The Interpretative Role of an Experiencer

How to Design for Meaningful Transmedia Experiences by Contrasting Ambiguous Vs. Prescribed Qualities

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BY
SABIHA GHELLAL

DISSERTATION SUBMITTED 2017

AALBORG UNIVERSITY
DENMARK

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by

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Dissertation submitted

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Open University: October 2006- September 2009, Postgraduate Diploma in Technology Management. Courses/Focus: User Interface Design & Evaluation & Innovation Management. Milton Keynes, MK7 6DQ UK

WORK EXPERIENCE

Stuttgart Media University: Since November 2014, Professor Mobile Interaction Design.
September 2012 – October 2012 Interim Professor Mobile Interaction Design

Lectures & Seminars : (Bachelor & Master): Mobile Content, User Interface Design, Mobile Game Design, User Experience, Transmedia Storytelling and Screen design

Projects & Committees:

Founding Member: REMEX Research Group and the HdM Games Institute: Responsibility UX, Transmedia & Game Related Scientific Research, Stuttgart Germany

Founding Member: Institute for Games (IFG), Stuttgart Germany

Curator: Game Zone at ITFS (International Animation Festival in Stuttgart).

Member of the Expert Panel: Animation Production Day (APD) as an Expert for Transmedia & Games

Freelancer April 2008 – August 2012, UID & UXD Freelancer

User Experience Design for Sony Europe, Nokia as well as several smaller agencies.

Tutor at Merz Akademie Stuttgart (Art Academy), and MdH in Berlin in and Munich, Film Akademie Stuttgart and Stuttgart Media University.

Courses: User Interface Design, Information Visualization, Game Design, User Experience, Transmedia Storytelling

Sony Europe December 2001 – March 2008, Manager Research & Innovation Concept, Design, and Implementation as well as overall Management of 2 EU Funded projects (Budget € 1.9 million): Concept, design, and implementation of UID, UXD and Game Design reflecting selected technology trends and research interests of pre-selected business owners. Berlin, Germany

Airmedia June 2001 – November 2011 07/01–11/01 Head of Product Development, responsibilities included: Concept, Design & Development of European Airmedia product suite and major accounts. Berlin, London & New York

GoIndustry April 2000 – June 2001, Product Manager. Independently responsible for concept, interaction and graphic design of the platform, partner management for 3rd party SW. Munich, Germany

Compaq Computers July 1998- March 2000, Program Manager Global Accounts
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CompuServe April 1996- July 1998, Project Coordinator: Liaison to the US headquarters and the localization, customization, and functionality requirement definition of the Germany CompuServe client. Munich, Germany

SKILLS & INTERESTS

- Interaction Design (Interface, Graphic & Experience Design)
- Game Design: Mobile Game Design & Transmedia Storytelling
- User Centered Design, Qualitative and Quantitative Evaluation (Tobii & SMI Eye Tracker Systems)
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Toowoomba, Australia, 27. February 2017

(Sabiha Ghellal)

MsC Technology Management

ENGLISH SUMMARY

Media designers and interactive artists continue to expand the boundaries of experience design (XD) as they engage with increasingly diverse environments. Teaching, designing and understanding experience design and its participatory culture are likewise no longer grounded in traditional ideas such as software engineering, or visual design. Interdisciplinary experience design approaches, such as transmedia experiences, i.e. experiences that mix modalities, require designers to combine various mental models of creation from different disciplines. Additionally, the fuzzy nature of transmedia experience design results in a plethora of theoretical frameworks, design methods, and approaches to consider during conceptual design processes.

The transmedia experience design matrix (TXDM) I introduce in the present research offers an adaptable conceptual design matrix that juxtaposes and combines existing interdisciplinary frameworks. The TXDM provides a structured interdisciplinary design approach that integrates design knowledge from multiple disciplines and assists designers to investigate suitable conceptual design frameworks. Ultimately, the purpose of the TXDM is to help interdisciplinary design teams to create meaningful experiences across disciplines.

Working with a three staged grounded theory process I analyse three case studies, The *Remediation of Nosferatu: Exploring Transmedia Experiences, The Interactive Hammock: Investigating two Contrasting Tangible Interface Installations* and *Get Milk: A Comparative Study Investigating Digitised Game Design Teaching Material.*

Expanding on the theory of 'ambiguity as a resource for design' and 'open vs. closed text' I propose designers consider the *interpretative role of an experiencer* as part of an iterative design process. Evidence suggests aiming for *ambiguous* qualities when a designer aims to slow down an experience and invite for own meaning making, critical thinking, contemplation, or if the designer aspires to invite for several interaction choices or would like to portray several perspectives or truth about a subject. In contrast, *prescribed* qualities give clear instructions on how to interact with a system, explain a topic or circumstance, speed up an experience or help to portray one perspective or truth about a subject.

With this research, I contribute evidence to support the importance of understanding and awareness of *ambiguous vs. prescribed* qualities. I propose a set of guidelines on how these qualities may be best applied to improve interdisciplinary conceptual design processes. I invite designers to consider the *interpretative role of an experiencer* as a new lens, consisting of a comparative set of qualities (*ambiguous vs. prescribed*) that will enhance design thinking and processes.

DANSK RESUME

Medie-designere og interaktive kunstnere fortsætter med at udvide grænserne for oplevelsesdesign (OD) i takt med deres engagement i forskelligartede miljøer. Undervisning, design og forståelse af OD og dens participatoriske kultur er ligeledes ikke længere funderet i traditionelle ideer såsom softwareudvikling eller visuelt design. Tværfaglige OD tilgange, såsom Transmedia oplevelser, dvs. oplevelser der blander modaliteter, kræver at designere kombinerer forskellige mentale skabelses-modeller fra forskellige discipliner. Derudover, resulterer den uforudsigelige natur af transmedia OD i et væld af teoretiske rammer, design-metoder og tilgange som skal overvejes i arbejdet med konceptuelle designprocesser. *Den transmedia experience design matrix* (TXDM) jeg præsenterer i den nuværende forskning tilbyder en fleksibel, konceptuel design matrix, der sidestiller de eksisterende tværfaglige rammer. TXDM giver en struktureret, tværfaglig designtilgang, der integrerer design-viden fra flere fagområder og hjælper designere til at undersøge egnede konceptuelle design-rammer. I sidste ende er formålet med TXDM at hjælpe tværfaglige designteams med at skabe meningsfulde oplevelser på tværs af faglige orienteringer.

Jeg analyserer tre casestudier i mit arbejde, hvor jeg har anvendt en tre-trinnet grounded theory process; The *Remediation of Nosferatu: Exploring Transmedia Experiences, The Interactive Hammock: Investigating two Contrasting Tangible Interface Installations,* og *Get Milk: A Comparative Study Investigating Digitised Game Design Teaching Material.*

I min udvidelse på teorien om "tvetydighed som en ressource for design" og "åben versus lukket tekst", foreslår jeg at designere bør overveje "den fortolkende rolle som oplever" som værende en del af deres iterative designproces. Beviser antyder, at man sigter efter flertydige kvaliteter, når en designer har til formål at bremse en oplevelse og invitere til egen betydningsdannelse, kritisk tænkning, fordybelse, eller hvis designeren stiler mod at invitere til flere interaktionsmuligheder eller ønsker at skildre flere perspektiver eller virkeligheder på et emne. Som modsætning giver foreskrevne kvaliteter klare instruktioner om, hvordan man kan interagere med et system, forklare et emne eller omstændighed, fremskynde en oplevelse eller hjælpe til at skildre et perspektiv eller fakta om et emne.

Med denne forskning bidrager jeg med beviser til støtte for betydningen af forståelse og bevidsthed om flertydige versus foreskrevne kvaliteter. Jeg foreslår et sæt retningslinjer for, hvordan disse kvaliteter bedst kan anvendes til at forbedre tværfaglige konceptuelle designprocesser. Jeg opfordrer designere til at overveje "den fortolkende rolle som oplever", som en ny linse, der består af en sammenlignelige sæt af kvaliteter (tvetydig vs. foreskreven), som vil øge designtænkning og processer.

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A special thank you to my colleagues at the Stuttgart Media University and especially the ReMeX group who not only funded most of my research but also gave me the opportunity to present my work at several international conferences.

I would also like to thank Benjamin Schaufler, Nick Mussin and Tobias Schneider for sharing my visions and for their wonderful collaboration. You supported me greatly with your enthusiasm and humour.

Finally, I would like to thank all of my friends and family who supported me in writing, and encouraged me to strive towards my goal. At the end I would like express the biggest **thank you** to my beloved partner Steffen Harrer who spent sleepless nights with me and was always my support in moments of doubt.

Thank you very much, everyone!

Sabiha Ghellal

Toowoomba Australia, February 27th, 2017

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PREFACE

The present research is submitted to the Technical Doctoral School of IT and Design. The research described herein was conducted under the supervision of Professor Ann Morrison between 01.03.2016 and 28.02.2017. This work is to the best of my knowledge original, expect where acknowledgments and references are made to previous work. This dissertation includes excerpts of published work that has been submitted as part of this research and details can be found in the co-author statement. The chapters where published work has been included are listed in brackets in the following list of published work:

RELEASED PUBLICATIONS:

Ghellal, Sabiha; et.al., Transmedia Perspective. In: *Artur Lugmayr and Cinzia Dal Zotto (edts.) Media Convergence Handbook*. , Springer-Verlag, 2016, http://www.Springer. com/series/11520, 2016. (Excerpts can be found in Chapter 2 and 3 and the full paper in Appendix A)

Ghellal, Sabiha; Morrison, Ann; Hassenzahl, Marc; Schaufler, Benjamin. The Remediation of Nosferatu: exploring transmedia experiences. In: *Proceedings of the 2014 conference on Designing interactive systems (DIS)*. ACM, 2014. S. 617-626. (Excerpts can be found in Chapter 4.1 and the full paper in Appendix A)

Ghellal, Sabiha; Mussin, Nick; Morrison, Ann. The Roaring Hammock. *Mensch und Computer 2015–Proceedings*, 2015. (Excerpts can be found in Chapter 4.2 and the full paper in Appendix A)

Ghellal, Sabiha; Schneider, Tobias; Holopainen, Jussi. Get Milk–A Game of Lenses Abstract. Conference of the Digital Games Research Association, (DIGRA) 2015.

Ghellal, Sabiha. The Fuzzy Front End of Experience Design – Considering Ambiguous and Prescribed Qualities 2015 VVT Technology 209, ISSN-L 2242-1211 ISSN 2242-122X (Online) (Excerpts can be found in Chapter 6 and the full paper in Appendix A)

MANUSCRIPTS SUBMITTED:

Ghellal, Sabiha; Morrison Ann; Schneider Tobias. *Get Milk:* A Comparative Study Investigating Digitised Game Design Teaching Material. Submitted to Designing Interactive Systems (DIS 2017), June 10-14, 2017, Edinburgh UK (Excerpts can be found in Chapter 4.3 and the full paper in Appendix A)

MANUSCRIPTS IN PREPARATION:

Ghellal, Sabiha; Morrison Ann. The Role of an Experiencer: Ambiguous and Prescribed Experiences. Submitted to Int. J. Human–Computer Studies Journal (IJHCS)

PUBLICATIONS BEFORE PHD RESEARCH:

Ghellal, S., & Lindt, I. (2008). Interactive movie elements in a pervasive game. Personal and Ubiquitous Computing, 12(4), 307-315.

Wittkämper, M., Lindt, I., Broll, W., Ohlenburg, J., Herling, J., & Ghellal, S. (2007, April). Exploring augmented live video streams for remote participation. In CHI'07 Extended Abstracts on Human Factors in Computing Systems (pp. 1881-1886). ACM.

Lindt, I., Ohlenburg, J., Pankoke-Babatz, U., & Ghellal, S. (2007). A report on the crossmedia game epidemic menace. Computers in Entertainment (CIE),5(1), 8

Lindt, I., Ohlenburg, J., Pankoke-Babatz, U., Prinz, W., & Ghellal, S. (2006, April). Combining multiple gaming interfaces in epidemic menace. In CHI'06 Extended Abstracts on Human Factors in Computing Systems (pp. 213-218). ACM.

Pankoke-Babatz, U., Lindt, I., Ohlenburg, J., & Ghellal, S. (2006). Crossmediales Spielen in 'Epidemic Menace'. In Mensch & Computer (pp. 233-242).

Lindt, I., Ohlenburg, J., Pankoke-Babatz, U., Ghellal, S., Oppermann, L., & Adams, M. (2005). Designing cross media games. In 2nd International Workshop on Gaming Applications in Pervasive Computing Environments

CONFERENCE PRESENTATIONS & DEMONSTRATIONS:

- DIGRA 2015 – Get Milk http://projects.digital-cultures.net/digra2015/
- Mensch Computer 2015- The Roaring Hammock
- DIS 2014- The Remediation of Nosferatu
- NordiCHI 2014 - The Fuzzy Front End of Experience Design – Considering Ambiguous and Prescribed Qualities
- FMX 2013 – Digital Forest
- NordiCHI 2012 – Transmedia Seams

CONFERENCE PARTICIPATION:

- FMX (Conference on Animation, Effects, Games and Transmedia Stuttgart, Germany (2016) http://www.siggraph.org/attend/events/fmx-2016)

- Mobile HCI (2013) http://www.mobilehci2013.org/
- FMX (Conference on Animation, Effects, Games and Transmedia Stuttgart, Germany (2015) http://www.siggraph.org/attend/events/fmx-2015

SCIENTIFIC WORKSHOPS:

- NordieChi2014 –The Fuzzy Frontend of Experience Design (Workshop Participant- Peer Reviewed and Published)
- Mobile HCI 2013 - Informing Future Design via Large-Scale Research Methods and Big Data (Workshop Participant)
- NordiChi2012 – Peer Reviewed Workshop Organizer Transmedia Seams (Workshop Organization- Peer Reviewed)

PRESENTATION/ DISSEMINATION

- Keynote: Keynote & Moderation & Workshop Lead: Museum Apps of Today and Digital Perspectives of Tomorrow (2015). Humboldtforum Foundation, Berlin
- Keynote Titled 'Transmedia Perspectives' (2013), SETECEC 20132nd Conference Software and Emerging Technologies for Education, Culture, Entertainment, and Commerce:

WORKSHOP:

- Game Aesthetics and Experience Design- How to design for meaningful experiences in a museum or gallery context with interdisciplinary experts (2016), Part of the Open Culture Initiative at MFG Medien- und Filmgesellschaft Baden-Württemberg mbH, Breitscheidstr. 4, D-70174 Stuttgart http://www.openculturebw.de/p/blog-page.html
- Game Aesthetics and Experience Design- How to design for meaningful experiences (2016), Part of the Open Culture Initiative at MFG Medien- und Filmgesellschaft Baden-Württemberg mbH, Breitscheidstr. 4, D-70174 Stuttgart http://www.openculturebw.de/p/blog-page.html
- NordiCHI 2014 - The Fuzzy Front End of Experience Design –Considering Ambiguous and Prescribed Qualities
- NordiCHI 2012 – 'Transmedia Seams', Interdisciplinary Workshop with the purpose of finding a common transmedia design framework.

CURATOR & EXPERT PANNEL ACTIVITIES

- 21st Festival of Animated Film – Games Curator 'Let's Play' (2014)

- APD Expert Panel (Transmedia & Games Expert) http://www.animationproductionday.de/en/ueber-den-apd/expertenrat/
- 22nd Festival of Animated Film – Games Curator "Games für Alle" (2015) http://www.itfs.de/archive/itfs-2015/www.itfs.de/en/festival/gamezone/index.html
- APD Expert Panel (Transmedia & Games Expert) http://www.animationproductionday.de/en/ueber-den-apd/expertenrat/
- 23rd Festival of Animated Film – Games Curator 'Level Up' (2016) http://www.itfs.de/archive/itfs-2016/www.itfs.de/en/programme/gamezone/index.html
- APD Expert Panel (Transmedia & Games Expert) http://www.animationproductionday.de/en/ueber-den-apd/expertenrat/

CHAPTER 1. INTRODUCTION

Many different naming conventions, approaches, theoretical frameworks, and sometimes even disciplines have appeared, re-appeared and disappeared over the last decades within the human-computer interaction (HCI) community as we witnessed a significant shift in how humans interact with computers. The focus of my PhD is informed by theories that emphasize how personal 'meaning making' may influence experience design. Designing for meaning or meaningful experiences has been popular within the HCI and experience design (XD) community for a number of years, with researchers such as Don Norman (D. Norman, Miller, & Henderson, 1995), William Gaver (Gaver, Beaver, & Benford, 2003), Marc Hassenzahl (Hassenzahl et al., 2013) or Dhaval Vyas (Vyas & van der Veer, 2006) to name a few, contributing to the field.

However, there seems to be no consensus regarding what makes an experience meaningful. On the one hand, Hassenzahl et al. (2013) argue that an experience is meaningful when it is personally significant, that is when a specific psychological need (Sheldon, Elliot, Kim, & Kasser, 2001) is fulfilled (or frustrated). On the other hand, Vyas and Van der Veer (2006) draw from the domain of art and regard meanings as interpretations that an experiencers construct during their interaction with or through an interactive system (Vyas & van der Veer, 2006)

A closer look at the definition of meaning within the HCI and XD community suggests that there are two somewhat contrasting schools of thought. Some XD scholars seem to draw from the domain of arts, e.g., Vyas and Van Der Veer (2006), or (Gaver et al., 2003, 2004, 2010,) or (Benford et al., 2004; Benford, Crabtree, Flintham, et al., 2006; Benford, Crabtree, Reeves, et al., 2006; Benford et al., 2012). They evidently consider 'ambiguity as a resource for design'. Other scholars, on the other hand seem to take a more *prescribed* approach to meaning making, determining the experience but leaving less room for interpretation for the experiencer (Diefenbach & Hassenzahl, 2009; Hassenzahl, 2003, 2010; Hassenzahl et al., 2013), or (Diefenbach, Kapsner, Laschke, Niess, & Ullrich, 2016).

Although multiple artists, scholars, and researchers refer to 'Ambiguity as a Resource for Design' (Gaver et al., 2003) which received, according to Google Scholar (10.02.2017) 816 citations or 'Technology for the Right Reasons' (Hassenzahl, 2010), which was cited 367 times, per Google Scholar (10.02.2017) to my knowledge no literature exists that compares and contrasts the two approaches. With the present research I propose to fill this gap by defining *ambiguous vs. prescribed* qualities as follows:

Ambiguous quality: an ambiguous quality is open to several interpretations and therefore allows several interaction choices.

Prescribed quality: a prescribed quality strongly stipulates one quality of interaction, and allows less room for interpretation.

In addition, I will refer to how a participant might interpret an experience with a system as *the interpretative role of an experiencer*. For this definition, I am borrowing and reinterpreting from Umberto Eco's 'The Role of the Reader' (Eco, 1979), which I will discuss in more detail as part of the theoretical background research (Chapter 2).

In my personal experience, working with artists and designers, I have continuously worked with *ambiguous vs. prescribed* qualities to design meaningful experiences and have engaged in numerous discussions that focused on the need for 'ambiguity' or catering to several possible interpretations or ways of interacting with a system.

Very often those discussions ended up looking for a distinction between art and design. However, I find that asking what distinguishes art from design is a complicated and overly theoretical question. There seem to be a shared understanding that artists will create a work with the intention of conveying a viewpoint, emotion, state of mind, or intuitive feeling; whereas a designer's purpose is to entice the audience to buy a product, use a service or visit a location. Or that art is associated with emotions, or individual performance and design can be interpreted as rational, empirical and customer-centric (Siu & Contreras, 2016). However, I find this distinction misleading and not as clear-cut, because many examples, in particular games, exist that have been designed to be thought provoking, e.g., This War of Mine (Skóra et al., 2014), or invite for multiple interpretation, e.g., The Migrant Trail (Williams, 2014).

This War of Mine, is an anti-war game inspired by the 1992–96 siege of Sarajevo during the Bosnian war. It challenges the player to make life-or-death decisions driven by their conscience and by showing, and not telling, the horrors of war, participants are invited to draw their conclusions on the matter, rather than to adopt a *prescribed* conclusion. The Migrant Trail meanwhile, is part of a transmedia production featuring a game and a documentary exposing the consequences of the United States immigration policy. The game presents a first-person journey through the Arizona desert where the player is invited to play the game as a border patrol officer or an illegal immigrant. By experiencing both sides of the situation, the game offers an alternative viewpoint on migration legislation.

There are many other examples both from the design and art world, such as the game 'Karen' (Row Farr, Adams, & Tandavanitj, 2014) which will be discussed in more detail within the theoretical background (Chapter2), that illustrate how new media design blurs the distinction between art and design. I propose that considering *ambiguous* or *prescribed* qualities as resources for design will help designers to create more meaningful experiences.

1.1. RESEARCH AIM, OBJECTIVES & RESEARCH QUESTIONS

The main aim of this PhD research is to evaluate the *interpretative role of an experiencer, i.e.* how a participant understands and assigns meaning to their personal experience. This entails investigating if and how designing for *ambiguous vs. prescribed* qualities, namely contrasting a more *ambiguous* interpretation that allows for several meaning and interaction choices with a *prescribed* interpretation that suggest one understanding and form of interaction, proves to be a valuable contribution to the experience design community.

For the purpose of investigating the *interpretative role of an experiencer* I addressed the following three main research questions:

1. What is the *interpretative role of an experiencer* within a transmedia fictional universe and how can a designer shape this interpretative role?
2. Which design concepts, methods, and frameworks are suitable and how can they be combined into one central transmedia experience design framework?
3. How will a holistic experience that is shaped on several *experience-fragments* influence the *interpretative role of an experiencer*?

1.2. SCIENTIFIC FRAMEWORK

The main aim of the present research is to evaluate the *interpretative role of an experiencer* as a new transmedia experience design lens. *The interpretative role of an experiencer* invites a designer to consider *ambiguous vs. prescribed* qualities as contrasting resource for design. Figure 1 illustrates that the research framework presented in this study is based on three main phases. It illustrates the methods applied, minor contributions and the dissemination of those contributions.

Phase one focused on the theoretical background and introduces the *transmedia experience design matrix* (TXDM). Phase two involved, two case studies *The Remediation of Nosferatu*, (Ghellal, Morrison, Hassenzahl, & Schaufler, 2014) featuring a location based augmented reality horror adventure and *The Interactive Hammock* (Ghellal, Mussin, & Morrison, 2015) a tangible interface installation. Phase three applied evidence found in the two previous phases into one final case study *Get Milk*: *A Comparative Study Investigating Digitised Game Design Teaching Material* (under review for DIS2017).

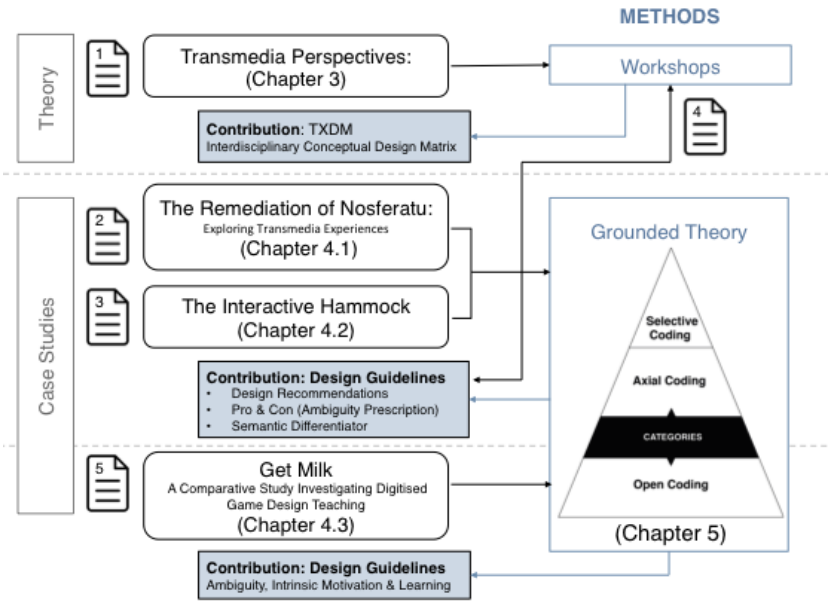

Figure 1. Research Framework (illustration by the author)

1.3. MOTIVATION TO UNDERTAKE RESEARCH

Since 2004, I have been fascinated by the possibilities of designing experiences that mix media modalities, such as reading a text, watching a movie or playing a game. As a manager of research and innovation at Sony Europe I was involved in many attempts to merge experiences for commercial exploitation. For me the most influential work was my involvement in the EU funded research project Integrated Project on Pervasive Gaming (Waeren, Benford, & Goetcherian, 2008). Here, I did not only meet and worked alongside a number of influential and critically acclaimed artists, scholars and researchers but could also unleash my passion for storytelling across multiple modalities. As the game designer and storyteller of the game *The Epidemic Menace* (Ghellal & Lindt, 2007) I could finally explore if and how movies, text and games could merge into one holistic experience without having to focus exclusively on commercial exploitation. I undertook this PhD program with over 15 years of experience as a designer and came armed with a set of ideas, questions and publications I had been working on. These experiences gave me the motivation to research the difference and commonalities of designing for *ambiguous vs. prescribed* qualities.

CHAPTER 2. THEORETICAL BACKGROUND

In the introduction, I stated that many different theoretical frameworks and design approaches have appeared, re-appeared and evolved over the last decades within the human-computer interaction (HCI) community as we witnessed a significant shift in how humans interacted with computers.

While experience design (XD) continues to be a widely debated topic within the HCI community (Diefenbach et al., 2017; Eggen, van den Hoven, & Terken, 2017; Windahl, 2017; J. Wu, Thoreson, Koo, & Kim, 2017) other subjects such as transmedia experiences seems to have lost some of its scientific momentum in recent years (Philips, 2019). Don Norman, who coined the term experience design in 1995 (Norman et al., 1995), defines XD as 'encompassing all aspects of the end-user's interaction with a company, its services, and its products' (Norman, 2016, p.1). He describes a complex interdisciplinary subject that could, among many other disciplines, also include transmedia experiences. In a recent online article Henry Jenkins, a transmedia scholar since 2004, explains that transmedia 'is an adjective in search of a noun to modify' and describes some 'structured relationship between different media platforms and practices' (Jenkins, 2016, p.1). Because transmedia can be understood as closely related to media convergence and divergence it describes an evolving paradigm of content consumption (Ghellal, Wiklund-Engblom, Morrison, & Obal, 2016) that may involve multiple evolving aspects. Today mobile devices such as smartphones, tablets or more tangible alternative interfaces (Ishii & Ullmer, 1997) allow for interactions that mix modalities, such as reading and writing, seeing and hearing, touching and feeling (Norman, 2009). This opens up opportunities for multi-sensory or multi-functional experiences that relate well to the idea of transmedia experiences.

