?
Darrin Brown (University of Florida)

Fantasy-Reality Tension Maps: A Practical Framework for Balancing Story, Tech, and Operations in Mixed-Reality Attractions
Stephen Dinehart IV (University of Tampa)

I Want It That Way: Experiencing & Understanding Immersive Concert Potential
Kristi Gatto (University of Tennessee-Martin)

Crafting the Edutainment Narrative: Exploring the Inclusion of Themed Entertainment as an Academic Concentration
Cody Havard, Timothy Ryan, and Michael Hutchinson (The University of Memphis)

Sharing the Experience: A Content Analysis of the Theme Park Guest Social Media Contribution
Will Henderson (Industry Professional, Independent Scholar), Lauren Duffy (Penn State University), and Iryna Sharaievska (Clemson University)

AI Photo Fusion: Real-Time Compositing of Student Imagined Worlds
Joshua Polk (Purdue University)

This isn't Disneyland, you know:" Lessons for Themed Entertainment from the World of Star Wars Location Tourism
Jacob Rowlett (San Diego State University)

Themed Environments Meet Real Communities: Investigating the Cultural Impact of Location-Based Entertainment and Proposing a Framework for Responsible Design
Ryan Scanlon (University of Florida)

The Abernethy-Shaw House as Heterotopia: Imagineering a Historic Home
David Steiling (Ringling College)

Exploring the design elements that make theme parks transformative experiences
Juliana Rodrigues Vieira Tkatch (University of Las Vegas)

Abstracts

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University of Central Florida

ANALYZING SUCCESSES AND CHALLENGES IN THE CONTEMPORARY JAPANESE THEME PARK INDUSTRY

BRIEF ABSTRACT
Japan is a major participant in the global attractions industry and hosts three of the world's top ten theme parks. This research examines the current industry landscape with a sample of parks (n = 162) comprised of varying categories (theme parks, amusement parks, stand-alone attractions, zoos with amusement zones, etc.) in 43 prefectures. It traces the locations that have been well-attended enough to appear on global industry visitation reports within the last 25 years (n = 13) and observes sites that have closed within the last 20 years (n = 30). The research employs historical perspective and empirical analysis to examine the Japanese industry within the last 20 years including its challenges, effective sites, and trends in attraction development. Findings reveal a varied attraction mix, internal and external reasons for site closures, impact from the Chinese market, the powerful glocalization of Disney and Universal's theme parks, and the appeal of Studio Ghibli and content tourism. Theoretical and managerial insights can be gained from comprehending the composition of the theme park industry in Japan, its lessons on successes and failures, and potential future directions.

INTRODUCTION
Since the 1990s, Asia has led the world in market growth in the amusement sector (Anton Clavé, 2007). Post-pandemic, Asia has seen impressive progress in theme parks, waterparks, and museums (Palicki, 2024). Within the robust Asian market, Japan is home to three of the world's top ten theme parks by attendance (Universal Studios Japan, Tokyo Disneyland, and Tokyo DisneySea). While Japanese parks have long relied on domestic visitation, inbound tourism to Japan has been steadily increasing to a dramatic degree (Sharpley & Kato, 2021), with international visitation numbers in the last two years record-setting (JNTO, "Visitor," 2025). International tourism to Japan was a frequent news story in 2024. A record-breaking year in attendance, the nation was impacted through visitor spending, employment, and other economic benefits but also overtourism and anxiety about continuously increasing demand (Wortley, 2024).

Japan is an important part of the Asian theme park story. It has the most mature market within the Asian theme park sector, with multiple parks that have existed for a long time. This includes the first international location for a major Western operator (Tokyo Disneyland, opened 1983). It also predates the proliferation of theme parks on mainland China. Japan experienced a leisure boom during the "bubble economy," "Heisei Bubble," or "economic miracle" of the late 1980s/early 1990s (Funck & Cooper, 2013; Hendry, 2017; Kawamura & Hara, 2010) that led to the creation of many leisure sites including theme parks (Freitag et al., 2023). Nonetheless, the crowded landscape of attractions thinned due to factors ranging from competition, the eventual bubble burst, and worldwide crises.

Japan is well-known for a range of touristic activities, but theme parks are a key reason for visitations. Of these reasons for visiting Japan in 2024, nearly 21% of visitors stated theme parks as a purpose they were coming

to Japan, with 24% having visited a park, and 22.7% indicating revisit intention (JNTO, "International," 2025). Visitor attractions including amusement parks and theme parks are an important component of the Japanese tourism industry with impacts from both the international and domestic markets.

Because of the dynamic nature of the attractions industry and the importance of Japan in the global market, this study seeks to provide an update on its contemporary form. The last substantive contributions to this objective are found in Kawamura and Hara (2010) in English and Nakajima (2011) in Japanese, which are 14-15 years old. In addition to crises as noted, several market factors have altered the business environment and guest demand trends. Discussions of rapid growth of international tourism to Japan necessitate an update, especially as these visitors are choosing leisure attractions when they arrive. This work continues the historical perspective and empirical analysis of the reference article (Kawamura & Hara, 2010). The objectives of the study were determining the current state of the attractions industry in Japan, the most attended theme parks, and industry failures since 2010. Insight can be found by gauging where this market is and where it is going.

METHODOLOGY

This research followed a reference study (Kawamura & Hara, 2010), which utilized both historical perspective and an empirical approach to determine the state of the attractions industry in Japan. For the empirical aspect of the study, three datasets were generated. First, a large sample of currently operating Japanese sites (n = 162, referenced in Table 1) was compiled to represent the current industry, noting the park name, prefecture, year opened, and classification type. Second, a list of Japanese theme parks (and a waterpark) that have appeared on global industry attendance reports (Table 2, n = 13) was determined to demonstrate very successful sites. Finally, a sample of Japanese parks that closed in the last twenty years (n = 30) was created to gauge failures in the industry. After collecting this data, it was processed by the authors in several ways. For defunct sites, news articles were consulted to find details of reasons for closures and to check years. In addition to the classifications gathered for the current list of parks, descriptive coding was utilized to assist with understanding (Saldaña, 2015). This was done inductively, emerging from the data (for example, the presence of intellectual-property-based content), and deductively, referencing previous literature (for instance, the newer Metsä Village aligning with the prior gaikoku mura trend as discussed in scholarship). Following this analysis process, themes were decided upon.

RESULTS

For the currently operating parks, the sample was concentrated in amusement parks, with stand-alone attractions as the second most represented category. Theme parks are less represented. Opening dates are fairly evenly distributed between the three listed periods of early, maturing, and contemporary. The most populated prefectures tend to contain the highest number of sites, with the Tokyo metropolis leading. On the list of most visited parks, 13 Japanese parks have appeared on these global lists. Of these, 4 of the parks have now closed, and 5 open attractions have previously made the lists but have since been overtaken by parks with higher attendance in the Chinese market. Nagashima Spa Land missed the list for the first time in 2023 because of several new entries to the list, so it is possible it will return though regional theme parks in China do tend to receive similar levels of visitation. Three theme parks and one waterpark have been on the lists every year they have been eligible. Related to the final data set, closed parks in the last twenty years derive from 20 prefectures, with the most represented being Hyōgo (4), Tokyo (3), and Ōsaka (3). 50% of the closed parks opened during the early period (pre-1980), 36% from the maturing period (1980-2000), and 1% from the

contemporary period (2001-now). 63% of the parks closed between 2003-2013, with 33% closing between 2014-2024. Of the closed parks, 60% were amusement parks, 20% standalone attractions, 13% theme parks, and 6% kiddie parks.

Several themes emerged from the study as indicated below:

The current industry: There is a wide variety of attraction types, locations, and opening periods. While there has been an emphasis on "theme and show" over thrill in the Asian market (Li, 2018; Rubin, 2012), amusement parks have their place (Nakajima, 2011) and are the majority of sites. Despite the rising popularity of integrated resorts (Ahn & Back, 2018), they are not as common in Japan.

Challenges: Sites have closed due to internal factors (poor management, lack of financial performance, ride accident) and external factors (financial volatility, disease crises, natural disasters) but major factors include lack of demand as well as quality of competition. The Chinese market represents a challenge with rapid expansion and displacement of Japanese parks on attendance lists, but it also represents an opportunity with high levels of visitation to Japan.

The long-term success of Disney: Tokyo Disney Resort (TDR) has been successful for many reasons including: location, timing, prior success of the brand, design, characters, quality, and being an American export but suited to Japanese society (Jimura, 2022) yet not ordinary or Japanese (Toyoda, 2014). TDR remains very popular, with Tokyo Disneyland and Tokyo DisneySea at #4 and #7 in the world in 2023.

The rising success of Universal: Universal Studios Japan (USJ) has gained success for many reasons including: location, important new investments in the Wizarding World of Harry Potter and Super Nintendo World, connecting with "Cool Japan" marketing strategy, and using local brands like Japanese animation intellectual properties (Rubin, 2020). Universal Studios Japan was #3 in the world in 2023.

The rise of the international tourism: Large amounts of inbound tourism to Japan has been a news story recently with anxiety about ever-increasing demand (Wortley, 2024). Destination theme parks: foreign visitors at 17.4% for TDR in 2024 (OLC Group, 2025), with the new land Fantasy Springs a big draw; USJ is the top site in Ōsaka for those guests ("USJ," 2023).

Studio Ghibli: Studio Ghibli Museum has generated anime tourism (Denison 2010; Liu et al., 2022) and Miyazaki-related content has generated appeal in Japan and abroad (Hashimoto et al., 2023; Jang & Yamamura, 2020). Ghibli Park (2022) appeals to those who connect with the films, their stories and settings, and the utopic vision of Miyazaki (Oh & Kim, 2020). The park has no rides and represents a new model based on the beauty of the natural environment and curated story scenes.

IMPLICATIONS

This study examined the current state of the attractions industry in Japan, following up on earlier studies (e.g., Kawamura & Hara, 2010; Nakajima, 2011) that gauged its development and impact. We examined the most visited, profitable theme parks and attractions that closed permanently to determine the causes for both states of accomplishment. The study fills a gap in the literature by providing a recent and holistic view of the attractions industry in Japan.

The global attractions industry is dynamic, with new strategies frequently tried to maintain appeal for guests. The first major market in Asia, the Japanese industry is diverse but has had challenges in the past ranging from

an ambitious development spree that did not last to worldwide disruptions in the industry from financial to infectious diseases crises. The dominance of Disney and Universal in the country is of note and changed the landscape of the global attractions business. Japan has also had some interesting models from the foreign country village theme parks and the rise of contents tourism as an attractor of visitation.

Theme parks and other leisure attractions continue to be "catalysts for regional economic developments" (Kawamura & Hara, 2010, p. 249), so comprehending them more can help stimulate regional planning and visitation. It will be beneficial to continue to observe what works in this country as the Asian market grows. An industry that has reached a billion visitors, the global attractions business will continue to expand. Understanding the current market will assist scholars and stakeholders in gauging the impact of these sites in tourism ecosystems as well as discerning Japan's evolving role in the worldwide industry.

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AUTOMATION AESTHETICS: THE ASSEMBLY LINE AND THE THEME PARK

BRIEF

In the mid 1950s, a growing fear and anxiety gripped the American public about the impact of automation. At the same time, Disneyland was conceived and planned, opening in 1955 in Anaheim, California. While the theme park is often thought about in the context of its themed lands and oversized cartoon characters, theme parks' attractions have emerged directly out of the automation technologies and control systems of their periods.

Historically, the theme park sought to conceal and sublimate its technologies, positioning itself against the early-twentieth-century amusement parks that had sensationalized the machine as the focus of the action. With the rise of Disneyland and the theme park concept, the machine was seen as being a mere means to an end. Here, however, I wish to provide a historically grounded counterargument, demonstrating how theme parks have aestheticized automation technologies, a narrative which I trace in my forthcoming book, Disneyland and the Rise of Automation (Princeton University Press, 2026). This paper presents a summary of these findings, proposing that while the theme park has long focused on the immersive totality of its theming, sublimating the technological systems of attractions, it is often the aesthetics of this technology that have enchanted audiences.

EXTENDED ABSTRACT

With the advent of new technologies emerging out of World War II, the Cold War, and later the Space Program, the mid 1950s to the late 1970s were marked by what many contemporaries referred to as a "Second Industrial Revolution." It was during this period that automation came to be distinguished from earlier definitions of mechanized manufacturing, where only individual portions of the process was aided by machines that were in turn directly controlled by manual labor, as in the Fordist assembly line. Instead, automation described a system whereby transfers (convey belts, tracks, etc.) moved materials across a series of steps where various programmed actions were taken in the making, testing, and packaging of goods. The whole process was controlled by a plurality of sensors and relays that enabled a feedback loop, monitoring production, and taking appropriate actions to automatically ensure standardized goods. The skilled machinist, now reduced to a trained operator, oversaw the process via a series of control panels, filled with indicator lights and pushbuttons, that only required intervention when something went awry.

Disneyland's rides aestheticized industrial automation, rendering the procedural and jerky movements of the assembly line's movements into an amusement experience. The leisure and amusement that was promised by Automation's machines would be found at Disneyland, produced by the same machines as those of the factory floor. While much attention has been paid to the question of how automation was aestheticized within the household, the applications occurring within the home were still largely iterations of mechanization, rather than a fully autonomous system. In other words, they largely lacked the transfer protocols, such as conveyor belts and turntables, that moved goods across a series of controlled and programmed actions, triggered by sensors, relays, and other feedback systems. The only place where Americans could fully confront the prowess of automation was in the rides and attractions of the rising theme park industry synonymous with Disneyland.

Consider for example one opening-day attraction at Disneyland, the pioneering journey over London and Neverland of Peter Pan's Flight in Fantasyland. As guests move along the track, limit switches, optical sensors, and changes in the track's current monitor the movement of the ride vehicle, triggering the appropriate audio and effects for each given scene, or facilitating the loading and unloading of passengers in the station. Drawing from the railroad system, the segmentation of the ride's track into block zones enabled for a safety system that ensured that two vehicles could never collide with each other, while also monitoring the progression and flow of vehicles through the attraction. While these elements already had found applications in the so-called "dark rides" of the period, what distinguished Peter Pan's Flight even from the rest of Disneyland's dark rides was its unique ride vehicle.

Rather than moving in a cart through a series of two-dimensional painted sets and figures, the unique experience of this ride was defined by the guest's suspended journey over its three-dimensional scenes. This vantage point was made possible by a material handling means developed for early-twentieth-century manufacturing, known as an overhead tramrail. The Peter Pan attraction adapted this overhead tramrail system that was used in factories for the transportation and circulation of materials through warehouses and assembly lines. Archival evidence demonstrates how the system was adapted directly from the sales catalogues of the Cleveland Crane and Engine Company and their signature guiderail, embodying early on the intimate relationship between Disneyland's innovative rides and the methods of the mid-century automated factory.

As an art historian, this study emerges from the recognition that art history has lacked the visual vocabulary to identify and articulate the technological and operational traces of automation present across our visual culture. While studies in materiality have been uniquely attuned to the processes of making and its theorization, this interest has largely focused on conventional artistic practices and overlooked the material indices of the assembly line and its automated systems. This has rendered art history unable to speak on, theorize, and historicize the palpable traces of automation across various spheres of cultural production. Without the ability to recognize sensors and relays, for example, in our art, architecture, streetscapes, and leisure spaces, we are also rendered unable to reason through the deep presence that automation has across the entirety of our built environment and material culture, well beyond the confines of the factory floor and its products. This research approaches this gap with a deep fluency in the technologies, principles, and operational realities of industrial automation, premised on developing a critical vocabulary and theoretical framework out of automation's own systems.

The aim of the project is to understand how industrial automation (composed of a series of largely inaccessible technologies and systems that were initially relegated to the factory floor or promoted as working invisibly in the background) was aestheticized by the theme park in the post-war period. However, unlike the Jet Age or the Space Age that are associated with their own distinct techno-futurist styles, exemplified by places like the Theme Building at LAX or the television show The Jetsons, Automation's aesthetics are largely non-visual. Nevertheless, my proposition here is that automation does leave distinct marks, like the imprint of the conveyor belt on the back of an Oreo cookie or the sound of hydraulic pistons on a motion simulator.

