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## Dark rides and the evolution of immersive media

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### Abstract

The dark ride is a format of immersive media that originated in the amusement parks of the USA in the early 20<sup>th</sup> century. Whilst their numbers have decreased, classic rides from the 1930s to the 70s, such as the *Ghost Train* and *Haunted House* experiences have been referenced in films, games and novels of the digital era. Although the format is well known, it is not well defined. There are no dedicated publications on the topic and its links to other media discourses are sparsely documented. Today, entertainment media is utilising technology extensively to create immersive experiences for audiences, transporting them into themed journeys and environments. This paper establishes the lineage of the dark ride format as an early example of this same immersive media. Field research shows the consistent use of particular technical effects over 90 years of production that are common in contemporary examples of the format. The findings clearly define the dark ride format and align it with immersive media today, making a case for greater examination of its history to inform current practice.

**Keywords:** Education; amusement parks; theme parks; virtual reality; new media; media history.

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### Introduction

Fairgrounds, world's fairs and amusement parks are disappearing from the entertainment landscape (Lostamusementparks, 2018), taking with them many of the earliest examples of electric popular media. The emergence of the academic discourse known as early cinema studies has helped define the importance of 19<sup>th</sup> century fairground technologies, albeit through the lens of contemporary cinema. Tom Gunning's seminal essay *The Cinema of Attractions* (1995), outlined the far-reaching influences on cinema that helped form the medium that it is today. Gunning cited the amusement park, fairground and world's fairs as influences on cinema and as the sites where film technologies were combined and experimented with. Research by Gunning and others such as Levebvre (2011) and Duckett (2009) give precedent to further examination of this era and the links it might offer to other media forms such as immersive, virtual and augmented media platforms. Despite a downturn in the popularity of the traditional amusement spaces of yesteryear, the attendance at theme parks and other location-based entertainments is on the rise (Statista, 2018). This year *Warner Brothers* opened the largest indoor theme park in the world (GulfNews, 2018) and virtual reality company *The Void* added nine new locations in the US alone (Fogel, 2018). Attraction design is big business and a widely patronised entertainment. Some academics have documented attraction developments such as roller coaster construction, park layout and ride themes. Few have articulated historic timelines for ride types that explain the evolution of different attraction media in a way comparable to cinema studies. A lack of documentation of the industry and clearly defined links to other media prevents those

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utilising new media entertainment technologies from discovering ride history as a fertile space for inspiration. The comparable lack of analysis to cinema is understandable, as cinema evolved into a mass distributable format, its reach outnumbered any other popular format of the 20<sup>th</sup> century. With virtual realities current potential to be distributed widely through headsets and mobile phones, a refreshed look at early immersive media is needed. In this paper, I will focus on the dark ride format, rides which operate indoors, best known for their frights and shocks, a popular format first seen in the early 20<sup>th</sup> century. Dark rides are still built today and represent some of the most successful and innovative experiences at parks across the globe (Creighton, 2016). Despite this, little has been written that defines the format clearly throughout its history, recognizing its strengths and acknowledging its place within the constellation of contemporary media. In 1956, William Mangels, a well-known amusement park historian defined the dark ride experience as ‘Greatly popular at some resorts are the attractions known as dark rides. In these, passenger carrying vehicles, which may be boats, cars, or small trains, pass through dark tunnels or closed-in passages at a very slow speed.’ (Mangels 1954:141). Mangels was heavily involved in the amusement industry, working on various parks in the famous Coney Island district throughout the early 20<sup>th</sup> century. His quote is well known, but it does little to define or position the dark ride experience clearly amongst other popular media. Even for those that lived and breathed the dark ride experience it was very difficult to firmly articulate it. Ongoing research into historic immersive media would benefit not only from the insight of ride developers but also from a concentrated analysis of the participatory ride experience.