Tangible (Ishii & Ullmer, 1997) or graspable (Fitzmaurice, 1996) interfaces, for example, offer malleable, resourceful and practical environments, allowing participants to interact through alternative input modalities, such as speech, gesture, orientation (position), handwriting, gaze or full-body interaction (Hornecker & Buur, 2006). And to receive information from the system through output modalities, such as text, sound, vibration, speech synthesis, video or smart graphics, amongst others, opportunely combined according to temporal and contextual constraints (Hornecker & Buur, 2006). New tangible interfaces are highly relevant for transmedia experiences that may span across 'time, space, roles and ecologies' (Benford, Giannachi, Koleva, & Rodden, 2009).

2.1. TRANSMEDIA

The fuzzy nature of transmedia not only describes a complex interdisciplinary design problem that requires the designer or storyteller to combine various 'mental models of creation' (Dena, 2016) but has also caused some major confusion and debate in the past. Figure 2 illustrates how the definition of transmedia has evolved since the term first appeared in 1993.

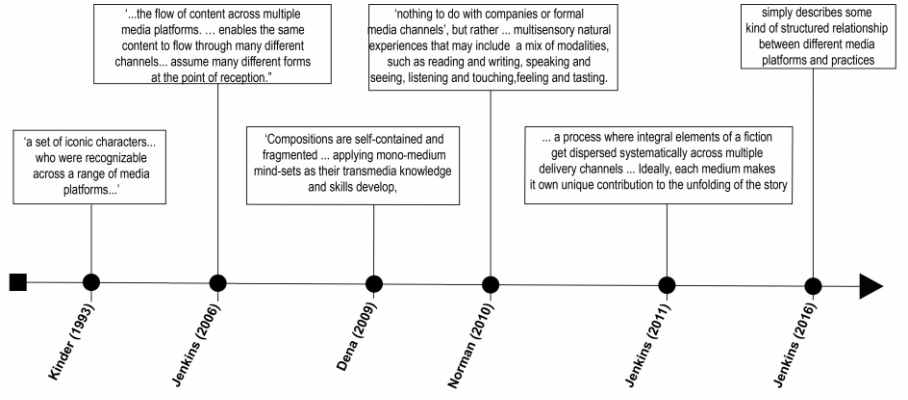

Figure 2. Transmedia Timeline (illustration by the author)

The concept 'transmedia', as coined by Marsha Kinder (1993), describes the reproduction process of TV or movie characters into video games and how this reproduction developed and intensified in the context of commercial 'Transmedia Supersystems'. In 2006, Henry Jenkins further defined 'transmedia storytelling' as 'the consumption of different content that is part of the same storyworld on several devices' (Jenkins, 2006 p. 5). Conversely, Jenkins discussed how consumer behaviour might associated with less predictable user-dynamic by highlighting that convergence occurs via the social interaction between users. Jenkins defined convergence as a flow of content across multiple media platforms, pointing out the necessary cooperation between multiple media industries and the migratory behaviour of media audiences. Since then Henry Jenkins redefined what constitutes a transmedia experience several times (Jenkins, 2006), (Jenkins, 2007) and (Jenkins, 2011).

More recently Henry Jenkins described transmedia as an 'adjective in search of a noun to modify' and that it simply describes 'some kind of structured relationship between different media platforms and practices' (Jenkins, 2016 p.1). Concordantly, I would argue that this reflects the complex and ever changing nature of media and that this might be true for a number of other HCI disciplines.

Meanwhile, other interpretations or perspectives of the term transmedia have emerged (Ghellal et al., 2016). Christy Dena (Dena, 2009), for example explained that transmedia experiences are fragmented in nature and pull a number of theories into focus that discuss fragmentation of narration such as 'distributed experiences' (McGonigal, 2006), 'pervasive games', (Montola, Stenros, & Waern, 2009), 'superfictions' (Hill, 2001), 'networked narrative environments' (Zapp, 2004), 'or 'free play' (Morrison, et al., 2011). Other perspectives result from commercial needs that often discuss how to produce transmedia content e.g., (Bernardo, 2011) or (Dowd, Niederman, Fry, & Steiff, 2013).

For the purpose of the present study I will refer to transmedia experience design as follows:

Transmedia defines a holistic experience that is shaped by experience-fragments, which may evolve over 'time, space and ecologies' (Benford et al., 2009). How the holistic experience evolves can either be designed or can be based on choices made by the experiencer.

Experience-fragments describe individual momentary encounters with a system, such as a specific location in a location-based game or a specific game mechanic, that in combination with other experience-fragments make-up an overarching, i.e. holistic, experience.

2.1.1. THE TRANSMEDIA CHALLENGE

Don Norman (Norman, 2009) invited us to consider transmedia as experiences that feature a mix of modalities and as such have nothing to do with companies and formal media channels, but rather offer the potential for free, natural powerful experiences. Norman suggests letting transmedia stand for multisensory natural experiences that may include trans-action, trans-sensory or a mix of modalities, such as reading and writing, speaking and seeing, listening and touching, feeling and tasting. In line with Don Norman's reflections on the meaning and uses of transmedia, this research focuses on designing interdisciplinary experiences that embrace the merits of a mix of modalities such as reading, playing, seeing, listening, touching and feeling. As such, the theoretical label, the media production and/or the devices used to consume transmedia content are only of secondary importance.

2.2. EXPERIENCE DESIGN

HCI can be defined as a discipline, which is concerned with the design, evaluation and implementation of interactive computer systems or products for human use (Hewett et al., 1992). The historical origins of experience as the heart of people's interactions with digital technology can be traced back to (1995) when Don Norman coined the term 'experience design' while he was vice president of the advanced

technology group at Apple. In an interview (Merholz & Norman, 2007) Don Norman explained:

'I invented the term because I thought Human Interface and usability were too narrow: I wanted to cover all aspects of the person's experience with a system, including industrial design, graphics, the interface, the physical interaction, and the manual. Since then (1995), the term has spread widely, so much so that it is starting to lose its meaning' (Merholz & Norman, 2007, p.2).

2.2.1. EXPERIENCE DESIGN PERSPECTIVES

Indeed, like the idea of transmedia interaction the background of experience design research is fragmented and complicated by diverse theoretical models with different foci such as 'pragmatism' (Cockton, 2008), 'emotion' (Desmet & Hekkert, 2007), 'technology as experience' (McCarthy & Wright, 2004), 'empathy and experience'(Wright & McCarthy, 2008), 'affect' (Forlizzi & Ford, 2000), 'pleasure' (Jordan, 2002), 'ambiguity' (Gaver et al., 2003),'beauty' (Diefenbach & Hassenzahl, 2009) and 'hedonic/aesthetic variables' (Hassenzahl & Tractinsky, 2006) to name a few. The need for one exhaustive definition of what constitutes experience design has been the subject of numerous publications over the last decade (Cockton, 2008; Law, et al., 2009; Law, et al., 2008; Obrist, et al., 2009; Roto, et al., 2009). Law et al articulate the fuzzy nature of experience design, for example:

'The unit of analysis for UX is too malleable, ranging from a single aspect of an individual end-user's interaction with a standalone application to all aspects of multiple end-users' interactions with the company and its merging of services from multiple disciplines.' (Law et al., 2009 p. 719)

2.2.2. THE QUALITATIVE NATURE OF EXPERIENCE DESIGN

While usability or pragmatic aspects of a system can often be measured objectively, an experience is subjective in nature. XD focuses on individual perception and the thoughts (or emotional responses) of an experiencer (Wright & McCarthy, 2008). One standard definition addresses the overall acceptability of an application or service as perceived subjectively by the end-user and further specifies that 'overall acceptability may be influenced by user expectations and context' (Ibarrola, et al., 2009 p. 1).

Similarly, the quality of experience indicates the degree of subjective satisfaction (Chen, et al., 2009). More broadly, the quality of experience can be seen as 'a multidimensional construct of user perceptions and behaviours'(Wu et al., 2009). As such, the need for qualitative measures that focus on the lived, subjective experience of participants becomes imperative.

2.2.3. HUMAN CENTERED DESIGN (HCD)

The most common method concerned with designing for humans suggests adopting a 'human-centred design' (HCD) which, according to the ISO Standard (ISO 9241-210:2010, 2015, p. 2010), describes an approach where end-users are integrated into an iterative design process. HCD can be understood as both, a broad philosophy and a variety of methods.

Historically, the HCD approach focused on the 'usability' (Nielsen, 1993) of systems or produces and introduces more pragmatic design principles such as 'learnability, efficiency, memorability, errors, and satisfaction'. Usability is built upon the idea of an HCD approach, particularly for the purpose of quantitative evaluation (ISO9241-11:1998(en), 1998, p. 9241–11). While the definition of usability has not changed much over time, its application and evaluation has been the subject of numerous publications since. For the purpose of my research I have selected the following definition/approach:

'An approach that puts human needs, capacities and behaviour first, then designs to accommodate those needs, capacities and ways of behaviour. Good design starts with an understanding of psychology and technology. Good design required good communication, especially from machine to person, indicating what actions are possible, what is happening and what is about to happen.' (Norman, 2013 p. 8)

2.2.4. PERSONAS AND EMPATHY MAPPING

A more recent trend within the XD design community is 'persona empathy mapping' (Cooper, 2014), which expands on the idea of 'personas' (Cooper, 2004). It assists with focusing on less instrumental experiences during the design process such as what an experiencer is thinking, feeling, doing, seeing or hearing as the experiencer engages with a system or product. While a 'persona' represents an imaginary person that cluster potential users of a system it was mainly used to ensure the 'usability' of a system. 'Persona empathy mapping', moreover, allows a design team to not only focus on **'instrumental'** attributes of a product such as 'utilitarian' (Batra & Ahtola, 1991), 'functional' (Kempf, 1999) or 'pragmatic' (Hassenzahl, 2003) ones. It also allows to consider **'non-instrumental'** attributes such as novelty, surprise, diversion or mystery (Gaver & Martin, 2000), 'ambiguity as a resource for design' (Gaver et al., 2003) or 'hedonic qualities' (Hassenzahl, 2010).

Figure 3 consolidates and groups the XD concepts and attributes I introduced in this chapter. It groups existing knowledge into **'instrumental'** and **'non-instrumental'** components and positions them opposite to 'human needs'(Sheldon et al., 2001), which might consider instrumental or non-instrumental attributes.

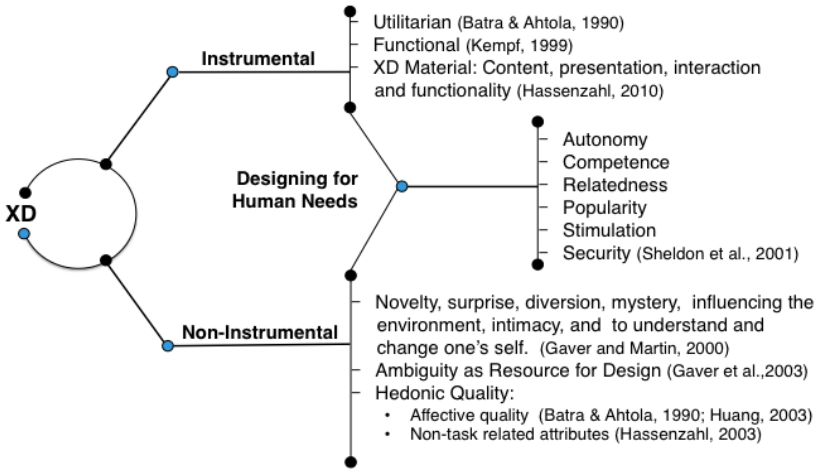

Figure 3. Theoretical Experience Design Knowledge as applied in this research (illustration by the author)

2.2.5. DESIGN THINKING

From a more commercial point of view interdisciplinary system design or 'design thinking' is an HCI topic that has also gained some scientific attention (Brown, 2009; Carr, et al., 2010; Cross, 2011; Liedtka & Ogilvie, 2011; Martin, 2009). One of the pioneers of 'design thinking' is David Kelly, an American entrepreneur, designer, engineer and teacher. Kelly is founder, chairman and managing partner of the critically acclaimed design agency IDEO and Professor at the Design School of Stanford University. His two books 'The Art of Innovation' (T. Kelley, Littman, & Peters, 2007) and 'Creative Confidence' (D. Kelley, 2013) have purportedly changed the way that organisations regard innovation. 'Design thinking' focuses on adopting an interdisciplinary approach that combines what is desirable from a human point of view (experience design) with what is technologically feasible (system development) and economically viable (innovation management). The theory of 'design thinking' was influential on my PhD research because it not only emphasises the need for an Interdisciplinary design approach but also illustrates its complexity and advertises an iterative design approach (Norman, 1986).

2.3. STORYTELLING

The theory of how stories are crafted is equally diverse; some define a linear storytelling approach (Campbell, 1949) others describe a fictional world that is based on the idea of non-linear storytelling such as (Pearce, 1994) or (Cameron, 2008). Many storytellers recommend building a storyworld, such as (Mittell, 2015), or a fictional universe rather than just one linear story.

What distinguishes a fictional universe or a storyworld approach from linear storytelling is the level of detail and internal consistency. Linear storytelling frameworks have been popular since Aristotle; examples include: 'The Hero's Journey' (Campbell, 1949), 'The Writer's Journey (Vogler, 2007) or the 'dramatic arc' (Freytag, 1863) and follow one line of engagement.

A fictional universe, on the other hand, has a multifaceted established continuity (that may enable several interwoven storylines) and internal logic that must be adhered to. The most popular example of a fictional universe, Tolkien's 'Lord of the Rings' (Tolkien, 1954), illustrates how complex and far-reaching a fictional universe can be. Tolkien first created the language of the fictional universe, 'Elvish', and then the fictional world itself, a process he describes as 'primarily linguistic in inspiration' in the foreword of 'The Fellowship of the Ring' (Tolkien, 1959,).

Fictional universes make use of several intertwined elements, such as genre, theme, setting, existence, concept, and conflict, to create a rich backdrop. Genre (for instance, the horror genre) defines the style of a fictional universe, setting its time and place; existence introduces characters and objects; theme represents the idea or subject of the world (for example, vampires); and concept describes any key events that impact the world and lead to conflict.

Within a fictional universe all elements are of equal importance and a designer/author may use any element as a starting point. However, the *interpretative role of an experiencer* plays an important part in the transmedia experience design, and the interface to allow access to all the individual elements needs consideration during a design process. Figure 4 summarizes the four main storytelling concepts I was informed by and referred to while designing the three case studies for this research.

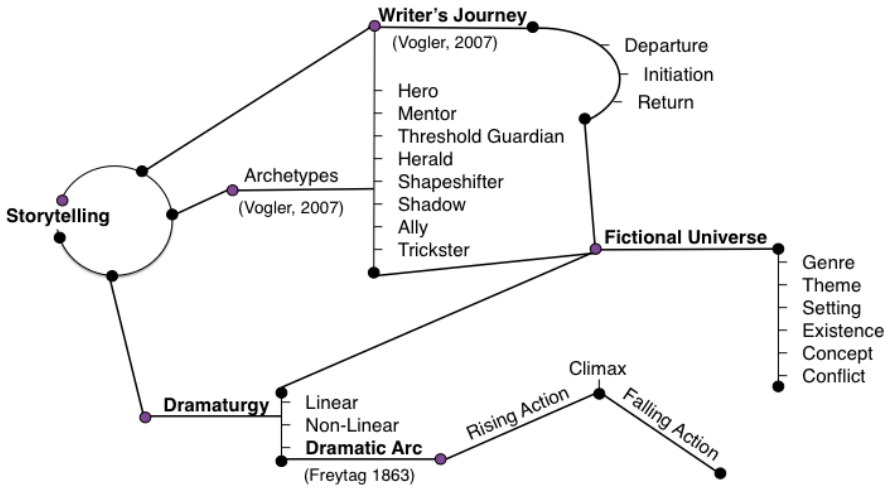

Figure 4 Theoretical Storytelling Knowledge as applied in this research (Illustration of the Author)

2.4. GAMES, PLAY, PLAYFULNESS & GAME INTERVENTIONS

When attempting to understand games and their connection to play and playfulness the area of 'game studies' presents a good starting point. Here 'playfulness' can be understood as a mindset and play as the activity of actually playing a game. However, while play and playfulness are connected, and in practice intertwined, analytically they can be separated (Zimmerman, 2010).

2.4.1. PLAY AND PLAYFULNESS

Play or playfulness have a long history of debate in academia where these topics have been addressed in multiple scenarios, situations and/or disciplines ranging from psychology (Dewey, 1910; Lieberman, 2014; Morgan, 2008; Suits, 1977) to anthropology (Geertz, 1972; Norbeck, 1974). Here, play and playfulness have been framed as activities, mindsets, forms, behaviour, as social communication, or even as the basis for cultural evolution.

Even though play and playfulness are the subjects for a plethora of publications, the definition remains amorphous and paradoxical (Myers, 2010). The contemporary understanding of play is rooted in the definition of Dutch philosopher Johan Huizinga who described play as a free activity standing quite consciously outside 'ordinary' life as being 'not serious', but at the same time 'absorbing the players deeply'. According to Huizinga play takes place in a 'magic circle' with its own rules and regulation and is not connected with material interest.

Although its core topic is playing rather than gaming, Homo Ludens (Huizinga, 1938) remains a standard reference in many game design books (Crawford, 2003; Fullerton, et.al., 2004; Zimmerman, 2003).

Games, play, playfulness and their effects are studied, analysed, and theorized in numerous disciplines and most discuss game studies as an interdisciplinary endeavour (Aarseth, 2014; Egenfeldt-Nielson, et.al., 2008; Mäyrä, 2008). However, more recently (Deterding, 2016) game studies have rather been characterized as multidisciplinary instead since the studies juxtapose different disciplinary approaches alongside games.

2.4.2. SITUATED FREE PLAY

The theory of 'situated free play' (Morrison et al., 2011) adds a new approach to the overall understanding of play by suggesting that free play is related to the idea of 'ambiguity as a resource for design' (Gaver et al., 2003). 'Situated free play' is grounded in the momentary context of use and invites participants to actively figure out how a system works: both the conceptual and the technological aspects of the work. Here participants are invited to test and debate various theories; often done in collaboration with others/strangers. In this 'context, situated free play' further indicated that 'free or speculative play' can occur through verbal, embodied, associative and/ or cooperative play'.

2.4.3. CRITICAL PLAY

Games can take many forms and are not simply a method of entertainment, diversion or relaxation. Games can be a means of creative expression, instruments for conceptual thinking, or tools that provoke social change. Mary Flanagan in 'Critical Play' (Flanagan, 2009) examines games that challenge the accepted norms embedded within the gaming industry and proposes a theory of avant-garde (Bürger, 1984) game design. Numerous twentieth- century avant-garde artists had the shared goal of bringing about private and public transformation through creative acts (Poggioli, 1968). In this way, many artistic interventions take the form of 'performance, parody, simulation, game, activist, and 'hacktivist' strategies. In 'Critical Play' Mary Flanagan introduces the terms 'activist game' and 'activist game design'. She defines 'activist games' as those that engage in a social issue through, most commonly, themes, narratives, roles, settings, goals, and characters; and less commonly, through game mechanics, play paradigms, interactions, or win states to benefit an intended outcome beyond a game's entertainment or experiential value alone.

Activist Games

One more recent example of an 'activist game' is the satirical mobile video game 'Phone Story' (Pineschi & Pedercini, 2011) developed by 'Yes Lab' activist Michael

Pineschi and designer Paolor Pedercini. The stated aim of this game is to demonstrate what the authors refer to as 'the dark side of your favourite smartphone'. The game features four mini-games that require the player to force children in the third world to mine coltan (Nathan & Sarkar, 2011) or prevent suicides at a Foxconn factory (Xu & Li, 2013). The authors state that the main purpose of the game is to evoke a response from people who 'fail to realize how their fashionable consumption can have negative effects on people in the globalized work'.

Phone Story was released on the iOS platform September 9th, 2011, and banned from the Apple store only four days after its release. Apple cited violations of their developer guidelines, including '15.2 Apps that depict violence or abuse of children will be rejected' as the reason for removing the game. Following the ban, a number of articles discussed and criticised the ban from Apple, see for example an article from the Guardian (Dredge, 2011).

Following the ban from the app store the game was released in the Android store and is playable as a free Adobe Flash version on a web site that also contains extensive information about the topics touched on by the game. All profits from the sale of the app go to charities that work in the areas described, including a donation of over $6000 to a young girl injured in a suicide attempt at the Foxconn factory.

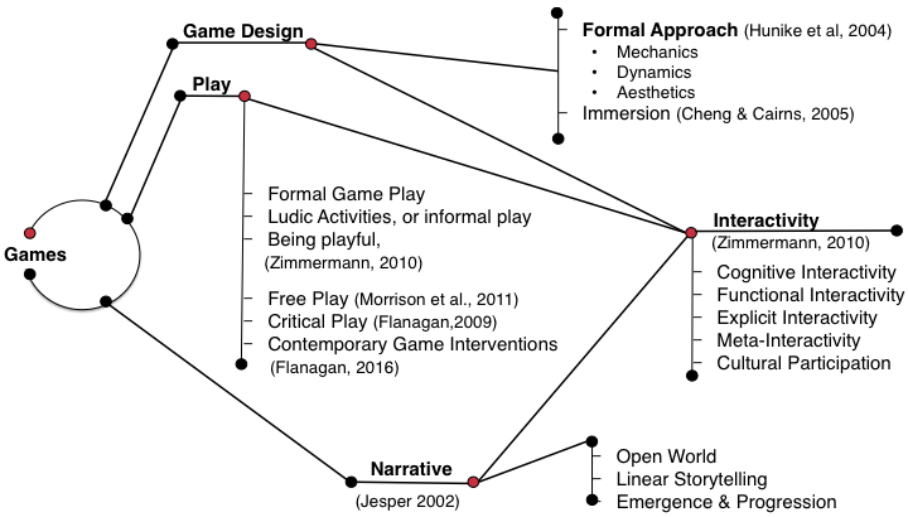

Figure 5. Theoretical Game Design Knowledge as Applied to this Research (illustration by the author)

Figure 5 illustrates how I categorized, play or playfulness and game design for the present research. However, the starting point of all game designs I applied in the present study was the MDA (Hunicke, LeBlanc, & Zubek, 2004). The MDA is a

formal approach to understanding games that describe mechanics, dynamics and aesthetics as interrelated components of a game. MDA describes 1) *Mechanics*, as particular components at the level of data representation and algorithms of a game; 2) *Dynamics*, as the run-time behaviour of the mechanics acting on player inputs over time and 3) *Aesthetics*, as the desired emotional responses evoked in the player when interacting with a game system.

2.4.4. INTERACTIVE NARRATION

In the essay 'Narrative, Interactivity, Play, and Games: Four naughty concepts in need of discipline', Eric Zimmermann (2010) discusses the relationship between narration and interactivity and introduces the following four modes of narrative interactivity:

(1) 'Cognitive interactivity: or interpretive participation with a text addresses the psychological, emotional, hermeneutic, or semiotic reader-response.' (p.4)

(2) 'Functional interactivity: or utilitarian participation with a text included functional, structural interactions with the material textual apparatus.' (p.4)

(3) 'Explicit interactivity: or participation with designed choices and procedures in a text takes into consideration elements such as the material of a book or the graphic design of the pages.' (p.4)

(4) 'Meta-interactivity or cultural participation with a text such as 'fan culture', in which readers appropriate, deconstruct, and reconstruct linear media, participating in and propagating massive communal narrative worlds.' (p.4)

This is relevant for the present research because it also invites a designer, a game designer in this example, to acknowledge and consider the participatory and interpretive role of an experiencer (and the many forms this can take).

2.5. THE INTERPRETATIVE ROLE OF AN EXPERIENCER

Experience design focuses on 'lived experiences' (Van Manen, 2016) which as a construct informs this research. I understand lived experiences as the knowledge an experiencer gains through direct, first-hand involvement in a product, interactive art or a service. As such the idea of the *interpretative role of an experiencer* and the theory of 'lived' experiences are related.

However, while there may be several factors that might influence a 'lived experience' such as 'visual methodology' (Van Manen, 2016), I will only focus on how an experiencer interprets an experience and assigns meaning to it in the three case studies I explore. Discussing phenomenological or human science, where lived

experiences are addressed in greater detail is beyond the scope of this study. However, a more detailed overview of the phenomenology of lived experience may be found in the book 'Researching Lived Experiences' (Van Manen, 2016).

Historically, the idea of open or *ambiguous* experiences can often be found in more art-related disciplines. In Participation (Bishop, 2008), Clair Bishop for example discusses social dimensions in so-called 'interactive' art, that is, art that relies on the participation of a spectator. She distinguishes the activation of individuals to participate in an interactive art installation from the social dimension of participation, e.g., the political magnitude of participation.

2.5.1. SOCIAL DIMENSION

'Karen' (Row Farr et al., 2014) a recent example from the artist group Blast Theory, is a mobile application that mixes modalities to provide a personalized experience. This mobile application illustrates how social dimensions, in this case, controversy over data surveillance, can be pulled into focus through a transmedia experience. The mobile application 'Karen', presents participants with a 'life coach,' played by the British actress Claire Cage, who interacts with participants via video clips, text messages, multiple choice questions and audio files. The main focus of the app, although in many ways similar to data-mining self-help products on the market, is to show how seductive and insidious technology can be. Participants find themselves drawn into 'Karen' and her invasive questions, only to be left with a feeling of subtle discomfort and a new awareness of privacy issues in technology. By showing, and not telling, flaws in government surveillance, participants are expected to draw their conclusions on the matter, rather than to adopt a *prescribed* conclusion.

