

# PALACE64: IMPOSSIBLE ROLLER COASTERS AS SCORES FOR EXPERIMENTAL MUSIC PERFORMANCE

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## ABSTRACT

In *Palace64*, a major new multidisciplinary project combining video and chamber ensemble, I examine the ways in which the domains of music composition and virtual roller coaster design might influence one another. First, I briefly discuss existing artistic projects relating to roller coaster design. Second, I present my own early artistic explorations combining music and virtual roller coasters. Finally, I discuss *Palace64*. In this project, I create a new medium of score that combines oral transmissions describing imaginary impossible roller coasters with videos created using innovative 3D roller coaster design software (NoLimits 2). Using strategies pioneered by Éliane Radigue and Jennifer Walshe for interpreting imagined images and paths as musical material, I develop ways in which performers can “read” these impossible roller coasters—remembered and virtual—as scores. Ultimately through this project my goal is to create and demonstrate a hybrid artwork that exists not only as a score to facilitate the performance of experimental music, but also as a conceptual theme park ride that traverses the boundaries of possibility and impossibility in a region that marries the digital with an embodied human experience of risk and pleasure. This paper is intended as an accompaniment to the performance of *Palace64* by Decibel New Music Ensemble.

## 1. AERIAL VIEW

Roller coasters are powerful icons, looming in our subconscious minds and permeating popular culture. [1] The domains of virtual roller coaster design and music composition have been knotted together for most of my life. As there have been few examinations of virtual roller coasters as an artistic material, I will begin this paper by providing a brief survey of major artworks on the topic. Then, I will return to a few personal *loci* that highlight the potentially fruitful bond between roller coasters and music. Finally, I will conclude with a discussion of my current project, *Palace64*. Specifically, I will examine the way that impossible roller coasters—both imagined and virtual—can be read as musical scores by combining strategies of mapping with the broader interpretational possibilities of verbal scores.

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## 2. ARTISTIC CONTEXT

Artistically, roller coasters are often explored in terms of their relationship to danger and death. Most notably, Julijonas Urbonas’ *Euthanasia Coaster* presents a hypothetical theme park attraction designed to slowly kill passengers using extreme g-forces. [2] Similarly, YouTube user No1WillWatchThis has created an extensive portfolio of rides that highlight the technical limits of *Roller Coaster Tycoon 2*, particularly as related to duration and death.<sup>1</sup>

Till Nowak’s *The Centrifuge Brain Project* shows a fantastical futuristic theme park where the monstrous scale of the rides is intended to stimulate brain activity. Nowak ascribes a narrative to his project, creating a fictional future context for his attractions. [3] By contrast, Urbonas describes his work as a “design fiction” that

“does not say anything itself about the settings (historical moment in time, geographic location), ethics, institutionalising, legal issues, etc. Presenting itself in such a minimalistic way, it reveals itself as a script proposal (of the usage) or as a McGuffin object for your own story”. [2]

I am compelled by this idea of a ride concept that allows the audience to drape their own narrative over the work.

Real-world theme park designers are currently exploring combinations of the virtual and the real. Roller coasters that integrate VR headsets have been shown to increase people’s desire to ride roller coasters and visit theme parks. [4, 5] Roller coasters are now being draped with *virtual* theming, mixing the possible with the impossible.

## 3. PERSONAL CONTEXT

In my experience, roller coasters are not only a site of collective cultural nostalgia but also of personal creative nostalgia. I began designing roller coasters when I was eleven years old. At the time, I lived in Manitoba, a province where the only permanent theme park was intended for children. I interfaced creatively with simulated roller coasters before I ever had the privilege of riding any real ones. I began designing roller coasters using *Roller Coaster Tycoon* (1999), but quickly graduated to a more

<sup>1</sup> YouTube user channel No1WillWatchThis. Available: [https://www.youtube.com/watch?v=CFVm5R\\_dxoo](https://www.youtube.com/watch?v=CFVm5R_dxoo)

complex 3D simulator, NoLimits (2001). I improved my technical skills by taking part in a cycle of feedback and development made possible by various online forums and cyber peers.

After a few short years, I abandoned roller coaster design in favour of composing music. I began learning to compose music in much the same way I had learned to create roller coasters: by collaborating with other online users and iteratively testing concepts.

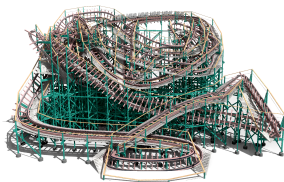
In 2017, after a fifteen-year hiatus in designing roller coasters, I began to wonder whether aspects of simulated roller coasters could be mapped onto or translated into musical material. During a brief residency at Arnolfini in Bristol, UK in April 2017, I tried to build a realistic simulated roller coaster—defined by my memories of design as a young teenager and by current designers’ maxims found on online forums<sup>2</sup>. I quickly realized that the same community of users was still active after fifteen years, rendering the standards of realism and sophistication much higher than I could achieve.