Many people recognise the dark ride as first emerging with the advent of electricity at the *Buffalo Pan American Exposition* in the form of the *Trip To The Moon Ride* (Thompson, 1901). This attraction has been discussed by Angela Ndalianis (2012), and I (Zika, 2014) in the context of the evolution of the dark ride. The ride in question was technically revolutionary and has risen to prominence in the field of early cinema research for its combination of immersion and theatrics. It is seen as a key influencer on cinema's history. Brandon Kwaitek performed one of the earliest and still the most thorough historical analysis of the dark ride in his thesis, *The Dark Ride* (1995). Kwaitek takes a historical approach to defining the origins of the dark ride, examining the technology and the iconography that led to its invention. Kwaitek's analysis ends with some small comparisons of early ride technology to successful immersive media, not just at the theme park but influencing other location-based media such as IMAX. Kwaitek said of the dark ride's links to immersive media: ‘The older dark ride connects the "illusion rides" of the early 20th century expositions to the "themed experiences" and "immersion rides" of contemporary parks. In all forms, the dark ride fulfills the cinematic promise to "really" take the viewer somewhere.’ (Kwaitek, 1995, p55). It is clear that Kwaitek believes the historical dark ride has a connection not only to the current iterations of the form, but also to other immersive media today. What is unclear is exactly what immersive techniques existed in the early dark ride that are being utilised in today's immersive media, or even which techniques have been maintained through that history. Is the dark ride a reflection of the immersive technologies available at any given time in history or is there a consistent approach to immersive design that runs throughout? One which has potentially been utilised in other media without documentation. With new and emerging approaches to immersive media appearing, it is crucial to establish what the dark ride offers in terms of structure for these types of experiences. Technologies like virtual reality, immersive cinema and augmented reality have the technology to build new worlds for audiences but will they look to the established history of cinema for structural inspiration or further afield?

## Method

Dark rides built in the pre-digital era have largely disappeared from the entertainment landscape. The *Pretzel Ride Company*, patented the first dark ride design in 1929 (Thompson, 1929) and ceased production in 1974, claiming to have distributed over 1,700 rides throughout the world. Today, there are a total of thirteen dark rides that remain from the 1930s to 1980, five of which were built by the Pretzel company. For a detailed explanation of the early days of the dark ride, one can refer to my earlier paper on the topic (Zika, 2014). For this paper, I travelled to each of the remaining historic sites, rode the rides and documented them using 360-degree cameras. This method allowed for a review of the experience in the temporal context in which it was presented, an application of new technology that has only recently been made available. Those rides still in operation feature examples from every decade since the first patent (excluding the 1940s, when ride production was halted). This field examination is intended to identify technical characteristics of the format that are evident across all iterations of the media, establishing a definition of the format and a way to potentially identify its legacy in other media. The 13 rides visited as part of the analysis of classic or pre-digital dark rides are:

- Terrordide, 1967, Lagoon Amusement Park, Utah

- Dracula’s Castle, 1974, Lagoon Amusement Park, Utah
- Devil’s Den, 1968, Conneaut Lake Park, Pennsylvania
- Whacky Shack, 1969, Waldameer Park, Pennsylvania
- Haunted Mansion, 1973, Knoebels Amusement Park, Pennsylvania
- Laffland, 1954, Sylvan Beach Amusement Park, New York
- Spookarama, 1955, Deno’s Wonderwheel, New York
- Haunted Mansion, 1974, Funland, Delaware
- Haunted House, 1964, Trimpers Rides, Maryland
- Haunted House, 1961, Camden Park, West Virginia
- Haunted Castle, 1964, Terrortorium, Alabama
- Ghost Train, 1930, Pleasure Beach Amusement Park, Blackpool, UK
- Ghost Train, 1934, Luna Park, Melbourne, Australia