In this paper, I suggest that automation's aesthetics encompass a unique set of markers, understood as a wide host of sensory traces that we have come to associate with automated systems: including, the fluid, yet jerky movements of the conveyor belt; the looping actions of a robotic arm; or, the expected movements of a vehicle on a track. Automation's aesthetics also encompass a series of more conceptual frameworks, like the ladder logic of relays and computers that ensure safety, efficiency, and continuous production. This project walks us through how these various degrees of perceptibility all define automation's aesthetics: from the discretely visible sensor to the choreographed dance of robotic arms, and on to the programmable logic of control that takes information from each sensor and translates that information into action.

By enveloping these systems in narratives and oversized cartoon characters, Disneyland not simply exposed guests to these technologies, but personified and narrativized the operational logic of automation. Suddenly, Snow White's Evil Witch popping out of a corner in a ride is not merely a scare tactic, but an audio-visual stimulus triggered by a limit switch as your vehicle approaches a specific location, your affective jerk away from the Evil Witch happens physically on a track that always already was forged to turn sharply away. In other words, at Disneyland, mid-century Americans got to experience the automation systems that produced all their goods through the veil of their favorite characters. As fears of widespread job loss and massive economic change spread due to the rise of automation in the 1950s, the theme park ameliorated these anxieties by making the assembly line the happiest place on earth. This history allows us to understand how automation was able to be made palatable, marketed as aspirational, and welcomed into all realms of American life. For industry, this study suggests that new opportunities are offered by embracing the technologies and systems of automation as critical parts of the theme park experience. This implies a move away from the notion that the magic or realism of the fantasy is opposed to the revelation of its technology.

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APPLYING THEORIES OF IMAGINARY WORLD-BUILDING AND SUBCREATION TO THEMED ENTERTAINMENT

BRIEF ABSTRACT

The world of themed entertainment draws from a multitude of disciplines to create unique experiences that combine various artistic and technical skills. Similarly, the study of imaginary worlds as an entity (rather than of individual books, films, television shows, etc.) has combined literary criticism, media studies, philosophy, psychology, economics, and religious studies to create a relatively new academic subfield.

This presentation will be a first step in putting this new window of study into conversation with themed entertainment.

In practical terms, the creators of themed entertainment can look to the type of "world-building" analyzed in the study of imaginary worlds—a process that Mark J. P. Wolf, quoting J. R. R. Tolkien, calls "subcreation"—to gain insight into all of the ways that creators develop and audiences experience rich, immersive fictional realms. This can lead to new design techniques for greater depths of verisimilitude, emotional connection, and guest absorption in themed spaces.

Academically, scholars of both themed entertainment and subcreation can look to the tools used for insightful analysis of these various objects of study in order to find new and potentially groundbreaking ways to better understand how these creative works speak to audiences and their desire for both escapism and experience.

EXTENDED ABSTRACT

In 2012, Mark J. P. Wolf, a leading scholar in video game studies, made a major impact upon the world of media studies in general with his book *Building Imaginary Worlds: The Theory and History of Subcreation*. In it, Wolf argued that,

> *Imaginary worlds, built of words, imagines, and sounds, can be tremendous in size . . . Worlds of this size, even closed ones that are no longer being added to (though they may still be adapted and interpreted), can often be difficult to see in their totality, and much time must be spent to learn enough about a world to get an overall sense of its shape and design. In this sense, an imaginary world can become a large entity which is experienced through various media windows; but quite often, no one window shows everything, and only an aggregate view combining a variety of these windows can give a complete sense of what the world is like and what has occurred there. (Wolf, 2012)*

To that end, Wolf proposed a new area of study, one that would bring to bear "a variety of fields (such as philosophy, film studies, psychology, video game studies, economics, and religion)" (Wolf, 2012) to unite these disparate field of studies and gain a greater insight into the way that imaginary worlds function as transmedia entities.

In the decade-plus since this foundational work was published, Wolf himself has taken steps towards establishing this subfield, editing several collections of essays and serving as series editor of a Routledge book series exploring imaginary worlds and the nature of "subcreation" (a term he borrows from J. R. R. Tolkien to refer to the act of creating and developing imaginary worlds). The general description of the

Routledge series provides a good idea of the nature of the subfield as Wolf envisions it: "Each volume in the Imaginary Worlds book series addresses a specific imaginary world, examining it in the light of a variety of approaches, including transmedia studies, world design, narrative, genre, form, content, authorship and reception, and its context within the imaginary world tradition" (Routledge, n.d.).

Though still relatively new, the study of imaginary worlds as its own subfield already shows that it has much to offer to the world of themed entertainment, both from a practical, design standpoint and from an academic perspective.

On the design side, we can look to former Disney Imagineering executive Theron Skees' recent book *Creating Memorable Worlds: A Journey Into Themed Experience Design* for a clear link between subcreation and themed entertainment. Skees defines themed entertainment as,

> *the creation of an artificial physical environment where various elements bring to life a thematically driven story for the purpose of immersing visitors in a strongly identified or 'branded' setting. Visitors enjoy these environments as a form of escapism and play. Terms like 'world-building,' 'spatial storytelling,' and 'placemaking' are great descriptors that have been used to encapsulate the art and science of creating these environments. (Skees, 2025)*

Here we can see areas of linkage between the two creative endeavors. Both themed entertainment and subcreation involve "world-building" and "placemaking," rely on a strongly identified (or "branded") setting), and bring to life a thematically driven story. Yet thus far the application of subcreation to themed entertainment locales has largely been one of adaptation, particularly in the form of recreating film sets in for Imaginary worlds, as described by Wolf as objects of analysis, go far beyond scenery, though. Author Jeff Vandermeer, in his writer's guide *Wonderbook: The Illustrated Guide to Creating Imaginative Fiction,* goes into depth on the elements that are required to make an imaginary world feel full, rich, and believable:

- The setting exhibits a ***coherent and consistent logic***.
- The setting has built-in wider ***cause and effect***.
- ***Specific details*** convince the reader and do not seem jarring.
- The setting ***impacts the characters' lives*** in surprising and interesting ways.
- A certain ***depth and width*** are expressed consistently across chapters or stories.
- The setting both ***mirrors our real world and deviates from it*** in interesting ways.
- The setting has ***sufficient mystery and unexplored vistas***.
- The setting exhibits varying levels of ***consistent inconsistency***.
- The setting reflects that ***we live in a multicultural world***.
- Certain objects within the narrative are acting as ***extended, literalized metaphors.***
- The setting allows for ***several different operational realities.***
- ***Collective and individual memory*** plays an active role.
- ***Miscommunications*** and moments of ***imperfect comprehension*** occur. (VanderMeer, 2013)

This list, lengthy as it may be (and specific to written fiction), is by no means exhaustive. Wolf himself notes that fully realized imaginary worlds have certain structures/infrastructures and systems of relationship that

come out in the worlds' maps, timelines, genealogies, nature, culture, language, mythology, and philosophy, without which, "worlds would fall apart and become little more than a collection of data and information, and they would cease to be worlds" (Wolf, 2012).

Similarly, many themed entertainment environments fail to connect with guests because they lack attention to all of these details. In both cases, it is the tension between reality and fantasy that forms cracks in the imaginary façade, creating breakage in the connections between guests and immersive environments on a story level that no amount of set-dressing can patch.

This presentation will dig deeper into the work that has been done in the study of imaginary worlds and argue about how it can be applied, both academically and practically, to the world of themed entertainment. Star Wars: Galaxy's Edge serves as a perfect example of how these two fields intersect, as the multimedia *Star Wars* franchises has already been explored as a piece of subcreation in works written or edited by Wolf and several collaborators while Galaxy's Edge has been interrogated as a piece of themed entertainment for its points of success and failure.

Through this exploration and analysis, I hope to spur further conversation amongst scholars and potentially unleash new avenues of creative potential for themed entertainment designers, enriching both fields in the process.

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KINGDOMS OF ARTIFICE: DISNEY AND THE THEMING OF THE CONTEMPORARY ZOO

BRIEF ABSTRACT

The 1998 opening of Disney's Animal Kingdom (DAK) formally introduced theme park design principles to wildlife display. In the decades since, zoo designers worldwide have adapted Disney's approach to theming both the visitor and the animal experience. Post- Disney zoo environments combine entertainment with education and complexify credibility with theatricality. Zoos today demonstrate a unique tension between fantasy and reality because wildlife display has always been an artificial construct. Though the Disney parks and places like them have often been decried as inauthentic, paradoxically, themed wildlife exhibits feel more real rather than less. In this sense, DAK represents the realest fake possible.

Our four-year study, the first of its kind, is based on interviews with over three dozen zoo designers, managers, and other professionals; as well as landscape architects and former Disney Imagineers. Site studies were conducted at DAK and nearly 50 zoos worldwide. This was supplemented by archival research and a review of zoo and Disney park literature. We describe contemporary zoo design as a spectrum of suspended disbelief, a fluid, tiered taxonomy of implicative theming, evocative theming, and finally a category we call integrated immersion in which realistic animal habitats are combined with themed architecture, props, and graphics.

ABSTRACT

Despite zoos generating nearly $23 billion in revenue with over 700 million annual visitors worldwide, zoo design has received scant scholarly attention (Gusset & Dick, 2011). Zoos have been studied by anthropologists, biologists, and sociologists. But what little design discussion exists remains limited to practitioner circles. As designers and design educators, we are interested in the contours of this unique praxis. Similarly, serious discussion of Disney Park aesthetics and mechanics are lacking in the literature. Our study, spanning over four years, addresses both.

Since its 1998 debut, Disney's Animal Kingdom (DAK) has remained the world's most popular zoo, and in the decades since most zoos have adopted Disney's design techniques. This demonstrates a unique tension between fantasy and reality, in that zoos have always been artificial constructs. Even the term captive wildlife is a contradiction. At post-Disney zoos, entertainment is combined with education and credibility is complexified with theatricality, resulting in quite an irony, because themed spaces have always been criticized as inauthentic. Paradoxically, because zoos are by their very nature a matter of artifice, themed wildlife exhibits feel more real rather than less. In this sense, DAK represents the realest fake possible.

Our analysis is based on interviews with over three dozen zoo designers, managers, and other professionals; as well as landscape architects and former Disney Imagineers. Site studies were conducted at DAK and nearly 50 zoos worldwide, supplemented by archival research and a review of zoo and Disney Park literature. This has enabled us to deeply understand the interplay between mainstream zoo design and WDI's methods during DAK's long development, and to best describe the park's impact.

Three primary aspects of zoos have shifted over time—function, organization, and narrative. An evolution from prison, to gallery, to educational theater. DAK was presaged by Carl Hagenbeck, Jr., who in 1896 patented a

kind of naturalistic stage set which obscured the boundaries between animals and visitors with moats and rockwork, making exhibits appear cageless. Though initially derided as garish hucksterism, other zoos soon followed suit until postwar modernism turned to abstracted concrete and sterility (Ames, 2009). The landscape immersion movement began at Seattle's Woodland Park Zoo. These exhibits, which flourished starting in the 1970s, immersed visitors in naturalistic foliage and rockwork which approximated an animal's actual habit—a resurrection of the Hagenbeck approach (Coe, 1994). Beginning in the late 1980s and early 1990s, cultural resonance, a method of combining landscape immersion with relevant architecture, gained traction (Jones, 1989) [Figure 1]. All these developments prepared the zoo community to be greatly affected by Disney as a theatrical company.

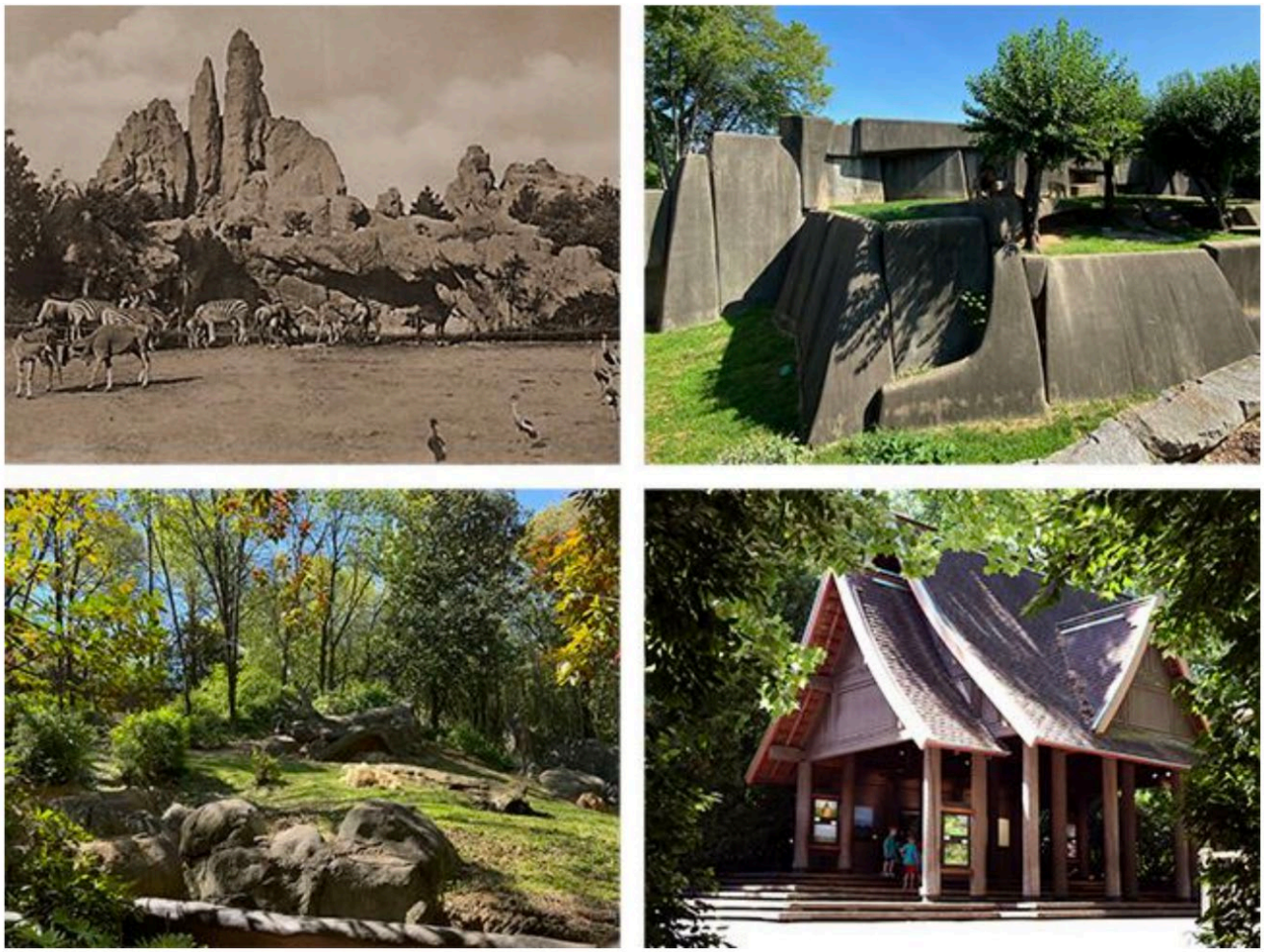

Figure 1: Clockwise from top left: Tierpark Hagenbeck's natural stage set, modernist abstraction at Louisville Zoo, landscape immersion at Zoo Atlanta, cultural resonance at Woodland Park Zoo.

Today, contemporary zoo design exists along a spectrum of suspended disbelief we characterize in a fluid, tiered taxonomy of implicative theming, evocative theming, and integrated immersion in which landscape immersion is brought full circle to deliver what we conceive of as guest habitats. These environments leverage all aspects of a Disney park—architecture, interiors, props, sets, and graphics—to support the wildlife habitats they are paired with. Spaces which only imply a sense of place are apt to be architecturally muted, and the graphics resemble museum exhibits. Spaces which evoke a sense of place utilize more theatrical

techniques, but often present an exaggerated, what has been described as cartoon nature (Coe, 2019). Integrated immersion is defined by themed set design, as popularized by Disney, and the use of filmic grammar to stage, pace, and frame wildlife vistas. After DAK, we see a dramatic increase in a seamless blend of credible animal habitats and visitor areas in the integrated immersion category. This shift from cartoonish immersion towards hyper-realistic immersion utilizing Disney design principles is ironic considering the origin of WDI's praxis in theme parks rooted in fantastical depictions. Several WDI techniques, including storyboarding, the development of character backstories, and attention to transitions and liminal zones are evident. We emphasize that integrated immersion is not necessarily better. There are many successful, evocative, and implicative exhibits. These are simply more Disney-like.