At the end of my residency, I asked double bassist Dominic Lash to experiment with performing my (failed) realistic roller coaster design as a score. We identified potential variables to be mapped onto each other. For example, a roller coaster’s height, speed, and g-forces might correspond to a musician’s pitch, volume, and bow-pressure respectively. The roller coaster’s predictable physical layout can be seen in Figure 1. The slowly undulating rises and falls resulted in a ridiculous glissando played on the double bass.



**Figure 1.** My realistic roller coaster created using NoLimits 2.

Dominic Lash asked me whether it would be possible to make a roller coaster that defied realistic building specifications. With a few clicks, I created a complex tangle of track, seen in Figure 2. Lash commented that this new impossible roller coaster was filled with musical potential. Unknowingly, I had created a surface texture, rather than a discrete entity that was traceable by the eye.



**Figure 2.** My first impossible roller coaster created using NoLimits 2.

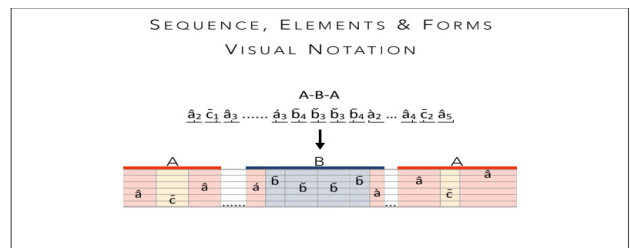
<sup>2</sup> In addition to the Steam community, popular forums include <https://nolimitscentral.com/forum> <https://www.coastercrazy.com/forums/> and <https://coasterforce.com/forums/forums/nolimits-projects.8/>

This interaction highlights the creative potential made possible through cross-talk between the domains of music and roller coasters. What once seemed like an undesirable result—an impossible roller coaster—became a site for expanded possibilities.

## 4. ROLLER COASTERS, MUSIC, AND SURFACES

### 4.1 Surface Intensity

Perhaps because of their relative newness, roller coasters lack the rigorous critical analysis of other disciplines, such as music. Many analyses consist of either reports of physical parameters—speed, height and g-forces—or prose descriptions of a rider’s experience. Industry specialist and theorist Jeremy Thompson has attempted to create a system for roller coaster analysis that represents roller coaster elements using graphic notation designed to represent time, gesture, and intensity. He writes that this system is ultimately interpretive—an art, rather than a science. [7] In Figure 3, seen below, roller coaster elements are notated by letter in order to group similar elements together. The Y axis represents intensity, while small lines above the letters indicate “inflections” such as inversions, curvature, and hills.



**Figure 3.** Roller coaster sequencing theory, credited to Jeremy Thompson / Thinkwell Group.

The intensity of roller coasters as mapped by Thompson may look similar to graphic representations of the form of many pieces in the *classical* music canon; however, gesture and intensity are concepts that have changed vastly over the course of learned eurological composition<sup>3</sup>. There exist many pieces that dwell at a similar intensity for their entire duration—such as Satie’s *Vexations*—or musical practices outside this eurological tradition that relate to intensity in completely different ways. Absent of the demands of realism, virtual roller coasters can absorb some of this mutability. What might a non-gestural roller coaster look like?

### 4.2 Surface Tension

When designing impossible roller coasters, I continually return to the figure of a knot. The knot fascinates me be-

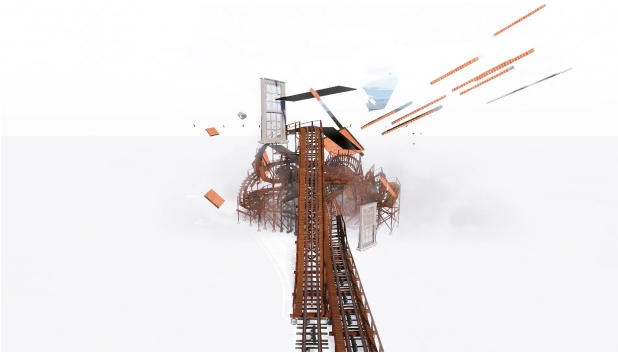
<sup>3</sup> Here I refer to Sandeep Bhagwati’s observation that conceptual traditions often called Western Art Music are found in practices not dependent on the geographical location or lineage of the participants. [8]

cause it is an entanglement of threads. Tim Ingold categorises lines as representations or etched marks and threads as malleable materials. [8] The knotted roller coaster becomes a surface because it transforms the lines of a track—demarcations of force—into threads to be woven together. The roller coaster’s clear path becomes intangible.