This analysis then examines whether those characteristics manifest themselves in a range of successful contemporary immersive media productions. The examples include a defined dark ride, an augmented cinema experience and a completely virtual piece of entertainment. Across all the media that was surveyed, the focus was placed on the techniques used by media to immerse the audience; interactivity was not a factor, nor was the quality of the experience. The three contemporary examples of popular media were chosen for popularity in the immersive entertainment design field today. They were: *Jurassic Park: Fallen Kingdom 4D* (Jurassic World: Fallen Kingdom, 2018), an augmented cinematic experience which topped the box office (Box Office Mojo, 2018), *Ghost Busters VR*, a free roaming head mounted display attraction, which won the 2017 Lumiere award for best live action experience (UploadVR, 2017). Finally, *Harry Potter and the Forbidden Journey*, a theme park ride at Universal Studios, which won the Golden Ticket for best Dark Ride five years in row (Golden Ticket Awards, 2018). These examples all utilise texts and visual content from previous cinematic works but for this study, it is the application of immersion that is being observed.

## Results

### *A Thematic Journey*

At the end of the boardwalk in Blackpool England is the *Pleasure Beach Amusement park*, built in 1896, it features the oldest running electric dark ride on earth. It was purchased from the pretzel amusement company in 1930 (Toulmin, 2011.p150), which would have made it one of the earliest purchases of the newly patented product. A similar aged dark ride exists in Melbourne, Australia, which was also purchased in 1934 a short time after its UK counterpart (Montagnana-Wallace, 2012). The rides were both titled *Ghost Train*, which was not a common term in the USA, but *Pretzel* had little context within the Commonwealth and so the name was taken from a popular theatre show of the day (Toulmin, 2011.p150). The theming of these early rides is one of the first observed traits of the pre-digital or ‘classic’ dark ride. Even before the concept of the theme park had arrived, the dark ride design created the sense of a fantastic but sequential journey that could be understood and engaged with before the experience began. Everything from the ride’s name, the façade design and in most cases the shapes of the carts themselves built context for the ride theme (Zika, 2018b). This journey-based theme, coupled with the content inside the ride, engaged tensions of control and trust in a journey that the audience was helpless to control but had agreed to participate in.

### *360 Degree Imagery*

After World War II, there was a resurgence in interest in the theme park and the *Pretzel* company continued to create rides. In 1955 and 1956, they created three rides that are still in operation today, two in the state of New York and one in Pennsylvania. The *Spookarama* sits inside *Deno’s Wonderwheel* amusement park in the Coney Island suburb of Brooklyn; the lengthy ride was built in 1955 (Luca, 2018) and has one particularly unique feature. Unlike most dark rides, there are no walls, instead, the carts move quickly through the space, swinging the viewer from position to position, prop to prop. Despite the rides unique structure -which utilizes 360-degrees of vision at all times- this was a technique used in all dark rides in this study. Track designs placed items outside of the front viewing position of the cart, forcing the rider to look, left, right, above and behind at all times. A great example is

the position of the ghostly organ in the Luna Park Ghost train which cannot be seen without turning your head more than 90 degrees left (Zika, 2016).

### *Triggered Sound*

Upstate at the *Laffland* ride in the holiday town of Sylvan Beach, a similar ride was built in 1954. Utilising an old bathing shed as the structure to house the ride, the experience features many darkened hallways with few props. Triggered Sound plays a part key role in all dark rides, especially in the *Laffland*, which features great examples of rudimentary sound devices that required no electricity to function. At various moments in the *Laffland* ride, a thud and a crash are heard from outside of the riders facing direction, without any visual cue (Zika, 2016e). These effects happen at the same moment in every ride. The cause is a metal container full of scraps which falls as the cart tips it over and is then reset with a spring, effects of this nature work because the space is immersive and content could appear at any time from any direction. *The Devils Den* was another ride built by the pretzel company in 1968 at Conneaut Lake, Pennsylvania, which, alongside the *Haunted House* in Huntington, West Virginia, utilised gravity to power the ride experience. These dark rides are often classified as roller coasters because the carts fall naturally and aren't individually powered. Despite this unique design, dark rides like this still exhibit all of the unifying characteristics examined in this paper.

