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# Vertigo as a Design Resource for Digital Bodily Play

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## Abstract

This document presents my research as a doctoral student. Following a brief description about myself I then present a summary of my research, before describing my research area, research question and my approach to answering this question. Finally I conclude with my thesis statement and describe my expected contributions of this research.

## Author Keywords

Vertigo; play; design; HCI

## ACM Classification Keywords

H.5.m [Information interfaces and presentation (e.g., HCI)]:  
Miscellaneous

## Research Situation

I am Richard Byrne, a PhD researcher with a background in Computer Science and Human Computer Interaction. Currently, I am enrolled in a three year PhD program in Melbourne Australia, offered by the School of Media and Communication at RMIT University. My PhD commenced in March of 2014 under the supervision of Assoc. Professor Florian 'Floyd' Mueller and Dr. Joseph Marshall (Nottingham University, UK). I am currently on track to complete my PhD studies in March 2017, as I confirmed my candidature with a written report and presentation to an independent panel in December 2014. My next major milestone is my

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mid-candidature presentation and report due before March 2016.

### Context and Motivation

My research topic explores the use of “Vertigo” as a design resource for bodily play. In essence, I am leaning on the teachings of French sociologist Roger Caillois [3] who describes in his seminal work, *Man, Play and Games* four categorisations of games: Mimicry, Chance, Competition and finally, Vertigo. He describes games of Vertigo as “an attempt to momentarily destroy the stability of perception and inflict a kind of voluptuous panic on an otherwise lucid mind” [3, p.23].

Scholars such as Kenyon have expanded this definition by suggesting that “physical experiences providing, at some risk to the participant, an element of thrill through...speed, acceleration, sudden change of direction, or exposure to dangerous situations” [8] are inherently attractive to humans, since “man has always been attracted to activities in which he is unable to maintain complete control of his body or his immediate environment” [8].

Alderman [1] has reflected on Kenyon’s work and further stated that although people pursue vertigo “they do not necessarily achieve it” [1, p.69]. Understanding this attraction to the pursuit of vertigo and why people enjoy the experience allows us to consider how to adapt and design for the same feeling in a digital way, since perhaps the influence and assistance of digital technology can help people to *succeed* in their pursuit of vertigo. This is the opportunity I wish to address with my research.

### Related Work

Caillois [3] provides examples to illustrate what he means by games of vertigo, such as children whirling and spinning,

tightrope walking, falling, and the acceleration of vertilinear movement (straight, upward movement). However, some designers have described the difficulty of situating Caillois’ example within game design, saying they “fall outside the boundaries of games” and go “beyond a description of games” [11]. Despite this, several works in the fields of game design and HCI have begun to explore the novelty of vertigo like resources in system design, (such as gravity [6]), highlighting its relevance as a topic of research.

Specifically, using the body as a primary source of input in digital games has been explored in the HCI community via Exertion Games, with some systems directly exploring vertigo like experiences such as hanging by ones arms [10] or rock climbing [7].

Additionally game studies scholars such as Bateman [2] have reflected on Caillois’ definition of vertigo, stating how “very little has been written about the [vertigo] of videogames, despite the fact it is an increasingly potent force in popular games” [2]. Bateman gives reasons for the possible absence of vertigo in earlier games, stating that technological limitations such as limited graphical power meant that it is only recently that games including vertigo principles are gaining popularity. He also describes simulator machines as requiring both virtual simulation and physical movement to achieve a vertigo effect [2], whereas Caillois also discusses “powerful machines” [3, p.25], (e.g. fairground rides) being needed to create Vertigo Experiences, explaining that technology is not sufficient to realise Vertigo Experiences.

Work on theme parks and rides have investigated these “powerful machines” as a way to create novel experiences in spectators [12] and individuals [9], with both these examples exploring *control* as a key resource, however, although Vertigo Experiences could be said to be present in this work, they are secondary to the investigation at hand.

Recently, due to technology like the Oculus Rift becoming available and affordable, some exploration of Vertigo Experiences have begun, such as systems like *Ascent* [5] (a mountain climbing game designed for the first person perspective via the use of an Oculus Rift) and *Haptic Turk* [4], (a game that simulates flying experience), being explored.

Although these explorations and other related work have highlighted that elements of Vertigo Experiences are present in digital games and bodily play, a structured understanding of how to use vertigo as a design resource for digital bodily play is still under-explored. Additionally the technology needed to achieve a Vertigo Experience has also been described as too costly in the past, and despite systems like the Oculus Rift gaining popularity, how to design specifically for Vertigo Experiences from a bodily play perspective has not been considered.

### **Problem Statement**

My core research question stems from what I have outlined above as it is clear that there is a gap in knowledge related to designing digital Vertigo Experiences that involve whole body interaction. Therefore, I see an opportunity to address the ability to create novel and engaging Vertigo Experiences through the use of digital technology. My primary research question is therefore: *How do we design digital Vertigo Experiences?*

### **Research Approach**

The primary research method that I am following is Research Through Design (RtD). As RtD is an iterative and reflective practice, designing in this way allows me to evaluate prototype systems by examining the process, invention, relevance and extensibility of their design. What is interesting about this approach, and why it is of key importance in answering my research question, is that the focus on the

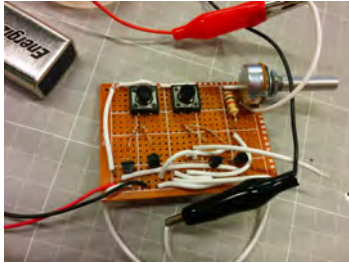
design is not necessarily as important as how the design is adopted in the context, allowing me to construct a framework to guide designers of future systems, in developing digital Vertigo Experiences.

### *Data Collection and Analysis*

Primarily, data will be collected in a qualitative way through observations and recordings, and in the wild study methods. This will be appropriate as I wish to observe how the technology is adopted by participants and to also delve deeper into their responses via coding and grounded theory. This will allow me to extract recurring themes that will be essential to forming my design framework contribution. Making use of semi-structured interviews and digital recordings of audio/video will aid me in doing this, and has proved useful in my most recent investigation.

### **Dissertation Status**

After exploring related work, identifying the research gap and refining my research question, I have conducted a workshop exploring the design of Vertigo Experiences. The purpose of the workshop was to identify key themes that are present in the design of vertigo games and to also provide design ideas for future explorations. I built several Galvanic Vestibular Stimulator (GVS) interfaces as ideation tools (see figure 1) and participants were invited to use them in order to experience a vertigo effect (figure 2). The GVS devices affect the human vestibular system by connecting to electrodes behind the ears and introducing a small (1-2.5mA) current between them. The result is that balance is affected. Five games were designed in total and Control, Embodiment, Effect, Structure and Immediacy of the Vertigo Experience were identified as recurrent themes. The results of the workshop and derived themes have been written up and submitted for review at a conference. Next steps will involve a deeper exploration into these themes,



**Figure 1:** GVS System used in workshop.



**Figure 2:** Participants trying their maze navigation game with the GVS system.

with another workshop planned to validate the themes before using them to design a Vertigo Experience, making use of a combination of GVS and an Oculus Rift system. The intended goal of the thesis is to create several systems to explore the entire space of vertigo as a design resource for digital bodily play, by investigating the themes and exploring both real and virtual settings.

### Expected Contributions

- 1) Contribute to design theory by creating a design framework to inform designers of Vertigo Experiences.
- 2) To encourage designers of bodily play experiences to explore vertigo as a design resource in their games.

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