Integrated immersion features what we define as static and dynamic show sets. The static show set can be traced back to Disneyland's Swiss Family Robinson Treehouse (1962), and many theme park visitors will be familiar with them—environments which replicate film sets, yet the actors are missing. WDI later took this concept to attraction queues, notably at Indiana Jones and the Temple of the Forbidden Eye (1995). Both were executed to a high degree at DAK. Static show sets provide context for animals, but everyone is absent [Figure 2]. Wildlife is separate. There is no interaction; the presentation is static. Conversely, a dynamic show set is one in which animals have taken over, illustrating overlap between human settlement and wildlife populations in many parts of the world [Figure 3]. This relationship is ever-changing; hence dynamic.

Continued...

Figure 2: Static show sets at DAK (left) and London Zoo (right).

Figure 3: Dynamic show set, Wildlands. The calendar has notes between backstory characters warning about invading racoons.

Additionally, graphic design plays a large role in the theming of the contemporary zoo. Like museums, zoos aspire to communicate a large amount of information to augment their exhibits. With integrated immersion, such devices are typically presented, in the words of the designers we spoke with, in-world or in-story. Here the interplay between fantasy and reality is most poignant and deliberate. These embedded didactics convey numerous levels of communication, from the atmospheric to the practical. The goal is to keep zoo visitors completely enveloped in the surrounding spatial narrative. The nature of these graphics, from the lettering style to application and substrate, exist in a pseudo-fictional context. They establish a sense of place, tell us about the animals, educate us about conservation, and even show us where the restrooms are [Figure 4]. Like the architecture, static and dynamic show sets, along with embedded didactics, are most successful when coherently and consistently interwoven with wildlife viewing, demonstrating the very same gestalt which makes Disney's themed environments so comprehensive.

Figure 4: In-world wayfinding at DAK (left) and London Zoo (right).

Though all these aspects can be found at zoos worldwide, we summate with a detailed review of seven we find have most deeply modeled themselves after DAK. Two were virgin builds; both lead designers visited DAK and say they were heavily influenced by its design. The other five have committed themselves to follow in the Imagineers' footsteps with each new habitat, expansion, and renovation. They are Erlebnis-Zoo Hannover (Germany), Pairi Daiza (Belgium), Zoo Leipzig (Germany), Bali Safari and Marine Park (Indonesia), Fort Worth

Zoo (United States), San Diego Zoo Safari Park (United States), and Wildlands Adventure Zoo Emmen (Netherlands).

Zoos were already headed towards greater immersion. Yet DAK entered the market as a dramatic accelerant and shifted direction from abstract immersion to hyper-realism. Many who worked on the development of the park took their experience and applied it at other zoos. Evinced by our site research and interviews, DAK has left an indelible impression. Because of its considerable influence, the contemporary zoo is more engaging, immersive, educational, and entertaining than ever before. Every single practitioner we spoke with, whether they employ thematic principles in their design work or not, we are clear on this point, from guest areas to habitats and back of house. It was visible at every single zoo we visited and is a trend that shows no signs of abating.

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ENCOUNTERS WITH ROOSJE: FICTIONAL INTERACTIONS WITH A NON-FICTIONAL HISTORICAL CHARACTER IN 2D VERSUS 3D STORYTELLING ENVIRONMENTS

ABSTRACT
Museums increasingly use interactive digital storytelling to create emotional connections between visitors and historical narratives. This study compares visitor experiences with the same World War II personal narrative presented in two formats: a 2D screen-based exhibit and a 3D virtual reality environment. Both versions feature the same character/actress who engages visitors in spoken dialogue using speech recognition technology. The key difference lies in spatial affordances - while the 2D version constrains visitors to a fixed viewing position, the VR version enables natural movement around the character and immersive exploration of the narrative space. Using a between-subjects experimental design (n=100), we combine physiological monitoring (skin conductance), validated questionnaires measuring presence and narrative transportation, and qualitative interviews to understand how dimensionality and levels of interactivity affect visitor engagement with historical content. By directly comparing identical content across different levels of immersion, this research examines how immersive technologies can shape visitors' relationship with heritage storytelling. Findings will inform best practices for heritage institutions seeking to balance storytelling and immersive technology adoption with providing historical information.

INTRODUCTION
Few settings reveal the tension between fantasy and reality as vividly as the creation of interactive heritage experiences for museums. On the one hand, there is a need to bring a factual account of history; on the other hand, it is important to let visitors engage with the content in an (inter)active way. Storytelling serves as a powerful mechanism for fostering emotional engagement among visitors and establishing a connection with heritage (Mitas et al., 2024). Its capacity to evoke emotions and facilitate meaning-making has led to its growing application in the design of visitor experiences (Calvi et al., 2024). Central to effective storytelling is the elicitation of empathy toward a character, which is essential for inducing narrative transportation, defined as the sensation of feeling drawn into the story (Gordon et al., 2018). This phenomenon, crucial for creating memorable and impactful experiences, can occur with both fictional and non-fictional characters.

Contemporary museums increasingly encourage visitors to participate in storytelling, often through digital interactions with artifacts, with the aim of creating emotional, memorable experiences (Li et al, 2024). Interactive digital storytelling empowers users to influence both the progression and, in some cases, even the content of the narrative (Rizvic, Okanonic, et al., 2019), thereby introducing an unavoidable element of fiction into the experience. The fictional dimension in heritage representation becomes even more pronounced when transitioning from third-person observational narratives to second-person experiential formats, wherein visitors are directly addressed by a character as "you" and are expected to play an active role within the story (Baker, 2022). This role-playing aspect may increase the level of immersion (Fu, et al., 2023), yet it poses significant challenges for heritage institutions that must balance the goal of deepening the visitor experience with the imperative of maintaining historical authenticity.

THE EXHIBITION CONTEXT

[Authors] conducted research and subsequently developed the scripts and dialogues for an innovative interactive exhibit located at a heritage center in Den Bosch, the Netherlands, where visitors engage with personal stories from World War II. The exhibit features three characters from World War II. Visitors engage in spoken dialogue with these life-sized characters against backdrops of archival photographs, with the characters treating the visitors as if they are present in the time and place of the photo. What makes this installation unique is that visitors don't just listen but can also ask questions; they engage in actual conversation with the characters, who ask their thoughts and respond to their answers, creating a personal dialogue. One of the characters is non-fictional. Roosje Glaser was a Jewish dance teacher whom – in the first scene - you meet at a dance shortly before the war, and – in the second scene – in front of her destroyed house immediately after the war, where she has just dug up a chest with photos she had buried before going into hiding. Roosje explains how she managed to survive the concentration camps: by dancing with the enemy. The script is based on Roosje's true story as recorded by her nephew Paul. The Glaser family was actively involved in the development process.

FROM 2D to 3D FICTIONAL EXPERIENCES

A key objective in designing experiences is to cultivate a strong sense of presence, often described as the subjective feeling of "being there" in a mediated environment (Witmer et al., 2005). This concept is multifaceted and has been measured using various scales, including the Sense of Presence Inventory (SOPI), which is considered a de facto standard for evaluating XR applications (Lessiter et al., 2001; Bernardet et al., 2011). The SOPI framework assesses several key dimensions, including spatial presence (the feeling of being physically located in the virtual space), engagement (the degree of psychological involvement), and, crucially, naturalness (the perception that the mediated world and interactions within it feel real and behave as expected) (Piccione et al., 2019). The naturalness of an interaction is also foundational to a good story-driven experience. When an interaction feels seamless and authentic, it lowers the cognitive barriers for the visitor, allowing for deeper emotional investment and narrative transportation. The effectiveness of creating engagement is understood to increase with a higher level of immersion or presence within a story-driven experience (Green et al., 2004).

Central to this study is the 2D interactive, screen-based installation where visitors engage in spoken dialogues with Roosje, using speech recognition technology against backdrops of archival photographs. The ability to respond through speech with the character allows participants to feel more present in the story world. The character tells her story but also asks for your perspectives on the matter and in turn responds to that. In this 2D interaction, your control is limited to if or what you decide to say to the character. While interaction is intended to enhance immersion, it might also reduce it, as the need to formulate a response can disrupt the fluid process of mental simulation (Green & Appel, 2024). We assume it increases the level of social presence because of the parasocial relation with this pre-recorded character.

For this research project, an exact copy of the interactions with Roosje was made in a 3D environment through the volumetric capturing of the same actress with the same appearance and props. The 3D version is, in text and interaction, an exact copy of the 2D version, but the spatial dimensions are completely different. This VR version allows for an even more realistic fictional meeting with a non-fictional character. This study directly compares the 2D interactive screen with the 3D VR experience, focusing on the effect of adding extra dimensions to the interactions, such as being able to dance around a person or to pick up a photograph from

a chest. Its effect on narrative transportation, presence, and experience impact will be measured through self-report, physiological measures of arousal, and qualitative interviews a week later to see what direct and 'long-term' effects this fictional interaction with history could bring. This multi-method approach allows us to understand not just whether visitors prefer one format over another, but how each format shapes their emotional connection to history.

FUTURE DIRECTION AND IMPACT OF RESEARCH

As heritage institutions look to develop more advanced XR/VolCap-based experiences, the tension between immersion and authenticity will only intensify. The goal is not to create a perfect historical simulation but to leverage technology to forge a deeper, more empathetic connection between contemporary audiences and the human stories of the past. Achieving this requires a nuanced, interdisciplinary approach that combines rigorous historical research, sensitive storytelling, and a critical understanding of the affordances and limitations of new media technologies. The central challenge remains: how to craft experiences that are emotionally true, even when they are factually fictional. The creation process, which is described in a to-be-published paper, and the impacts of the 3D version as compared to a 2D version should bring the field insights into how to further navigate this challenge effectively.

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EXPLORING TECHNOLOGICAL INNOVATIONS AND AI IN THE THEME PARK AND ATTRACTIONS INDUSTRY: A PROPOSED CURRICULUM FRAMEWORK

ABSTRACT

The rapid integration of emerging technologies is reshaping the theme park and attractions industry, transforming both operations and guest experiences. Artificial Intelligence (AI), the Internet of Things (IoT), robotics, virtual and augmented reality (VR/AR), mobile solutions, and sustainable technologies now play key roles in operating theme parks and attractions. These innovations require a workforce that is proficient in technological knowledge while retaining the human touch essential to the hospitality industry's guest experience. This paper examines current applications of AI and digital tools in theme parks and attractions, highlighting benefits such as operational efficiency, cost reduction, safety and security, enhanced guest personalization and engagement, sustainability, and more. It further identifies challenges related to data privacy, cybersecurity, and workforce readiness. To address these trends, the paper proposes a curriculum framework that embeds technology across hospitality and tourism education, with focus areas including foundational AI knowledge, industry-specific applications, data-driven decision-making, ethics, and professional collaboration. By aligning academic preparation with industry innovations, hospitality and tourism programs can equip graduates with the skills needed to succeed in a technology-driven environment while sustaining creativity, inclusiveness, and guest-centered service.

INTRODUCTION

The hospitality industry is rapidly evolving through technological innovation (EHL Hospitality Business School, 2024; Sukach *et al*., 2021; Thakur, 2022). Advances in software, hardware, and digital tools are transforming guest experiences and reorganization operations across airlines, hotels, restaurants, the entertainment industry, and many other sectors, including theme parks and attractions. Key trends include Artificial Intelligence (AI) and Machine Learning (ML), the Internet of Things (IoT) & Smart Technology, Contactless & Mobile Solutions, Virtual & Augmented Reality, Robotics & Automation, Data Analytics & Revenue Management, Cybersecurity, and Sustainable Technologies (Jayadatta, 2023; Tlili *et al*., 2021)

By embracing technology in the hospitality and tourism industries, several benefits have been identified such as (1) improvement of personalized guest experience, (2) greater efficiency and cost savings through automation, robotics, and smart systems, (3) competitive advantage by attracting tech-savvy guests and strengthening brand differentiation, or (4) improved sustainability by promoting eco-friendly practices and operational efficiency (Buhalis *et al*., 2024; Ruel and Njoku, 2021; Sharma and Singh, 2024).

The market size of the amusement park industry is projected to experience steady growth in the forthcoming years, estimated to reach $114.77 billion in 2029 with a compound annual growth rate (CAGR) of 3.7% (Guridham, 2025). Key trends projected for the forecast period highlight technological applications such as leveraging the Internet of Things (IoT) to boost operational efficiency, increasing reliance on renewable energy to power rides and attractions, investing in retractable roofs and enclosures, integrating virtual and

augmented reality technologies, incorporating sustainability into daily operations, and offering digital platforms that allow guests to book rides flawlessly (Guridham, 2025). These innovations not only uplift guest experiences but also enhance operational efficiency, reduce costs, and increase revenue (Mitchell, 2025; Shivnani *et al*., 2024).

Recent industry-level partnerships also highlight the growing trend of adopting technologies in the amusement, theme park, and attraction industries (Noel, 2025; Swift, 2025). In 2024, the International Association of Amusement Parks and Attractions (IAAPA) announced a three-year collaboration with Satisfi Labs, an AI-powered conversational platform provider. This initiative introduced advanced tools like large language model (LLM)-based chatbots, expo bots, and conversational search engines, designed to streamline communication, improve guest engagement, and optimize operations (Satisfi Labs, 2024).

However, while the integration of emerging technologies in hospitality and tourism operations has enhanced guest experiences and generated operational efficiencies, it also brings important challenges. Issues such as data privacy, cybersecurity, protection of consumer information, and the digital divide to ensure equitable access for individuals to modern information and communication technologies must be addressed to ensure fair and secure access to modern information technologies.

The goal of this paper is to examine and categorize emerging technology trends in the theme park and attractions industry, emphasizing the role and influence of artificial intelligence and related innovations on operations, guest experiences, and employee involvement. Additionally, the paper aims to evaluate how hospitality and tourism education can adapt to these developments to better prepare future professionals for technology-driven environments.

LITERATURE REVIEW

AI and Technology in the Hospitality and Tourism Industry

Technology-driven innovation has become a cornerstone of contemporary hospitality and tourism, transforming operational practices and redefining customer experiences. The subject has been addressed not only in trade publications and online discussions (Schwarz, 2025; Hollander, 2025) but has also attracted attention in the academic literature from multiple perspectives. Recent studies demonstrated the increasing prominence of AI and digital innovations, with most contributions focusing on technology-related service innovation (TRSI) **(**Kim and Han, 2022; So *et al*., 2023; Tai *et al*., 2021), while the collaboration between technology-related and human-related service innovation (HRSI) was less examined (Brunner *et al.,* 2023; Kandampully *et al*., 2023; Kerdpitak *et a*l., 2022).

A group of studies addressed consumer technology acceptance and revealed several critical factors. Trust plays a vital role in consumers' adoption of smart technologies (Bano and Siddiqui, 2024), while the COVID-19 pandemic accelerated acceptance of contactless solutions (Hao, 2021). Ethical concerns, such as privacy and autonomy, continue to shape consumer attitudes (Zhu *et al*., 2023). From a human resources perspective, AI influences employee engagement, productivity, and service delivery. While AI can support employees by automating repetitive tasks, job displacement and autonomy remain significant concerns (Ruel and Njoku, 2021; Limna and Kraiwanit, 2023; Tschang and Almirall, 2021). This contrast highlights the need to balance efficiency with human-centric service delivery. Other studies addressed the impact of

technology on business models (Troisi *et al*., 2023), innovative customer experience (D'Souza and D'Souza, 2023), sustainable innovation (Elkhwesky *et al*., 2024), and more.

A recent literature review of 82 articles from top-tier hospitality and tourism journals revealed that technology-driven service innovation has mainly been examined as a service or delivery method, with less attention to management, marketing, and institutional innovation. Therefore, the authors concluded that several key areas should be considered for further research, such as co-creative technology, human resource management, strategy management, emerging technologies, and digital transformation (Park *et al*., 2023).

AI and Technology in Theme and Amusement Parks

In the context of theme parks and attractions**,** scholars have studied the impact of IoT systems on ride safety and operational monitoring (Zhao *et al*., 2024), the role of VR and storytelling in enhancing visitor engagement (Oh and Kong, 2022), and consumer perceptions of supporting experiential technologies (Zhang *et al*., 2022). These studies emphasized the importance of aligning technology adoption with visitor expectations, ensuring that innovation enhances rather than replaces the emotional and sensory aspects of the entertainment experience.