### *Perspective and Illusion*

In the 1960s, the cultural interests and demographics had changed and a new wave of development and innovation swept the amusement park. The most prolific creator of dark rides in the second half of the 20<sup>th</sup> century was Bill Tracy, an entrepreneur from Toledo. Tracy created 54 rides throughout the 1960s and 1970s and all but two of the remaining rides in this study (Bahur and Seidl, 2018). *Waldameer Park* in Erie and *Trimper's Rides* in Ocean City, Maryland, both feature dark rides with incredibly iconic facades from the period and some exemplary examples of dark ride techniques. Crash doors were a design device which appeared in the earliest examples of dark rides but were exemplified in Tracy's creations. The effect creates what appears to be a solid wall which riders 'crash' through like barn doors, a jarring spatial effect and physical effect is created. The goal of the dark ride is to transport the audience somewhere fantastic, regardless of the physical footprint of the ride, the attraction must create the illusion of greater space. In the earliest dark rides this was achieved with painted perspective (Zika, 2016), using techniques developed in the panoramas of the 19<sup>th</sup> century (Oetterman, 1995). In the 1960s and 70s Bill Tracy used Dayglo paint to create a far bolder, less detailed set of distortive effects on the viewer. Sequences of fake squares gave the impression of a long or bending corridor, which would quickly prove fake as the cart hurtled through the painted illusion which was rendered on crash doors (Zika, 2017b). Crash doors were a crucial element to increase the shock that the sudden collision created. In the *Wacky Shack* at Waldameer Park doors are used not only to separate rooms but operate as floating canvases for geometric shapes which the cart smashes into. The combination of dark lighting and dayglo images creates a psychedelic distortion of the physical space which is unique to the dark ride experiences. In Tracy's rides we see a consistent and extensive experimentation with perspectival illusion, sometimes extending the space with mirrors.

### *Light and Touch*

As its name would suggest, the dark ride uses the controlled lighting conditions to full advantage. Once the rider is contained within the cart, there is no need for the safety of light. Rides such as the *Haunted Castle* in Birmingham, AL utilise almost 30% pure darkness throughout the experience (Zika, 2016b). Where lighting is completely mediated and controlled, the use of haptic feedback can be applied to enhance the illusion and the feeling of unease in the dark ride design. In addition to simple collisions through crash doors, haptics can give the impression of a rocky cave surface (Zika, 2016c), or the webs in den of spiders (Zika, 2016d). Haptics and perspective illusion work together with lighting; if the lighting can be controlled, then the haptic effect can be utilized properly and simple visual elements can fool the audience on multiple levels.

### *Review*

In review, amongst the 14 remaining dark rides built throughout the 20<sup>th</sup> century, there are six consistent attributes that can be found in each ride experience. These technical characteristics are key to the immersion being created in

each ride, where spaces are used to transport the audience both physically and conceptually. The six components of the classic ride design are:

- A themed Journey
- 360 Degree Imagery
- Triggered Sound
- Mediated Lighting
- Perspectival Illusion
- Haptic feedback

Examining current immersive media with these techniques in mind takes us first to *Ghost Busters: Dimension*, an experience with many locations globally including *Madamme Tussaud's* in New York City (Madamme Tussauds, 2016). The experience is coupled with a physical exhibit which themes the journey before the digital experience begins, introducing them to the journey and the characters they will meet along the way. At this point, each participant dons a haptic suit and a head mounted display. The head mounted display controls all of the vision that the user experiences from that point and is synchronized with a rudimentary physical environment that the participants can touch but can't see (Velasco, 2018). In the real-world environment, objects like fans and water spraying devices are set outside of reach to create moments of haptic feedback. These physical props also work in conjunction with a suit that delivers multiple points of feedback to coincide with the experience. Moments of relative but not complete darkness are utilised throughout this experience, which adds a highly sophisticated veneer to effects which have been used in the dark ride since the 1930s. *Ghost Busters: Dimension* utilises all of the components of the dark ride, adding two additional components, a sense of embodiment and the use of smell. Each participant can view their own body whilst in the game. As a member of the team, they are asked to select an avatar at the beginning and this visual look accompanies you throughout the experience. Smells are also used to correspond specifically with the action throughout, which adds a new dimension to the immersive experience that is not evident in the classic dark ride.