Much like Dominic Lash, I think an impossibly woven tangle has more potential for musical interpretation than the hills, valleys, and loose knots of real roller coasters. A surface has more variables than a line, such as density, depth, weave, direction, orientation, and texture.

### 4.3 Warp and Weave

In *NoLimits 2*, it is not practical to manually create a densely woven track. The editor interface consists of vertices and curves, rather than lines, and each vertex relates to the one before in increasingly complex ways. My initial explorations into hand-building tangles resulted in medium-density tracks that still somehow look realistic, as seen in Figure 4.



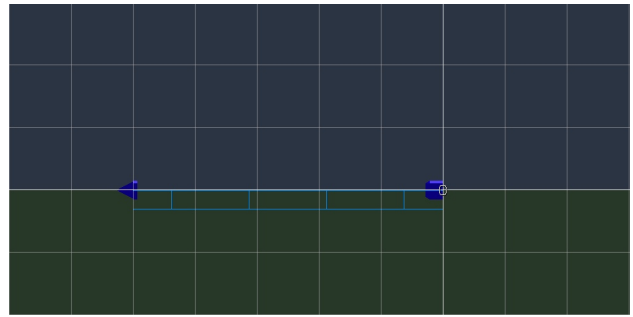
**Figure 4.** Aerial screenshot of *Moonriver32*, my first completely hand-built and themed tangle track.

Using advanced features in the program, it is possible to export and import track splines as CSV files. The resultant data consists of nine parameters, including most notably the spline’s X,Y, and Z coordinates. Table 1 shows the CSV of a five-meter section of straight track.

No.	PosX	PosY	PosZ
1	0	0	0
2	0	0	-1
3	0	0	-2
4	0	0	-3
5	0	0	-4

**Table 1.** CSV X,Y, and Z values for a five-meter section of straight track.

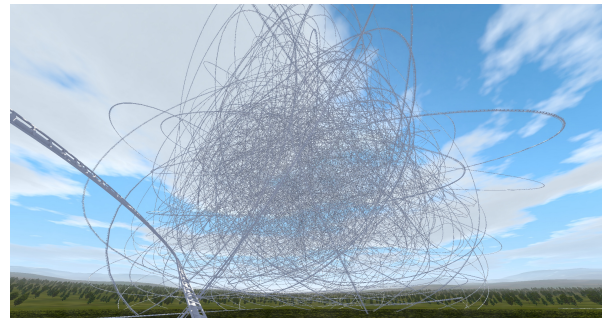
In this table, I have omitted the other six columns for ease of presentation, which relate to variables such as lateral banking of the track. NoLimits allows the user to choose how often the coordinates are plotted. In this case, each point represents one meter. Figure 5 shows the corresponding track in the NoLimits editor.



**Figure 5.** A five-meter section of straight track in NoLimits 2 editor, side view.

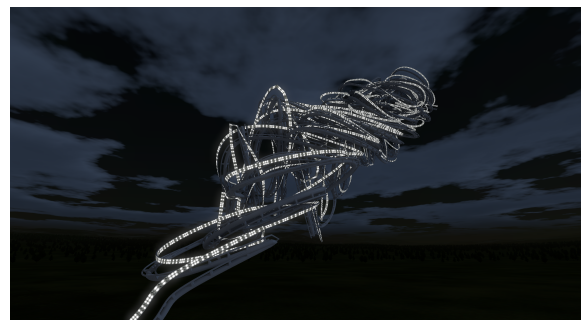
This import/export process enables users to create an element in NoLimits, export it as numerical data, manipulate it, and import it again as track. Other designers generally use this feature to create track in custom-built software that allows for more realistic physics or mathematically precise building. I am more interested in the capabilities of this feature in terms of algorithmic generation.

The following figures are two examples of tracks generated with different formulae. Figure 6 shows a track where I randomized every XYZ coordinate within a range of 150 meters.



**Figure 6.** Track consisting of points randomized within 150 meters.

Figure 7. demonstrates a track where I hand-built a hill, then used simple successive random deviations within five meters to gradually transform the original element over many iterations.



**Figure 7.** Track created with a formula for random iterative deviation.

The result is an upward spiralling knot of track that comes much closer to a woven surface than any of my hand-built attempts.

## 5. IMPOSSIBLE ROLLER COASTERS AS SCORES: MEMORY AND VIRTUAL REPRESENTATION

In my own use of impossible roller coasters as scores, I seek to unite senses of nostalgia and possibility. Like Urbonas, I aim to create a design fiction—a roller coaster separated from the real world and full of possibilities for draped narratives.