Theme parks and attractions are among the most innovative sectors in hospitality because their success depends on blending entertainment with seamless operations. Advances in AI, personalization, gamification, loyalty programs, and real-time engagement are central to driving growth in this sector. For example, Disney has pioneered the use of AI in animatronics and interactive attractions that recognize repeat guests and adapt their experiences accordingly (Sahota, 2024). Likewise, wearable devices like Universal's TapuTapu enable virtual queuing and interactive experiences, enhancing convenience while reducing waiting times. A limited number of academic contributions addressed topics such as supporting and experiential technology applications in theme parks (Zhang *et al*., 2022), the development of theme park applications (Srisombut *et al*., 2021), or monitoring systems for queue management (Martínez, 2022).

The Need for Classification of AI And other Technology Applications in The Theme Park and Attraction Industry

While industry reports and trade publications highlight numerous applications of AI and other digital innovations in the theme park and attraction industry, specific empirical research examples of how AI, machine learning, and related technologies are being implemented in theme park and attraction operations, guest experience design, and workforce management are scarce in academic literature. This can be attributed to the fast-evolving nature of technology, which makes it difficult for scholars to conduct empirical research on specific applications that might become obsolete by the time their work is published. This gap underscores the need for an integrative overview that synthesizes existing knowledge, categorizes emerging applications, and identifies future educational, training, and research directions in the theme park and attractions industry.

Classifying AI and technological innovation is essential for creating conceptual clarity and advancing scholarly understanding. Because technological developments in the hospitality and tourism industry are

diverse and highly dynamic, a classification framework could help organize these innovations into coherent categories. Such classification will allow researchers to identify patterns, compare findings across studies that address specific technological applications, and highlight areas that remain underexplored. This classification can also support practitioners and educators by converting a wide array of innovations into a structured framework that informs strategic decision-making, operational integration, and curriculum development.

EXAMPLES OF TECHNOLOGY AND AI APPLICATIONS AND THEIR IMPACT ON THE THEME PARK AND ATTRACTIONS INDUSTRY

In the past decade or so, the theme park and attractions industry has undergone a significant transformation driven by the continuous introduction of artificial intelligence (AI) and advanced technologies into its operations. The key technological trends and their impact on operation and guest experience are highlighted below:

1. Technological Trends

I. Artificial Intelligence (AI) & Machine Learning (ML)

Applications: AI and ML are leveraged for personalized marketing, predictive maintenance, chatbots, guest sentiment analysis, and facial recognition. These tools allow park operators to tailor experiences, optimize operations, and better understand guest behavior.
Example: Disney Genie+ utilizes AI to generate personalized itineraries for visitors, considering individual preferences and real-time crowd data, thereby enhancing guest satisfaction and park operational efficiency.

II. Internet of Things (IoT) & Smart Technology

Applications: IoT-enabled devices facilitate smart wristbands, real-time asset tracking that monitors the location, condition, and movement of assets such as equipment, vehicles, or merchandise in real time., Other applications include intelligent lighting that can sense, adapt, and optimize lighting conditions automatically, HVAC control, and predictive queue monitoring. These solutions enable seamless operations and improve guest convenience.
Example: Universal's TapuTapu wearable at Volcano Bay supports virtual queuing and interactive experiences, allowing guests to engage with the park environment in innovative ways.

III. Contactless & Mobile Solutions

Applications: Contactless technologies encompass mobile check-in, mobile food ordering, contactless payments, and QR-based ticketing, enhancing convenience and reducing physical touchpoints.
Example: SeaWorld's mobile application enables contactless park entry, on-demand food purchases, and real-time updates on show schedules, reorganizing and improving the guest experience.

IV. Virtual & Augmented Reality (VR/AR)

Applications: VR and AR technologies are used to create immersive attractions, offer pre-visit previews, and provide AR-guided tours, enhancing the guest's experiential dimension of a theme park visit.
Example: Legoland's *LEGO Mythica* features a VR coaster that allows riders to "fly" through a fantasy world, combining entertainment with pioneering immersive technology.

V. Robotics & Automation

Applications: Robotics enhances operational efficiency through robotic cleaners, security systems, food delivery bots, animatronics, and robotic concierge services.

Examples: Universal Studios employs robotic arms in rides such as *Harry Potter and the Forbidden Journey* to ensure smooth and immersive motion, while Six Flags utilizes security robots to reinforce park safety.

VI. Data Analytics & Revenue Management

Applications: Advanced data analytics enable theme parks and attractions to implement dynamic pricing, crowd flow management, loyalty tracking, and predictive forecasting, supporting the park's operational and financial objectives.

Example: Six Flags parks have implemented dynamic pricing for tickets and in-park experiences based on demand patterns and guest segmentation, optimizing revenue and resource allocation.

VII. Cybersecurity

Applications: Cybersecurity frameworks are critical for securing guest data, preventing fraud, protecting payment systems, and maintaining privacy standards. However, the increased reliance on digital data heightens vulnerability, necessitating vigorous security measures and continuous monitoring to safeguard guest information.

Example: While the Disney company collects sensitive data through tickets, hotel reservations, *My Disney Experience* app, and MagicBands, cybersecurity safeguards protect guest privacy and prevent identity theft. These include cryption (converting readable data (plaintext) into unreadable code (ciphertext) using mathematical algorithms), tokenization (replacing sensitive data like credit card numbers with a unique random "token" that has no exploitable value outside the system), or secure authentication (verifying that someone is who they claim to be before granting access to data or systems).

VIII. Sustainable Technologies

Applications: Sustainability initiatives incorporate smart energy grids to optimize power use, waste reduction systems, conserve water resources, and develop environmentally friendly infrastructure. These measures demonstrate a strong commitment to protecting the environment.

Example: Disney World operates solar farms that supply approximately 40% of the park's energy needs during peak periods, demonstrating a commitment to sustainable operations.

TECHNOLOGY APPLICATION IMPACT ON THEME PARK AND ATTRACTION OPERATIONS

Technological advancements, especially in Artificial Intelligence (AI) and the Internet of Things (IoT), are revolutionizing theme parks and attractions, making them more efficient and cost-effective. For example, AI's capacity to process and analyze large volumes of operational data, such as guest visit history and ride preferences, allows for continuous improvement in operational efficiency. Other key benefits include:

- **Efficiency improvements,** including automated scheduling, route tracking, and traffic optimization, queue management, hazard detection and incident reporting, predictive maintenance, reduce labor requirements, and minimize attractions' downtime.
- **Cost Reduction, such as s**mart energy management, automated systems, or dynamic staff scheduling based on attendance, weather, and operational needs, reduces operational errors and costs.
- **Revenue Optimization, like d**ata-driven strategies, including dynamic ticket pricing, personalized marketing campaigns, social media monitoring and reputation management, yield management, or supplies, food, and beverage inventory forecasting, enhances profitability.
- **Predictive Maintenance:** IoT sensors and AI algorithms enable early detection of equipment failure or potential breakdowns, preventative maintenance, downtime prediction, and damage detection, justifying operational interruptions.

Example: Universal Studios is piloting an AI system for ride operations that utilizes a vision system and Convolutional Neural Networks (CNN), a type of artificial neural network specifically designed to process and analyze grid-like data, most commonly images, to interpret ride operator movements. This technology has the potential to automate the roller coaster loading process while reallocating staff to other operational tasks. While this technology application raises concerns about job security, it demonstrates AI's potential in reshuffling ride operations.

As these technologies mature, theme parks are challenged to achieve a balance between operational excellence and highly engaging, individualized guest experiences, ultimately optimizing both performance and profitability.

TECHNOLOGY APPLICATIONS IN THEME PARKS AND ATTRACTIONS: ENHANCING GUEST EXPERIENCE

Artificial Intelligence (AI) and Machine Learning (ML) have become crucial in transforming theme park operations and elevating guest experiences. By examining and analyzing real-time data, these technologies enable parks to provide highly personalized, interactive, and convenient experiences to their guests.

Key Enhancements Include:

1. **Personalization:** AI systems generate recommendations tailored to individual guest preferences by analyzing past behavior and location data. This helps guide guests to rides, dining options, shops, and post-ticket purchases, improving engagement and loyalty. Wearables, such as Disney's MagicBand, enhance personalization by managing ride entries and providing tailored recommendations throughout the park.
2. **Interactivity:** Technologies like Augmented Reality (AR) and immersive storytelling, such as Disney's *Star Wars: Galaxy's Edge*, enhance visitor participation and increase satisfaction. Interactive location-aware maps, such as those offered by Universal Orlando Resort, facilitate navigation and improve movement in the park.
3. **Convenience:** Mobile applications have transformed traditional park visits by providing real-time wait times, interactive maps, and convenient food and beverage ordering. Responsive automated guides and virtual assistants modernize ticketing, queue management, and food ordering, which improve the guest experience.

4. **Gamification:** Loyalty points, badges, and achievements encourage visitor interaction and incentivize repeat engagement, making the park experience more engaging and memorable.

These AI-powered solutions not only improve guest satisfaction but also optimize park operations, including crowd flow, staffing, and resource allocation, ultimately increasing revenue potential and operational efficiency.

INTEGRATING ARTIFICIAL INTELLIGENCE INTO THEME PARK AND ATTRACTION EDUCATION: A PROPOSED CURRICULUM FRAMEWORK

The rapid adoption of Artificial Intelligence (AI) and emerging technologies in theme parks and attractions highlights the need to prepare students for their future careers in the industry. Several academic programs have already begun redesigning their curricula and have incorporated content aimed at preparing students for the increasingly automated work environments. A few empirical studies addressed this educational trend. For example, Olatunde-Aiyedun (2024) explored the impact of AI integration on learning outcomes, student engagement, and overall educational quality. Similarly, Tong (2024) explored different approaches to incorporate technology into the curricula, such as interdisciplinary programs, hands-on projects and simulations, and industry collaborations. Tong's contribution (2024) also addressed significant challenges, such as faculty readiness, resource allocation, and ethical considerations

Park *et al*. (2023) argued that teaching Artificial Intelligence (AI) as a stand-alone subject is not effective, as AI is not a traditional stand-alone discipline. They recommend embedding technology and AI-related content within discipline-based courses to help students make meaningful connections and understand its relevance. Applied to theme park and attraction management, this approach suggests that technological advances should be integrated into the curriculum across a variety of operational and visitor experience topics. Some examples may include queue management, crowd control, food services, merchandise, rides, shows, or entertainment productions. Embedding the technological applications within existing coursework will ensure that students build both a strong technical foundation and an understanding of industry-specific practices, thereby aligning academic preparation with ever-changing industry practices and standards.

Proposed Curriculum Focus Areas

As Artificial Intelligence (AI) and emerging technologies become increasingly embedded in theme park and attraction management, traditional hospitality and tourism programs must change continuously. Future professionals must be able to navigate complex technological environments that drive innovation, enhance operational efficiency, and increase guest satisfaction. Developing a structured curriculum with clear focus areas ensures that students not only gain a foundational understanding of AI and related technologies but also learn to apply these tools strategically within operational, experiential, and ethical contexts. The following are proposed key topics to be incorporated into a theme park and attraction curriculum.

1. Foundational Knowledge

- **Basic AI Concepts:** Introduce students to the fundamentals of AI, machine learning, and automation, emphasizing their applications within theme park and attractions contexts. This introductory knowledge is essential for understanding the fundamental technologies driving industry innovations.

- **Emerging Technologies:** Familiarize students with cutting-edge technologies such as robotics, Internet of Things (IoT), Augmented Reality (AR), Virtual Reality (VR), facial recognition, and data analytics. Understanding these technologies enables students to grasp their roles in enhancing guest experiences and operational efficiency.

2. Industry-Specific Applications

- **Guest Experience Innovation:** Explore how AI facilitates personalized experiences through tailored recommendations, interactive storytelling, and immersive environments. Case studies from industry leaders like Disney or Universal illustrate the transformative impact of AI on guest engagement.
- **Operational Efficiency:** Analyze the role of AI in improving park operations, including crowd control, staffing, maintenance, and resource allocation. AI-driven solutions contribute to efficient operations and improved service delivery.
- **Safety & Security:** Examine AI's contributions to surveillance, contactless entry systems, emergency management, and health protocols. Understanding these applications is vital for ensuring guest safety and compliance with industry standards.

3. Analytical and Strategic Thinking

- **Data-Driven Decision Making:** Equip students with skills to interpret guest behavior and performance data, supporting strategic planning and operational adjustments. Emphasizing the importance of data analytics fosters informed decision-making processes.
- **Problem Solving with Technology:** Encourage students to apply AI solutions to real-world operational challenges, promoting innovation and practical problem-solving skills.

4. Ethics and Responsible Use

- **Privacy & Data Ethics:** Discuss the implications of data collection, consent, and digital tracking in guest environments. Addressing ethical considerations ensures responsible use of AI technologies. Some of these applications are already embedded in the legal systems of various countries.
- **Accessibility & Inclusion:** Examine how technology can serve diverse audiences and remove barriers to participation, promoting inclusivity within theme park experiences.

5. Professional and Soft Skills

- **Collaboration with Tech Teams:** Develop students' ability to communicate effectively with engineers, data scientists, and creative professionals, promoting interdisciplinary collaboration. This can be initiated by inviting guest speakers to the classroom.
- **Adaptability:** Encourage an awareness of evolving technological trends, preparing students to adapt to the dynamic nature of the industry.
- **Innovation Mindset:** Encourage creativity in applying technology solutions to enhance guest experiences, promoting a culture of innovation within the industry.

THEORETICAL AND PRACTICAL IMPLICATIONS

This paper contributes to the growing body of literature on technology-related service innovation (TRSI) by extending the discussion to the underexplored context of theme parks and attractions. It highlights the need to view AI not as a stand-alone discipline but as an integrative tool across diverse operational and experiential domains, currently employed in the theme park and attraction industry. The proposed curriculum framework strengthens academic hospitality and tourism education by offering a structured approach to integrating digital literacy, ethical awareness, and interdisciplinary collaboration, thereby enhancing students' readiness for professional practice.

For industry practitioners, the findings emphasize the necessity of investing in technologically competent employees who can apply AI solutions to enhance both operations and guest experiences. As theme parks and attractions embrace these innovations, they must also prioritize data privacy, workforce training, and inclusivity to ensure their sustainable and responsible implementation. It is highly recommended that theme parks and attractions share their up-to-date innovative technology with academic institutions, so students will be exposed not only to the actual technology applications but also understand the development process of these creative products. Collaboration could be implemented through classroom guest speaking, supporting the development of AI and other technological labs, or joining forces with faculty members to conduct research in this area.

For educators, the proposed curriculum focuses on areas that offer actionable guidance on integrating emerging technologies into hospitality and tourism programs. This ensures that graduates are not only technologically proficient but also capable of applying critical thinking, ethical reasoning, and creativity in real-world industry contexts.

CONCLUSION

The integration of Artificial Intelligence (AI) and emerging technologies into theme parks and attractions is transforming both operational efficiency and guest experiences. However, these advancements also present challenges related to ethics, workforce readiness, and curriculum design. This paper underlines the importance of embedding technological competencies in hospitality and tourism education, ensuring that graduates can balance innovation with the human-centered service that remains essential to themed entertainment. By aligning academic curricula with industry trends, educators can prepare students to navigate a technology-driven environment while sustaining creativity, safety, and guest satisfaction.

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LIVING SETS: QUANTITATIVE INSIGHTS INTO GUEST AGENCY IN THEME PARKS

INTRODUCTION

Today, theme parks stand at the intersection of culture, storytelling, and technology. No longer simply destinations for rides and spectacles; they have evolved into immersive environments where architecture, narrative, and interactivity converge. Their scale and rapid return potential make them powerful laboratories for testing how audiences engage with emerging media.

Despite decades of innovation, most rides remain rooted in designer-controlled, linear narratives where visitors act as passive spectators. This model contrasts with the proven success of park-wide interactive systems, such as the Wizarding World of Harry Potter's wands or Super Nintendo World's Power-Up Bands, demonstrating the appeal of micro-stories and personalized play. However, these systems rarely influence ride architecture, prioritizing throughput and safety over guest agency.

This study addresses this gap by investigating how visitors perceive personalization and agency in rides. Using survey data, it examines how guests value recognition and uniqueness, offering insights into how ride design can align with shifting audience expectations.