Peter Bürger's theory of the avant-garde (Bürger, 1984) criticizes the 'bourgeois' model of art that is produced and consumed by equally 'bourgeois' individuals. His complex understanding of avant-garde is instead based on the idea of how art is fused by social praxis produced in art movements such as 'dada' or 'surrealism'. Dada and surrealism are both revolutionary art movements that emerged in response to the events and ideas of the early twentieth century. Dada is often defined as 'anarchic' or as 'anti- art' (Graver, 1995) and characterized by found objects such as Marcel Duchamp's (Duchamp, 1917) art object, a porcelain urinal entitled 'Fountain'. Dada is widely understood as nihilistic, for its declared purpose was indeed to make clear to the public that all established values, moral or aesthetic, had been made meaningless by the catastrophe of war. In February 2008, almost a century after the 'Fountain' was submitted for exhibition, 'The Independent' article 'The loo that shook the world' claimed that Duchamp invented conceptual art (Picabi, 2008) and 'severed forever the traditional link between the artist's labour and the merit of the work'. In the arguments presented by Peter Bürger the role of

the reader/participant changes to allow more critical interpretations and multiple meanings.

2.5.2. THE ROLE OF THE READER

Similarly the French literary critic and theorist Roland Barthes outlines in his short essay 'The Death of the Author' (French: la morte de l'auteur) (Barthes, 1968), that a work's meaning is not dependent on authorial intention but on the individual point of active reception. Barthes continues by writing that assigning a single, corresponding interpretation to a text means to impose an unnecessary limitation on that text. Indeed, it is the prior experience that the reader brings to the text that helps to construct the interpretation the reader takes away. Once out in the world, the writing is alive to the interpreter and the author 'dead', or no longer in command of the meaning of the work, or of how the work is interpreted and experienced.

The Umberto Eco theory of 'open' and 'closed' works picks up the Barthes idea in the widely acknowledged book 'The Role of the Reader: Explorations in the Semiotics of Texts' (Eco, 1984). Umberto Eco compares 'open' and 'closed' texts by juxtaposing a work of art that actively involves the 'addressee' in its production and one that holds the 'addressee' at bay and seeks to evoke a limited and predetermined response.

According to Eco, openness to experience and interpretation is a fundamental part of perception. The experiencer can observe and interpret, but essentially never exhaust a work's possibilities'. For artistic creation, the artist's role is to start a work, and it is the role for the viewer (addressee) to finish the work. The completed work, which exists after the interpretation of the observer, still belongs to the artist in a sense, but must also belong to the viewer. Open works are never quite the same, but are also never gratuitously different. The open work is still constrained in its outcomes and limited in that it is still grounded within an ideology. However, Eco also points out that every work, regardless of whether the artist intended the work to be open or closed, is open to degrees of interpretation.

2.5.3. AMBIGUOUS VS. PRESCRIBED QUALITY OF EXPERIENCES

Within the HCI community, open works are often referred to as possessing *ambiguous* qualities. One definition of 'ambiguity' reads:

'Ambiguity frees users to react to designs with scepticism or belief, appropriating systems into their own lives through their interpretations…Thus ambiguity is a powerful design tool for raising topics or asking questions, while renouncing the possibility of dictating answers. By virtue of this balance, ambiguity both offers an inspiring resource to designers and shows a deep respect for users. (W. W. Gaver et al., 2003 p. 240)

Similar to Umberto Eco's idea of distinguishing between 'open and closed' texts I propose contrasting 'ambiguous' from *prescribed* qualities. By considering *ambiguous vs. prescribed* qualities while designing a system, I would like to invite designers to step into the shoes of an experiencer and consider their role, or the level of interpretation the experiencer can be enabled to assign to specific experience moments.

Although, Eco provides a good example by opposing open works with closed works, there is no definition within the HCI community that defines what contrasts an *ambiguous quality*. Yet, there are contrasting design approaches that seek more control of the perceived experience, which I define as possessing a *prescribed quality* as part of this research, such as the following definition:

'An experience designer is foremost an author of experience...each and every detail (content, functionality, presentation, interaction) has to be scrutinized according to its potential to create or destroy the desired experience" (Hassenzahl, 2010 p. 68)

For the purpose of distinguishing between *ambiguous and prescribed* experiences as a resource for design I propose the following definition:

The interpretative role of an experiencer' invites a designer or artist to consider ambiguous vs. prescribed qualities as contrasting resource for design.

The *interpretative role of an experiencer'* refers to 'The Role of the Reader' (Eco, 1984). However, I would like to emphasise that I am not suggesting that one experience design quality (*ambiguous vs. prescribed*) is superior to the other, rather I emphasize that the two contrasting approaches are suitable for different design contexts—to elicit diverse experiences. However, as Umberto Eco and Terry Barrett (Barrett, 2000) indicated, no single interpretation is exhaustive of the meaning of an artwork (and I would argue this applies equally to design). As such all experiences may be perceived as *ambiguous* even though they may not have been intended as such by the artist or the designer. Therefore, whether or not it is possible to design for more *ambiguous vs. prescribed* experiences represents an interesting research question I will discuss as an integral part of this dissertation (Chapter 6).

CHAPTER 3. TRANSMEDIA EXPERIENCE DESIGN MATRIX (TXDM)

The aim of the present research is to evaluate the *interpretative role of an experiencer* within a fictional transmedia universe for the purpose of finding a conceptual design framework that will assist in designing meaningful transmedia experiences. The purpose is also to investigate if and how designing for *ambiguous or prescribed* qualities will prove to be a valuable contribution to the XD community. Transmedia experience design requires designers to combine various mental models (Dena, 2016) of creation from different disciplines.

However, the fuzzy nature of transmedia and experience designs results in a plethora of theoretical frameworks, design methods, and approaches to consider during conceptual design. The intention of the TXDM is to provide a holistic, yet detailed view of transmedia experience design frameworks.

For the purpose of exploring the requirements of such a transmedia experience design framework, I conducted twenty international semi-structured interviews, with early adopters, scientific researchers, broadcasters, production experts as well as traditional storytellers. Each interview lasted two hours and was focused on terminology in use, personal experiences as well as tools and techniques applied, and revealed that transmedia experience necessitates mixing theories from game design, storytelling and experience design.

Next I presented the results of the above-outlined interviews at a full-day workshop, I organized at the NordiCHI 2012. The participant's backgrounds at the workshop had been selected based on their interdisciplinary background and included a transmedia evangelist, an interaction design scholar, a senior researcher that focused on transmedia learning, one transmedia producer, one transmedia storyteller and myself as the organizer.

During the NordiCHI 2012 workshop, we found that the wide array of perspectives that transmedia can entail often causes confusion from scientific, investigative and economic perspectives. Additionally, we concluded that the main challenge in designing transmedia experiences lies in its interdisciplinary nature. The finding of the interviews and the NordiCHI 2012 workshop results have been published as *Transmedia Perspectives* in a book titled 'Convergent Divergence' (Ghellal et al., 2016).

Additionally, I worked with the TXDM as a teaching strategy while lecturing on transmedia experience design at masters' level at the Stuttgart Media University. At two interdisciplinary workshops, dedicated to experience design, game design, and

movie production/storytelling experts, I challenged more specifically if and how the TXDM could serve as a communication tool for interdisciplinary designs. The first workshop involved 32 designers, curators and content owners from a selection of non-profit organizations, such as museums, art galleries and music venues from the south/west of Germany. The other workshop gathered 23 movie producers, storytellers, game designers and movie directors also from the south/west of Germany.

3.1. THE BASIC EXPERIENCE DESIGN MATRIX (TXDM)

The basic TXDM comprises theories from storytelling, game and experience design because those disciplines have been identified as the basic requirements for a transmedia design during the initial theoretical research and the NordiCHI 2012 workshop (Figure 6).

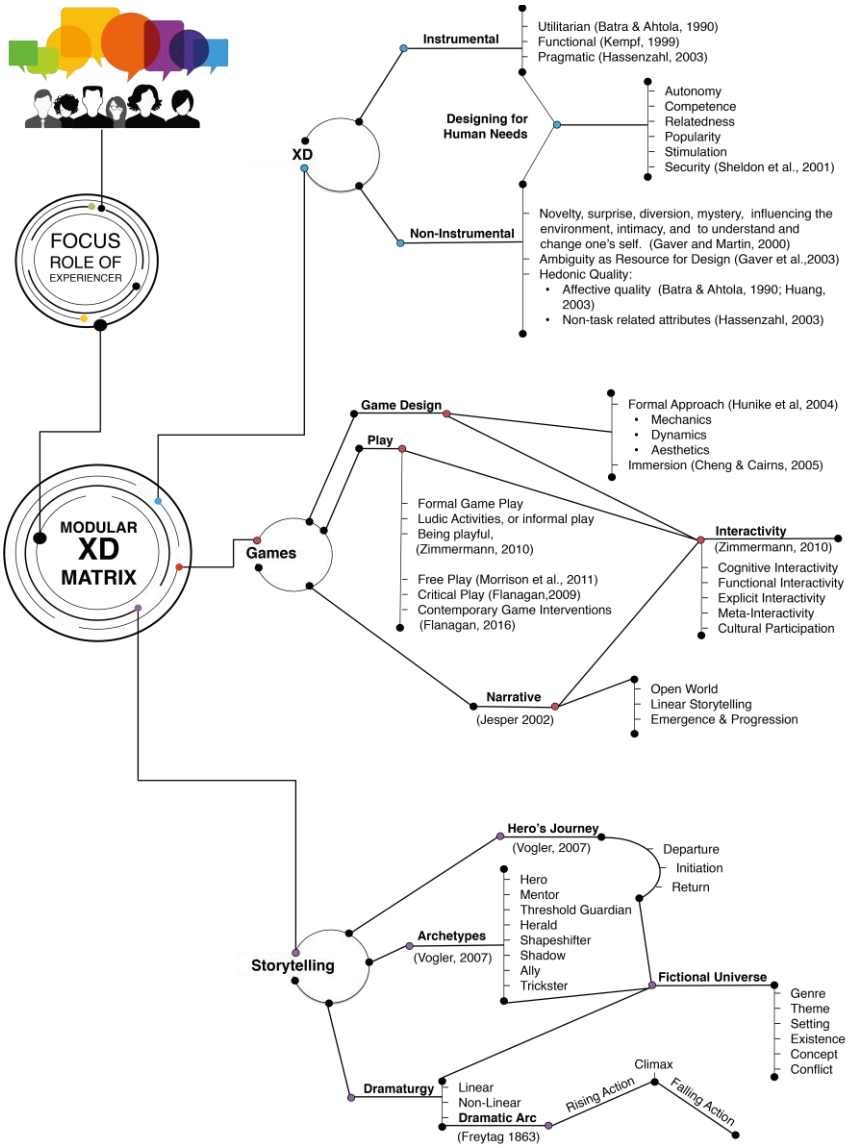

Figure 6. Transmedia Experience Design Matrix (TXDM) Poster (illustration by the author)

By offering a holistic lens, the TXDM invites us to contemplate new kinds of relationships between various media platforms and practices. With the TXDM I apply the idea of lenses as a set of perspectives to look through, to operate from, to better understand complexities and the otherness of different disciplines. In this way designers and researchers can more easily become sensitised to alternative, sometimes sympathetic—other times opposing—viewpoints and knowledge. The TDXM operating

as a lens acts to enrich designer/researcher and experiencer involvement in the conceptual design stages as well as enhance the experience for both parties (Morrison, 2011).

The purpose of the TXDM is to provide a comprehensive but detailed lens through which to view complex interdisciplinary design cases. 'Comprehensive' because the TXDM illustrates the various disciplines involved and 'detailed' because the TXDM involves conceptual design methods or approaches used to design experiences within each discipline.

The primary focus of the TXDM is the *interpretative role of an experiencer,* i.e., the interpretative meaning making an experiencer constructs while interacting with a system. By juxtaposing experience design, game design, and storytelling, the TXDM invites designers and scholars to consider the importance and implications of the involved disciplines while crafting a transmedia experience.

3.2. EXTENDING THE TXDM

The purpose of the TXDM is not to provide one fixed conceptual design approach but rather to allow for adaptation. I established through interdisciplinary interviews and literature research that there are three basic concepts that need to be considered when designing for a transmedia experience, include experience design, game design, and storytelling. For the present research, expanded the TXDM as follows:

(1) For the location-based augmented reality game, *The Remediation of Nosferatu* game, I adapted the TMXD to include the conceptual framework of trajectories (Benford et al., 2009).
(2) For the comparative study *The Interactive Hammock* I added tangible interfaces (Ishii, 2008) to the TXDM.
(3) Finally, I extended the TXDM to include concept of 'interactive multimodal learning environments' (Moreno & Mayer, 2007) for *Get Milk, A Comparative Study Investigating Digitised Game Design Teaching Material.*

The TXDM & Trajectories

The Remediation of Nosferatu is a location-based augmented reality horror adventure that is based on the idea of experience trajectories (Benford et al., 2009). Trajectories regard user experiences as journeys through hybrid structures, punctuated by transitions, and in which interactivity and collaboration are orchestrated. The TXDM and its focus on the *interpretative role of an experiencer,* presented as part of this study, and the idea of 'trajectories' are closely related. Both regard individual momentary encounters with a system. I refer to those encounters as *experience-fragments,* which in combination with other experience-fragments comprise an overarching (or holistic) experience. However, while

trajectories present a framework that explains 'journeys through hybrid structures, punctuated by transitions and in which interactivity and collaboration are orchestrated' (p.1). The *interpretative role of an experiencer* focuses on the qualitative lived experiences a participant might assign while experiencing trajectories. In this interdisciplinary study, I intertwine traditional storytelling and scriptwriting skills with interaction and game design methods. For the game setting, I created 'hybrid spaces' by merging the storyworld and the physical environment into one pervasive experience by placing a variety of augmented reality activities played out at sunset on an abandoned graveyard that has been converted into a park. Figure 7 illustrates how I combined the theory of trajectories with storytelling and game design elements for the purpose of creating one holistic conceptual design framework for location-based transmedia experience designs.

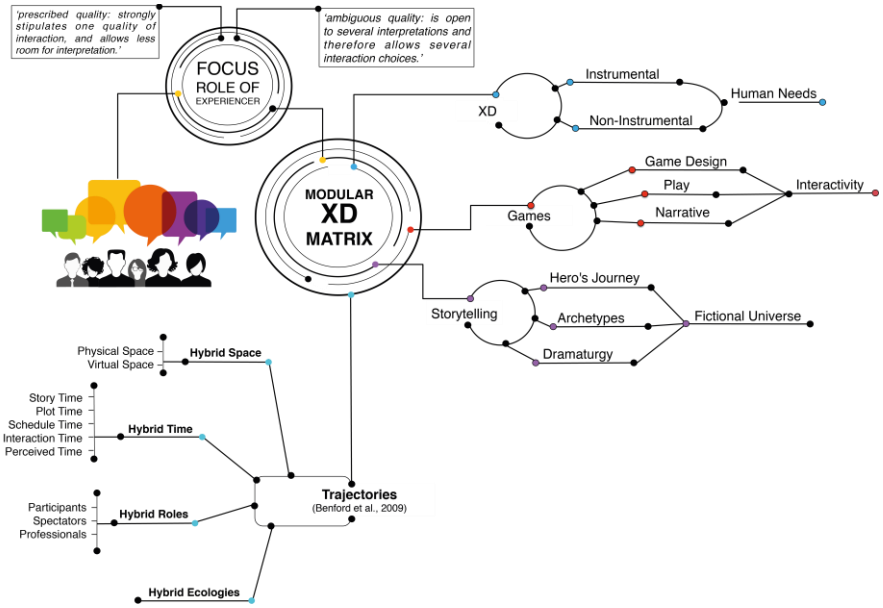

Figure 7. The TXDM Expanded for Trajectories (Illustration of the Author)

To be specific, I combined the theory of 'hybrid spaces' (Benford et al., 2009) with the storytelling concept of the 'dramatic arc' (Freytag, 1863). Here I expanded the 'dramatic arc' into a *circular three-act dramaturgy* (Chapter4.1). I assigned one experience-fragment to one specific location (a gravestone) and placed additional *experience-fragments* in circles around it. In addition to expanding on the storytelling concept for the purpose of creating a *circular three-act dramaturgy* I applied the concept of 'situated free play' (Morrison et al., 2011) by inviting participants to decide if, when and how to visit each *experience-fragment*. More details of the case study can be found in Chapter 4 and the full paper provided as Appendix A.

The TXDM & Tangible Interfaces

The Interactive Hammock is an experimental installation aimed at exploring *ambiguous vs. prescribed* tangible (Ishii, 2008) experiences. Historically tangible interfaces (Ishii & Ullmer, 1997), or graspable interfaces (Fitzmaurice, 1996) constituted an alternative more natural or physical vision for computer interfaces. Hiroshi Ishii, a professor in the MIT Media Laboratory who is widely recognized as one of the tangible interfaces pioneers, titled his research '*Tangible Bits'* (Ishii, 2008) with the purpose of giving back physicality to digital information and thus enabling direct manipulation. Research by Hornecker and Buur (Hornecker & Buur, 2006) demonstrated interaction with tangible interfaces can be grouped into four themes: tangible manipulation, spatial interaction, embodied facilitation and expressive representation that offer mutually exclusive, but interrelated, perspectives. For the purpose of adapting the TXDM to feature more tangible interfaces I integrated the four interactions mentioned above, as shown in Figure 8.

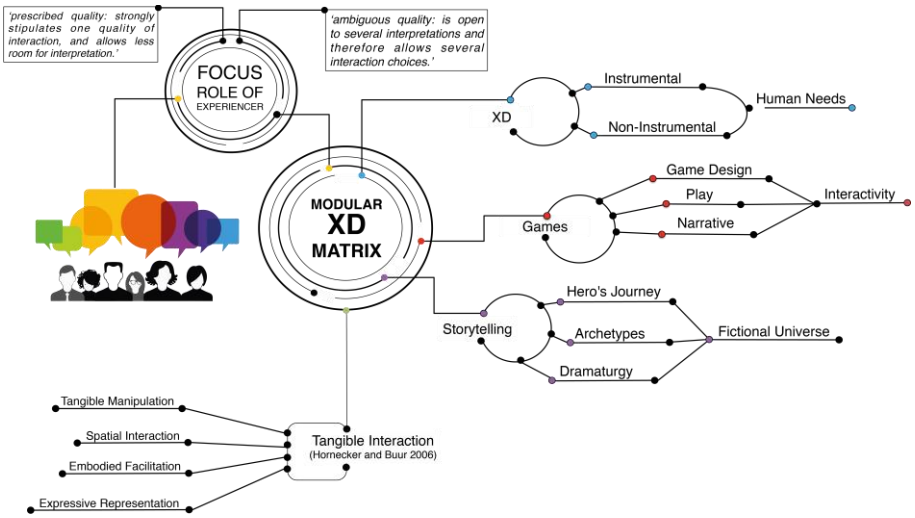

Figure 8. The TXDM Expanded for Tangible Interactions (Illustration of the Author)

With the case study The Interactive Hammock, I compared two contrasting installations for the purpose of evaluating *ambiguous vs. prescribed* holistic experiences in more detial. For *The Interactive Hammock* I focused on two aspects of tangible interfaces 'tangible manipulation,' and 'embodied facilitation'. 'Tangible manipulation,' refers to material representations with distinct tactile qualities, which are typically physically manipulated in tangible interaction (Hornecker & Buur, 2006, p.439). 'Embodied facilitation' focus 'on the material and digital representations employed by tangible systems, their expressiveness and legibility' (Hornecker & Buur, 2006, p.439).

Both installations, *The Forces of Nature* and *The Roaring Hammock* featured the same functionality and interaction, though the content and presentation of the two installations differed. With *The Forces of Nature* installation, I displayed abstract fractural images that would transform themselves based on the participant's movement in the hammock on a canvas above the hammock and made the volume and type of sounds dependent on the movement within the hammock.

The Roaring Hammock was designed as *prescribed* and displayed a gramophone with a spinning record as visual feedback. The faster the participants rocked in the hammock the faster the record on the canvas would spin and the faster (beats per minute) the music would play. More details about the case study can be found in Chapter 4 and the demonstration paper provided as Appendix A.

The TXDM & Interactive Multimodal Learning Environments

In this case study, I designed the under-graduate mobile learning game *Get Milk: A Comparative Study Investigating Digitised Game Design Teaching Material*, featuring a touch-optimized, responsive, web-based platformer game. The digitized game *Get Milk* makes use of context-aware digitized game design theory using an ambiguous quality. The purpose of the case study was to find out if ambiguous digitised learning material would foster 'intrinsic motivation' (Deci & Ryan, 2010). In an empirical comparative study with two sets of undergraduate students, I investigated if a more immersive multimodal learning instructional format would improve understanding of game design theory. Applying a top-down design approach, I started the design process by defining the holistic experience I wanted students to have, one that would stimulate student players to critically assess a game using easy-to-access and logically assigned game design theory. In particular, I focused on designing for a more 'intrinsic motivation' that would 'stimulate' (Sheldon et al., 2001) students by making them curious. By implementing free-play (Morrison et al., 2011), I instilled a feeling of 'competence' and 'control' (Hassenzahl et al., 2013) for the learner. Here, my design goal was to enable students to make decisions on their initiative, offering them autonomy in their role as player and designer. Figure 9 illustrates how I integrated the theoretical background of 'interactive multimodal learning environments' (Moreno & Mayer, 2007) into the TXDM. They suggest considering 'dialoguing, controlling, manipulating, searching and navigating' as interactivities for learners. The main interaction I focused on while designing *Get Milk* was to enable the learner to 'control' and 'manipulate' their learner experience by making a game designer view available at all times and thus allowing the students to switch modes between a player and a game designer.

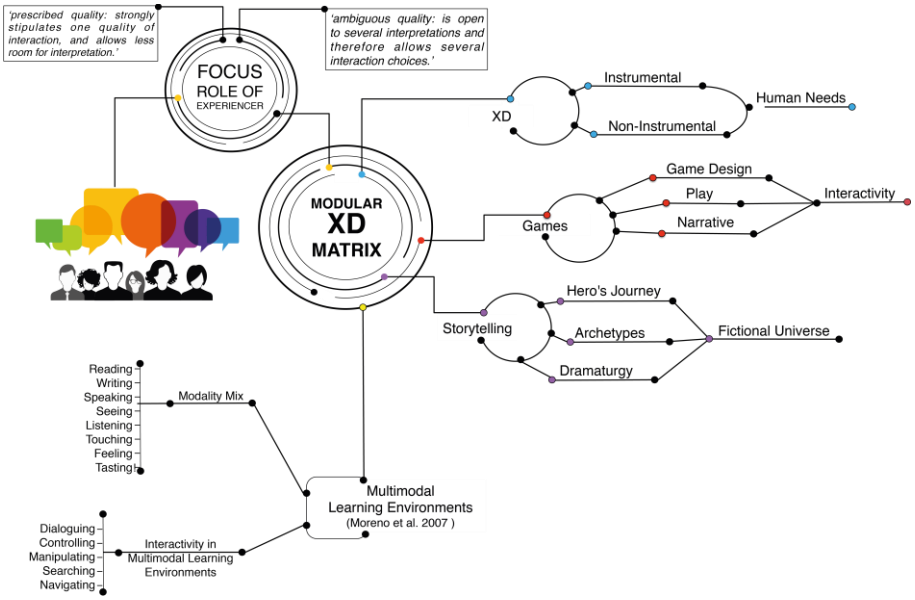

Figure 9. The TXDM Expanded for Interactive Multimodal Learning Environments (illustration by the author)

CHAPTER 4. CASE STUDIES

In this chapter I will provide a summary of all three cases studies. As I will introduce a summary of the scientific framework and methods applied in Chapter 5, methods or tools used to evaluate each case study are not included in this chapter.

This chapter serves only as an overview of the three case studies. The research material used within the study can be found in Appendix B, and the published papers are presented in Appendix A.

For the purpose of researching the *interpretative role of an experiencer*, I designed and evaluated the following three case studies:

(1) *The Remediation of Nosferatu: Exploring Transmedia Experiences* (Ghellal et al., 2014). For the purpose of brevity I will refer this case study as *The Remediation of Nosferatu* for the remainder of the dissertation.

(2) *The Interactive Hammock* which consist of two installations *The Forces of Nature* and *The Roaring Hammock* with was displayed at the Mensch & Computer conference in 2015 (Ghellal et al., 2015)

(3) *Get Milk: A Comparative Study Investigating Digitised Game Design Teaching Material* (under review for DIS2017), I will refer to this case study as *Get Milk* in the reminder of this Dissertation.

All three case studies are prototypes that I designed and evaluated for the purposes of researching the impact of designing for *ambiguous or prescribed* qualities. Here, my goal was to see if and how designing for *ambiguous vs. prescribed* qualities may help to craft more meaningful experiences early in a design phase when the designer is still contemplating the multiple various design implications. For all three case studies, I compared how an experiencer perceived or 'lived' (Van Manen, 2016) an experience, as either *ambiguous or prescribed*, with how I as the designer intended the experience to be perceived, to find out how successful designing for *ambiguous vs. prescribed* qualities in these instances was.

Even though I designed the main idea of the three case studies, provided the conceptual design, evaluation strategy, and scientific approach and evaluated the data. Other researchers and student volunteers have discussed design options with me, gave feedback, provided graphics or helped to set up the experiments. However, for the purpose of unity of the present research I will use an active singular voice to describe each case.

4.1. THE REMEDIATION OF NOSFERATU

Figure 10. Impressions of The Remediation of Nosferatu (illustrated by the author) Left: Participant explores the abandoned graveyard, Middle: AR video fragment on a bridge in Stuttgart, Right: Nosferatu rising from the a specific grave and 'attacking' the player

The Remediation of Nosferatu is a location-based augmented reality horror adventure played in the surrounding areas of an old abandoned graveyard that has been converted into a park in Stuttgart, Germany (Figure 10).

4.1.1. EMPIRICAL EXPLORATION

To provide the reader with an in-depth impression of *The Remediaion of Nosferatu*, I present a particular experience taken from the empirical exploration of the system.

'Sam', our example player, is 26 years old, is employed as an architect, plays casual games and is a passionate cineaste. We meet Sam close to a park in an urban environment. He starts *The Remediaion of Nosferatu* on the tablet and is prompted with a black and white map and a sound file informing him about mysterious deaths in ancient 'Stuttgardia', He is further told that all spots highlighted on the map could be visited in any given order, but that he, however, can only learn more at the exact location and at a particular view. Upon reaching the first spot, a bridge over a busy street, (Figure 10 middle), Sam hears music and is prompted to find a certain position and angle illustrated by a particular 'frame' on the tablet. The moment the frame and his actual camera-position matched, a semi-transparent video is played that visually merged with the physical environment. The video shows a woman balancing on the balustrade of the bridge. To 'Sam' the scenery feels like a hint from the past, the woman being an unsettled ghost asking him for help.