The medium of the score for *Palace64* is twofold. The first is a private set of oral transmissions. The second is a video that serves as both an accompaniment and a score. My reasons for folding these types of transmissions together is partially conceptual—inspired by a roller coaster’s connection to physics and collective memory—and partially practical. Decibel New Music Ensemble, with whom I am making the piece, is an ensemble uniquely suited to performing both orally-transmitted and video scores. Not only have they pioneered new animated score-reading technology through the creation of the Decibel ScorePlayer app, but they have also commissioned and performed a major orally-transmitted work by Éliane Radigue. My own work also traverses these two modes of transmission, making this piece the ideal opportunity to combine them.

*Palace64* has three stages of development. In the first stage, I transmit verbal instructions of myself speaking about an impossible roller coaster to individual members of the ensemble.<sup>4</sup> I describe parameters such as the roller coaster’s height, texture, speed, and direction. For example:

*The roller coaster is a knotted spiral to heaven. It starts on the ground, but forms a tangled nest of tracks climbing upward. Cars travel via magnetic propulsion systems up the spiral, grinding and colliding with metal the whole way. This roller coaster isn’t safe for humans. This roller coaster carries no-one. The speed is breakneck, but slows as the cars approach the summit of the spiral.*

Each member of the ensemble receives the same information. This first stage is an exercise in visualisation. Musicians build an impossible roller coaster in their mind. This process is similar to Éliane Radigue’s collaborative compositional method utilized in her *Occam Ocean* series. Radigue asks musicians to visualise personally-familiar

<sup>4</sup> For a more detailed account of my oral composition process, please refer to publications by Jennie Gottschalk [9] and Tim Rutherford-Johnson [10].

<sup>5</sup> Playing videos as scores creates an exceptional relationship with the way musicians view screens. Schonig describes the tendency of film theory to link camera movement to an embodied notion of viewing—the camera represents our eye. He uses a number of examples to show film where instead the video becomes a surface to be read, pointing to a twofoldness of the mobile frame. [13] Video scores, both animated and made

bodies of water to guide their performances, not only in terms of formal development but also in terms of timbre and technique. [11]

In the second stage of development, I transmit verbal instructions of myself speaking to convey the relationship between characteristics of the imagined roller coasters and musical parameters. Jennifer Walshe’s *THIS IS WHY PEOPLE O.D. ON PILLS/AND JUMP FROM THE GOLDENGATE BRIDGE* points to certain strategies to avoid obvious mappings between physical paths and music. In the score, Walshe asks performers to learn to skateboard, and to memorize a favourite skateboarding path. In the performance, the musician(s) visualize skating along this path and, using one pitch as a drone, convey the surface texture, speed of skating, and shifts in muscle as timbral variations. [12] The performer(s) must use embodied memory and mapping to transform a single line of drone music.

In my piece, I take a similar approach. I ask the performers of Decibel to map their breath and bow lengths to their imagined roller coaster tracks’ torsion, amplitude to speed, brightness to height, and noise-to-pitch ratio to the surface density of track.

In the third stage, I create an algorithmically-generated impossible roller coaster that focuses on knots, tangles, and surfaces. I drape this track with audiovisual theming, such as distorted sound effects from the NoLimits simulator and photogrammetrically-scanned 3D objects evoking memory and nostalgia. I film this roller coaster using screen capture technology and edit together a fixed video that serves both as score and accompaniment to the ensemble.

I ask the musicians to blend their orally-transmitted and embodied imaginings of impossible roller coasters with a reading of my video. Specifically, the musicians respond to different types of footage as cues to change their relationship to the video. While the video shows on-ride footage, the performers respond to the roller coaster on screen with the mapping strategies discussed earlier. This results in a homogenous ensemble texture. When the screen shows fly-by shots or abstractions of the footage, the performers return to their own remembered roller coasters, resulting in a more heterogeneous texture. I allow the video to oscillate between representation and surface<sup>5</sup>, score and accompaniment.

## 6. CONCLUSION

Roller coasters are complex sites of nostalgia and creation. Their tracks are draped with layers of physical anticipation

up of camera footage, require musicians to traverse this duality. These scores at once require musicians to “see” what is represented on the screen, but also to see it as representational and to translate it to embodied gesture.

and danger, maps (both as objects to be mapped and themselves a map of force and trajectory), and narratives (personal and imposed by theme park designers). Along the winding tracks are various loci, both birthed and forged—individual and collective—making roller coasters a productive tool for remembering and for imagining new futures. Roller coasters may even be an essential tool for teaching us about our own humanity. [13]

The domains of music composition and roller coasters have much to learn from each other. Further directions for this project might include: impossible roller coasters focusing on figures other than the knot; virtual roller coasters that become musical instruments through links to programs such as MAX/MSP; and tangential artworks, such as custom soundtracks for real-world roller coasters and 3D-printed sculptures.

### Acknowledgments

In researching and creating this project, I acknowledge the support of the Canada Council for the Arts.

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