Extensions of the cinematic experience have existed since the 1960s when director William Castle added haptics and other effects to individual theatres to bring immersion to his horror movies (Clepper, 2016). 4DX technology augments the cinematic image in front of the user with a range of immersive effects which are synchronised to the action. In *Jurassic World: Fallen Kingdom* (Amblin, 2018), there is no prior theming of the experience and the image content is presented in front of the viewer at all times. Whilst there is no theming or 360-degree immersion, the other components of the dark ride are utilised to their full potential; haptic effects, 3D illusions and extensive lighting effects are explored. At times, the lights are completely turned off and sound and haptics are given prominence. The system adds smell components to the repertoire of immersive effects as well as temperature, which is delivered via heat lamps above the seats, set to coincide with on-screen actions. The effects and design of the 4DX cinema have clearly been influenced by dark ride and roller coaster effects with some advancements being added to what is possible. Less consistent is the conceptual connection between what is happening on screen and the use of the physical effects, with certain content suiting the techniques better than others. When the cinematic vision locates the audience inside a vehicle (like a helicopter), the haptic movements add to the immersion in that journey, and when the imagery is as an onlooker, the seat movements seem unrelated.

The most awarded dark ride of the last decade was *Harry Potter and The Forbidden Journey* (Universal 2014), a highly regarded attraction which uses extensive digital technologies and engineering to deliver effects to its audience. Participants board a two-person cart which is manoeuvred through the experience using a mechanical arm that is not visible to the participants. The ride is built for the Universal Studio's theme park chain and contains extensive theming upon entry with characters backgrounding the story and the journey that is about to commence. On the ride, there is a combination of physical environment and projected digital content which at times wraps around the cart to give a simulation of perspective and in various environments. There are moments of complete darkness and a soundtrack linked directly to the cart which synchronises with the imagery displayed outside. Despite the high-end technology being utilised in Universal's ride, the consistency in approach to the earliest dark rides is evident. Carts move smoothly through complex pre-programmed movements, but the core immersive effects are the same; sharp turns, surprising changes in environment, controlled lighting and utilisation of the 360-degree field of vision.

## Discussion

Dark rides have utilized and experimented with many immersive effects since first entering the amusement and fairground landscape in the early 20<sup>th</sup> century. With patenting and distribution around the world, we have seen certain effects solidify consistently in the delivery of the format over 90 years. Most of the techniques that the dark ride exemplified are well known to anyone who has ridden on a spooky ride in their life. With artefacts disappearing rapidly, it is important to document and define the components at play in this historic entertainment format. In this paper, I have explained the key techniques that make up the classic dark ride; thematics, 360 immersion, sound, light, illusion and haptics. In the 50 years before digital media, these components were combined to create a consistent format for immersive media delivery. In the contemporary context, these few examples show us the ways that elements of this history can be applied and extended and how new technology still uses these same approaches. They also show us how little has changed from the earliest iterations of the format, from controlling light and vision, utilizing hidden haptic and sound devices to creating thematics to prepare audiences for a journey. Whether on large scale or small, these are still the building blocks for transporting audiences to new realities. Virtual reality offers cost benefits by limiting the infrastructure needed for traditional attractions, but this evolution, albeit cheaper, should observe the legacy of the dark ride to achieve the most comprehensive immersion possible. By noticing the six components of a dark ride, we can explain a longer history of location-based media that does more than augment cinema, but adds a new lineage to evolving formats like virtual reality and augmented media, helping to give inspiration to new developments and judge the effectiveness of immersive media into the future.

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