Sam then enters the park. Music started to play, and Sam hurries to find the next spot. It is hidden under a tree and features a carnivorous plant. Sam beginns to speculate whether a new type of plant may have poisoned the citizens of ancient 'Stuttgardia' and rushes to the next location. It features a semi-transparent augmented reality video featuring a group of university professors at the gate of a university building. The professors are reading reports about incoming ships, speculating if 'the plaque' may have caused the deaths. Driven by curiosity, Sam enteres the old abandoned graveyard. The sun had already set, it is getting dark, and Sam hesitates and askes himself: 'Do I really need to go there?'

He walkes across various very old, partly disintegrated graves. To him, the old abandoned graveyard lookes like the location of a horror movie, and he rememberes the ‘ghost’ he had ‘encountered’ earlier. After searching for and finding a specific gravestone. Count Orlok aka. Nosferatu enteres the scene by rising from the grave (Figure 12, left). Sam is then informed that he has 60 seconds to find a cross on a specific grave to stop the vampire from attacking him (Figure 12, right).

Figure 11. Climax of The Remediation of Nosferatu (Left: screenshot of the game, Right: photographed by the author)

After a brief moment of shock, Sam startes to laugh. He now realizes that the vampire has caused the deaths in ancient ‘Stuttgardia’ and rememberes that he had ‘seen’ Count Orlok earlier, lurking under a bridge he had passed. Sam startes running across the graveyard to find the needed cross, where he ‘mets’ Nosferatu again one last time before he dissolved into ether (Figure 13) and Sam wins the game.

Figure 12. Nosferatu dissolving into ether (screenshot of the game)

4.1.2. ORCHESTRATION

Applying the theory of experience trajectories (Benford et al., 2009), I used diverse material from the movie Nosferatu (Murnau, 1922), the horror genre and a vampire theme to craft a transmedia experience using a tablet (iPad2) (Figure 10).

For *The Remediation of Nosferatu*, I designed a total of 12 *experience-fragments* and placed them in proximity and on the site of an abandoned graveyard using a *circular-three-act-dramaturgy* I designed for this case study. The *circular-three-act-dramaturgy* expands the 'dramatic arc' (Freytag, 1863) by positioning *experience-fragments* in circles around the 'climax'. Freytag developed an analysis of ancient Greek and Shakespearean drama that is based on the Aristotlean idea of a plot structure (defining the 'beginning,' 'middle,' and 'end' of the drama). Freytag divided 'drama' into a dramatic, highlight that is based on five parts: 'exposition,' 'rising action,' 'climax,' 'falling action,' and 'dénouement.' For *The Remediation of Nosferatu* I compressed the five parts of the Freytag's dramatic arc into three stages: 'exposition phase', 'rising action phase' and 'climax' (Figure 11).

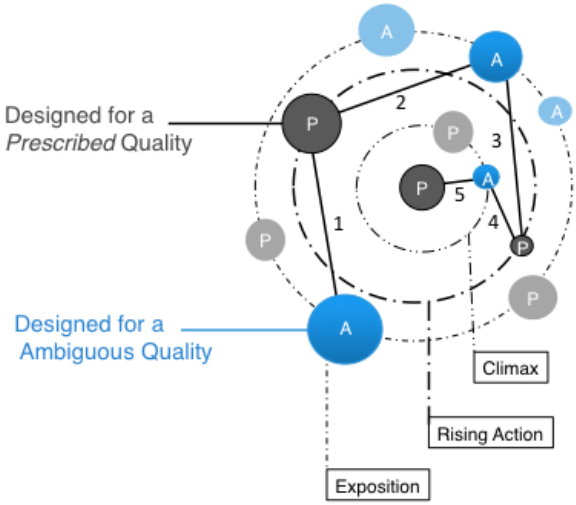

Figure 13. Circular-three-act-dramaturgy (illustration by the author)

Using a *circular-three-act-dramaturgy*, I placed the 'climax' of the game, Nosferatu rising from the grave and attacking the player, on one specific gravestone and carefully placed the 'rising action' in close proximity and the 'exposition phase' in close proximity to the 'rising action' (Freytag, 1863). I designed this location based

augmented reality horror adventure applying free-play, (Morrison et al., 2011a). The holistic experience was designed with an *ambiguous* quality in mind because participants could decide which locations to visit, how often to visit a location and when to visit a specific location. They thus chose for themselves, which experience-fragment to play.

However, every experience-fragment in itself was designed with either *ambiguous or prescribed* qualities in mind. A *prescribed experience-fragment* involved very clear instruction, e.g. having to find a specific gravestone within a certain time limit. In contrast, an example of an *ambiguous experience-fragment* is one that featured a semi-transparent augmented reality video fragment of the movie 'Nosferatu- Eine Symphonie des Grauens' (Murnau, 1922) displayed on a bridge in downtown Stuttgart, and was a seemingly unrelated 'task' that could be interacted with in any order (Figure 10, middle).

4.1.3. SUMMARY OF FINDINGS FOR THE REMEDIATION OF NOSFERATU

The findings presented in this study are based on the explorations of a total of 21 volunteer participants (8 female, average age 30 (Min=18, Max=62). On average the participants played *The Remediation of Nosferatu* for 33 minutes.

Many topics emerged during the analysis of the data. I found, for example, that the needs perspective (Sheldon et al., 2001) revealed the overall need for more stimulation with material. Here, 14 out of 21 participants wanted to engage more with tangible interfaces. For example, an IT Student (P 21) stated '…I started to think of opportunities to add sensor based objects within the environment maybe because I study imbedded technologies at the moment… for example, the carnivorous plant seemed to invite for more physical interaction… I don't know… I wanted to search and pluck it and see if I could use it later on…'

However, I was investigating how meaningful or pleasurable the experiences were for the participants and if I could match *ambiguous or prescribed* experience fragments to how the experiencer interpreted their lived experiences. Table 1 illustrates the lived experiences of 21 participants, the order in which they visited the different *experience-fragments* and how the participants interpreted the holistic and each experience-fragment (grey = *prescribed* and blue = *ambiguous*).

Nr	Profession & Age	Lived Experiences													
		Experience-Fragments												Holistic	Tangible Need
		A	B	C	D	E	F	G	H	I	J	M	N		
1	Concert Eventmanager (42)	1		2	3	4						5	6		
2	Graphic Designer (27)		1			3			2	4	5		6		*
3	Retired Researcher (62)		2				1	3	4		5	7	6		
4	Marketing Copywriter (33)		4			2	1	3	5		6	8	9		*
5	Lawyer (44)	1		2	3	4				5	6	7	8		*
6	Student- UXD (27)		1		2	3		4	6	5		7	8		*
7	Student-Media PM (24)	7	2		6	5	1		3	4		8	9		*
8	Social Worker (30)	1	2			3				4		5	6		
9	Cinematographer (23)						1		2		3	4	5		*
10	Student –Sport (31)		2			3	1		5	4	5		6		*
11	Media Agency Admin (39)	1		2	3					4		5	6		
12	Architect (26)						1	2	3	4	5	6	7		*
13	Game Designer (25)	1		2	3					4		5	6		*
14	Concept Designer (28)	1		3	2			4			5	6	7		
15	Student-Cinema (33)	6	2	7	8	5	1		3	4		9	10		*
16	Key Account Manager(24)	1		2	3					4	5	6	7		
17	Student IT (22)		2	3			2			4	5	6	7		*
18	Student Mobile Media (22)	1		2	3					4	5	7	6		*
19	Musician (32)		4			2	1	3	5		6	7	8		
20	Pupil (18)	1		3			2		4				7		*
21	Student- IT (22)			2	3		1				4	6	7		*

Table 1. Summary of Participants order of Experience-Fragments &Resulting Holistic Experiences (grey = prescribed *and blue* = ambiguous*).*

All participants described the overall experience as holistic. Many participants (67%) expressed the need for more tangible interfaces (they explained for example, that they wanted to be able to touch gravestones or crosses or that they wanted to collect material such as carnivorous plants). Overall I evaluated 145 *experience-fragments,* of which 41 (28%) were perceived as *prescribed*, 66 (45%) as *ambiguous* and 38 (26%) could not be assigned to *ambiguous or prescribed* qualities. Most found *experience-fragments* A (see Table 4) (91%) and M (94%) to be more *prescribed*. Location A was understood as an explanatory introduction to the fictional universe and M gave some clear instructions to follow. In contrast, all participants described the *experience-fragments* F and N as *ambiguous*. For a more elaborate report of *The Remediation of Nosferatu* case study, please refer to Appendix A.

4.2. THE INTERACTIVE HAMMOCK

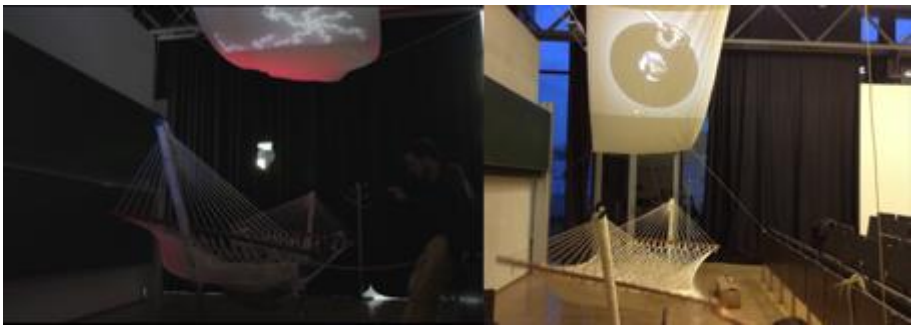

Figure 14. The Two Contrasting Installations, (Left: The Forces of Nature, Right: The Roaring Hammock) (photograph by the author)

The Interactive Hammock is an experimental installation aimed at exploring *ambiguous and prescribed* tangible (Ishii, 2008) experiences, featuring a full-body interaction (Hornecker & Buur, 2006). For input in the hammock I integrated motion sensors, and for output, a set of embroidered speakers. Additionally a cotton canvas was installed above the hammock for visual projection of content. External loudspeakers were positioned nearby for supplementary sounds. For the purpose of experimenting with the *interpretative role of an experiencer*, I compared two versions using the same installation set up. One used *ambiguous* content, and the other used a *prescribed* style of content. While the main set-up, i.e., the input and output modalities, remained the same, the content and consequently how the experiencer would interact with the system differed.

For *The Forces of Nature* installation, I implemented an *ambiguous* quality of experience that was free in the ways participants could make their interpretation and how the experiencer could interact with the hammock. *The Forces of Nature*, (Figure 14, left), was created as an homage to Jørn Utzon, the architect known for designing, amongst other structures, the famous Sydney Opera House. I included fundamental considerations from Utzon's aesthetic in the design, such as light, colour, geometry, structural expressions, additive geometry, and references to nature, harmony, and unity. The more the participants swung or moved in the hammock, the louder the ambient sound installation became and the more distant and reverberating Utzon's voice became. Participants could, if they wished, swing the hammock so vigorously that the corresponding volume of the ambient music and soundscape drowned out Utzon's words. The animated fractal visualization responded to the swinging by changing its speed and depth and by increasing or decreasing contrast.

For *The Roaring Hammock* version (Figure 14, right), I altered content and interaction to feature a more *prescribed* style of experience. The Roaring Hammock

echoes the “Roaring Twenties” and uses images and music from that time. Here, the content was built based on the history of swing music. The embroidered speakers gave some basic swing dancing instructions (i.e., how the participants should move their arms and legs) while the external speakers played the music based on the speed (beats per minute) that the hammock was rocked. The interactive challenge with this work was to move the hammock in a rhythm that would play the music and turn the record on the gramophone illustrated on the canvas above the hammock at a pleasing speed (Figure 14, right).

Both installations featured a tangible interface, and both featured the same functionality and interaction, only the content and presentation of the two installations differed. With *The Forces of Nature* installation, I displayed abstract fractural images that would transform themselves based on the participant's movement in the hammock on a canvas above the hammock and made the volume and type of sounds dependent on the movement within the hammock. *The Roaring Hammock* featured a more *prescribed* quality that displayed a gramophone with a spinning record. The faster the participants rocked in the hammock, the faster the record on the canvas would spin and the faster (beat per minute) the music would play.

4.2.1. EMPIRICAL EXPLORATION

To provide the reader with an in-depth impression of *The Interactive Hammock*, I present two specific experiences taken from the empirical exploration of the system, one featuring ‘*The Forces of Nature’* and one featuring ‘*The Roaring Hammock’ (Ghellal et al., 2015)* installation.

The Forces of Nature

‘Peter’ is an architecture professor at an art school in Stuttgart. He is interested in new media and loves to combine new media with architecture. One of his students tells him that there was a user test at the Stuttgart Media University for an interactive hammock, titled *The Forces of Nature*. He is immediately intrigued by this and arrived to participate in the user study. Peter is greeted by a group of researchers briefed and invited. The hammock installation reminds him of the sea and sailing. The net hammock and the ropes used to install the hammock and the cotton canvas above the hammock remind him of the materials used for old time sailing boats. He carefully lies in the hammock, and the hammock responds immediately with a noise and some fractal movements projected on the canvas. He relaxes in the hammock and looks around, after a while he hears a whisper close to his ear. It seems to come from within the hammock. The voice talks about architecture and nature, and he starts to think about sailing boats and the sea again and how this influences his profession as an architect. Slowly he starts to rock the hammock again and hears some bird like noise. When he rocks a little harder he

hears some music from a distance and starts to see some fractal forms on a cotton display above him. After spending a little over 13 minutes in the hammock, Peter relaxes again, and a researcher approaches him and asks for permission to discuss the experience with him while Peter remains in the hammock (Figure 15). The researcher asks him what kind of adjectives he would use to describe his personal experience within the hammock and Peter immediately responds 'inspired' and tells the researcher about his love for the sea and sailing and that this installation immediately reminded him of his favourite hobby because of the materials used for the installation. The second adjective Peter chooses is 'Fernweh' (a German expression describing a desire to travel). Then Peter has some questions about the technical realization of the project and the purpose of the user study.

Figure 15. The Forces of Nature Installation. (photograph by the author)

The Roaring Hammock

'Maze' is a DJ who loves electro music and has been invited by Nick, his roommate, to visit Media Night an annual event where the best student work is exhibited at Stuttgart Media University. Because Maze is a DJ, he seeks out music related audio-visual style installations. He reads about an installation titled *The Roaring Hammock* in the Media Night program and decides to look for that installation. After searching the installation for 10 minutes he finally lies in the hammock and swing music starts to play slowly, too slow. As he moves faster, he sees an old gramophone above him that somehow displays his movements (Figure 16). He starts to realize that his movements are used as a feedback to stipulate the speed of the music and the speed of the record spinning on the gramophone projected on the canvas. Then he moves

faster, and the swing track turns into an upbeat electro-swing tune. Amused he decides to try to out the boundaries of the hammock and rocks and bounces as hard as he can within the hammock, the music and the record on the gramophone go wild, it is mayhem, and he enjoys it! He relaxes and now realizes that there is a whisper coming from within the hammock. He lies very still and listens. He hears some dancing instructions telling him how to dance the Charleston within the hammock, he laughs and follows the instructions. Maze spends close to 6 minutes in the hammock. As he is about to get up, a researcher approaches him. After a short interview, the researcher asks him what kind of adjectives he would use to describe his personal experience with the hammock. Maze thinks for a moment and then stipulates 'fun,' 'dancing' and 'overdrive.'

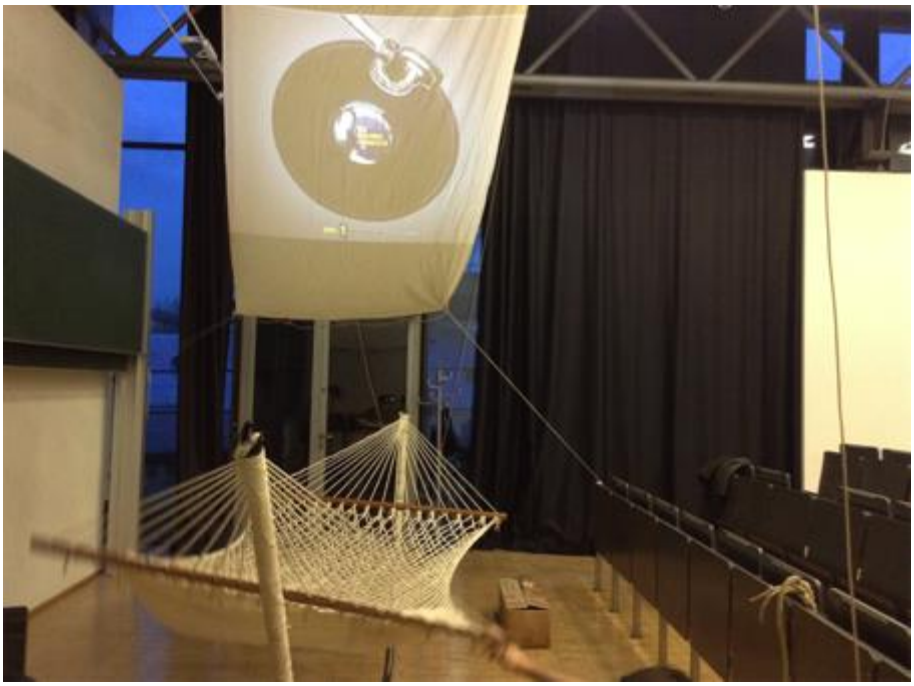

Figure 16. The Roaring Hammock (photograph by the author)

4.2.2. SUMMARY OF FINDINGS FOR THE INTERACTIVE HAMMOCK

The findings presented in this study are based on 42 participants' encounters with *The Interactive Hammock*, 20 for *The Forces of Nature* and 22 for *The Roaring Hammock*, with volunteer participants (18 female, average age 27 (Min=20, Max=55). The purpose of this comparative study was to evaluate the difference between *ambiguous and prescribed* holistic experiences. On average the participants

interacted with *The Forces of Nature* 11 minutes and with *The Roaring Hammock* 5 minutes.

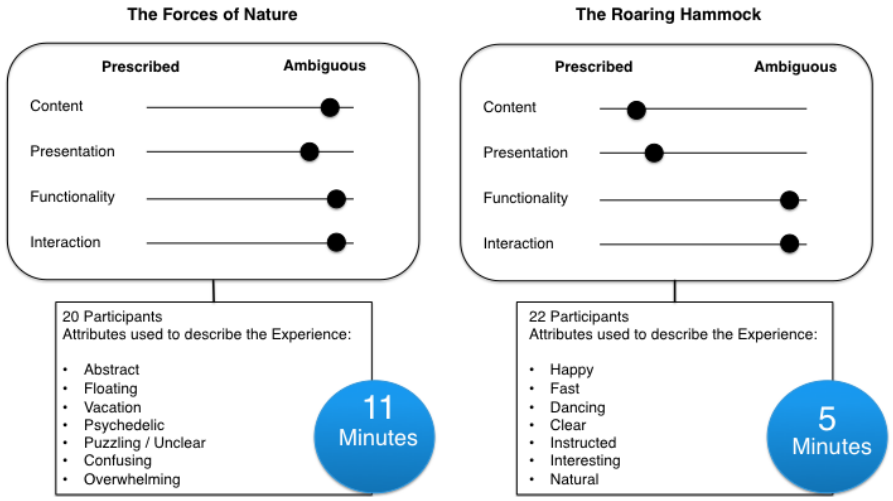

Figure 17. Summary of Findings Comparison of the Two Interactive Hammock Installations. (illustration by the author)

Figure 17 shows that participants stayed longer in *The Forces of Nature* hammock then in *The Roaring Hammock* and used more abstract adjectives to describe their experience within the hammock. However, the axial coding process and data analysis (Corbin & Strauss 1990) revealed that participants interacting with *The Roaring Hammock* reported more fun and appeared comparatively more comfortable to interacting with the more *prescribed* version of *The Interactive Hammock*. With the two contrasting installations, I wanted to emphasize and exaggerate the *ambiguous* vs. *prescribed* qualities to research the possible advantages and disadvantages of the two approaches, (see Figure 18). However, since the idea of an interactive hammock in itself invites for a more *ambiguous* functionality, I could only exaggerate the *ambiguous* quality for this case study. Here, I found some evidence that if all materials that shape an experience, that is the content, presentation, functionality and interaction, are *ambiguous* then the participants seemed lost and the installation was perceived as overly abstract and meaningless to many. In contrast, a mixture of *ambiguous and prescribed* qualities (as seen with *The Roaring Hammock*), resulted in a more positive participant responses from the participants. This would suggest that to design a system to support the participants' 'meaning making'(Vyas & van der Veer, 2006) and a more personal interpretation the system needs to give some structure, as suggested by 'Situated Play' (Morrison et al., 2011).

That said, not all participants were confused by *The Forces of Nature* installation. Two participants assigned very rich own meaning making to their experiences. Both participants reported loving the sea and sailing elements suggested by the materials used in the installation. The materials and the interaction triggered strong 'mental models (Gentner & Stevens, 2014) that the participants assigned to their personal experiences. For a more detailed description of *The Interactive Hammock*, please refer to the demonstration paper (*The Roaring Hammock)* in Appendix A.

4.3. GET MILK: A COMPARATIVE STUDY INVESTIGATING DIGITISED GAME DESIGN TEACHING MATERIAL

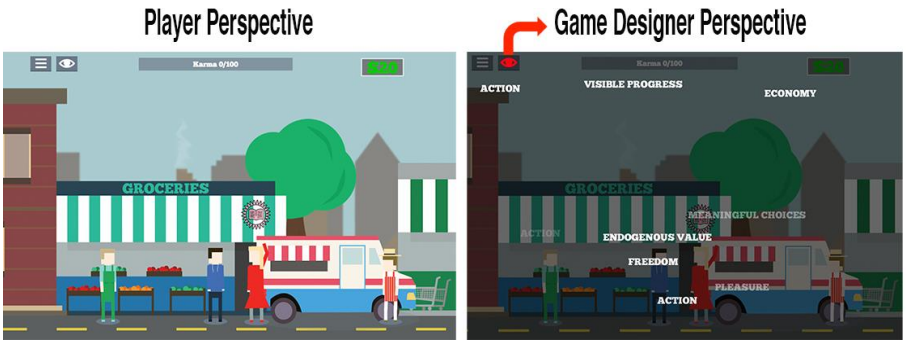

Figure 18. Left: The Game Player Perspective. Right: The Game Designer Perspective (Screenshot of the Game)

Get Milk, investigates the effectiveness of digitised game design teaching material. From the study, I present findings from an experiment with 51 postgraduate students playing the learning game *Get Milk*; a touch-optimized, responsive, web-based learning game (Figure 18).

For this case study I ran a comparative trial using two forms of teaching materials. The first was digitised and interactively displayed context-aware game design theory for players, and merged established game interaction paradigms into an educational context (played by Group A). The second (the control group) used a paper version of the same theory for the same game. Analyses of videos, logged data, interviews, questionnaires and user-created content revealed phenomena unique to those students working with the digitised material.

4.3.1. DESIGNING GET MILK

Applying a top-down design approach, I started the design process by defining the holistic experience I wanted students to have, one that would stimulate student players to critically assess a game using easy-to-access and logically assigned game design theory. In particular, I focused on designing for the human needs (Sheldon et al., 2001) of competence and stimulation (Hassenzahl et al., 2013) by implementing free play (Morrison, Viller, & Mitchell, 2011b). By hiding the game designer view behind an 'perspective menu item' illustrating a human eye, see Figure 18, top left, I wanted to make students curious to discover more about the underlying game design theory and designed to provoke a more intrinsically motivated investigation (Deci & Ryan, 2010). They define intrinsic motivation as follows: 'The most basic distinction is between intrinsic motivation, which refers to doing something because

it is inherently interesting or enjoyable, and extrinsic motivation, which refers to doing something because it leads to a separable outcome' (Deci & Ryan, 2010 p.33)

The design goal of the game is to enable students to think and act as a game design critics, fostering their own meaning making (Vyas & van der Veer, 2006) and inviting them to reflect on implemented game experiences by invoking game design theory while playing the game. This should improve students' understanding and successful application of game design theory, specifically Schell's (Schell, 2008) 'game design lenses'.

As the player progresses through the game, the game design lenses appear on screen and hover close to the area where they have been applied. However, the lenses are not directly assigned to specific interaction areas, instead they are placed in proximity for the purpose of representing the abstract nature of design patterns (Alexander, Ishikawa, & Silverstein, 1977; Bjork & Holopainen, 2004) and encouraging personal meaning making (Vyas & van der Veer, 2006). Through this and by applying the theory of free play (Morrison et al., 2011) students could choose whether to continue playing as a player or to explore the underlying game design lens by clicking on a game-design view icon, as seen in Figure 19 and 'playing' as a designer.

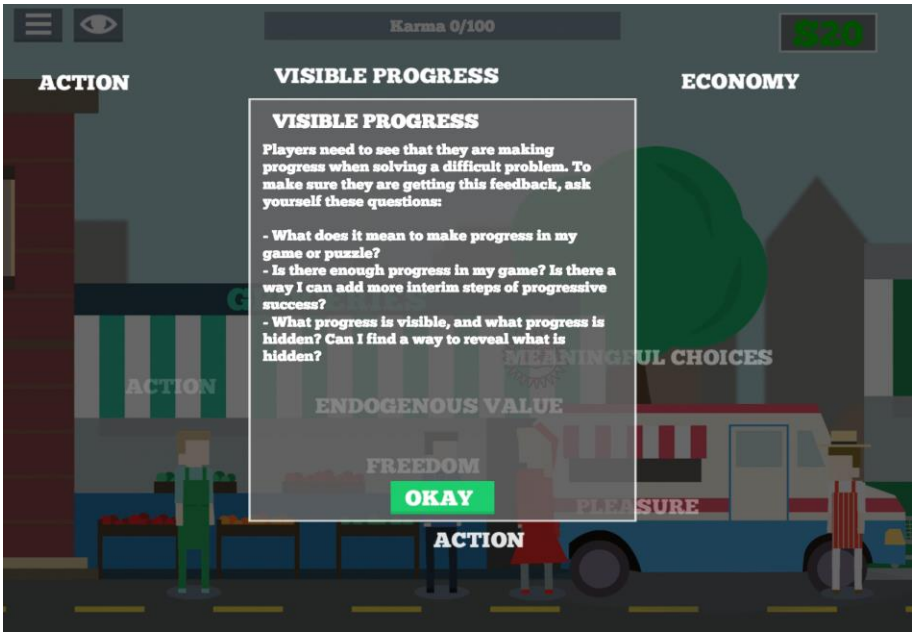

Figure 19. Group A could choose whether to continue playing or to explore the underlying game design lens by clicking on a game-design view icon and selecting a lens. (screenshot of the game)

At the end of the game the learner sees a game report (Figure 20) that summarises the in-game-behaviour as a gamer but also as a learner for the purpose of encouraging self-reflection. The design intention was to ensure that learners would access as many game design lenses as possible and to provide the learner with a clear overview of how many lenses he/she activated.