PRIOR LITERATURE

The study of interactivity in themed environments is interdisciplinary, drawing from media studies, storytelling, and experience design. American scholar Henry Jenkins introduces the concepts of participatory and convergence culture to describe the shift from passive spectatorship to active co-creation, in which audiences expect to contribute to and reshape stories (Jenkins, 2006). This shift aligns closely with contemporary theme design, where immersion increasingly depends on participation.

Dr. Carissa Baker (2016) notes that immersion deepens when guests play an active role, a point echoed by the designer David Younger and others (2016), who observe that "the more the guest is able to feel like they are part of the fiction, the more immersive it is" (p.86). Building on this, Baker (2018) identifies the Wizarding World of Harry Potter (WWoHP) as a turning point, explaining that it "not only recreate[s] portions of the Harry Potter story but allow[s] visitors to be inside of Harry Potter's world" (p. 55). With interactive wands, character encounters, and detailed environments, WWoHP moved beyond simply placing guests in a setting to allowing them to act, create personal moments, and shape narratives of their own, marking a landmark in guest agency through interactivity.

Earlier, Kischuk (2008) argued that interactivity should extend beyond "pushing buttons and getting an instant response" (p. 3), insisting that true narrative interactivity empowers guests to act, influence, and shape outcomes. Nearly two decades later, her critique remains relevant: despite technological advances, most attractions continue to follow linear, designer-controlled structures, often offering only cosmetic forms of interactivity that enhance surface engagement without truly altering the narrative or outcome of the ride.

Together, these perspectives reveal that although scholarship highlights the cultural appetite and technological capacity for interactivity, rides remain primarily linear and designer controlled. This research

builds on that literature by focusing on guest perceptions gathered through a survey, advancing the conversation from theoretical potential to evidence-based demand for personalization.

METHODOLOGY

The study employs a descriptive quantitative design. Data is collected through an online survey distributed across social media platforms, annual passholder forums, and personal networks. Eligibility criteria require participants to be at least 18 years old, residents of the United States, and to have visited Disney or Universal parks within the past five years. The survey covers sociodemographic information, frequency of park visits, prior experience with interactive devices, and perceptions of personalization and agency in attractions. Open-ended questions invite participants to share spontaneous impressions. While the broader dissertation employs a mixed-methods design, this paper limits itself to the quantitative survey. Focus groups and social media analyses are reserved for subsequent phases of the research.

RESULTS

At this stage, 186 valid survey responses have been collected, and findings remain preliminary as data collection continues. Results suggest that guests do not hold a consistent view of their influence over theme park narratives. When asked whether their actions shape the story, responses were divided: 34% agreed to some extent, 31% disagreed, and the remainder were neutral. This division indicates that perceptions of agency in rides are uneven and often unclear. However, a clearer pattern emerged when participants compared rides and attractions directly. Nearly 60% agreed that attractions provide greater opportunities for guest involvement and authorship, while only 13% disagreed. This suggests a broader consensus that attractions, as a format, are perceived as offering more meaningful opportunities for agency than rides.

Expectations for the future leaned strongly toward interactivity. More than 60% of respondents agreed that rides would be more enjoyable if guest choices shaped the story, while only 13% disagreed. When asked to select preferred forms of personalization, “different story paths” emerged as the most popular option, followed by “hidden special effects and collectibles.” Together, these results highlight a clear appetite for personalization that strikes a balance between replay value and small moments of discovery, without compromising narrative coherence.

Qualitative responses reinforced these trends but also revealed a paradox. Guests frequently described attractions such as Avatar Flight of Passage, Star Wars: Rise of the Resistance, and Harry Potter and the Forbidden Journey as favorites, citing immersion, storytelling, and interactivity as central to their appeal. Roller coasters like Jurassic World VelociCoaster and Guardians of the Galaxy: Cosmic Rewind were similarly praised for variety in speed, music, or sequences, even though these elements involve limited or no true agency. This suggests that guests often perceive interactivity where it is minimal, implying that even small increases in genuine agency could create amplified perceptions of interactivity.

Beyond the park context, respondents linked exclusivity to everyday forms of personalization, such as name recognition, customized products, and tailored services. They also emphasized the importance of convenience, priority access, and meaningful human interactions that made them feel acknowledged. Additionally, respondents highlighted hobbies, clothing style, tattoos, and other personal choices that facilitate self-expression. These observations suggest that the appeal of personalization in themed entertainment reflects broader cultural values related to individuality, recognition, and agency.

IMPLICATIONS FOR SCHOLARS/ INDUSTRY

This research makes two contributions. Academically, it advances the debate on guest agency in rides by showing that visitors perceive limited influence in current attractions yet express strong interest in greater personalization and interactivity. This challenges assumptions that narratives must remain solely designer controlled. For the industry, the findings offer valuable insights for designing attractions that strike a balance between operational efficiency and personalization.

At this stage, the contributions draw on partial survey data, pointing to clear trends in guest expectations. Upcoming qualitative stages, including focus groups and social media analysis, will further deepen this understanding by examining how guests describe their sense of agency, portray theme park experiences online, and engage with attraction narratives. These insights will refine preliminary findings into more robust design strategies.

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BETWEEN TWO WORLD: NAVIGATING THE TENSIN BETWEEN FANTASY AND REALITY IN THEMED EXPERIENCES

In themed entertainment, the spaces we create are not simply containers for content- they *are* the content. These are not merely environments in which experiences occur- they *are* the experience. Designed worlds that must feel immersive, yet safe. Evocative, yet comprehensive. Familiar, yet extraordinary. And at the heart of this delicate balancing act lies a productive and often under-appreciated dynamic: the tension between fantasy and reality.

This tension is not a design flaw to overcome- it is the very medium in which we work. To design compelling, believable experiences, we must first understand how to calibrate that tension, how to manipulate it, and how to invite our audiences to participate in it. Mastery of this balance is essential for success in any themed experience, whether it's an immersive land, a single attraction, a brand activation, or a retail environment.

This presentation explores that creative tension in depth, drawing from key principles outlined in my book *Creating Memorable Worlds*- particularly from the sections titled **"Artificial Environments"** and **"The Art of Storytelling."** These two domains- spatial construction and narrative structure- are deeply interwoven in the themed entertainment industry. Together, they shape audience perception, guide emotional rhythm, and foster immersion that lingers far beyond a guest's visit.

Artificial Environments are the building blocks of our medium. They are purpose-built physical constructs that simulate or suggest alternate places, times, and realities. Though wholly fabricated, they must still feel coherent, credible, and meaningful. The success of these environments does not hinge on hyper-realism. Rather, their believability stems from a consistent internal logic- alogica set of visual, spatial, and emotional cues that allow the audience to suspend disbelief. Guests are not passive spectators in these worlds; they are active participants. The environment proposes a world, and the guest, knowingly and willingly, agrees to believe in it. This moment of "voluntary disbelief" is not a failure of logic, but a leap of trust—and it's in this space that the tension between fantasy and reality is most vividly negotiated.

To support that negotiation, we as designers rely on shared human perception. Our minds are wired to make sense of space through memory, patterning and often metaphor. We borrow recognizable architectural elements, culturally resonant forms, familiar materials, and logical flow. But we do not present them in purely realistic terms. Instead, we heighten or compress, romanticize, or abstract. We use the language of the real to tell a story that is *more than* real—an idealized expression of place or idea. A medieval town might be cleaner and warmer than history remembers. A spaceship might contain familiar industrial design to help us navigate. A sacred grove may echo with archetypal cues that transcend culture. The goal is not accuracy- it is emotional truth.

And this is where the art of storytelling becomes not just helpful, but essential. In themed experience design, story is not decoration- it is *structure*. It is the invisible scaffolding that gives shape to every surface, every sound, every step. In The Art of Storytelling section, I describe how every environment begins with a thematic core: an emotional or intellectual truth the experience is meant to explore. From this seed, a layered narrative grows- infusing decisions about architecture, landscape, lighting, materiality, music, and interaction. Every narrative carries within it a protagonist, a challenge, a theme, a progressive pace, and ideally, a

transformation. In a well-designed space, the guest becomes that protagonist. Their journey—both physical and emotional —is carefully choreographed through the environment using spatial rhythm, sensory layering, and intellectual engagement. These cues are subtle, but powerful: an arched entrance that narrows the guest's field of view; a material change underfoot that signals transition; a soundscape that draws attention or foreshadows conflict.

Importantly, storytelling in these contexts is not *overt*. It is not about instructing guests what to feel or understand. Rather, it's about constructing the conditions under which meaning can emerge organically. A path may open wide into wonder, compress into suspense, or gently invite reflection. These moments function like scenes in a cinematic arc, but without the need for dialogue or exposition. They are felt rather than told.

In doing this well, we don't ask guests to abandon reality. We invite them to hold two realities in tension. The one they know, and the one they're stepping into. Themed environments do not succeed because they offer pure escape; they succeed because they offer a reframe—a new lens through which to consider the familiar. Fantasy, in this sense, becomes a mirror, a metaphor, or even an aspiration. Reality is not denied—it is illuminated.

But this delicate equilibrium is not guaranteed. When handled with care, the tension between fantasy and reality produces environments that are deeply engaging and resonant. When handled poorly, the illusion can collapse. Over-design— through excessive detail, forced narrative, or visual noise—can feel overwhelming or inauthentic. Under-design, on the other hand, risks losing the audience's trust. Gaps in logic, inconsistent tone, or unclear progression can cause confusion or detachment. Every texture, sound, transition, and narrative beat contributes to the cumulative experience. And each of these elements must be in service to a coherent world—one that knows what it is, what it wants to say, and how it wants to be felt.

This presentation is not a technical breakdown, nor is it a rigid methodology. It is a conceptual lens—a creative provocation designed to encourage reflection at every level. In 15 minutes, it offers a framework for rethinking the role of narrative and spatial design in immersive work. It prompts attendees to ask themselves: How much reality is needed to give fantasy weight? How do we invite belief without demanding it? Where does illusion end and interpretation begin?

As our industry continues to expand—into digital spaces, branded environments, educational institutions, healthcare, and beyond—these questions become more relevant than ever. Themed design is no longer confined to parks and attractions. It is rapidly influencing how people learn, shop, heal, connect, and work. And in every case, the same foundational tension remains: how do we shape experiences that are both extraordinary and deeply human?

In the age of "immersive everything," expectations are shifting fast. Today's audiences are sophisticated. They've grown up with games, films, apps, and hybrid spaces that blur entertainment and function. They arrive at our experiences with expectations and biases for what feels coherent, what feels cliché, and what feels authentic. To capture their attention—and more importantly, their hearts—we must do more than impress them. We must offer them something *meaningful*. Something that resonates. Something they can believe in, if only for a moment. And belief, after all, is the greatest currency of the themed experience.

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THE FACTORS OF EXPERIENCE MODEL: MEASURING THE GAP BETWEEN THE FANTASY OF ACCOMODATED GUESTS AND THE REALITY OF DISABLED EXPERIENCES

BRIEF ABSTRACT

Theme park guest enjoyment and satisfaction is core to the academic study of themed entertainment, yet existing studies often treat guests as a monolith without accounting for the wide variety of experiences related to accessibility or connecting the reality of guest experiences to choices made in the design process. This study proposes the Factors of Experience Model as a new framework for more precisely quantifying factors affecting guest experience. Using a survey of U.S. theme park visitors, both disabled and non-disabled, we identified and quantified three factors that make up a major component of guest experience: stigma, planning, and interpersonal issues. Notably, it was found that common accommodations that involve separation from other guests or group splitting resulted in significantly higher experiences of stigma and negative interpersonal factors, suggesting the key idea that failures of design that create the need for accommodations requiring separation and splitting have downstream effects that could otherwise be misattributed in an isolated analysis. By providing comparable objective measurements through which to study accessibility of themed environments and guest experiences, research can further inquire whether particular aspects within development processes have measurable and consistent effects on the accessibility of the built environment.

EXTENDED ABSTRACT

Studies of guest experience and enjoyment of theme parks are a common feature of themed entertainment literature; however existing studies rarely break down the monolith of guests to examine the different ways people experience theme parks beyond a single factor. Further, literature on design processes and decision making for themed entertainment is nearly nonexistent and certainly does not connect design processes to their influence on the guest experience. To address this gap, this study used a quantitative analysis of guest experiences relating to accessibility to propose a new framework to quantify the different factors affecting guest experience. We conducted an anonymous structured survey of 134 theme park visitors in the United States, including both disabled and non-disabled respondents.

The survey aimed to more precisely study the different ways people experience theme parks beyond the single factor of "enjoyment," and to see how design decisions regarding who is or is not considered cause variation and inequality of experience for different groups. Thus, we began by quantifying the factors affecting guest experience. It is important to have these multifaceted and quantitatively meaningful measures of experience, since traditional single axis measures of satisfaction have little discriminative variability in practice, especially as theme parks have particular desirability biases, and when considering people with disabilities who may have very different experiences but have also acclimatized to different expectations regarding overall satisfaction. The flattening of overall satisfaction is precisely what we found, as 60% of participants reported the highest possible "extremely positive," and 36.9% of

participants reported “somewhat positive” overall enjoyment of their experience; with only two reporting “somewhat negative” and none reporting “extremely negative” experiences. Therefore, while overall enjoyment remains a factor to study regarding guest experiences, it hides much of the underlying variability of how different people experience the parks.

The survey presented a series of 16 statements describing different aspects of experience and participants selected the degree to which they agree or disagree with how each statement describes their most recent theme park experience. We mapped these responses onto a linear scale and conducted a factor analysis to extract the primary independent factors that best explain the variance in overall guest experience responses (Figure 1), determining three as the optimal number for subsequent analysis.

Conducting factor analysis with three factors for the full valid survey response dataset accounted for 46% of the variance in the responses. Thus, while this implies that the analysis on the three factors in this study makes up a major component of guest experience, more research is needed to develop future models to explain different aspects of guest experience in greater detail.

Factor 1, called the ***Negative Stigma Factor***, explained the greatest degree of response variance and was most associated with statements related to the subjective experience of feeling judged, separated, stigmatized, and unequal. Factor 2, the ***Negative Planning Factor***, explained the next highest degree of variance and was most associated with statements related to the ease or difficulty of planning and navigating the trip. Factor 3, the ***Negative Interpersonal Factor,*** was most associated with statements related to negative interpersonal experiences with park staff and systems.

Together, these factors outline three distinct, independent ways in which guests may have a more negative experience and thus represent three primary goals by which to understand how these kinds of experiences are designed. Notably, the factors of experience represent a much wider range of experiences, both positive and negative, than reported enjoyment which was overwhelmingly positive (Figure 2) and less distinguishable. Therefore, these factors outline a more detailed way to study how particular groups experience parks differently, and what interventions may be most helpful.

Establishing the factors of experience as an outcome variable, we can analyze how different predictors affect them in distinct ways. We analyzed the three factors of experience model as the dependent outcome variable to compare the factors that different groups delineated by various independent variables. We found no statistically significant difference in the planning or interpersonal factors between those who identify as having a disability and those who do not, a surprising result owing to the additional steps required to research and secure accommodations. The only statistically significant difference between these groups is in the stigma factor ($p=0.0014$), where disabled guests report an average stigma factor of 0.35, compared to non-disabled guests’ average of -0.18, an effect which persists beyond just the disabled individuals themselves to all guests in a party that includes disabled individuals. This is a highly significant and sizeable effect and demonstrates how the principal mediation of negative experiences for people with disabilities does not relate to the systems they navigate or accommodations they require per-se but rather, as explained in the social model of disability, negative experiences are primarily driven by the social systems of judgement, exclusion, and stigmatization.

One hypothesized mechanism contributing to experiences of stigma, specifically regarding accommodations, is separation from other guests and group splitting, as many current park solutions to accessibility rely on alternate experiences. People who were separated from the standard guest experience reported significantly higher stigma ($p=0.003$) and negative interpersonal factors ($p=0.024$). The substantial effect of separation on the stigma experience factor indicates its potentially primary role as a mediating mechanism for stigma among disabled guests. Groups that were internally split showed similar but slightly different profiles of experience from those that were separated. Group splitting had a smaller effect on the stigma factor ($p=0.03$) but a larger effect on the negative interpersonal factor ($p=0.0001$). This effect of group splitting on the interpersonal factor is the largest effect by any variable on any factor in the analysis. Additionally, unlike separation, group splitting produced a statistically significant effect on the negative planning factor ($p=0.03$), potentially due in part to difficulties associated with things like assistance and caregiving for people with disabilities, which may be impossible or greatly complicated by being split.