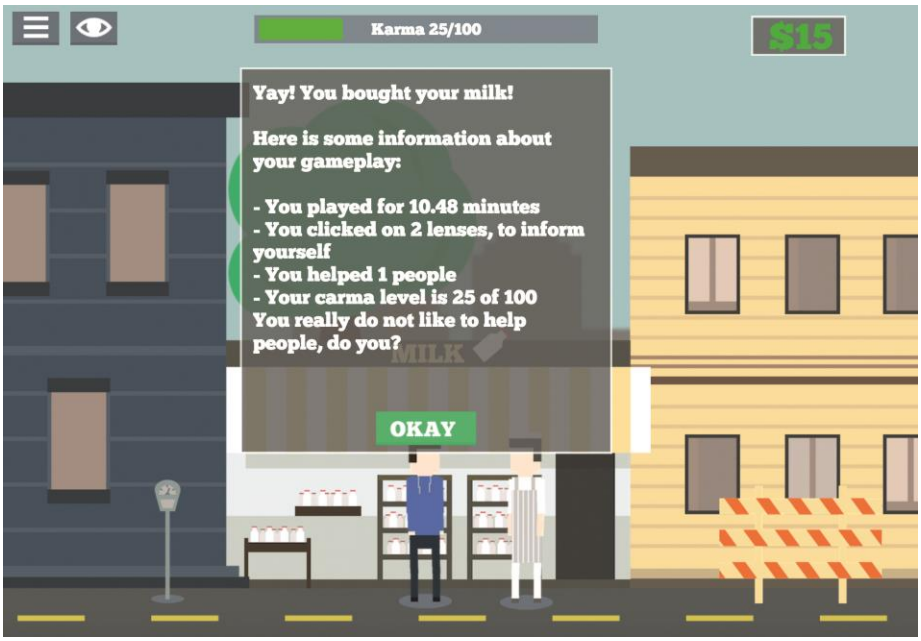

Figure 20. The learner is prompted with an end-of-the-game report summarizing the in game behaviour as a gamer and as a learner for the purpose of encouraging self-reflection (Screenshot of the Game)

4.3.2. SUMMARY OF FINDINGS FOR GET MILK

A total of 51 undergraduate students participated in the study (14 female; the average age was 26, ranging from 19 to 30). The summary of findings presented in this chapter will focus on providing evidence that supports that the digitised dynamically displayed game design theory, and the end-of-the-game report resulted in more intrinsic motivation. The full Report of the *Get Milk* case study can be found in Appendix A.

Assignment Observation

I analysed in depth how *Get Milk* was used and experienced in both groups, focusing on how the particular idea of linking first-hand game experience with game design theory played out for the students subjectively and matched the found data for axial

coding(Strauss & Corbin, 1998). Many topics emerged during analysis of the logged activity and participant observation. However, the most potent differences I found were in the playtime and the number of game design lenses accessed during the assessed exercise. Since I designed for free play (Morrison et al., 2011), the students could decide if, when and how often to play the game. While all students started the exercise playing the game, players of Group A, who played the digitised version of *Get Milk*, replayed the game up to three times, accessing an average of 6 (min=2, max= 10) game design lenses. All participants of control Group B played the game only once and only read an average of 2 game design lenses (min=0, max=4). In total, 24 students (86%) of Group A replayed the game, 19 students did so upon self-reflection (68%) i.e., after seeing the end of the game report, 12 students (43%) for the purpose of answering the assignment question, and 6 students (21%) for both purposes.

Students' Perspectives

During retrospective semi-structured interviews, I found that both the initial interaction and the interaction following the assignment questions were mainly based on more extrinsic motivations (Deci & Ryan, 2010), such as being in a better position to answer the assignment questions. However, in the case of the self-reflection within Group A, (afforded by the end of the game report, see Figure 22), the interaction was described as more intrinsically motivated (Deci & Ryan, 2010) where students reported feeling curious or stimulated (Hassenzahl et al., 2013) to find out more about the introduced game mechanics. In addition, students of Group A explained in the retrospective semi-structured interviews that they felt '*enabled*', explaining that the *digitised* game provided them with a feeling of '*competence*' and they felt '*in control'* of their own learning experiences while playing and felt '*competence*' and '*motivation*' while answering the assignment questions. Students were invited to rate their overall gaming and learning experiences (Figure 21) in a short anonymous online survey following the assignments in order to further reflect on their own gaming and learning experience.

The semi-structured interviews revealed that asking the students to distinguish between their experiences as players and as learners in the online-survey encouraged them to reflect and question their own learning behaviour. In the case of the *digitised* approach most students had ideas on how they could improve the game design. Some also reflected on their personal learning experiences, offering responses such as, '*The game is boring, but teaching game design theory through this game is great because one thinks of plenty of improvements based on the questions asked by the lenses'*. In the *paper-based* group, the majority of students criticised the abstract nature of the game design lenses, showing less individual meaning making when discussing the personal learning effects. Figure 21 illustrates that students who used the *digitised* approach rated the learning experience higher than the fun factor of the game, and a majority of the students rated the effectiveness of the game for teaching game design theory as 'good' or 'very good'.

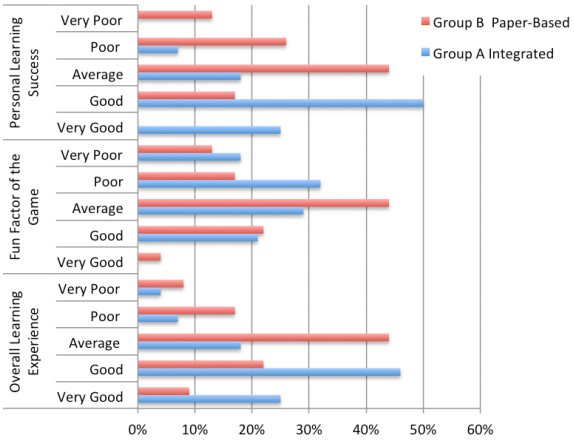

Figure 21. The Student Perspective (Results of the Anonymous Online Survey Results) (illustration by the author)

For the purpose of learning more about the students reasons for choosing to change from the player perspective to game designer perspective within the *digitised* approach, I asked, *'What was your reason for accessing the game design theory perspective for the first time?'* Fifty-three percent of the students (15 of 28) claimed that they were curious to see the game designer view; twenty-seven percent (8 of 20) wanted to learn more about a specific game mechanic; and ten percent (3 of 28) wanted to see how one could improve the game. Ten percent (3 of 28) did not access any game design lenses in the initial game, i.e., before seeing the game report and reflecting on their player behaviour.

The main aim of the presented empirical study was to create more immersive holistic learning experiences that would link text/*paper-based* knowledge with related interactive elements within the *Get Milk* game for the purpose of fostering a greater intrinsic motivation (Deci & Ryan, 2010), synthesis (Bloom, 1956) and critical thinking (Paul, 1992) amongst undergraduate students. The results, presented in the full report in Appendix A, shows that, in the game-*digitised* theory approach, students played not only longer but also read more game design theory, were more immersed and activated the knowledge encapsulated in theory better during the exercises. In addition, the *digitised* theory helped students to apply the theories more meaningfully to their own design thinking. I found that the *digitised* material opened up opportunities for synthesis (Bloom, 1956) and critical thinking (Paul, 1992), and that it taught game design theory dynamically and helps students to develop a deeper understanding and a wider application of the game design patterns introduced. In addition, it helped students grasp the difference between a player and a designer perspective. And most importantly, Group A students rated

their personal learning experience higher than the control group (see Figure 21), describing their learning experiences as '*enabling*', '*motivating*' and reported feeling '*competent*' and '*motivated*'.

CHAPTER 5. RESEARCH FRAMEWORK

This chapter will summarize all data collected and found using the case studies outlined in Chapter 4. The case studies have been organized in sequence and even though all three case studies investigated the *interpretative role of an experiencer* yet each study differed in its approach. For *The Remediation of Nosferatu* I chose and experimental approach that was designed to look at *ambiguous vs. prescribed experience-fragments* and how they might shape into a holistic experience. With (*The Interactive Hammock*) I focused on *ambiguous vs. prescribed* holistic experiences with a tangible interface (Ishii, 2008). Finally for *Get Milk*, I investigated if a more *ambiguous* learning experience could result in intrinsic motivation (Deci & Ryan, 2010).

For the purpose of exploring the quality of *ambiguous and prescribed* experiences I summarized the initial two case studies, *The Remediation of Nosferatu,* (Ghellal et al., 2014) and The Interactive Hammock. To date, only *The Roaring Hammock (Ghellal et al., 2015)* has been published. In both case studies I focus on the quality of experiences, that is, I researched, expanded and analysed the lived experience of each participant individually. This evidence was then summarized as part of the analyses within the thesis.

The two case studies were organized and evaluated in sequence. First, I experimented with *The Remediation of Nosferatu,* creating *ambiguous vs. prescribed experience-fragments* that where spread across time and space. Second, I designed two contrasting versions of *The Interactive Hammock, The Forces of Nature and The Roaring Hammock and* evaluate the interpretation of *ambiguous vs. prescribed* tangible interfaces in more detail.

As suggested by grounded theory (Strauss & Corbin, 1998), I applied a three-staged inductive research approach (Figure 22).

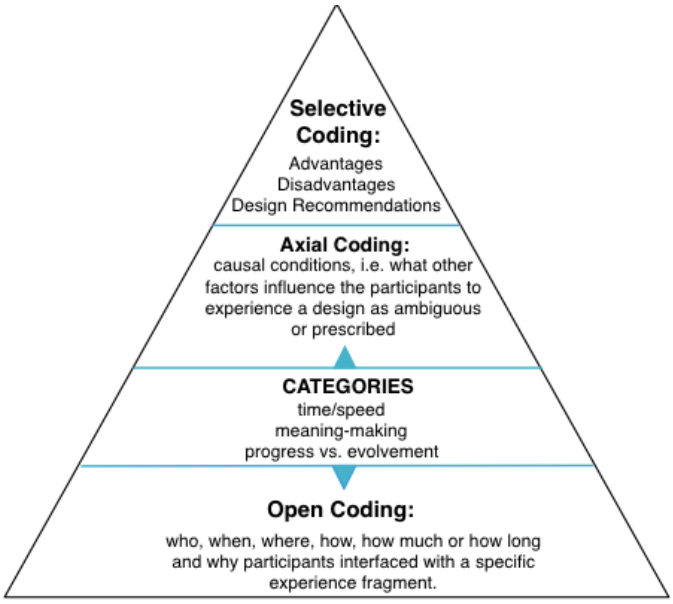

Figure 22. Grounded Theory Approach (Strauss & Corbin, 1998) (illustration by the author)

Using 'open coding' (Strauss & Corbin, 1998) I collected various data composed of: questionnaires, interviews, video reports and logged GPS data. Time/speed, meaning-making, and progress vs. evolution emerged as the main 'categories' though the open coding process. Armed with this information, I looked for causal conditions within these identified categories using an axial coding process (Strauss & Corbin, 1998). Finally, I actively searched for advantages and disadvantages and any design patterns or design recommendations I could formulate using a selective coding process (Strauss & Corbin, 1998).

5.1. EVALUATION STRATEGIES

Before defining and organizing data collection across case studies, I carefully developed evaluation strategies for each case. The data collection methods for the three case studies differed because of the contrasting experiences they delivered.

5.1.1. THE REMEDIATION OF NOSFERATU

Why am I evaluating?	How can a holistic dramaturgical experience, which is based on several *experience-fragments* that are spread across space and time, be designed and how does this relate to the *interpretative role of an experiencer*, i.e. *ambiguous vs. prescribed* quality of experiences?
What type of data do I want	- Semantic differential scale

to collect?	- Semi-structured interview (looking for attributes to define *ambiguous vs. prescribed* qualities of experiences) - GPS coordinates during play - Video material of the experience - Retrospective think aloud data
What am I evaluating?	The interpretative nature of *experience-fragments* and holistic experiences
What constraints do I have?	I do not have a user-friendly illustration of the individual journeys (only the raw GPS data) and may have to remind participants of the order and the content of each *experience-fragment*.

Table 2. The Remediation of Nosferatu Evaluation Strategy

5.1.2. THE INTERACTIVE HAMMOCK

Why am I evaluating?	The difference between *ambiguous vs. prescribed* quality of experiences of a tangible interface using full-body interaction
What type of data do I want to collect?	- Retrospective think aloud - Semantic differential scale - Semi-structured interview (looking for attributes to define *ambiguous vs. prescribed* qualities of experiences)
What am I evaluating?	The lived experience of the participant and if and how s/he assigns meaning making.
What constraints do I have?	Because I want to evaluate the experience as close to the encounter as possible the participant will be evaluated while s/he is still in the hammock. Need to observe the participants closely to make sure we approach participants at the right time (when s/he has noticed and tried all hammock features).

Table 3. The Interactive Hammock Evaluation Strategy

5.1.3. GET MILK: A COMPARATIVE STUDY INVESTIGATING DIGITISED GAME DESIGN TEACHING MATERIAL

Why am I evaluating?	Investigate whether 'ambiguity' fosters greater intrinsic motivation within an interactive multimodal learning environment.
What type of data do I want to collect?	- Screen capturing software (Quick Time player for iOS 8) - Video observation - Personal observation - Assignment results - Online questionnaire - Interview results (looking for motivation and personal learning experiences)
What am I evaluating?	Comparing the lived learning experiences of two groups to evaluate the difference between a 'digitised' (featuring an

	ambiguous dynamic display of game design theory) and a 'paper-based' approach.
What constraints do I have?	The interaction with the 'paper-based' approach (interaction with the books) will not be captured with the screen capturing software. I need to observe and film the learning behaviour of the participants using the 'paper-based' approach.

Table 4. Get Milk Evaluation Strategy

5.2. DATA COLLECTION

The data collection methods for each case study differed because of the different experiences they delivered (and formats the experiences were produced in—outdoor game, indoor installation, learning environment) (Table 5).

Case Study	Data Collected	Experience		Demographics
		Holistic	Fragments	
The Remediation of Nosferatu	• Demographic data • GPS coordinates during play • Video recording of participants • Observation of participants • Retrospective think aloud based on individual journeys (using GPS tracking and some video material) • Semi-structured interviews (including a semantic differential scale, see Figure 23)	22	145	Average age at 30 (18-62); 8 female
The Interactive Hammock	• Demographic data • Video report of participants • Retrospective think aloud (no prompts to not disturb because of the audio experience) • Observation of experiences • Semi-structured interviews (including a semantic differential scale, see Figure 23)	42	0	Average age at 28 (20-54); 18 female
Get Milk	• Demographic data • Screen capturing software during game play. • Player observation and recording • Assignment results • Anonymous online survey • Semi-structured interviews	51	214	Average age at 26 (19-30); 14 female

	(including a semantic differential scale, see Figure 23)			

Table 5. Data Collection Approach

5.2.1. THE SEMANTIC DIFFERENTIAL

For the purpose of matching how an experiencer perceived an experience, *ambiguous vs. prescribed*, with how I as the designer intended the experience to be perceived, I asked participants to rate their experiences using a semantic differential scale (Osgood, 1964). Because distinguishing between *ambiguous vs. prescribed* experiences was new to the participants I added a definition of both qualities to the semantic differential scale (Figure 23).

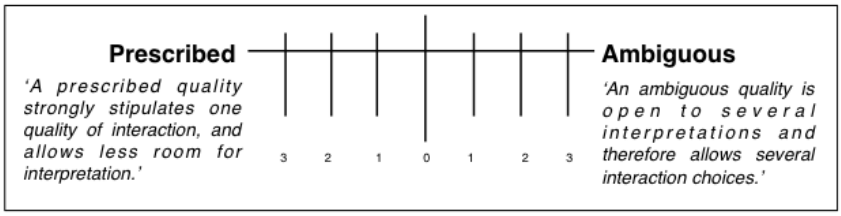

Figure 23. Semantic Differential Scale Contrasting Ambiguous vs. Prescribed Experiences (Illustration by the author)

With each case study, I added new attributes that had been used to describe the two contrasting experience design qualities. I carefully grouped the attributes if possible and made sure only to include attributes that would be applicable to all three case studies. In this way, my intent was to ensure that the semantic differential I presented with this research would be widely applicable.

5.3. DATA ANALYSIS

Similar to data collection, the data analysis methods for each case study differed because of the different formats and experiences they delivered. However, all case studies collected data from semi-structured interviews, used a retrospective think aloud approach and provided video material where possible. Therefore I initially used data collected from semi-structured interviews during the open coding process. Collected video material, GPS logs and questionnaire results were then used to look for causal conditions, that is, what other factors influenced the participants to experience a design as *ambiguous or prescribed*.

5.3.1. OPEN CODING

After collecting multiple data formats, I carefully analysed the collected data using open coding (Strauss & Corbin, 1998), Here I actively looked for categories that emerged inductively rather than using predefined categories for data analysis, and asked questions such as who, when, where, how, how much or how long and why. Participants interfaced with a specific experience-fragment. Specifically, I looked for description and naming used through close examination of interview data. For example, one participant described his experience in *The Forces of Nature*, installation as follows:

'I feel **relaxed**, … there is **no time pressure**, and I don't feel challenged, I initially thought I would have to play a game in the hammock, … I feel like I am on **vacation**…I can just lay here and **do whatever I want**. If I want to relax, I gently move the hammock, and if I want more action, I can bounce in the hammock...'

From this retrospective think aloud report I selected the adjectives 'relaxed' and 'vacation' and combined 'no time pressure' into the adjective 'slow' and 'do whatever' I want into 'free' because they were conceptually similar to adjectives used my other participants. Table 6 and Table 7 presents a summary of the most commonly used attributes found during open coding

The Remediation of Nosferatu

	Ambiguous	Prescribed
Positive context	*'Surprising'* *'Spontaneous'* *'Ethical'* *'Mysterious'*	*'Clear'* *'Instructed'* *'Obvious'*
Negative context	*'Unrelated'* *'Bizarre'* *'Strange'* *'Unclear'* *'Without a purpose'*	*'Wrong'* *'Unsuitable'* *'Forced'* *'Unspontaneous'* *'Overly obvious'*

Table 6 Attributes Used to Describe Ambiguous and Prescibed Experience-fragments

The Interactive Hammock

	The Forces of Nature	*The Roaring Hammock*
Positive context	*'Hypnotic'* *'Pschodelic'* *'Inspiring'* *'Floating'* *'Sailing'* *'Relaxing'* *'free'*	*'Fun'* *'Fast'* *'Crazy'* *'Happy'* *'Creative'* *'Inspiring'* *'Challenged'*

Negative context	*'Overwelming'* *'Pretentions'* *'Slow'* *'Strange'* *'Unclear'* *'Without a purpose'*	*'Out of tune'* *'Too laud'* *'Exposed'* *'Overtorqued'*

Table 7 Attributes Used to Describe Ambiguous and Prescibed Holistic Experience

Before I moved from a more open to axial coding I defined the three following main 'categories' (Strauss & Corbin, 1998) that had emerged from the data:

(1) *Time/speed*: *ambiguous* experiences were often perceived as slow while *prescribed* experiences were described as feeling rushed. This was validated by the fact that participants require more time for *ambiguous* experiences than for *prescribed* experiences.

(2) *Meaning-making* (Vyas & van der Veer, 2006): *ambiguous* experiences foster more own meaning making than *prescribed* experiences

(3) *Progress vs. evolvement* (Jesper, 2002) participants who chose more *ambiguous* qualities of experiences describe their holistic experience as 'evolving' (Jesper, 2002), while participants that visited more *prescribed* qualities of experiences describe their holistic experience as a 'progression' (Jesper, 2002).

5.3.2. AXIAL CODING

Using a process of 'axial coding' (Strauss & Corbin, 1998), I then compared the categories across resources and looked for causal conditions, that is, what other factors influenced the participants to experience a design as *ambiguous vs. prescribed*.

From an axial coding process, I found that the main categories that emerged during the open coding process (Strauss & Corbin, 1998) could be contrasted and defined using a bipolar scales (Kamoen, Holleman, van den Bergh, & Sanders, 2013) as follows:

(1) Closed for interpretation = *prescribed ambiguous* vs. open for interpretation = *ambiguous*
(2) Fast = *prescribed* vs. slow = *ambiguous*
(3) Directed = *prescribed* vs. exploring = *ambiguous*
(4) Planed = *prescribed* vs. unplanned = *ambiguous*
(5) Coherent = *prescribed* vs. unplanned = *ambiguous*
(6) Goal driven = *prescribed* vs. aimless = *ambiguous*
(7) Obvious = *prescribed* vs. obscure = *ambiguous*
(8) Forced = *Prescribed* vs. free = *ambiguous*

During the final stage of the axial coding process (Strauss & Corbin, 1998), I further refined the categories and bipolar word pairs (Kamoen et al., 2013) into a more elaborate semantic differential scale (Osgood, 1964). For the purpose of measuring connotative meaning, i.e. the emotions and associations connected to the attributes used by participants.

That said, the semantic differential I am working with at the moment (Figure 24), and present as part of this research, is still a work in progress that will have to be applied, evaluated and adjusted in a broader empirical research to ensure its validity.

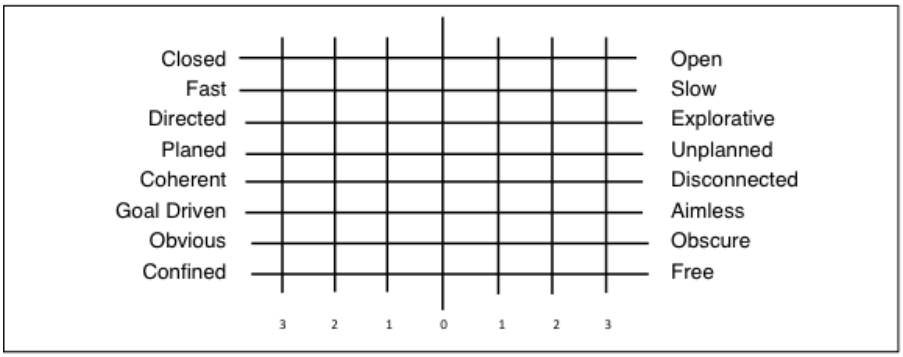

Figure 24. Semantic Differential Scale, Representing Contrasting Meta-categories (illustration by the author)

5.3.3. SELECTIVE CODING

During the selective coding process (Strauss & Corbin, 1998), I matched the data I found to 'materials that shape an experience' (Hassenzahl, 2010), i.e. content, presentation of content, functionality, and interaction because I wanted to find more factors that would influence whether an experience-fragment was experienced as either *ambiguous or prescribed*.

Through selective coding I found that if all materials that shape an experience, that is content, interaction, functionality and presentation are perceived as *ambiguous* the experience is most likely (in 70% of the cases) to be described as aimless, disconnected or unstructured. Similarly, if all materials that shape an experience are understood as *prescribed* the experience is most likely (in 85% of the cases) to be described as forced, boring, obvious and confining.

Additionally, I searched for concrete design recommendations, i.e. circumstances where the two contrasting qualities were reported to be suitable or not suitable and I summarized the advantages and disadvantages of *ambiguous vs. prescribed* qualities of experiences from data analysis that will be highlighted in Chapter 6 and 7.

CHAPTER 6. SUMMARY OF FINDINGS

In this chapter I present a set of design guidelines that should be understood as emergent findings. Several of the more important understandings that have emerged over the course of this research, how they built upon each other and how they can be used in future research processes, projects and disciplines will be discussed in Chapter 7.

6.1.1. AMBIGUOUS VS. PRESCRIBED QUALITIES

In total I organized 3 case studies, designed 4 holistic experiences (*The Remediation of Nosferatu, The Forces of Nature, The Roaring Hammock* and *Get Milk*) and designed a total of 25 *experience-fragments. I compared and* evaluated 115 holistic experiences and 359 *experience-fragments.* I found significant evidence that it is possible to design for the *interpretative role of an experiencer*. I did, however, find some smaller differences between *ambiguous vs. prescribed* qualities while comparing 'lived'(Van Manen, 2016), i.e. how the participants rated the experience, with how I 'designed' the experiences. 92% (80 of 87) of the experiences that have been designed using a *prescribed* quality matched the lived experience. Slightly less, 84% (59 of 79) of the experiences that have been designed featuring *ambiguous* qualities matched the 'lived' experiences. This would indicate that *prescribed* qualities of experiences are slightly easier to recognize then *ambiguous* qualities of experiences.

Using an open coding process (Strauss & Corbin, 1998), I found the following four major differences between designing for *ambiguous vs. prescribed* experience qualities, time/speed, meaning-making (Vyas & van der Veer, 2006), progress vs. evolvement (Jesper, 2002) and motivation (Deci & Ryan, 2010).

- Participants who engaged in an *ambiguous* experience needed more time. Participants who engaged in a *prescribed* experience tended to hurry and approach a system with a stronger problem-solving mentality. I found that *ambiguous* experiences take longer because participants look for their meaning-making (Vyas & van der Veer, 2006) and interaction choices while interacting with the system, rather then performing a stipulated interaction or consuming a pre-defined meaning.
- Participants who engaged in more *ambiguous* experiences were more likely to display their meaning-making (Vyas & van der Veer, 2006) but would also more often report a feeling of being lost. In the case of *The Interactive Hammock* installations, I noted that an overly *ambiguous* experience might also confuse a participant. This suggests that an *ambiguous* quality without any structure can end up feeling meaningless and therefore will also not

foster own meaning-making (Vyas & van der Veer, 2006) or intrinsic motivation (Deci & Ryan, 2010).

- Participants who engaged in an *ambiguous* experience were more likely to describe their experience as something that emerged over time. In contrast, participants who engaged in *prescribed* experiences were more likely to report a feeling of progression. As a designer, it is, therefore, important to notice that an experience that is designed for evolution will entail behaviour that could not be predicted or intended by the designer.
- While *prescribed* qualities of experiences enables progression, where participants perform a predefined set of interactions, an *ambiguous* quality affords evolution, which provides a smaller number of rules that yield a larger number of interaction variations. If a designer wishes to design for several interaction choices, it is, therefore, necessary to design for an *ambiguous* quality.
- Evidence found in the final case study *Get Milk*, suggests designing for *ambiguous* qualities, e.g. by designing for curiosity, may result in more intrinsically motivated participation (Deci & Ryan, 2010).

6.1.2. HOLISTIC EXPERIENCES AND FREE PLAY

A free-play phenomena I found during data analysis was that if participants are free to choose not only the order of events but also if, when, and how long they take to visit a particular *experience-fragment*, then not all *experience-fragments* are guaranteed to be visited. This may mean that multiple design fragments are essentially 'wasted'—not visited and ineligible for analysis.

This may also result in a set of 'un-finished' experiences. For *The Remediation of Nosferatu*, for example, I designed, a total of 12 *experience-fragments* but our participants only visited an average of 7 (Min=6, Max=10) *experience-fragments*.

When designing for free play, it is, therefore, necessary to consider all possible experience design options and carefully consider the *interpretative role of an experiencer* for each *experience-fragment* and the resulting holistic experience. Because free-play allows a participant to construct her/his holistic experiences by the choices s/he makes during play. I conclude that free-play affords a more *ambiguous* holistic experience (as was the case for *The Remediation of Nosferatu)*. More directed play, one the other hand - for example, a linear gameplay, where participants are required to follow a set rules and a specific line of action- promotes a more *prescribed* holistic experience (as was the case for the gameplay of *Get Milk*). In this instance all of the *experiences-fragments* are visited in a linear progression so all are useful in analysis as well.

6.1.3. THE SEMANTIC DIFFERENTIAL

The semantic differential was developed iteratively. Each case study provided new adjectives and insights into how an experiencer would interpret *ambiguous vs. prescribed* experiences. Data was collected and coded using grounded theory. Specifically this included coded interview results, coded observation and how the participant rated their own experience using an initial reduced version of the semantic differential scale from *Chapter 5.2.1*.

With the semantic differential (Figure 23) featuring bipolar scales (Kamoen et al., 2013) I propose an evaluation method for the purpose of measuring connotative meanings, i.e., the emotions and associations connected to the attributes used by participants of *ambiguous vs. prescribed* qualities of experiences.

The bipolar word-pairs, i.e., polar adjectives, illustrated (Figure 26) are based on attributes found in the two case studies (*The Remediation of Nosferatu* and *The Interactive Hammock*) during data analysis (Chapter 4). I selected the connotative meanings based on the following three factors:

(1) Self Rated: How participants themselves rated the experience. The participants were asked to define the *ambiguous vs. prescribed* qualities using an initial semantic differential scale (Chapter 4).

(2) Coded Interviews: The attributes participants used to describe their experience. For example that the participants felt free or open to making a choice within a game or closed and restricted from doing so, or felt that an experience was slow or fast paced.

(3) Coded Observation: Observation and interpretation of the found data during data analysis suggested that participants who mainly chose *ambiguous* qualities of experiences would describe the holistic experience as evolving, i.e., that they felt like they could influence the outcome. Participants that mainly chose *prescribed* qualities of experiences would describe the holistic experience as progress, i.e. a predefined outcome that could only result in two possible outcomes.

With the semantic differential (see Figure 25), I provide a rating scale designed to measure the connotative meaning of *ambiguous vs. prescribed* experience qualities for the purpose of an iterative conceptual design approach. However, the semantically differential should be understood as an early work in progress, relevant specific to these case studies at this point. To ensure a wider application, the semantic differential should be further challenged with a larger set of participants as well as within a broader set of disciplines and applications. Additionally the parameters for assessing the meta-categories need to be further defined and enlarged upon to ensure replication and validation.

6.2. THE ITERATIVE EXPERIENCE DESIGN APPROACH

The iterative experience design approach has been a mainstay of the evolution of the case study and design processes implemented in this research. In Figure 25, I illustrate the iterative experience design approach that I have devised based on the main findings of this research. The iterative interdisciplinary experience design approach starts with a conceptual design phase using the *transmedia experience design matrix* (TXDM). This process is then followed by a cyclical design/ evaluation/analysis phase where the *ambiguous vs. prescribed* qualities of the experiences are evaluated using a semantic differential scale (Chapter 5.3.2). Then working with a 3-stage grounded theory approach to analysis, the information is fed back into a redesign process, where the knowledge gained from the evaluation cycle feeds into improving the next design. In this case, each case study was improved upon by knowledge gained from an interactive interdisciplinary approach to experience design and the results of the analysis were fed into the next stages.

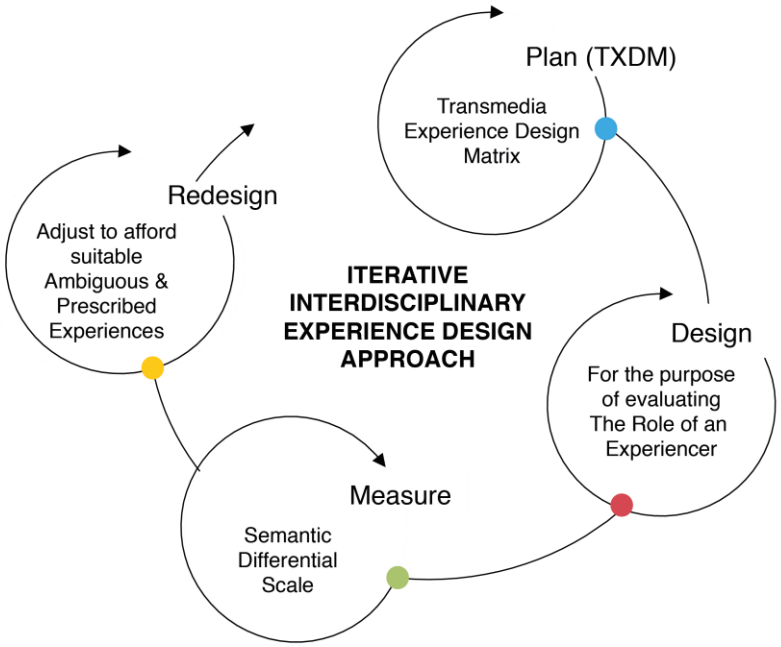

Figure 25 The Iterative Interdisciplinary Experience Design Approach uses an iterative design circular approach to address feedback and evaluation analyses into improving (redesigning) the next set of designed experiences. (illustration of the Author)

CHAPTER 7. DISCUSSION

In this chapter, I discuss understandings that emerged through the research process. I then address the research questions. Next, I define the limitations of this research project. Finally I discuss opportunities for future research.

7.1. FRAMEWORKS: DO WE NEED MORE FRAMEWORKS?

There were several changes in process during the course of this research and these are important to highlight in this discussion chapter. A major research question I addressed in this research asked *how to combine interdisciplinary design concepts, methods, and frameworks into one common conceptual transmedia experience design framework*. However, during my research I found that crafting yet another conceptual framework would not solve the problem that transmedia scholars, designers, developers, artists and experts face.

During phase one I established that the problem is not a missing framework but the very broadness of transmedia's interdisciplinary nature. Game designers, technologists, storytellers and experience designers do not only use different conceptual design models, but also use different naming conventions and approaches and are part of different cultures, fields and disciplines (Ghellal et al., 2016). As such the *transmedia experience design matrix (*TXDM) does not merely present yet another new conceptual design framework but rather merges selected conceptual design frameworks into a new lens. By contrasting the existing conceptual design frameworks of various disciplines, the TXDM invites interdisciplinary design teams to discuss, compare and contrast design options from multiple disciplines before deciding on a conceptual design approach.

7.2. THE EVOLUTION OF THE TRANSMEDIA EXPERIENCE DESIGN MATRIX (TXDM)

Initially I designed the TXDM for the purpose of illustrating the various disciplines, theories and concepts or methods applied within those disciplines in order to structure my own theoretical research. This was done as part of the initial research phase; the background literature review of my dissertation. However, during a workshop at 'Humboldtforum Foundation' in Berlin in 2015, (titled 'Museum Apps of Today and Digital Perspectives of Tomorrow') I spontaneously ended up presenting the TXDM (Figure 5) and received the feedback that the visualization helped to discuss design options in interdisciplinary teams and assists understanding the various design options involved and how they are interconnected.

Encouraged by the feedback of this workshop, I decided to challenge the TXDM. First through using the TXDM lens as teaching material for a 'Transmedia Experience Design' course at Masters level at Stuttgart Media University. Second as a conceptual design framework at two interdisciplinary workshops. The first workshop was titled 'Game Aesthetics and Experience Design- How to design for meaningful experiences in a museum or gallery context'. Thirty-two interdisciplinary practitioners participated (designers, content owner and curators). The next workshop was titled 'Game Aesthetics and Transmedia Experience Design- How to design for meaningful experiences' (with 23 movie producers, storytellers, game designers and movie directors).

Through these workshops and teaching environments, I came to understand that the value of the TXDM is not necessarily it's scientific contribution, (because the TXDM does not present anything new or innovative), but the TXDM lens has merits as a communication tool because it provides a new holistic, yet detailed view to a complex interdisciplinary problem. In this way the TXDM assists scholars, designers and commercial experts to solve real communication and translation problems they face when attempting to design transmedia experiences in interdisciplinary teams.

7.1. FOCUSING ON AN INTERDISCIPLINARY SET OF FIELDS

At first glance, the three case studies '*The Remediation of Nosferatu'*, '*The Interactive Hammock'* and '*Get Milk'* may appear as if disconnected. However, all three case studies experiment with *ambiguous vs. prescribed* experiences. Additionally, all three case studies have been designed and evaluated in sequence and each case study builds upon the findings and contributions from the previous case study. Moreover, all three disciplines (location based games, tangible interfaces and multimodal learning environments) have been identified as acting within a Transmedia Perspective (Ghellal et al., 2016) during the theoretical research in phase one.

There is a common traditional understanding that transmedia productions should be rolled out by at least three media types or that transmedia designs should be dispersed because this encourages a participant to construct storyworlds through encounters across multiple platforms. However, I would argue that is an outmoded way of thinking that technology progress has over-ridden. There is currently a mix of modalities, such as reading and writing, seeing and hearing, touching and feeling (Norman, 2009) that is possible to access on a solo platform because mobile technology (such as smartphones or tablets) enable multimodal interaction with one system.

7.2. THE THREE RESEARCH QUESTIONS AND THE ANSWERS

In this section I highlight and identify the answers to the three research questions I asked at the beginning of the thesis research.

7.2.1. THE INTERPRETATIVE ROLE OF AN EXPERIENCER

(1) What is *The Interpretative Role of an Experiencer* within a transmedia fictional universe and how can a designer shape this interpretative role?

The evidence presented demonstrated that it is possible to design for *ambiguous and prescribed* experiences (Chapter 6.1.1). However, as part of the theoretical background (Chapter 2) I introduced the idea of 'lived experiences' (Van Manen, 2016) for the purpose of evaluating if experiences could be designed for *ambiguous vs. prescribed* qualities. I claimed that I would not consider phenomenology as part of this research because it would open a whole new field in an already very broad research scope. However, as analysis unfolded, I had to go back to the theory of 'lived experiences' because the theory of 'visual methodology' played an important role in *The Forces of Nature* case study. This became apparent where the building materials for the hammock evoked memories for participants of the sea and sailing. In turn, this resulted in the participants constructing their own rich meaning making (4.1.1. Empirical Exploration) that had little to do with the *ambiguous* qualities that had been designed for in the installation. This would indicate that there are potentially many more (as yet to be identified) factors that can shape the *interpretative role of an experiencer* and that these factors may surface where *ambiguous vs. prescribed* qualities are challenged in more diverse case study applications in wider fields of study. There is room for future work here.

Advantages and Disadvantages of Ambiguous vs. Prescribed Qualities of Experiences

The present research emphasizes that the two contrasting approaches, *ambiguous vs. prescribed* qualities of experiences, are suitable for different design contexts—to elicit diverse experiences. Both experience qualities have advantages and disadvantages (Table 8) and are therefore suitable for different design contexts. Considering the advantages and disadvantages of *ambiguous vs. prescribed* qualities of an experience will help a designer to craft more meaningful experiences because these comparative qualities invite the designer to step into the shoes of an experiencer and appreciate the experience from the perspective of the potential participant.

	Ambiguous	Prescribed
Advantages	• Fosters own meaning making (Vyas & van der Veer, 2006) • Provides room for a more vivid imagination • Provides a more intrinsic motivation (Deci & Ryan, 2010) • Invites for speculation or contemplations • Invites longer speculative play (Morrison, 2011) • Invites several interaction choices	• Provides clear instructions & purpose • Provides one clear affordance • May speed-up an experience • Brings order to chaos • Easier to design (More standardised design patterns are available)
Disadvantages	• Challenging to Design (less standardised design patterns are available) • May lack order, purpose and clarity • May be perceived as confusing • If exaggerated it may be perceived as meaningless • *Experience-fragments* may be wasted (not used)	• May provide less room for own meaning making (since it provides a more extrinsic motivation) • May be perceived as unchallenging (or too obvious) • Participants may feel restricted or limited

Table 8. Comparing the advantages and disadvantages of ambiguous vs. prescribed qualities

A designer can identify what experience qualities they wish to craft with the attributes identified in Table 8. They can then shape the interpretive experience for the participants by designing activities or tasks that enable the identified elements (e.g., multiple interaction choices or clear linear instructions).

7.3. COMBINING CONCEPTS, METHODS, AND FRAMEWORKS

(2) Which design concepts, methods, and frameworks are suitable and how can they be combined into one central transmedia experience design framework?

For the purpose of constructing a conceptual design framework I investigated common experience design practices and found two contrasting schools of thought. One school of thought fosters *ambiguous* qualities as a resource for design e.g., (Gaver et al., 2003). Another claims, 'an experience designer is foremost an author of experience' (Hassenzahl, 2010 p.68) and suggests to design for one specific human need and then design each and every detail to create or destroy the desired experience. While the concept of designing for 'ambiguity' (Gaver et al., 2003) or

the idea of 'open and closed' interpretation are popular concepts, to my knowledge no literature exists that compares the advantages and disadvantages of *ambiguous vs. prescribed* experiences. This dissertation contributes not only with: (1) a clear set of definitions that will help designers to consider *ambiguous vs. prescribed* qualities; it also (2) offers concrete guidelines how to design or evaluate if and how a participant may interpret an experience as *ambiguous vs. prescribed*; and (3) illustrates what the implications of *ambiguous vs. prescribed* qualities can be by giving three examples of application.

Transmedia Experience Design Matrix (TXDM)

In regards to how to combine existing interdisciplinary frameworks into one central transmedia experience design framework I proposed to use the TXDM early in the development cycle. During the initial phase of this research (Chapter 3) I found that the greatest challenges transmedia teams face are routed in different naming conventions, design approaches, theoretical frameworks and concepts used within the different disciplines. The TXDM lens illustrates those differences and invites to look for commonalities and differences and by doing so may improve interdisciplinary communication during conceptual design processes.

The benefit of the TXDM is that it combines existing design frameworks into one central transmedia framework that design teams can use to discuss, leap off and return to during interdisciplinary design processes. However, I propose the TXDM can be used as an adaptable lens that can be customised and worked with in a modular fashion where elements can be omitted and/or new conceptual design elements could be added as and when needed. As such I advocate the TXDM be understood as an evolving lens that provides visualisations of complex design problems and assists interdisciplinary design processes. In this way the TXDM is a lens that can be adapted to the pertinent set of circumstances and design problems on a case-by case basis.

For this research, I expanded the TXDM with the conceptual framework of trajectories (Benford et al., 2009) for the location based augmented reality game *The Remediation of Nosferatu*, with tangible interfaces (Ishii, 2008) for *The Interactive Hammock*, and with interactive multimodal learning environments (Moreno et al., 2007) for *Get Milk*. However many other disciplines such as interactive books, theatre, art installation or museum experiences could be added to the TXDM to provide a broader holistic conceptual experience design lens.

7.4. ORCHESTRATION OF HOLISTIC EXPERIENCES

(3) How will a holistic experience that is shaped on several experience-fragments influence The Interpretative Role of an Experiencer?

With the final research question I addressed the issue of constructing holistic interpretative experiences by combining, adjusting and scaffolding *experience-fragments*. This research question was mainly addressed as part of the case study *The Remediation of Nosferatu* and the final case study *Get Milk*, where I evaluated *ambiguous and prescribed* holistic experiences. For *The Remediation of Nosferatu*, I expanded on 'free play' (Morrison et al., 2011) and implemented an *ambiguous* holistic experience, where each participant was invited to construct his/her own dramaturgy by choosing which events and the order of *experience-fragments* with little instruction. While I also implemented an *ambiguous* learning experience for *Get Milk* the overall game dynamic featured a more *prescribed* quality since the design follows a linear gameplay that progresses based on a predefined set of actions.

One of the free-play phenomena I found during the case study evaluations was this: if a designer offers several interaction options (without any limitations) and lets the player orchestrate the game through their own interaction choices, the overall experience may become a gamble. What that means is that while some participants craft a rich overall experience, others may end up confused and/or lost. Additionally, the designer may end up with wasted or obsolete experience designs if not all of the *experience-fragments* have been visited.

Orchestrating the Experience

Holistic transmedia experiences are shaped by *experience-fragments* that may evolve over 'time, space and ecologies' and will necessitate careful orchestration for a meaningful holistic experience. Designing for the *interpretative role of an experiencer* does not only promote awareness of how a participant may interpret an experience, but invites design for a broad range of interpretations.

However, orchestrating holistic transmedia experiences is a challenging design task. It requires an iterative design approach where the balance between *ambiguous vs. prescribed* experiences needs to be carefully adjusted. The iterative design approach outlined in chapter 6.2 was developed to assist revealing when it would be necessary to provide more structure. For example, more structure of a *prescribed* quality would be for a specific task that stipulates system interaction or a map that an experiencer can access when s/he feels lost. Another example, but in this case for providing an *ambiguous* quality, would be for a slow type of *experience-fragment* that invites contemplation or critical assessment with a newly experienced fragment. Please refer to Table 8 for a more elaborate presentation of the advantages and disadvantages of *ambiguous vs. prescribed* qualities for further recommendations.

7.5. LIMITATIONS OF RESEARCH

The limitations of this research can be categorized into three main aspects, limitations that result from the generalist research approach, the broadness of the research scope and the need for a more elaborate study in order to proof the validity of the semantic differential,

The generalist research approach

Transmedia design approaches require designers to combine various 'mental models of creation' (Dena, 2016) from various disciplines, such as game design, storytelling, interactive art and experience design, as was the case for this study. In turn, this requires applying a more generalist research approach than perhaps a more specialist thesis would entail.

While experience design is the main discipline and focus of this study, I provided a wider research scope. Needing to introduce theories from several disciplines entails combining sometimes contrasting frameworks and design constructs which can seem to result in losing focus of the main research goal. However, this is the nature of the interdisciplinary field of transmedia design where elements from different sometimes-conflicting disciplines meet and merge. I have attempted to do this in a way that is respectful of the knowledge of multiple disciplines.

Research Scope

The three case studies *The Remediation of Nosferatu*, *The Interactive Hammock* and *Get Milk* illustrate how *the transmedia experience design matrix* (TXDM) can be expanded for in these instances, a location based augmented reality game, tangible interfaces, and a digitized learning game.

However, there are a plethora of other disciplines, such as electronic books, theatre or museum experiences, that could be equally suitable to expand and work with the TXDM as a lens. Additionally, there are many disciplines that could have been equally suitable and important to base my research upon, including for example, Lucy Schuman's' concept of 'situated actions'(Suchman, 2007).

Suchman discusses how actions that were taken in the context of particular concrete circumstances are, although systematic, never fully anticipated and change continually. However, the main focus of this set of studies was how to design more meaningful transmedia experiences (considering *ambiguous vs. prescribed* qualities) and therefore I based this research mainly on methods and approaches that are related to the experience design community, even though I considered other knowledge, such as interactive art and literary theory, during the initial theoretical research.

Early Version of the Semantic Differential Scale

The semantic differential scale is in early experimental stages and requires more work and explication of processes. In addition, it needs to be applied and tested on a larger scale and in a variety of circumstances. To date, it has only been tested as a proof of concept for the case study, *Get Milk*. Additionally, only two researchers have used this semantic differential scale and I was one of them. As yet this tool is not replicable as an evaluation tool.

7.6. FUTURE RESEARCH

There are a number of interesting research questions that arose during the research process. Including temporal aspects and how they might impact the interpretative role of an experiencer, some more concrete guidelines how to design a holistic experience that is based on ambiguous and prescribed experience-fragments and are what are other roles that my impact the interpretative role of an experiencer.

a) Temporal Aspects:

In the present study, I focused on the interpretation a participant makes during and just after the interaction takes place. However, Hassenzahl (2010) suggests that experiences are not just subjective and meaningful, which I considered in detail in Chapter 2, but are also dynamic, i.e. change over time.

In his book, 'Experience Design: Technology for All the Right Reasons', Hassenzahl (2010) refers to the psychologists Kahnemann and Tversky (2000) who distinguish between 'experienced' and 'remembered utility.' Kahnemann and Tversky elaborate that while, what they refer to as the 'remembered utility,' is based on the momentary experience a participant recalls, there are other, more complex psychological factors that shape a 'remembered utility,' such as, an individual frame of references.

The ‘peak-end-rule,' (Fredrickson & Kahneman, 1993) also discusses a temporal aspect of an experience. The 'peak-end-rule' stipulates that participants judge experiences mainly based on how they felt at the peak of an experience. This phenomenon adds another complexity to address during orchestration of free-play experiences. Designing holistic experiences, particularly if free-play allows a participant to choose the order of events will be affected by the 'peak-end-rule.' How temporal aspects, such as the ‘peak-end-rule’ and 'remembered utility' may affect *ambiguous vs. prescribed* quality of experiences represent an interesting research question I would like to further elaborate in future.

b) Ambiguous vs. Prescribed Orchestration Guidelines:

In future I would collaborate with other researchers in order to provide examples that offer further guidance how to orchestrate *ambiguous and prescribed* experiences into holistic experiences. That will not only entail proving more specific

guidelines where a *prescribed* quality is more useful and when to lead the participant into more *ambiguous* quality of experiences but also how to scaffold the stages in between these extremes.

c) Expanding the role of an experiencer

In Chapter 7.2 I discussed how 'visual methodology' (Van Manen, 2016), played an important role in *The Forces of Nature* installation where participants showed rich meaning-making because the material used reminded them of the sea and sailing. Eric Zimmermann (2010) emphasises in his essay 'Narrative, Interactivity, Play, and Games: Four naughty concepts in need of discipline' additional factors that may influence how a participant may interpret an interaction. Zimmermann suggests to consider 'cognitive interactivity', 'explicit interactivity', 'functional interactivity' and 'meta-interactivity or cultural participation' for what he defines 'narrative interaction'. In future, I would explore additional factors that may help to further define the *interpretative role of an experiencer*.

CHAPTER 8. CONTRIBUTION

In this thesis, I contribute evidence to support the importance of how designing for understanding and awareness of *ambiguous vs. prescribed* qualities during the conceptual design processes results in designing more meaningful experiences. I offer a set of guidelines on how these qualities may best be applied to improve interdisciplinary conceptual design processes. I invite designers to consider the *interpretative role of an experiencer* as a new lens, consisting of a comparative set of qualities (*ambiguous vs. prescribed*) that will enhance design thinking and processes.

For the purpose of examining the *interpretative role of an experiencer* I investigated common experience design practises and found two contrasting schools of thought, one fostering 'ambiguity as a resource for design' e.g. (Gaver et al., 2003) and one that regards an experience designer foremost as 'an author of experience' (Hassenzahl, 2010). In order to contrast the two schools of thought, I defined and contrasted *prescribed* qualities of experiences from *ambiguous* qualities.

As part of this contribution, I introduced the TXDM, a conceptual transmedia design matrix that acts as a lens to perceive and juxtapose interdisciplinary design frameworks. The TXDM translates between disciplines and enables designing for *ambiguous vs. prescribed* qualities for interdisciplinary teams. The research is applied across three case studies that focus on comparing *ambiguous vs. prescribed* qualities of experiences.

Each case study addressed a different transmedia perspective (Ghellal et al., 2016) I establish as part of the initial theoretical research. The aim of the research was to address both theoretical and applied research contributions. The findings contribute to the importance of understanding of the *interpretative role of an experiencer* as an innovative design lens (design perspective) through with which to view the participant that we design for.

I detail the advantages and disadvantages of *ambiguous vs. prescribed* qualities, as well as adding an iterative interdisciplinary experience design approach and include an initial experimental version of a semantic differential scale for evaluating *ambiguous vs. prescribed* experience qualities (Figure 26).

Based on the outcomes of this research, the evidence suggests a set of design recommendations for when to use *ambiguous and prescribed* qualities to achieve certain outcomes. The evidence advocates to design for *ambiguous* qualities when a designer wishes to slow down an experience and invite for own meaning making, critical thinking, contemplation, or if the designer wishes to invite for several

interaction choices or would like to portray several perspectives or truths about a subject.

Conversely, the evidence suggests designing for a *prescribed* quality when the designer wishes to give clear instruction how to interact with a system, explain a topic or circumstance, speed up an experience or if the designer would like to portray one perspective or outline specific information about a subject.

8.1. MINOR EVOLVING CONTRIBUTIONS

Within the processes I have applied with these studies, I made other minor contributions which are experimental and in early stages but are concepts or applications that may be more useful to the field generally. These include:

Transmedia Timeline:

I provided a transmedia timeline (Figure 1) that clearly illustrates how the discipline of transmedia has evolved over time. In addition, the evolution needs attention and maintenance to keep relevant. For transmedia, that means to take into account and reflect changes in consumer behaviour, new technological enablers, new design innovations and/or the changing relationship we have to technology as it evolves.