The significant effects of separation and group splitting on the negative interpersonal factor, the factor most directly linked with reduced reported enjoyment, is indicative of an essential idea: that failures of *design* that create the need for accommodations requiring separation and splitting have downstream effects, such as interpersonal and customer service issues, that would otherwise be misattributed in an isolated analysis. By finding and describing the mediative mechanism of separation and its relation to downstream effects, this work provides a more powerful interpretive lens for actionable changes and correct attribution of the failures of design rather than failures of individual park employees.

This work introduces the Factors of Experience Model, a novel, detailed framework for analysis of theme park guest experiences. The study provides stronger, more empirically grounded terms and concepts to structure and evaluate the criteria of accessibility *as it actually meaningfully affects the experiences of people* and can thus provide a resource for designers and decision makers in industry as well as academia to better understand why design choices are made. By providing comparable objective measurements through which to study accessibility and inclusivity of themed environments and guest experiences, research can further inquire whether particular aspects or practices within design and development processes have measurable and consistent effects on the accessibility of the built environment. These inquiries can establish the basic ideas of the most relevant design considerations, how they might interact with people, and the perception and consideration of accessibility within development, thus providing a foundation for meaningful change.

Tables and figures continued on next page

TABLES AND FIGURES

Respondent Disability Status				
Category	***N***	**Percent**	***N***	**Percent**
Self Identity	***Disability (N = 141)***		***Neurodivergent (N = 142)***	
Does Not Identify	97	68.79 %	89	62.68 %
Does Identify	38	26.9 5%	44	30.98 %
Prefer Not to Answer	4	2.84 %	5	3.52 %
Other	2	1.42 %	4	2.82 %
Visited With	***Disability (N = 142)***		***Neurodivergent (N = 142)***	
Did Visit	75	52.81 %	72	50.70 %
Did Not Visit	56	39.44 %	56	39.44 %
Unsure	11	7.75 %	14	9.86 %
Disability and Neurodivergence Overlap (N = 127)				
Category	***N***		**Percent**	
Both Disabled and Neurodivergent	29		22.83 %	
Neither Disabled nor Neurodivergent	78		61.42 %	
Disabled but not Neurodivergence	8		6.30 %	
Neurodivergent but not Disabled	12		9.45 %	

Table 1: Survey respondent disability demographics

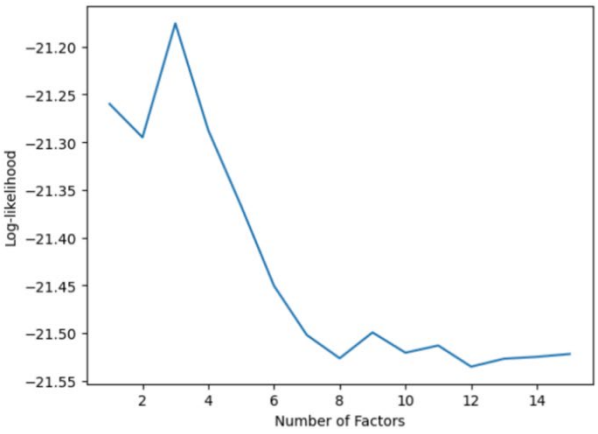

Figure 1: Cross Validation Comparison of Log-likelihood of

Different Factor Analysis Dimensions

Planning and navigating my trip was straightforward	-0.11	**-0.82**	-0.26	0.37
I felt like I could find or get the answers I needed without too much trouble	-0.28	-0.40	**-0.52**	0.55
I feel I am able to visit without extensive prior planning	-0.27	**-0.87**	+0.10	1.12
I felt like my needs were an afterthought	**+0.57**	+0.40	+0.45	0.52
I felt limited in what I could experience	**+0.57**	+0.39	+0.28	1.00
I felt judged	**+0.73**	+0.19	+0.16	0.43
I felt I was given agency over my experience	-0.23	-0.29	-0.33	0.65

Statement	Factor 1 (Stigma)	Factor 2 (Planning)	Factor 3 (Interpersonal)	Noise Variance
I felt my privacy was respected	-0.19	-0.25	-0.28	0.52
I felt heard and understood by cast/team members	-0.21	+0.00	**-0.75**	0.36
I felt respected by cast/team members	-0.17	-0.08	**-0.54**	0.35
I felt comfortable and included in the park	**-0.53**	-0.21	-0.27	0.33
I felt like the park was designed with me in mind	-0.48	-0.12	-0.41	0.72
I was able to experience everything I wanted to	-0.26	-0.42	-0.37	0.94
I feel like my experience was equal to that of any other guest	**-0.65**	-0.32	+0.03	0.67
I felt singled out	**+0.64**	+0.12	+0.17	0.33
I was embarrassed or uncomfortable due to my needs	**+0.72**	+0.23	+0.26	0.56

Table 2: Components of the factors of experience and the contributions of each statement. Bigger positive numbers mean a more positive relationship between the factor and the statement, larger negative numbers mean a larger inverse relationship, while small values indicate little or no relationship. Key statements for each factor with absolute values greater than 0.5 are bolded. Noise

variance is the overall variance of the statement responses after taking into account the factor analysis, larger values indicate statements that are less well explained by the existing 3 factors while small values indicate statements which have variability better explained by the model.

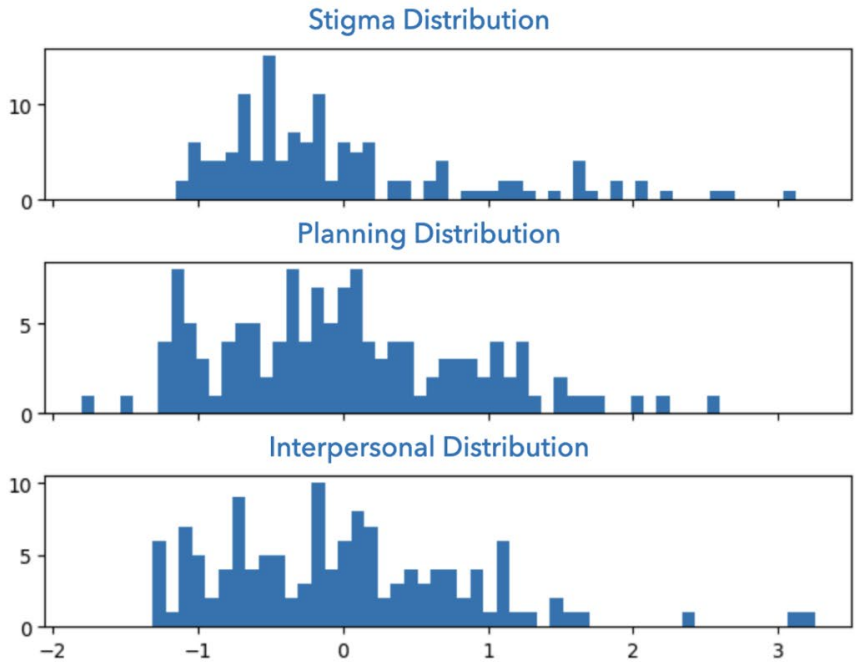

Figure 2: Histogram Distributions of the Factors of Experience. The resultant distributions are close to normal and distinguish a wide range of experiences when compared to the highly concentrated results of reported enjoyment.

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On the neuroaesthetics of themed entertainment: A brain study on the environmental aesthetics of themed compared to real-world environments

Themed entertainment environments are meticulously designed to (among others) evoke aesthetic experiences that shape visitor motivations, behaviors and well-being. Such aesthetic experiences are crucial in distinguishing themed environments from those found in everyday life. Drawing from environmental psychology, empirical aesthetics and neuroaesthetics, this study investigates how the aesthetic experience dimensions of coherence, fascination and hominess contribute to distinguishing themed from real-world environments, thus comparing fantasy with reality. Based on the general characteristics of themed entertainment design, we hypothesize that themed environments are experienced as more coherent, fascinating and homy compared to real-world environments. In testing these hypotheses, we conducted an experimental study in which participants were presented with images of built and natural environments in both themed and real-world contexts while their brain activity was recorded via electroencephalography (EEG). Participants then had to evaluate these pictures on the dimensions of coherence, fascination and hominess. As hypothesized, self-report results show that themed environments are perceived as more fascinating. However, against expectations, themed environments were perceived as less coherent than real-world environments, with no significant differences in hominess. EEG data, currently under analysis, will be used for further insights into the underlying neural dynamics of these findings.

INTRODUCTION

Themed entertainment relies heavily on meticulously designed environments, where aesthetic experiences serve as a foundational element in shaping the themed entertainment experience. Aesthetic appeal is not only important in shaping visitor motivations (Cornelis, 2017) but is also influencing many other aspects of the themed entertainment experience, ranging from purchasing behavior to the enhancement of subjective well-being (Cuypers et al., 2012). These effects make aesthetics a key consideration for both themed entertainment consumers and providers. Understanding how aesthetic experiences function in the themed entertainment context is therefore not only academically relevant but also has significant implications for industry practices. Given themed entertainment's character as being a counter-structure to everyday life (Freitag et al., 2023), it is particularly relevant to understand how aesthetic experiences contribute to its distinctiveness when contrasted with the ordinary qualities of real-world environments, thus comparing fantasy with reality.

Environmental aesthetic experiences

Aesthetic experiences can be understood as perceptual experiences that involve elements of evaluation, affective absorption and meaning processes (Vessel, 2022). They often contain a conceptual component as well, such as understanding what a work of art represents, and are often paired with feelings of beauty or pleasure, although they can also evoke more nuanced emotional responses, such as feelings of the sublime or being moved. The field of empirical aesthetics is involved with understanding such experiences, with the field of neuroaesthetics making a connection to its neural and behavioral basis in specific. Environmental aesthetics, then, is the niche that is concerned with aesthetic experiences of environments, both built and

natural, and has a longstanding tradition in scholarship (see Brady et al., 2020 for review). However, the neuroscience of architecture is just beginning to advance (Chatterjee et al., 2021).

Environmental aesthetic experiences come in many qualities. A recent strand of research (Coburn et al., 2020; Weinberger et al., 2021) has uncovered that these qualities tend to cluster together on three underlying dimensions: coherence, fascination and hominess. Coherence refers to the extent to which a space 'hangs together' and is organized and structured, as well as the extent to which one could easily orient oneself around the space (Van der Jagt et al., 2014). Fascination refers to the extent to which a space contains diverse elements and features and would be interesting to explore further (Van der Jagt et al., 2014). Hominess refers to the extent to which a space feels at home, comfortable and personal (Coburn et al., 2020; Weinberger et al., 2021). The dimensions of coherence and fascination can be embedded in the landscape preference matrix of Kaplan and Kaplan (1989), a model that is well-established in environmental psychology to explain how people evaluate and respond to natural environments based on informational needs. The dimension of hominess is a novel finding by Coburn and colleagues (2020).

Coherence, fascination and hominess in themed entertainment versus reality

Compared to everyday real-world environments, themed entertainment spaces can be hypothesized to be more coherent, more fascinating and more homy. Their coherence stems from the careful orchestration of its design around a unified theme (Lukas et al., 2023), while their fascination is driven by their design's emphasis on sublimity and emotional impact (Mitrasinovic, 2006). Their sense of hominess arises from the hospitality context of themed entertainment, often characterized by choices for positive themes and settings in their design (Strijbosch, 2019). However, these suggestions are largely inferred from theoretical discussions rather than being supported by empirical evidence.

Methods

To test these hypotheses, we presented a large set of pictures depicting both natural and built environments in both theme park and real-world settings (i.e., a 2x2 design), which they were asked to rate on the experienced sense of coherence, fascination and hominess. During the presentation of the pictures, we recorded their brain activity using electro-encephalography (EEG). While early work (i.e., Coburn et al.'s (2020) reanalysis of existing fMRI data) has linked coherence, fascination and hominess to activity in areas of the visual cortex commonly associated with visual processes (Coburn et al., 2020), an electroencephalographic (EEG) approach may offer crucial complementary insights. Unlike fMRI, EEG captures the brain's rapid coupling and uncoupling of functional networks, making it well-suited for exploring the temporally dynamic nature of aesthetic experience as found earlier (Strijbosch et al., 2022).

Results

Early results of the self-report data show that themed entertainment environments were evaluated as more fascinating than real-world environments, which is in line with our expectations. However, contrary to our expectations, themed environments were evaluated as less coherent than real-world environments. There were no differences in hominess between themed and real-world environments. Additionally, several differences were found on theses dimensions between built and natural environments, regardless of them representing a themed entertainment or real-world setting.

Analyses of the EEG data are being finalized at the moment of writing. These, in addition to an elaborate discussion of the self-report data described above, will be presented at the Themed Entertainment and Attraction Academic Symposium in Orlando (FL) in 2025, together with plausible explanations and interpretations of these findings.

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PLAY IN THEME PARKS: A CASE STUDY OF DISNEY'S GALAXY'S EDGE

BRIEF ABSTRACT:
In this talk I will look at the emerging status of play in Disney theme parks via a case study of Galaxy's Edge. Drawing on in-park fieldwork and interviews, I examine how the company continues to explore ludic and playful experiences on property. Of particular interest is what happens when emergent and participatory guest engagement occurs within these spaces of play, at times in tension with Disney's governance and rules. This piece looks at both the sociotechnical assemblage of play being constituted in-park, as well as the grassroots practices and meaning making of guests.

EXTENCEC ABSTRACT:
Theme parks have long been spaces of playfulness scaffolded upon designed engagement. Fascinating initial work exploring the role of games and play within theme parks (Baker 2016, Moulton 2022, Pearce 2007, Raffe et. al. 2015, Raz 2002, Schell & Schochet 2001), as well as important analysis on the socio-technical side of being on property (Terrell 2024, Vertesi 2023) has proven there is a rich vein to mine in this direction. This talk will pick up these threads and seek to extend the line of inquiry.

As an ethnographer with expertise in games and play communities who is now undertaking a larger study focused on play in theme parks, I reflect on the ways these spaces increasingly seek to leverage a ludic modality in guest engagement, often with an eye toward more immersive experiences. Two components structure the analysis: the socio-technical experience facilitated through the Play app on guest's mobile phones and the more general invocation to play via spatial design, rides, theming, and artifacts. I bring an attention to the specificities of play as an assemblage, constructed by both formal designed artifacts and the emergent processes of players (Taylor 2006).

Drawing in my fieldwork over several years at Disney properties, as well as interviews with guests, in this talk I will explore one slice of play in the parks via a case study of Galaxy's Edge, the section of the park thematized as the fictional planet of Batuu that guests are invited to imagine they are on while visiting (Eddy et. al. 2020, Geraghty 2022, and Williams 2019).

Galaxy's Edge is a fascinating experiment in merging ludic-sensibilities and immersive aspirations with a theme park experience from the ground up. I explore not only how guests are using the space, but also moments of tension between emergent practices and Disney's construction of a designed play world.

The Disney Play app has offered an interesting glimpse into how the company is making moves to bridge more explicitly into digital gaming within the parks. Though Disney has long offered a variety of games on property (*Sorcerers of the Magic Kingdom*, a collectable card game being notable), the Play app and its variety of mini-games offer a clear way-pointing to ludic engagement. Notable for this discussion is the development of a specific game experience unique to Galaxy's Edge via the *Datapad*. In it, guests construct a character, can complete a variety of "quests," and interact with the environment. Experience cumulates over time and there is a digital currency within the app in the form of "credits."

Figure 1. Screenshots from the Datapad app that allows you to interact with physical locations within Galaxy's Edge (example of which also shown).

Building on elements reminiscent of other AR and mobile games but uniquely located within the framed experience of the Disney park, the instrumented socio-technical space of Galaxy's Edge offers an interesting peek into emerging ludic theme park experiences. While the formal aspects of this game are important, drawing on my empirical research I focus here on some of the tricker facets of this experiment.