Sourcing 'Other' Ways of Regarding the Participants:

I integrated interactive art and literary theory perspectives to address the complexities of the many roles a participant may take on or address when interacting with technologies. The changing role of the consumer/the audience/the participant/the reader is important to recognise and many fields have novel ways to investigate this beyond the more traditional Computer Science view of the user. In turn, this broadening in addressing how to consider 'the people' may help experience designers to craft more meaningful experiences by reflecting on and evaluating where possible individual interpretations might lead. This is important to consider while designing a system to be sure to see the participants as having extended perspectives and to be able to grace them with roles that offer autonomy and agency within the qualities of activity.

Link between Ambiguous and Intrinsic Motivation:

The *Get Milk* case study illustrates that an *ambiguous* quality may also foster curiosity and intrinsic motivation in multimodal learning environments. *Get Milk* demonstrates how inviting learners to synchronously explore and interact with theory, rather than following a *prescribed* literature-list as part of a study-plan, did result in more meaningful learning experiences. We see the participants explored more at their own instigation and reported a richer learning experience. The initial finding that ambiguous learning experiences may lead to more intrinsic motivation offers potential that needs further investigation.

8.2. BROADER IMPLICATIONS

The three case studies I presented are all playful interactive systems. However, considering *ambiguous vs. prescribed* qualities of experiences can also be applicable for a wider audience and a wider set of applications—not necessarily play-based. In addition, while I focused on transmedia experiences the contributions of this study can also be applicable to a wider audience because transmedia experience design and interdisciplinary design are closely related.

8.3. SUMMARY OF CONTRIBUTION

Working with three case studies, I contribute three findings. (1) The *transmedia experience design matrix* (TXDM), offering a holistic conceptual design framework that juxtaposes and combines existing interdisciplinary frameworks. (2) I found evidence that it is possible to design for *ambiguous vs. prescribed* qualities. (3) I contribute a set of design recommendations including advantages and disadvantages of an *ambiguous vs. prescribed* quality of experiences.

CHAPTER 9. CONCLUSION

With this research, I contribute evidence to support the importance of designing with an understanding and awareness of *ambiguous vs. prescribed* qualities during conceptual design processes and how these can result in more meaningful experiences.

In the early stages of the research, I conducted interviews with transmedia practitioners and scholars with the purpose of combining existing storytelling, experience design, and game design frameworks, which I then combined into the *transmedia experience design matrix* (TXDM). Next, I designed three case studies and expanded the TXDM successively.

For *The Remediation of Nosferatu*, I expanded on the idea of 'trajectories' (Benford et al., 2009) as part of a location-based augmented reality adventure. With *The Interactive Hammock* I compared two contrasting 'tangible interfaces' (Ishii, 2008), one with more *ambiguous* interactions and the other with more *prescribed* qualities of experience.

Lastly, with the third case study *Get Milk*, I challenged the main contribution of this research: how designing to produce *ambiguous vs. prescribed* qualities during the conceptual design approach (Figure 23) can result in more meaningful experiences (or can more easily govern (step up/step down) levels of participation). In the case of *Get Milk*, this was achieved by applying a more *prescribed* holistic experience to structure the game and a more *ambiguous* quality for the purpose of displaying game design theory dynamically. Through considering *ambiguous vs. prescribed* experiences I managed to instil a feeling of curiosity, which resulted in more intrinsically motivated experiences for the participants.

For validation I challenged the initial findings, with the results of the two case studies, *The Remediation of Nosferatu* and *The Interactive Hammock* at a NordiCHI 2014 workshop titled '*The Fuzzy Front End of Experience Design: Considering Ambiguous and Prescribed Qualities*' (Appendix A). Within the workshop experts from various disciplines, including industrial product developers, packaging designer, marketing expert, educations specialist and health care researchers, discussed and applied the concept of *ambiguous vs. prescribed* qualities to their disciplines as part of a one-hour breakout session at the workshop. The workshop participants understood and agreed that designing for *ambiguous vs. prescribed* qualities will help designing more meaningful experiences within their respective disciplines.

As an outcome, the main focus of the TXDM is to offer a lens that invites designers and researchers to be able to consider and design for the *interpretative role of an experiencer*.

In total, I organized 3 case studies, designed 4 holistic experiences (*The Remediation of Nosferatu, The Forces of Nature, The Roaring Hammock* and *Get Milk*) and designed a total of 25 *experience-fragments* and evaluated 115 holistic experiences and 359 *experience-fragments*. I found evidence that suggests working with *ambiguous vs. prescribed qualities* as a resource for design during conceptual design may result in more meaningful experiences. I highlighted advantages for an *ambiguous* quality, such as designing for own meaning making and intrinsic motivation as well as for *prescribed* qualities, such as a clear instruction and a faster interaction. Some of the disadvantages I found included that *ambiguous* qualities without any structure may end up leaving a participant confused (thus not fostering own meaning-making or intrinsic motivation) and that *prescribed* quality of experiences may end up feeling overly obvious or might be experienced as intimidating. This suggests that it is not only necessary to carefully consider the two contrasting interpretative qualities but that it is advisable to mix and match and merge and switch between the two qualities to provide the best experience.

Additionally, I see the need for an iterative design approach where the quality of *experience-fragments* can be easily adjusted, i.e. mix and match *ambiguous vs. prescribed* qualities in cycles until the holistic experience can be reiteratively shaped into one meaningful, holistic experience according to the circumstance of the person and the restrictions/freedoms of the activity set being designed for.

Based on the outcomes of this research, the evidence suggests a set of design recommendations for when to use *ambiguous and prescribed* qualities to achieve certain outcomes. The evidence advocates to design for *ambiguous* qualities when a designer wishes to slow down an experience and invite for own meaning making, critical thinking, contemplation, or if the designer wishes to invite for several interaction choices or would like to portray several perspectives or truths about a subject.

Conversely, the evidence suggests designing for a *prescribed* quality when the designer wishes to give clear instruction how to interact with a system, explain a topic or circumstance, speed up an experience or if the designer would like to portray one perspective or outline specific information about a subject.

In this research the focus has been on playful interactive systems as case studies. However, the qualities of *ambiguous vs. prescribed* experiences can just as usefully be applied to a wider range of interactive systems (such as leisure, learning, work place training/collaboration, public spaces) where ease of entry into a system is required.

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APPENDICES

Appendix A. Case Studies

In this appendix I will provide all publications in the order they appeared in the present research.

Ghellal, Sabiha; et.al., Transmedia Perspective. In: *Artur Lugmayr and Cinzia Dal Zotto (edts.) Media Convergence Handbook*. , Springer-Verlag, 2016, http://www.Springer. com/series/11520, 2016.

Ghellal, Sabiha; Morrison, Ann; Hassenzahl, Marc; Schaufler, Benjamin. The Remediation of Nosferatu: exploring transmedia experiences. In: *Proceedings of the 2014 conference on Designing interactive systems (DIS)*. ACM, 2014. S. 617-626.

Ghellal, Sabiha; Mussin, Nick; Morrison, Ann. The Roaring Hammock. *Mensch und Computer 2015–Proceedings*, 2015.

Ghellal, Sabiha. The Fuzzy Front End of Experience Design – Considering Ambiguous and Prescribed Qualities 2015 VVT Technology 209, ISSN-L 2242-1211 ISSN 2242-122X (Online)

Ghellal, Sabiha; Morrison Ann; Schneider Tobias. *Get Milk:* A Comparative Study Investigating Digitised Game Design Teaching Material. Submitted to Designing Interactive Systems (DIS 2017), June 10-14, 2017, Edinburgh UK

Transmedia Perspectives

Sabiha Ghellal [1], Annika Wiklund-Engblom [2], Damjan Obal [3] and Ann Morrison [4]

Abstract The term transmedia is often used to describe the seamless consumption of a variety of content that is part of the same product across multiple delivery channels. Media convergence, divergence and transmedia are closely related and describe an evolving paradigm of content consumption. In this chapter, we address the challenge to provide a clear distinction between transmedia, convergence and divergence as separate, but intertwined concepts. The multifaceted and interdisciplinary nature of the subject necessitates respecting various interpretations of transmedia storytelling. By collecting and grouping the various perspectives that shape the understanding and expectations of transmedia storytelling, we came up with a conceptual transmedia methodology that is based on both traditional storytelling frameworks such as 'fictional universes' and user experience design theories. This stands in contrast to the commercial interpretations of transmedia storytelling, which are often based on multimedia merchandising solutions rather than on rich evolving storylines that run across multiple platforms. The evolving methodology illustrates the complexities of transmedia design, including for example interdisciplinarity, genres, and emergent production models. We focus on user experience design early in the creative writing process, replacing former methods that added transmedia patterns as if an afterthought at the end of a production cycle.

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Introduction

Media convergence and transmedia are closely related by theory, methods and application. Media convergence (1979) was introduced by Nicholas Negroponte during a presentation to raise funds for the MIT Media Research Laboratory[5]. Negroponte predicted that the digitalisation of content would lead to major industrial changes, forcing broadcasting and motion picture, computer and print or publishing industries to move closer towards one common content distribution model. He further outlined this theory in his book 'Being Digital' in 1990. Roger Fidler (1997) also researched the issue of digitalization in his book Mediamorphosis, where he anticipated how the digitalization of content could influence value chains and how convergence may impact upon more traditional media producers and service providers.

The concept 'transmedia', as coined by Marsha Kinder in 1993, describes a reproduction process of TV or movie characters in video games and how this reproduction might intensify and accelerate in commercial '*transmedia supersystems'*. In 2004, Henry Jenkins further defined 'transmedia storytelling' as *"the consumption of different content that is part of the same storyworld on several devices"* (Jenkins, 2004). He conversely discussed how consumer behaviour might cause a less predictable user dynamic by highlighting that convergence occurs via the social interaction amongst the users. Jenkins further defined convergence as *"…the flow of content across multiple media platforms, the cooperation between multiple media industries, and the migratory behaviour of media audiences who will go almost anywhere in search of the kinds of entertainment experiences they want. … enables the same content to flow through many different channels and assume many different forms at the point of reception." (Jenkins, 2006).*

However, almost a decade after Henry Jenkins introduced his vision, storytellers and producers working with transmedia storytelling still struggle to live up to its full potential. Meanwhile, other interpretations of the term transmedia add confusion to this already complex emerging subject. Henry Jenkins himself has recently distinguished his vision from current transmedia branding 'buzz' by reminding us that transmedia content always expands rather than merely adopts existing stories (Jenkins, 2011).

While we have seen a number of independent transmedia storytelling productions and grassroot projects over the years we still have not seen a commercial transmedia storytelling project that is as successful as blockbuster movies. One possible reason might be that a commercial project that adheres strictly to Jenkins' vision would require very large corporate resources. The challenges within logistics, planning, scripting, marketing or distribution describes complex interdisciplinary issues.

5 MIT Media LAB (Media Research Laboratory) Massachusetts Institute of Technology. http://web.mit.edu/. Accessed 16 Dec 2012

In addition to the challenge of pinning down a new production model as it evolves comes the challenge of bringing together domains that have been firmly established as being separate but which now have to work together. Enabling processes, personnel and language to match up between game producers, film producers and book publishers involves having to change mind-sets, organizational structures as well as building new infrastructure for long established multimillion-dollar industries.

Transmedia content production requires scriptwriters, interaction designers and content producers to collaborate in order to come up with a complex storyworld that allows for interactive and non-interactive entertainment. This necessitates A-Shape skills (Leonard & Sensiper, 1998). The concept of A-shaped skills is a metaphor used in job recruitment to describe the abilities of a person. A-shaped individuals embody technological fusion; within the context of transmedia storytelling it describes individuals that merge creative writing and interaction design skills. The vision of 'growing up digital' (Tapscott, 2008) suggests that such talents might emerge over time. However, such talents or multi-talented teams do not fit within current production models. Current content financing and production models are limited to pre-produced content creation that might be distributed using cross-media channels but would not allow for emerging storyworlds. Consequently, transmedia storytellers struggle to find funding – and those few that do, struggle with the challenge of combining traditional and new media production methods which in turn requires addressing a complex issue forcing major changes to long established multimillion dollar industries. Bearing in mind that transmedia storytelling describes only one possible entertainment format it would be unrealistic to claim that those industries would have to change in order to cater for transmedia only. What necessitate a change are user behaviours such as for example, video on demand (Cheng et al., 2008) trends that have a major impact on broadcasting value chains similar to the changes that the digitalization of music brought to that industry.

For the purpose of designing a conceptual transmedia methodology we conducted 20 international interviews including early adopters, scientific researchers, broadcasters, production experts as well as traditional storytellers. Each interview lasted two hours and was focused on terminology in use, personal experiences as well as tools and techniques applied. During an international interdisciplinary one-day workshop we consolidated the findings from these interviews and discussed perspectives of transmedia storytelling. We found that the wide array and differing perspectives that transmedia can entail often causes confusion from scientific, investigative and economic perspectives.

In this chapter we introduce several perspectives of transmedia content consumption, discuss its challenges, influences, current trends and illustrate an early version of our conceptual transmedia methodology.

The Problem of Complexity

Transmedia storytelling does not only require interdisciplinary creative teams to collaborate closely and form collective intelligence; it is also based on complex cross-domain know-how that forms complicated and diverse frame-works that require a multitude of tools and techniques.

One example of such complexity can be found in the area of cognition (Sternberg & Sternberg, 2011). Cognitive mental processes might include, attention, memory, producing and understanding language, learning, reasoning, problem solving and/or decision making, to name a few. A central problem that needs to be addressed is that multitalented teams, including scriptwriters, game designer, graphic designers, or user experience designers, use different mental models. Their understanding of cognition is related to their genre's perspective of how people perceive their creative work.

In the area of script writing, where story is key, cognition is often referred to as 'narratology' (Prince, 1994) utilizing frameworks such as 'heroes journey' (Vogler, 1992). The 'heroes journey' claims that most stories can be boiled down to a series of narrative structures and character archetypes, which can be used to construct stories.

From an Interaction Design and User Interface perspective (Bolter & Gromala, 2005), cognition is discussed in terms of how well we understand and are able to manage an interface. Therefore concepts such as, 'cognitive load' (Paas et al., 2004), researching the overwhelming overload of multimedia data and 'cognitive friction' (Cooper, 2004)—focusing on the resistance encountered by human intellect when it engages with a complex system—are relevant within this field. Graphic designers work with a different perspective of cognition in applying rules of Gestalt psychology (Humphrey, 1924), in order to determine how we perceive visual designs. Experience design, on the other hand focuses on cognition in relation to our emotions and the motivational affordances offered by a system in how well it fulfils our motivational needs (Pritchard & Ashwood, 2008).

Orchestration

Orchestration describes another complexity issue within the production of transmedia storytelling. It describes the issue of arrangement, management and illustration of complex story structures. During a set of international interviews, transmedia storytellers reported difficulties in keeping an overview of their own complex transmedia structures. Transmedia stories feature not only the common linear story-paths but also offer cross-paths to side stories and additional multimedia content that have to be orchestrated into holistic user experiences. Keeping track of all the story and design elements within production teams is a time con-

suming and complex task. The main orchestration issues within transmedia storytelling are related to the multitude of media spaces and novel temporal aspects that have to be aligned to form rich transmedia experiences.

Media Disruption as 'Divergent Convergence'

Media disruption or discontinuity refers to a situation where a person seeking (or consuming) information is forced to change their mode of information processing or searching in order to comply with the media at hand. In divergence projects media disruption may play a major role and in order to deal with media disruption it has often been suggested to create seamless designs. In the context of transmedia this would refer to a situation where a person consuming information is disrupted and therefore no longer feels immersed in the story world. Media disruption should not necessarily be understood as an issue that arises when users switch media types since an interruption of an experience might be intentional within transmedia storytelling and might not necessarily result in breaking the illusion or 'flow' (Czikszentmihalyi & Nakamura, 2002). Switching media types is often introduced by designing for motivational affordance. For example, in the pervasive gaming project (Montola et al., 2009) 'Epidemic Menace' (Lindt et al., 2007) each media type featured a different role as part of a role-playing game. Here the user changed the mode of information processing if and when they felt the need to switch roles. Media disruption in the field of transmedia design could be defined as a phenomenon that needs to be integrated into the design of the storyworld in order to create one fictional world that provides a coherent experience in itself.

Storyworld or Fictional Universe

Fictional universe describes a self-consistent fictional setting that does not contain storylines or plots. Within a fictional universe all elements that form the universe such as theme, conflict, existence or genre are of equal importance (Jones, 1996). A cohesive fictional universe will consider all themes, but the trigger for an idea may of course vary in nature. A fictional universe is typically created prior to story writing and provides the frame for any type of story to occur. What distinguishes a fictional universe from simpler storytelling is the level of detail and internal consistency. Within linear storytelling frameworks, the story follows strictly along a line of engagement. In the case of TV series, such as 'The Sopranos'[6], it may also follow several storylines simultaneously, but each story line in itself is also based on a strict linear form of engagement. A fictional universe, on the other hand, has an established continuity and internal logic that must be adhered to throughout the work and even across separate works. Rather than adding interactive elements as an afterthought at the end of a production cycle, fictional universe

6 The Sopranos HBO 1999-2007 http://www.hbo.com/the-sopranos#/ Accessed 16 Dec 2012

based productions would allow considering user engagement from the outset of a production.

Convergence Trends as Opportunities for Transmedia Design

Above we suggested that convergence, divergence and transmedia describe separate intertwined theories. While convergence and divergence are used to describe both, a media distribution model and more general media consumption phenomena, transmedia describes one specific format of content consumption that inherits participatory elements. Television has drastically changed over the past 15 years due to the growth of digital modes of caption and transmission. Television content is no longer only delivered temporarily via networks, standardized broadcasting or cable/satellite solution providers. According to market researchers such as the 'Nielsen Company'[7], a growing number of households consume streamed rather than broadcasted content. It further suggests that many households no longer own TV-sets, but use their computer and high-resolution monitors as their main home entertainment device, consuming content as and when they want it.

Video on demand solutions impact current value chains, by excluding broadcasters and including network based content providers, such as for example, Netflix[8]. This trend may be relevant for transmedia storytelling by eradicating stipulated broadcasting times and allowing for evolving storyworlds. TV series content providers, such as for example HBO, have already adapted to the changing consumer behaviour. They now offer their content as video on demand solutions as well, and focus on more conceptualised content enabling multi-episode or even multi-season consumption. Here, the temporal aspect of content creation and consumption changes and provide new opportunities for stories to evolve across media types.

Divergence Trends as Opportunities for Transmedia Design

Due to the divergence of content, designers and business decision makers now face the task of figuring out how to deliver novel rich experiences across multiple screen sizes and devices, such as desktops, tablets, and smartphones. Responsive Web Design or RWD (Zhang & Urchurtu, 2011) offers automated device detection and optimized content displays by adopting CSS3 media queries[9]. Automated device detection in combination with environment and location detection could enable immersive responsive content selection. Responsive transmedia user expe-

7 The Nielsen Company. http://www.nielsen.com. Accessed 15 Aug 2013.

8 Netflix Inc. US Patent Nos. 6,584,450; 7,024,381; 7,631,323; 7,403,910; and 7,617,127. Accessed 15 Aug 2013.

9 CSS3 Media Queries. http://www.w3.org/TR/css3-mediaqueries/. Accessed 15 Aug 2013.

rience designs could enable users to consume content, when, how and where they want.

Literature State of the Art

Various interpretations of transmedia cause confusion and scepticism in the commercial and scientific world. Scepticism is very often related to a misunderstanding of the role of transmedia. In order to explore why and how these interpretations arose we have collected various perspectives aligned them to the understanding of convergence or divergence. Please note that since a list of all current and recent projects, as well as all interpretations of transmedia storytelling would be too extensive to describe here, we focused on the most common interpretations only and grouped them into commercial, current transmedia example and the learning perspectives.

Commercial Perspectives

Commercial examples of transmedia storytelling differ from grassroot projects or other smaller case studies. Mostly produced for mass consumption commercial transmedia projects face interdisciplinary issues we outlined previously.

Divergence: Alternate Reality Games (ARG) & TV

One of the first transmedia storytelling examples can be found in alternate reality games (Bjork & Holopainen, 2005). The rise of the Internet usage in 1990's enabled new forms of interactive content consumption and storytelling. Early examples of alternate reality games such as 'Dreadnot' published by Sfgate.com in 1996 [10], introduce transmedia experiences that would entail fictional characters that moved in the real, and fictional world, leaving traces on websites, fake phone calls or clues in source code. Today we see a rise of TV series that are linked to alternate reality games. Mostly focused around crime and conspiracy type genres, real time alternate reality game extensions are linked to air times of TV episodes such as e.g. the truth about Marika 'Sanningen om Marika'[11].

10 'Dreadnot' (1996) SFGate Productions www.SFGate.com. Accessed 13 Dec 2012

11 http://truthaboutmarika.wordpress.com/ Accessed 13 Dec 2012

Pre-Divergence: 360° Pre-Release Marketing Solution

For pre-release marketing solutions, cross-media content is produced and distributed over the course of time involving several media types as part of e.g. a guerrilla advertising campaign. Here the cross-media content is diverted in order to maximise profit. However, even though the movie might not be part of an evolving storyworld the experience prior to the movie might well be perceived as a transmedia experience. For instance, prior to the premiere of 'The Dark Knight' Entertainment [12] launched an alternate reality game to promote the movie. This pre-release marketing campaign contained all elements of a rich transmedia project: a compelling story, fan participation, games and clues, the use of digital technologies as well as live and digital events.

Post Divergence: Merchandising & Remediation

Cross-media merchandising solutions are also frequently described as 'transmedia campaigns'. Henry Jenkins referred to this development as 'the transmedia buzz' (Jenkins, 2011). Content is reproduced to create additional profit from blockbuster movies or popular TV series. Here, the same storyline is reproduced and additional functional or unseen footage might be added as an extension but seldom actually expands a story. Remediation, on the other hand, describes a process where not only elements of a movie but the entire storyline are repurposed for a game or vice versa. Examples of such an approach include 'Tomb Raider' or 'Star Wars' where the story and the character are remediated from TV into a game or vice versa as outlined by the theory of transmedia supersystems (Kinder, 1993).

Divergence: Multi- Screeners, Social TV

Other convergence trends are more related to changing consumer behaviour, such as e.g. multi-screeners (IAB Europe, 2010). Describing, simultaneous consumption of content on different devices, mostly using one device for broadcasting and the other device for participation, in associated communities. This trend seems to utilize the growing involvement of users in social networks. Often used for Social TV (Abreu & Almeida, 2009), this genre enables multi-screeners to experience live broadcasts as part of a holistic experience across different media types, which by definition could be classified as transmedia experiences. Here the user does not only consume broadcasted data but can actually actively manipulate the broadcasted content via interaction in social networks or Internet based services. However, although Social TV formats highlight the participatory nature of transmedia

12 42 Entertainment. http://42entertainment.com/. Accessed 13 Dec 2012.

content consumption, some transmedia evangelists criticize the quality of such experiences.

Convergence: Multipurpose Devices & Transmedia Novels

In 2006 the pervasive gaming (Montola et al., 2009) prototype 'The Epidemic Menace'(Lindt et al., 2007), part of the EU funded research project IPerG [13], combined a mobile, stationary, and augmented reality game into one storyworld that was introduced and interrupted by movie elements. The main purpose of the movie elements was to set the stage of the game world, ensure immersion into a fictional world, and afford switching game modes. At the time six different player devices and a multitude of backend devices were needed in order to enable the pervasive user experience. Soon after, mobile multimedia devices such as the iPhone entered the global market and we could witness a new convergence era. The implications for the game "the epidemic menace" would have been massive since all game elements (including the augmented reality game mode) could have been implemented on one single device.

This example illustrated how multipurpose devices (Murray, 2012) enable transmedia experiences by combining all functionalities associated with network computers; game consoles and conventionally delivered, episodic television, on one single platform. The shift from single purpose hardware to multipurpose hardware could not only enable immersive storyworlds on one single device but also allow the broadcasting, computing-, and publications industry to move even closer towards one common service platform.

One currently example that illustrates this perspective is the digitalization of books. The introduction of 'ePub' (Castro, 2010) technology enables transmedia experiences on eBooks by allowing for audio-visual experiences intertwined with more traditional reading experiences. Resent examples include 'Operation Ajax' [14] and 'Mirror World' [15] by Cornelia Funke. Both interactive books enable rich transmedia experiences on one single device.

Transmedia Cases

In addition to the highly commercial presentation of transmedia storytelling perspectives we outlined above, there are an increasing number of smaller more grassroot oriented transmedia productions. In order to portray their perspective of

13 IPerG, Integrated Project on Pervasive Gaming. http://iperg.sics.se/. Accessed 6 Jan 2013

14 Cognito Comics (2011) Operation Ajax. Accessed 6 August 2013

15 Funke, C & Mirade LLC (2013) ‚Mirror World'. Accessed 6August 2013

transmedia storytelling we asked two transmedia producers to provide us with a sneak preview of their latest projects. First, Christy Dena, a transmedia producer and expert, outlines her latest work 'AUTHENTIC IN ALL CAPS' [16]. Then the transmedia storyteller and producer Christian Fonnesbech, who has already launched several transmedia projects, such as 'TDC', 'The Galatheo Mystery' or 'The Climate Mystery', describes his latest work 'Cloud Chamber'[17].

AUTHENTIC IN ALL CAPS

'"AUTHENTIC IN ALL CAPS" is a web audio adventure created independently. Independent in this context means it is not funded by a client (brand, publisher, broadcaster, or agency). The ideas are not constrained by the needs of an external client. The project is created in iOS and will be distributed through iTunes. The design of the project form, the web audio adventure, is influenced by my work on large-scale global transmedia projects and my PhD research. The fragmented nature of transmedia projects is an obstacle to many players/audience members. While on the one hand there is an undeniable tendency of humans to engage in multiple "media" or "modes" or "touch-points", engagement with the same storyworld (especially in the same session) is not as common. So what we see a lot of creators do is take away the fragmentation, the divergence, and "converge" all the elements. If they're all available in the same time and place, then it is more approachable. But this takes away the divergent side of transmedia. I wanted to figure out a way you could have both convergence and divergence operating at the same time. One thing I had discovered from my PhD research was that convergence happens at the intangible level. Divergence at the tangible. Usually transmedia projects are joined conceptually, with a continuing storyworld that the player/audience member takes with them/imagines. The combining force is the storyworld abstracted in the mind as triggered by the "text". What I realised is that there is a "media" equivalent of the intangible. Audio. Audio can be the glue that combines fragmented elements in a manner that their distinctness is maintained. And so I created the idea of the web audio adventure. I draw on the design principles of audio tours of museums and apply them to the web. AUTHENTIC IN ALL CAPS is a playful story delivered through a whole lot of fictional websites that I create (divergence), navigated by the guided audio, a radio drama layer (convergence)'.