Figure 2. Guests playing in Batuu using the Datapad

In particular, I explore issues around stunted multi-player potential, help and mentorship (either formal or user-based), and uneven integration into the overall experience. I suggest these point to places where insights from game design and game studies have not quite made their way into theme park spaces interested in evoking play. As one of my interviewees put it, "Galaxy's Edge had all these grand plans about interactivity. They built a play board specifically for play. And then when they released it, they didn't give you the pieces." Guests who come to the *Datapad* with gaming experience or interest in really inhabiting Batuu can find the promise of play unfulfilled. While there is a clear ambition by Disney to leverage ludic and immersive experience, several important issues hinder its full realization.

Beyond the *Datapad* as a site of play, I also explore the ways guests are working beyond the formal designed experience. As is often the case in play communities, participatory modalities are central to how engagement unfolds. Grassroots forms of social organization and collective action, as well as unique and generative practices that extend the boundaries of formal action are consistent features in game communities.

In the case of Galaxy's Edge, we can see this happening in aesthetic, interactive, and social spheres. Disney-bounding, cosplaying, and kitbashing (customizing your phone case Star Wars theming) are all ways in which guests attempt to more fully embody a playful immersive experience on property (Williams 2023). As one of my interviewees who came dressed up to Galaxy's Edge put it, "I got to basically spend a day in Disneyland, dressed as a screen-accurate Jedi, which actually made walking through the Star Wars Land a totally emotional experience. I actually started weeping."

Creative user-generated practices have also emerged in the space through activities such as light saber nights or special meetups where guests attend in-character. Perhaps most interesting—and as homage to the now shuttered *Galactic Starcruiser*—are the handful of guest-created on property homebrew LARPs (live action role play), using the fictional space of Batuu and its physical structure as game setting (for more on the *Starcruiser*, see Murphy 2023). In this piece I offer a number of these examples, discussing what it looks like on the ground when fans repurpose a space like Galaxy's Edge in ways that exceed what Disney has provided.

As one might imagine, these guest-driven practices are often walking an interesting tightrope with Disney's desire, and need, to govern the space. As the woman I quote above clarified about her experience, "I showed up at security, and I actually got held for a while. They brought their supervisor over and he looked at me and said, 'We're going to let you through, but just know these rules.' And I said, 'Yes, of course. Of course!'" Akin to the tricky moments that have arisen in massively multiplayer gaming where user activities are sometimes in tension with that of the formal designers, we see similar moments in the parks.

Figure 3. Disney's cosplay guidelines for Galaxy's Edge from "Dressing the Part" official guidance (6/10/19).

At times tied to a concern about child safety, at other moments focused on guest experience or IP issues, grassroots activities that flow from players present challenges to curated environments.

Guests who are pushing to expand their play and immersive experience on property are often very aware of the boundaries they are pushing and are taking care to carefully navigate them (for more on fan self-policing in the park, see Baker 2016). We can simultaneously sense Disney working through unknown territory itself as it ventures into more gaming and immersive content, where the potential of play often exceeds it formal structures.

In this piece I work to build on lessons from STS and game studies about the intersection of emergent user practice and designed systems. As Disney continues to develop immersive sociotechnical spaces within the parks, such

as offered by Galaxy's Edge, putting research from these fields into more direct conversation with scholarship in theme park studies will likely prove a generative intersection. Making sure to include empirical work that looks at the actual experiences of guests, and not only the formal designed properties, is also crucial. This piece hopes to offer an early contribution to this endeavor.

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GROWTH AND EVOLUTION OF AN EXTRACURRICULAR DESIGN COMPETITION FOR UNIVERSITY STUDENTS PURSUING PROFESSIONAL INTERESTS IN THEMED ENTERTAINMENT

BRIEF ABSTRACT

This paper reviews the evolution of an extracurricular themed entertainment design competition from inception in 2014 to the 10th edition in 2025. This account begins with the original educational intent of the competition to reinforce human-centred approaches to engineering design, and describes an action-research approach of revisions based on observation and reflection. Positive experiences produced growth, necessitating some of the revisions. Other adjustments arose from the need for interdisciplinary collaboration and reflections on the priority of winning within the educational setting.

The competition has exposed over 1,000 diverse students to attractions industry careers, including many in engineering programs, many of whom pursue industry careers after university. Continued production of the competition will increase the complexity of managing growth, and will require consideration of remaining unsolved issues, including discrepancies in participant costs, international mobility, and adapting to the implications of the use of GenAI in the context of education and assessment.

INTRODUCTION

Themed entertainment professionals comprise a variety of backgrounds relevant to the many decisions, designs, and sustaining processes involved with business investment, entertainment production, engineering implementation, and operation. No single academic program prepares any student for practice of all of those professional disciplines in the unique context of this industry.
Academic programs exist that incorporate specific education about themed entertainment as an industry, complementing education about a specific professional discipline. For example, theme park operations can be incorporated into a wider hospitality and tourism program. Programs in entertainment or environmental design fields may offer a themed entertainment design focus. Curricular offerings may range from single courses to clusters of courses or concentrations, to degree programs specializing in themed entertainment.

Despite the need for engineering talent to sustain efficient and safe operations and continue innovation, and despite the keen interest in the industry among many engineering students, no academic programs specific to amusement ride and show technological innovations exist within engineering education. A designated amusement attractions engineering program is unlikely, and even establishing elective courses is difficult within engineering accreditation (Woodcock, 2024).

Despite this, many engineering students are keenly interested in the themed entertainment industry. Fortunately, the industry is also interested in them to meet future professional labour needs (IAAPA, 2025a). IAAPA Foundation has said, “Jobseekers often are unaware of the professional careers available in the attractions industry. They focus on the industry’s frontline positions and they are often unaware of the rewarding professional, behind-the-scenes career opportunities in the industry.”

Engineering students have used extracurricular learning experiences including attending conferences and meetings of industry organizations such as IAAPA, Amusement Industry Manufacturers and Suppliers (AIMS),

Themed Entertainment Association (TEA), and ASTM International Committee F24, and participating in competitions to enhance their application for work-integrated learning opportunities via industry internships, co-op placements, and work terms with theme park engineering groups, manufacturers, and specialist consultants.

ORIGIN STORY

A weakness in engineering design education was seen as designers' continued attribution of product dissatisfaction to user deficiency – "Where did you find such stupid users?" as paraphrased by Neilsen (2001) – rather than to the designer's failure to effectively design for users. With amusement rides, the purpose is for the user to enjoy it. User dissatisfaction cannot be attributed to the user's failure to enjoy it "correctly". The user is indisputably the last word.

Privileging the user as the arbiter of effective design is a key learning goal that is inconsistently delivered in engineering education. Less than 1.5% of engineering courses include human factors / ergonomics content, and less than half of engineering programs have any such courses (Black & Neumann, 2025).

Not only is prioritizing user needs inescapable in design of amusement rides and attractions, but amusement rides are generally familiar and appealing to the university undergraduate demographic, making them a strong pedagogical asset. In addition, situating design education within the domain of attractions provides a way for students to learn more about the specifics of this industry that is otherwise given little attention. Onerous engineering accreditation mandates make a designated amusement attractions engineering program unlikely, and even elective courses difficult (Woodcock, 2024).

Despite these advantages, efforts to overlay ride and attraction design onto engineering design education were met with resistance from the engineering education establishment. Some resistance commended the principles but cited insufficient student exposure to the subject matter lead, while other resistance asserted that the attractions industry was irrelevant, fringe, or trivial.

With student support, an extracurricular competition was organized in 2014, inviting other universities to participate in an educational day at Canada's Wonderland, and a competition day with three challenges. Teams from three Canadian universities and one U.S. team attended the event in Toronto, with a fifth university in the U.S. participating remotely in part of the competition.

At the invitation of Universal Creative, a second edition was planned in 2016, held in Orlando consecutively to IAAPA Expo, to optimize access to professionals for challenge juries, and facilitate student exposure to the International Association of Amusement Parks and Attractions. This initiated a process of Action Research: actions, reflections on the results, and revision through collaboration with stakeholders toward solving a pressing concern. In this case, the concern is the shared interest of educators, employers, and inspiring aspiring professionals to facilitate preparedness of engineering students, in particular, who lack access to formal curriculum. A previous report described the competition as "stopgap curriculum" (Woodcock, 2019) for these engineering careers. This paper expands on the observations and reflections, and the responsive revisions and includes an additional six editions of the competition, now known as Toronto Metropolitan University Thrill Design Competition (TMTDC).

CORNERSTONE

As a starting point, the competition emulated other engineering competitions. However, unlike a competition to determine who best demonstrates the use of an established body of knowledge or techniques, participants could not be expected to have formal preparation in the design of amusement rides or themed attractions. That being the case, the competition itself becomes an educational experience, not merely a summative assessment of education to a common standard.

Both the experience of tackling the challenge as a group and the feedback and results of the presentation are learning opportunities. The focus of the learning is on design, which entails creativity and innovation. Spontaneous, ambiguous prompts were chosen as the essence of this. Structured specifications and ample preview and preparation time would showcase the capacity for accessing reference materials and working out solutions following directions and formulas. Spontaneous, ambiguous prompts require participants to digest design briefs and define the problem by extracting needs through a human-centered design approach. Familiarity with the theme park domain is a significant asset, in that it provides insight into the ultimate goals of the patrons and operators, and knowledge of technologies that are used and have been used. Access to this knowledge about theme parks is a function of prior opportunities to pursue special interests, family resources permitting theme park vacations, and coincidences of geography affording part-time / seasonal work in the industry.

The competition addressed this inequity with an educational day featuring site visits interpreted by subject matter experts to brief participants on information that would be beneficial for responding to the challenges, then introduced challenges onsite, with a day to produce the designs. Based on other engineering competitions, student organizers scheduled the challenges to run concurrently, with teams visiting jury panels consecutively.

ADJUSTMENTS

The concurrent schedule limited students' access to learning from each other or the feedback received by other teams. However, the professionals saw promise for the competitive presentation concept, leading to the invitation to produce a second edition, and become a series. With each edition, the competition expanded. The growth required adjustments of format, but adjustments were also made to improve the value of the learning experience.

The first adjustment was to modify the schedule to allow teams to observe peers and learn from each other's approaches. The professional critiques were effectively a master class in industry-specific design considerations, beneficial to all. The direct proximity and personalized feedback from experts was quickly noted to be the most significant educational benefit. A secondary benefit was the opportunity to "audition" for professionals not just as competition judges but as employers of interns. Access to work-integrated learning, often in the form of internships, will be essential for students in programs not specializing in themed entertainment. Part of the value of the feedback was due to the competition Participant Agreements. The Invitational Participant Agreement assigns rights to the work to the business entity of Universal Creative, with non-disclosure obligations to cover the challenges and the information provided by the jury, and any inventions arising out of the teams' design, with the latter rights reverting to the inventors after a period of time if Universal does not elect to pursue a patent. In the NDA context, juries can provide more expansive feedback.

The educational tour was revised to a half-day, and has taken various forms, including scheduled "huddles" and encounters with patent-holders and creative leaders, focused but uninterpreted observation, and keynote presentations by senior design executives. Providing park access for self-directed research between challenge reveal and presentation has been a constant.

Additional educational presentations have been added in the weeks preceding the competition, covering general design methods, inclusive design, and presentation advice. The content anticipates common weaknesses and oversights by considering observations from previous competition editions. Each synchronous virtual session includes question and answer time, to enable participants to seek clarification. Presenters include producers and professionals from juries.

As the competition continued, multiple factors caused reconsideration of the "winning" aspect of the competition. At the outset, all teams participated in all challenges, and it was technically possible to make an overall comparison. It became evident that the maximum capacity of one jury panel was eight presentations. When the competition passed eight teams, overall comparison was no longer possible, as teams entered challenges of different types and difficulty. Only challenge winners could be designated.

Three problems occasionally arose that required further adjustments. Jurors sometimes disagreed about relative importance of criteria, or the effect of a particular choice on the design as a whole, due to the many trade-offs necessary in complex settings. In this case, the "best" was determined by authority dynamics in the jury. Juries passed over designs that "did what should have been done" for designs that "did what was asked". In other instances, juries determined that all designs had fundamental deficiencies, requiring the choice to recognize the least unsatisfactory, or to recognize no team. This could not be resolved by improving the scoring criteria because the competition is intended to stimulate innovation. The challenge does not predetermine a "right answer". The qualities that characterize the "best" answer can only be determined after seeing all of the solutions imagined by the teams.

This requires a decision whether the priority is conventional competition rituals of winning by following the rules, or whether the priority is educational. To ensure satisfactory designs, challenges would need to be limited to very simple problems, or the prompts revised to make specifications, constraints, and criteria explicit. As the most important part of the design process, defining the needs and constraints is the learning experience the competition aims for teams to have – even if what they learn is that there is more to learn. There was never a "winner" that did not have weaknesses.

If "winning" is deprioritized, it is possible to commend attributes in designs that had a fundamentally flawed premise. Juries had few disagreements over which design excelled on a particular criterion. For these reasons, the competition has adopted a commendation model rather than designating "winners". A design can be commended if it is outstanding in one of the relevant commendable qualities (Table 1). Limits are placed on the number of designs commended for a criterion, and higher commendations are permitted for exceptional performance. Certain criteria are not applicable to certain challenges, such as artistic illustration/creative skills for mechanical design challenges. The commendation model does not take away from designs that would have

Table 1. Commendable criteria.

- Communication/presentation
- Artistic illustration
- Technical communication
- Technology innovation
- Creative skills
- Human-centred design
- Operational feasibility
- Technology integration

been winners, as the qualities that would have made them winners would earn them multiple commendations. For participants in pursuit of internship placements, having contributed a commended aspect of a design is a marketable achievement; whether their team's design as a whole "won" their challenge has little weight in a hiring decision.

Eliminating "winning" does not mean no competition is involved. The competition aims to have the teams competing against the challenges, rather than against each other. Teams should aim to have the best solution for the challenge but should also celebrate and learn from excellent designs produced by another team. Receiving multiple commendations, and what they were commended for, shows a team's strengths, without implying that they were superior to their peers in every dimension.

Deprioritizing "winning" allows challenges to be ambitious, ambiguous, and possibly impossible, since the competition is not a "hackathon" intended to deliver ready-to-use results. Any well supervised graduate or senior intern from an accredited program in a discipline can execute detailed and structured deliverables. Challenges reveal teams' early-stage design creativity and knowledge about theme park goals and constraints, to enable juries to provide a customized learning experience. Strengths are rewarded with commendations, but weaknesses are also rewarded, as they prompt personalized lessons from industry experts. The commendation structure allows juries to recognize designs in the context of nuanced assessments like, "that design was the most innovative. And it should never, ever be made", and "I could open that ride tomorrow, but there was nothing innovative about it."

A significant education component is the feedback session. Feedback is now pooled for all teams in each challenge. This enables juries to compare and contrast elements of all of the presentations, and allows common observations to be conveyed efficiently, while staying on schedule. The feedback session becomes an improvised lesson for aspiring theme park designers on the most-needed knowledge related to the challenge topic.

CHALLENGES

The competition is broken into multiple challenges each intending to use and reveal particular knowledge or methods. Challenges situate a design requirement in a context but require teams to define the context to fully understand the requirement.

Both first and second competitions included one team that stood out by incorporating strong creative and artistic aspects. This led to expansion of scope from primarily engineering to attraction design more broadly, introduction of more varied challenges and diversification of the professional juries. The current competition format offers seven challenges (Table 2). All challenges have engineering or technical components, but many require collaboration with other disciplines. Teams were advised to diversify the academic backgrounds of members so participants' work would be

Table 2. Invitational challenges in 2025 (10th edition)

1. Roller coaster design with point-of-view animation (allowing some advance preparation but a substantial "twist" on arrival requires onsite modification)
2. Interactive attraction (focuses on interactive elements rather than a conveyance)
3. Safety / accessibility (identifies an issue related to safety, accessibility, or both, and requires an innovative response)
4. Attraction design (provides a story or theme and requires storyboard and technology integration)
5. Technical innovation (specifies a technical function that may not exist but is needed, or exists but could use improvement of performance or reliability)
6. Novel ride design (specifies some dimension of novelty, typically involves a flat ride)
7. Mechanical design (specifies a particular ride action to be achieved, requiring innovative thinking and application of mechanical and control system knowledge)

relevant to the type of internships for which they would be considered, and they would become used to the interdisciplinary collaborations characteristic of the industry. The competition does not intend for holistic attractions-design challenges to be "fantasy camp" exercises for engineers to role-play art directors or operations designers. Students building their own education rather than taking a themed-entertainment degree also generally lack the inherent professional networks of classmates interested in the same industry. More diverse challenges brought in teams that were not primarily engineering. Their counterparts at other universities are the closest thing to a peer network many will get, and are likely to become their colleagues through their career. Building those networks collegially rather than as mere adversaries is an objective.

Since the competition focuses on early-stage design, the challenge details are revealed at the onsite opening of the Invitational. During registration and preparation stage, the challenges are described in broad terms, and invited teams are advised of the academic disciplines generally intended to be explored by the challenge, to help teams select the best combination of team members.

Teams in early editions of the competition also often linked creative and artistic elements related to already-popular intellectual property (IP) despite general advisory notes about IP rights. and an assignment of public domain themes, such as literature or performing art works in the public domain or general concepts. The Invitational theme is revealed at the competition opening.

GROWTH

Growth prompted additional adjustments. The eight presentations per challenge in the third edition was the maximum capacity for adjudication, so by the fourth edition, with 12 teams, it was impossible for all teams to enter all challenges. However, teams were able to enter up to five challenges. This gave unintended advantages to larger teams. Despite formalizing the limit of 12, the average team brought six or seven members. Maximum team size was reduced further and is currently six.

Once it was not possible to accommodate all teams in all challenges, challenges were allocated by team preference in the order of registration. This worked until a team that registered late had to be allocated to technical challenges, without any technical programs delivered at their institution. While this was "fair", it was neither educational nor career-relevant. An interim blended allocation approach allowed teams to rank preferences such that all teams were allocated to a highly preferred challenge before others were allocated to additional challenges. This was effective at this stage, but would not be scalable to the point where more teams express interest than the competition can accommodate.

An Open Qualifying stage (OQ) was implemented in the seventh edition. With a list of challenges to be included in the Invitational, teams respond to a specific theme showing skills relevant to the challenges they would like to tackle. Invitations are allocated based on "desk review" of the type of skills shown and the quality of work.

An additional benefit of the OQ stage is that it entails no travel costs of participation, and teams may comprise an unlimited number of eligible members. This supports teams to develop their collaboration, teach new members about rides and attractions, and assess the skills and capacities to help them select the optimal invitational team for the challenge or challenges they are invited to tackle. The 2025 OQ involved over 400 participants at their respective teams.

To date, teams from 37 universities have participated at least once, and two teams have participated in all 10 editions. Invitationals have involved a total of 942 registrations, with participants often returning. The increase in teams participating stalled with extracurricular travel restrictions in the early stages of the COVID-19 pandemic but have since recovered (Figure 1). An additional 700 or more have participated on Open Qualifying designs within their clubs to earn an Invitation for a team.

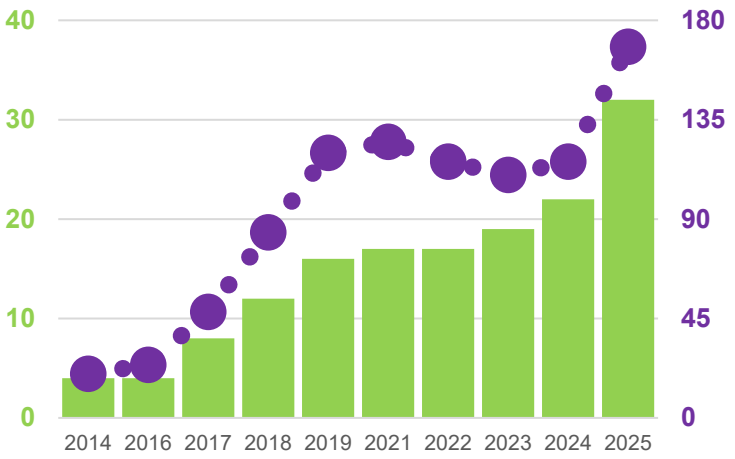

Figure 1 Growth in teams and registered participants.

IAAPA reported adding 5,000 new members in 2025 (IAAPA, 2025). The 172 IAAPA student memberships included through TMTDC 2025 registrations correspond to 3.4% of that number. Many past participants secured internships through the exposure, and graduated and pursued careers in the attractions industry, both at the sponsor and its competitors, as well as at ride manufacturers, consultants, regulators and other entities in the industry.

The competition participants also contribute to increasing the diversity in next generation of professionals. IAAPA Young Professionals outreach to STEM professions has lagged behind its strong performance in operations / business and creative disciplines. The 10th edition competition participant roster included 65% identifying enrollment in a STEM program, 17% enrolled in STEM with a creative arts minor or concentration, 14% creative arts, and 4% business, hospitality, economics fields.

Among 2025 participants completing the voluntary diversity self-identification survey (N=71, 42% response rate), the representation among the respondents (Figure 2) exceeds general population prevalences of each identity (racialized non-White identity, 40.9%, American Council on Education, 2022; disability, 13.4%, census.gov, 2024; LGBT, 9.3%, Gallup, 2025). The demographic composition of non-respondents may differ.

These new members benefit the global attractions industry as a whole. Many alumni of the competition have gone on to internships and career positions at manufacturers, suppliers, regulators, and even the competition. Only the IP produced during the event is proprietary to Universal.

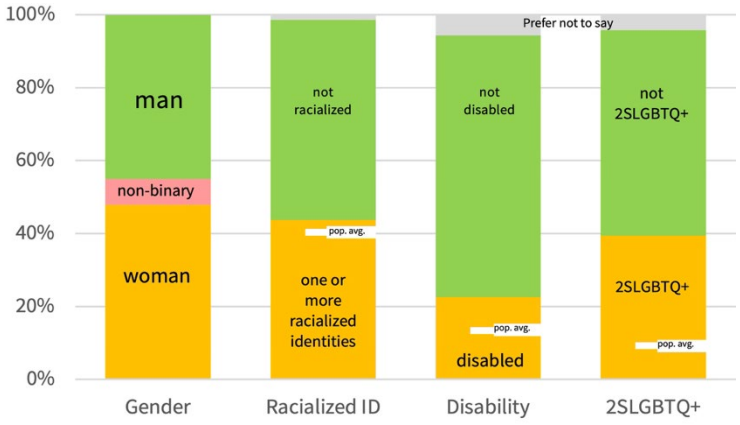

Figure 2. Diversity self-ID (N=71 participants).

ISSUES

As the competition continues, there are several issues that will need to be observed and addressed as needed. One of these is the **cost to participants**. The cost of the competition is greatly

supported by sponsors, providing park access, venues and technologies for the presentation sessions, discounted lodging, and considerable professional time and expertise to serve on competition juries. Team registrations cover about one-third of the market value of the event. Teams also incur expenses to, from, and around Orlando, meals, and optional lodging arrangements. The greatest variable is the cost of travelling to the event, which could range from local transport to international flights.
Based on responses from 40% of participating teams (Figure 3), budgets ranged from $1,575 to $5,500 for teams of up to six participants, with an average of $3,216. Distance from the university to Orlando was a strong predictor of total budget (r=0.79), associated with airfare.

Teams funded their participation in different ways, including student union funding (mean $1,216, median $1,250), proceeds of club fundraising (mean $463, median $300), and university or faculty funding (mean $240, median $0). Expenses not covered by other sources were self-funded. Just two responding teams indicated no self or family funding. Mean self-funding was $195 per person (median $115) and mean family funding $50 (median $0).

Another emerging issue is **use of Generative AI**. Many businesses are interested in exploiting AI: theme parks no less than any others. In an educational context, there is no means to ascertain based on a single design whether the learner has the knowledge needed to responsibly interpret GenAI work product. It can be challenging to determine when GenAI has been used when not disclosed, raising concerns about security of the challenge material. Some OQ work was suggestive of GenAI. Within the challenge itself, whether performance is adequate or inadequate, it is impossible to determine the relative contribution of the AI and the user. The competition permitted GenAI for illustrations, conditional on disclosure, with AI art ineligible for commendation for artistic illustration. Use of GenAI for other applications has been deemed contrary to the non-disclosure obligations of the Invitational Participant Agreement.

A third issue pertains to the **capacity for growth**. It is not feasible to add more teams per challenge nor more challenges. At the current pace of growth, the OQ may determine that some teams cannot be invited, as all of the challenges for which a team showed capacity have already been filled by teams that showed greater capacity. An alternate benefit with educational value might be developed. In addition, as invited teams are increasingly offered one challenge, there will be many teams who complete their challenges early in the competition. To sustain the educational purpose within this growth, the competition may need to add different types of educational tasks or exercises to be performed for recognition during the remainder of the event.

International mobility is another issue that merits consideration to ensure the global relevance of the experience. Although the attractions industry is global, the cost of participation privileges students at universities within driving radius of Orlando. Cost of participation is greatly increased for teams that must travel by air, which includes not just Northeast, Midwest, and Western United States locations, but all international universities. On top of the higher cost of participation, there are fewer benefits for international students, as most are not legally entitled to work in the U.S. Measures might include sponsorships to mitigate excess costs, expanded options for experiential learning through a network of partners with a capacity to employ students with other nationalities, or replication of the competition regionally.

FUTURE DIRECTIONS

Reflection and adjustment in collaboration with partners has enabled the competition to produce an experience in high demand, and continuously improve the educational benefits while growing to meet the demand. Several issues have been identified that will need consideration in order to continue to grow and serve this unmet educational need.

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THE SPHERE LAS VEGAS: DESIGNING FOR ILLUSION

BRIEF ABSTRACT
Over the past 20 years, buildings around the world have integrated digital technology into their external facades, with these screen surfaces acting as more than digital billboards. LED walls have become illusionistic tools to create public attractions. The Sphere building in Las Vegas exists as both a standalone screen and functional architectural space. The site offers a stunning outdoor canvas for artists and experience designers to manipulate and change the material fabric of the city, altering the buildings' purpose and interpretation in an instant.

The study will provide an overview of the history of art and attractions that use domes, cubes, and other multi-surface imagery to transform public spaces. This contextualization will be followed by a series of interviews with creative practitioners who have worked on the Sphere and curated content for it. The outcomes of this research will include a series of design principles for working with outward-facing, 360-degree media. These principles will guide and encourage diverse adoption by creative practitioners of all kinds and support the development of more complex thematic experiences within the attractions industry.

INTRODUCTION
In 1972 Robert Venturi, Denise Scott Brown and Steven Izenour published their seminal work Learning From Las Vegas. The book has been incredibly influential in the architectural world since it was first released (Hawthorne, 2023). Learning From Las Vegas was the first to offer an analysis of Las Vegas architecture (Lehmann, 2018) but also foreshadowed the effects of the digital age on architectural facades and signage. In discussing Las Vegas architecture Venturi et al believed that signage could be seen as more important than the building itself, suggesting an architecture of bold communication rather than one of subtle expression' (1977, P8). Venturi et al articulated a taxonomy of architectural design where a successful building might have more prominent signage than structure or where the structure itself is the sign. The Las Vegas Sphere represents a fascinating epilogue to the tendency in public design which Venturi, Brown and Izenour observed in the early 1970s. Built in 2023 the Sphere is an entertainment venue incased by a dome screen that creates an ever-changing façade. Images emanating from the dome are visible from 360 degrees across the surrounding suburbs of the city. The Las Vegas Sphere's surface is 580 sq ft and it has featured the work of artists, custom built advertisements and promotions for the shows programmed in its internal cinema (Orrall, 2024).

In August of 2025 it was announced that the Abu Dhabi government will begin building multiple additional Sphere venues across the Middle East and North Africa (Tusing, 2025). Over the course of the 21st century large screens have become intermeshed with entertainment zones around the world, from the screens of time square to the WAVE screen in Seoul's COEX Square, this type of major infrastructure is here to stay.

The Sphere Las Vegas is a unique example of architectural screen because the screen covers the entirety of the building, in fact it could be argued that the building is the screen. The Sphere is a new structure for the

realization of experiences and as such there has been very little academic analysis of how this media phenomena functions or its effectiveness as a public attraction. Spherical screens offer a unique set of parameters for creating location-based experiences. The growing number large scale public screen locations would benefit from an analysis and examination of the best principles for content design. The sphere is part of an evolution of media and shared experiences which has evolved over the last 800 years, it intersects with architecture, religion and engineering theory as well as the visual arts.

Prior knowledge/Literature

Dome structures such as The Sphere in Las Vegas have much in common with their ancient counterparts from the middle eastern and European architecture. In her book Neo Baroque Aesthetics and Contemporary Entertainment, Angela Ndalianis discusses the similarities between dome illusion and the special effects we see employed in cinema and the amusement park today (Ndalianis, 2005, p. 177). Since the earliest examples of architectural domes, the public appearance of the structure and its internal private experience have had an interesting relationship. From Brunelleschi's famed Duomo to the Las Vegas Sphere, the outside diameter of the dome evokes a far bigger space that what audiences will see when they enter (Manetti, Bellucci, & Bagnoli, 2019). The link between historical practices of theming and illusion and Las Vegas are traced brilliantly in Norman Klein's The Vatican to Vegas (Klein, 2004, p35). Klein describes Domes of the 1700s as Scripted and Immersive Spaces, carefully crafted to communicate detailed and experience driven stories to a discerning public (Klein, 2004, p48).

Writing for the Architectural record, Izzy Kornblatt reminds us of a piece of 18th century architecture by Étienne-Louis Boullée which was never realized but had similarities to the now realized Sphere. Kornblatt compares Boullée's hypothetical design for a cenotaph for Isaac Newton which matched the sphere in its ambition and grandeur (Kornblatt, 2023). Architectural writer Hugh Aldersey-Williams explained how Boullée's design for a spherical cenotaph would also serve as a monument to science and the French revolution.

> The spherical shell of the cenotaph was to be pierced with holes in the pattern of the constellations, allowing shafts of light to enter, creating for daytime visitors the impression of communing with the tomb under a starry night sky (Aldersey-Williams,2025, p1)

The Las Vegas Sphere follows in the historical traditions of other architectural domes in many ways. Like dome architectures of the 17th century the symbolism of spheres and domes to connect the ground with the sky in ways which are similar in effect to the experience of standing at the foot of the Dome of the Rock in Jerusalem which dates back to 685 CE.

Methodology/Theoretical frame

The use of digital surfaces in public architecture continues a long tradition of innovation where new technology is used to make buildings which can change at the press of a button and offer creative voices the chance to communicate at an incredible scale. As signage, spectacle and image combine through digital technology these new architectures can host any material as well as move and behave in ways that are novel and potentially jarring to our way of understanding the landscape. Kevin Fox Gotham talks about theming and the creation of spectacle in shared urban environments in his paper Theorizing Urban Spectacles (Gotham, 2005, p227). Gotham explains how the introduction and exhibition of new technology has always played a

role in creating urban spectacles which can either bring new knowledge or reduce cultural outputs to mere novelty (Gotham, 2005, p.227)

I discussed the history and theories surrounding the Las Vegas sphere with three artists and two of the centers digital curators who have all worked to generate new contemporary art pieces for the site since its inception. I asked questions focused on three main areas; how they saw the relationship between the sphere and the public? How the re-interpreted or re-evaluated the materiality of their work for the spheres shape and scale? What concepts and visual outcomes where effective for a public spectacle.

Results/Observations

A recent advertisement on The Sphere screen for the computer game Borderlands 4 shows a character trapped inside the dome attempting to break out before finally breaking the glass visually (Kallenbach, 2025). This is an inventive approach which sees many aspects of the illusionistic potential of The Sphere space utilized. The design and production of the Borderlands four piece shows how much room there is for aesthetic experimentation which may include performance among many other formal areas of investigation.

By exploring relevant historical approaches as well as investigating early work in the format, this research adds perspective as well as guidelines and principles for new creation in this emerging field. This study highlights what we know about building content for large format outdoor screens and reveals the gaps and areas for further examination in building spectacle through the combination of art and technology.

Implications for Scholars/Industry

The experience and attraction economy is a growing rapidly (Palicki, 2024) and large format LED screens are becoming more prevalent in public spaces around the world. These large format phenomena blend physical with the digital in ways that can become meaningful attractions but are not always effective. For spaces like the sphere to be successful they become a canvas for practitioners and communities from all fields of expertise not only architecture. By following the results of this study all forms of creative practitioner will be able to create works that are aesthetically powerful and add to public experiences.

As screens become more ubiquitous and more seamless in our public space the opportunities for artists to experiment will grow. This study will show how artists and curators have approached this media in its early stages and where there is room for advancement, innovation and further development in the future.

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