Cloud Chamber

'Cloud Chamber is an online mystery inspired by space and electronic music. Players collaborate on a single website to uncover the story of a young scientist who has risked her sanity and betrayed her father in order to save humanity from itself. In Cloud Chamber, electronic music is the key to opening the secrets of the universe. Cloud Chamber orchestrates 'found footage' across a variety of media. Players navigate and collaborate and interact in order to access media (film, video, text, diagrams, photographs etc.)– they are detectives discovering what actually happened. The experience can be

16 Authentic in all Caps (2013) http://www.christydena.com. Accessed 6 Jan 2013

17 Investigate North (2012) 'Cloud Chamber'. Accessed 6 Jan 2013

described as ‘a single site Altered Reality Game. ‘We think of it as fiction for the Facebook generation - part social network, part filmed mystery and part game. The tone mixes psychological thriller elements with supernatural horror and real space science to draw players into a dark mystery. As they explore the story, the mysteries of the human psyche and the heartless voids and immensities of outer space become one.’

Fig. 1 Cloud Chamber Investigate North (2012)

The Learning Perspective

When technological affordances change, it also changes how we interact with the world around us, as well as the way we learn and acquire knowledge. According to this theory, learning stems from the relation between the collective and the individual (Säljö & Linderoth, 2002), similarly to the notion of collective intelligence.

There is no doubt that transmedia solutions will allow for new ways of acting and interacting. Therefore, we find it of interest to further elaborate on a perspective of transmedia learning, as we see that transmedia storytelling can add to our understanding of the learning process in the context of educational technology and how it is affected by media convergence and divergence. Jenkins states in his definition of transmedia that “each franchise entry needs to be self-contained enough to enable autonomous consumption”. This echoes the notion of learning objects, which is often described as the smallest unit, which in itself can be seen as an entity, representing building blocks of content

We argue that humans are by default transmedia storybuilders based on our multichannel sensory system and multimodal brain. Our perceptual and sensory

systems are the source of our conscious experience (Fauconnier & Turner, 2002). Sight, hearing, touch, smell, and taste can metaphorically be seen as the tools of our bodies, which aid us in experiencing various perceptions from a variety of perspectives. Our cognitive and emotional brain translates these perceptions into experiences and learning is the process where knowledge is created through the transformation of experience (Kolb, 1984). Media tools function as extensions of our bodies and, hence, transmedia affordances can be described as extensions of our bodies and senses to assist this transformation of experiences into knowledge through learning.

In educational technology contexts, multimodal media platforms are often used for delivering information, as well as allowing for networking, collaboration, participation, and performance (Luckin et al., 2012). Multimodal stimulations allow for different perspectives and consequently optimize opportunities for learning (Sankey, Birch & Gardiner, 2010), and thus, allow for 'additive comprehension' of a subject (Jenkins, 2006). Transmedia learning involves utilizing a variety of media tools that complement each other as a blended and dynamic content method to facilitate learning (Jenkins, 2006; Teske & Horstman, 2012). The intention is to put the learner through a constructive act, not merely transmit content.

The transmedia storyworld allows us to learn about the content through various transmedia affordances, i.e. options of interconnected content and possibilities to engage and interact with the content. One such example of a transmedia learning experience is provided by 'Inanimate Alice'[18], originally created for entertainment, but later adopted in education for teaching both global citizenship and digital literacy skills. However, in this transmedia storytelling, the storyworld is predetermined. Another angle is when the story in itself is a creation of the learner, enabled by powerful multipurpose devices. An example of this is 'Talking Tools' (Johansson & Porko-Hudd, 2013), a smartphone application, supporting multimodal transmedia storybuilding through documentation and communication. The aim is to make the learning process in itself transparent and taking the form of a learning story flowing between converging media options.

From a participator perspective, transmedia seams determine how you are able to make choices of actions, which path you can take, which bricks of content you can build your own story with. Ultimately, how you can add your own voice of co-creation in the transmedia conversation. From the participator's view this becomes a transmedia storybuilding process, as you as a participator may create your own version of how to experience the story depending on choices of content and choices of interaction. In these ways, you become a co-producer of your own experience.

18 http://www.inanimatealice.com/index.html. Accessed 6 Jan 2013

Methodology & Approach

The goal of our conceptual transmedia storytelling methodology is first of all to enable storytellers to create better transmedia storyworlds - no matter which domain they draw upon, and no matter where they are in the complicated process of fusing media channels and/or media types. Secondly, our aim is to provide a visual tool to handle the involved complexity and to make narrative choices by displaying the storyworld and trajectories (Benford et al., 2009) using infographics that are easy to read and manipulate. Thirdly, we want to help establishing a common language, as well as a structural understanding of the complexity of transmedia designs.

Figure 1 illustrates a possible conceptual transmedia methodology, and displays how more traditional storytelling frameworks such as the fictional universe could be merged with user experience design aspects of a transmedia experience. Our goal is to combine multi-disciplinary perspectives into one common conceptual framework. By placing storytelling frameworks and user experience design frameworks on opposite sides of a transmedia storyworld, we wish to emphasise that storytellers will have to design for user experience if they wish to produce a transmedia story.

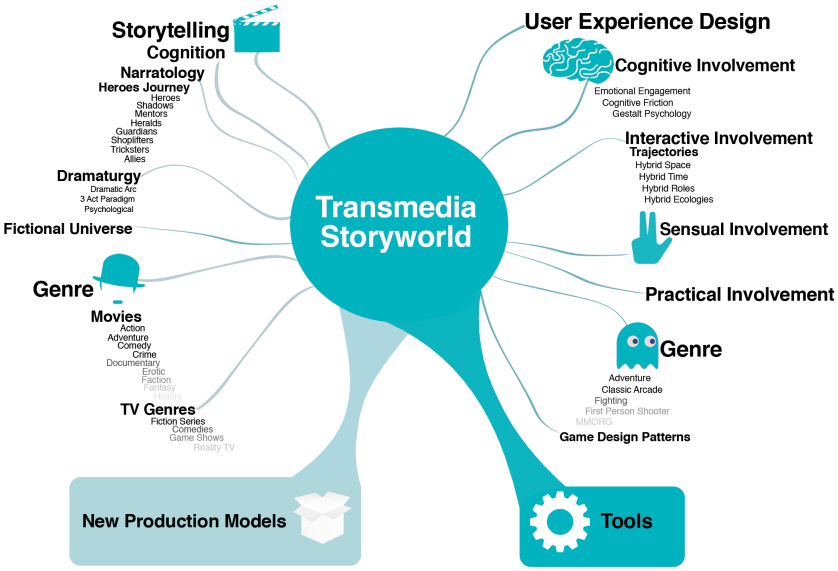

Fig. 2 Conceptual Transmedia Methodology

Storytelling Frameworks

Many transmedia storytellers stress the importance of building a transmedia world that is based on a fictional universe. Fictional universe describe self-consistent fictional settings that are typically created without specific storylines and provide the frame for any type of story to occur. In contrast, more traditional storytelling frameworks such as 'heroes journey' (Vogler, 1992), 'three act paradigm' (Fields, 1979) or 'dramatic arc' (Freytag, 1836), which focus on telling one story that follows strictly along one storyline. Our evolving methodological approach, Figure 1, readily allows for all storytelling frameworks. However, it stresses the necessity to consider user experience design theories such as cognitive, interactive and sensual involvement during creative writing in order to create a holistic and cohesive experience.

User Experience Design

For the purpose of drafting a conceptual methodology we started by focusing on the dimensions of a user experience encountered by the consumption of various media content. The goal of the transmedia storyteller could be to target specific user needs (Hassenzahl, 2010) in order to facilitate a great experience and user satisfaction. Experience can be regarded as 'meaning-making' (Dhaval et al., 2006). According to Vyas and van der Veer (2006) there are at least four important areas to consider in the design of technology and digital content, in order to facilitate a positive user experience: the experience in interaction as a dynamic process, experience as interpretation of how we actively construct meaning, the experience as what the designers offer and what the users bring to it, and finally, the four inseparable dimensions of experience, which are practical involvement, cognitive involvement, emotional involvement, and sensual involvement. We use these four dimensions of experiences as headlines and overarching structure for the HCI aspects of transmedia storytelling and assigned below more tangible design patterns or frameworks such as 'game design patterns' (Bjork & Holopainen, 2005) or 'interactional trajectories' (Benford et al., 2009). Please note that this evolving methodology only illustrates a high-level approach as this point in time. Applying game design pattern or interactional trajectories will require a more abstract form of storyworld building. In order to apply game design patterns or interactional trajectories it will be necessary to translate those into the various contexts of a specific fictional universe.

Interactional Trajectories

Benford et al. introduced the concept of 'interactional trajectories' (Benford et al., 2009). It describes a trajectory as a journey through a user experience that passes through the following hybrid structures as outlined below (Benford et al., 2009, p. 71):

> "Multiple physical and virtual spaces may be adjacent, connected and overlaid to create a **hybrid space** that provides the stage for the experience.
>
> **Hybrid time** combines story time; plot time, schedule time, interaction time and perceived time to shape the overall timing of events.
>
> **Hybrid roles** define how different individuals engage, including the public roles of participant and spectator (audience and bystander) and the professional roles of actor, operator and orchestrator.
>
> **Hybrid ecologies** assemble different interfaces in an environment to enable interaction and collaboration"

While the theory of 'meaning-making' (Dhaval et al., 2006) describes an overall approach of creating a user experience, the interactional trajectories framework could help creating transmedia user experiences on a more tangible level, such as defining orchestration tools that could enable transmedia storytellers to explore the overlaps of temporal and special aspects. In turn, this would enable transmedia teams to work collaboratively and assist in understanding both the interdisciplinary challenges and the consequences. Tools such as user journey simulations, an information visualization interface displaying narrative choices and media intersections based on user journeys, could enable designers to target user experience attributes pragmatically, by focusing on 'do-goals' and hedonistically by focusing on 'be-goals' (Hassenzahl, 2010). Do-goals describe utility-based functions such as casting a vote or searching for content while 'be-goals' focus on individual experience such as the subjective feeling of identification, being immersed, or feeling a sense of urgency.

Conclusion

In this chapter, we propose several transmedia perspectives, including commercial, non-commercial and learning perspectives, to expand and clarify the current terminology in use in the transmedia field and introduce a high-level conceptual transmedia storytelling methodology.

With regards to terminology, we argue that the term transmedia may provide a limiting view of future convergence centered content consumption. On the other hand, transmedia merely defines one specific entertainment format. In this case,

the term was never intended to, and should not be used to define a whole new era of convergence content consumption. We therefore propose that convergence, divergence and transmedia be understood and used as separate albeit intertwined situations.

From a transmedia storytelling perspective, we identify convergence as a part of the textual level, in line with Jenkins (2006) notion of "flow of content". Divergence, on the other hand, can be referred to as a fragmentation on the contextual level. Or as Christy Dena outlines in her case description for 'AUTHENTIC IN ALL CAPS', convergence has to do with the intangible and divergence the tangible part of a transmedia solution. In the area of transmedia, we define media disruption and discontinuities as a phenomenon that needs to be integrated into the design of the storyworld in order to create one fictional universe that provides a coherent experience. This could be framed as designing for 'divergent convergence' in the field of transmedia storytelling. Convergence thus allows for transmediation (Siegel, 1995) of the meaning making as well as motivation. The aim is, in other words, to design content that acknowledges, enables and addresses a diverging context. The objective of our transmedia storytelling methodology is to establish a framework for the dynamics of the contextual and content-based elements presented. As we are still establishing the ground work and are subject to an ongoing paradigm change, our proposed methodology readily allows for expansion.

From a psychological perspective, we conclude that we are all innate 'learning beings'. For transmedia designs this comes down to our 'additive comprehension' in relation to content despite diverging context. In a keynote at the AERO 2012 conference, Sir Ken Robinson stated there are two important factors that are characteristic of learners: diversity and creativity. These two characteristics are perhaps the major reason for the evolution of media convergence and divergence. We find this to be particularly relevant for transmedia storytelling, which discards linearity, provides several perspectives to a story, promotes a participatory culture, and often harnesses the added value of collective intelligence.

Janet Murray (2013) argues in a recent publication, 'Transcending Transmedia' that most users no longer separate the TV and web entertainment and she is therefore less convinced of the idea of transmedia productions. She foresees a new form of entertainment or genre that will arise based on an act of imagination rather than a business model that ensures a 360° exploitation of a storyworld. In this chapter, we propose a conceptual transmedia methodology that embraces the paradoxes and complexities of this particular field. We contribute this conceptual methodology to provide foundational work to assist understanding of this emerging participatory genre whatever its label may be.

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The Remediation of Nosferatu – Exploring Transmedia Experiences

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ABSTRACT
In this paper we present *The Remediation of Nosferatu*, a location based augmented reality horror adventure. Using the theory of fictional universe elements, we work with diverse material from Nosferatu's horror genre and vampire themes as a case study. In this interdisciplinary research we intertwine traditional storytelling and scriptwriting skills with interaction design methods. For the game setting, we create hybrid spaces merging the fictional universe and the physical environment into one pervasive experience, centering around a variety of augmented reality activities played out at sunset. Focusing on the phenomenological world of 21 participants, we analyse triangulated data by distinguishing between a range of more 'open' and 'closed' styles of interactions. Our study illustrates how Speculative Play may enable non-linear storytelling elements within a transmedia fictional universe. We believe our approach can be more generally useful for designing future rich, enjoyable and meaningful transmedia experiences.

Author Keywords
User Experience Design; Fictional Universe; Transmedia; Open & Closed Qualities of Experiences

ACM Classification Keywords
H.5.m. Information interfaces and presentation (e.g., HCI): Miscellaneous.

INTRODUCTION
While much research deals with processes or methods for generating meaningful experiences through technology in general, only a few studies address the quality of transmedia experiences. Transmedia [19, 20 and 21] is a particular form of entertainment, where a story is told and experienced through a distributed and fragmented interactive system. Transmedia design is an interdisciplinary endeavour, merging more traditional storytelling and scriptwriting with Human-Computer Interaction (HCI) and interaction design. In this paper we empirically investigate emerging experiences within a transmedia fictional universe—*The Remediation of Nosferatu*—styled as a location based augmented reality horror adventure. We used a phenomenological approach [26], focusing on the individuals' meaning-making [29]. We further link emerging experiences to the material configurations (i.e., the design), we provided. The goal of this paper is to deepen knowledge of how to design fulfilling, meaningful and engaging transmedia experiences.

We contribute with this paper an interdisciplinary design approach that merges the theories of Transmedia [19, 20 and 21], Fictional Universe, Trajectories [1, 10], Speculative Play [24] and Experience Design [9, 12, 32 and 16] by focusing on the quality of experiences.

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Transmedia, Fictional Universes, Experience, Trajectories, AND Play – the Theoretical Background
In 1999 Marsha Kinder [21] coined the term *Transmedia* to describe the trend to extend TV or movie characters and storyworlds to video games. Henry Jenkins further developed the term into *Transmedia Storytelling* [19], defined as *'a process where integral elements of a fiction get dispersed systematically across multiple delivery channels for the purpose of creating a unified and coordinated entertainment experience. Ideally, each medium makes it own unique contribution to the unfolding of the story.'* (See 'Transmedia 202' [20]) Accordingly, transmedia systems (i.e., the material configuration to tell these stories) pose the challenge to deliver a coherent, meaningful experience through several '*sub*'-experiences created by distributed and fragmented materials, such as location-based video messages [25], or game-like challenges [15]. The story becomes pivotal for creating the experience. However, the fragmented and interactive nature [9] of those systems limit the designer's/author's control of the story progression. The successful strategy employed to

address this issue, is to create a 'fictional universe' rather than a storyline. The Fictional Universe acts as a backdrop to emerging stories and as the glue that combines fragments into meaningful experiences, as they unfold through interaction [20].

The idea of a Fictional Universe is not new –it dates back as far as 1516 [23]. Fictional Universes makes use of several intertwined elements, namely genre, theme, setting, existence, concept and conflict [4] to create a rich backdrop. Genre (e.g. horror genre) defines the style of a fictional universe, setting its time and place, existence introduces characters and objects, theme represents the idea or subject of the world (e.g. vampire theme), and concept describes any key events that impact the world and lead to conflict. Within a fictional universe all elements are of equal importance and a designer/author may use any element as her starting point.

What distinguishes a fictional universe approach from linear storytelling is the level of detail and internal consistency. Linear storytelling frameworks have been popular since Aristotle; examples include Hero's Journey [30] or the Dramatic Arc [11] and follow one line of engagement. A fictional universe on the other hand has a multifaceted established continuity (that may enable several interwoven storylines) and internal logic that must be adhered to. The most popular example of a fictional universe, Tolkien's The Lord of the Rings [28], illustrates how complex and far-reaching this can be. Tolkien created first the language of the fictional universe, 'Elvish' and then the fictional world itself, what he describes as '*primarily linguistic in inspiration and was begun in order to provide the necessary history for the Elvish tongues'* [27].

We focused on a fictional universe as a basis for our transmedia experience because its elements (genre, theme, setting etc.) enable a logical follow through when designing interactive roles for rich, meaningful transmedia experiences.

Transmedia spans an array of technologies and heavily draws upon interactive systems, which pulls HCI and Interaction Design related theories of experience into focus. For *The Remediation of Nosferatu*, we built upon the notion of experience-oriented or Experience Design [9, 12, 32 and 16] during transmedia fictional universe creation. Specifically, we followed Hassenzahl's [17, p73] notion that *'…experiences are emergent, and in Experience Design, we use functionality, content, presentation and interaction as materials to create and shape experiences.'* (see also [18] for a more process-oriented description of *Experience Design*). Further, we especially focus on *how* people connect with the material and its appropriateness for the chosen fictional universe. Since *Nosferatu* draws upon the horror genre, a genre that often uses surprise or speculation for creating suspense, we further borrowed from Speculative Play [24]. In Speculative Play...'*participants actively figure out how something works—both the conceptual and the technological aspects of the work—with testing and debating various theories; often done in collaboration with others/strangers. Speculative Play can occur through verbal, embodied, associative and/ or cooperative play…'* [24, p. 8].

In order to enable Speculative Play for *The Remediation of Nosferatu* we cut the original movie into fragments. Then we scouted for locations that would resemble locations in the original movie material. It was important to find suitable locations and to ensure these locations were proximate enough to safeguard the dramaturgy logic, which may have called for sequences of *sub-experiences* in a certain order. Applying elements of Freytag's Dramatic Arc [11], i.e. exposition, rising action, climax, falling action, and dénouement, we located each sub-experience. By repurposing the Dramatic Arc into an emergent location-based dramaturgy centering around a climax area we allowed for several Interactional Trajectories. Interactional Trajectories [1, 10] describe journeys through an experience that passes through Hybrid Structures. Such Hybrid Structures may include '*hybrid spaces, hybrid times, hybrid roles and hybrid ecologies'* [1, p 719]. Speculative play allowed participants to find their own trajectories and in so doing, to construct their own narrative. For designing the *sub-experiences* we applied the theory of Hybrid Spaces [1, 10] to merge the virtual content (i.e. the movie fragments) with a suitable frame within the real environment. We needed to find exact frames that would blur the borders of real and virtual spaces borrowing from pervasive game design [22]. We wanted to instill a feeling of horror and surprise, as if the participant would physically enter into a potentially dangerous situation, as is often the case in the horror genre.

In this paper we detail the design challenges we encountered and the strategies we used to design this transmedia location-based augmented reality horror adventure. We outline *The Remediation of Nosferatu* by illustrating the phenomenological world of one participant to offer insight into how we designed and orchestrated the overall experiences and the involved *sub-experiences*. Finally we outline the results of our thematic analysis and conclude by discussing the role of Speculative Play as well as the suitability of open and closed experiences within a transmedia fictional universe.

THE REMEDIATION OF NOSFERATU

Based on the general notion of experience shaped through the material, trajectories as journeys through hybrid spaces created through interactive technologies, and the specifics of Speculative Play, we created *The Remediation of Nosferatu*, a location-based augmented reality horror adventure (see figure 1). It is a 'remediation' of *Nosferatu*, a German expressionist horror movie from 1922 by F.W Murnau, featuring Max Schreck as the vampire Count Orlok. Following a court ruling, only one illegal copy of this unauthorized adaptation of Bram Stoker's Dracula

Figure 1. The Remediation of Nosferatu a Location Based Augmented Reality Horror Adventure

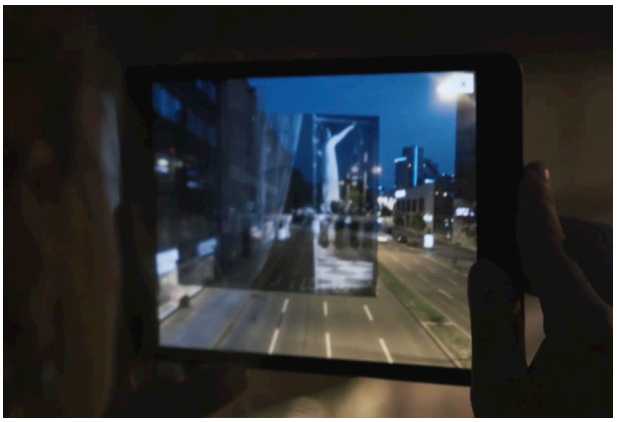

Figure 2. Bridge, an Open Sub-Experience

survived. Upon rediscovery the movie became regarded as one of the most influential cinematic example of its times. We chose *Nosferatu* as our transmedia content because it is based on a fictional universe that entails many myths and side stories and because its expressionistic quality allows for ambiguity [12] and Speculative Play [24].

Over all, we designed and evaluated 12 single, location-based *sub-experiences*. For designing the *sub-experiences* we cut the original movie into fragments, found suitable locations that resembled the locations in the movie, designed hybrid spaces [1] and arranged them in proximity to these locations. Participants were free to choose their starting point and the order of events (i.e., their trajectory [1]). The overall experience lasted approximately 40 minutes. It ran on a 7.9-inch display tablet, using a customized version of the augmented reality App Zeitfenster [33].

An Illustrative Experience

To provide an in-depth impression of *The Remediation of Nosferatu*, we present a particular experience taken from the empirical exploration of the system. 'Sam', our example player, was 26 years old, a passionate cineaste, employed as an architect, who like to play casual games. We met Sam at an urban park. Sam started *The Remediation of Nosferatu* on the tablet provided. He was prompted with a black and white map informing him about mysterious deaths in ancient 'Stuttgardia', He was further told that all spots highlighted on the map could be visited in any given order. However, he can only learn more at the exact location and at a particular view. His goal was to find out what happened in ancient 'Stuttgardia'. Upon reaching the first spot, a bridge over a busy street, (Figure 2), Sam heard music and was prompted to find a certain position and angle illustrated by a particular 'frame' on the tablet. The moment the frame and his actual camera-position matched, a semi-transparent video was played back that visually merged with the physical environment. The video showed a woman balancing on the balustrade of the bridge. To 'Sam' the scenery felt like a hint from the past, the woman being an unsettled ghost asking him for help. Sam then entered the park. Music started to play, and Sam hurried to find the next spot. It was hidden under a tree and featured a carnivorous plant. Sam began to speculate whether a new type of plant may have poisoned the citizens of ancient 'Stuttgardia' and rushed to the next location. It featured a group of university professors at the gate of a university building. The professors were reading reports about incoming ships, speculating if 'the plaque' may have caused the deaths. Sam was slightly annoyed by this since it did not fit the story he already started to construct. Driven by curiosity, Sam entered an old graveyard that has been converted into a park. The sun had already set, it was getting dark, and Sam hesitated: '*Do I really need to go there?*' He walked across various very old, partly disintegrated graves. To him the old abandoned graveyard looked like a location of a horror movie and he remembered the 'ghost' he saw earlier. He found a certain gravestone. Count Orlok aka Nosferatu entered the scene by rising from the grave (Figure 3) and Sam was told that he has 60 seconds to find a cross on a specific grave to stop the vampire from attacking him.

After a brief state of shock, Sam started to laugh. He now realized that the vampire has caused the deaths in ancient 'Stuttgardia' and remembered that he had 'seen' Count Orlok earlier, lurking under a bridge he passed. Sam started running across the graveyard to find the requested cross, where he met Nosferatu again one last time before Nosferatu dissolved into ether (Figure 4).

Designing The Remediation of Nosferatu

We aimed for an overall experience of curiosity, tension and 'black-humour' horror. Table 1 summarizes the design rationale, linking elements of the fictional universe with content, design choices (and specific theoretical constructs). For *The Remediation of Nosferatu*, the fictional universe elements setting, genre and theme played a key role. The horror genre affords speculation and surprise. The vampire theme offers a rich mythical structure, rules, side stories and characters, such as the vampire hunter 'Van Helsing'.

Figure 3. Nosferatu Rises and Attacks.

Figure 4. Nosferatu Dissolves into Ether

The settings were chosen to 'physically' place participants in a fictional universe by matching publicly and physically available objects (e.g., gravestones) or locations (e.g., an old bridge) to the fictional universe. By that, we created hybrid spaces (see [1]) combining virtual and physical environments to merge the fictional universe and the environment into one experience [22]. In addition, temporal aspects became important. Within the vampire genre, day and night standardly play significant roles for certain kinds of activities and we subsequently placed our experience around sunset.

A good part of the interaction with *The Remediation of Nosferatu* was based on the idea of 'Speculative Play' [24] where participants are free to access various spots on a map in any sequence. Speculative Play was encouraged by inviting participants to actively figure out how the system worked, choose their order of *sub-experiences* and speculate over their resulting and emergent narrative. Here, Speculative Play may enable non-linear storytelling and ownership of the generated, emergent experience by allowing the participant to not only apply their own meaning making [29] but also to construct their own stories based on the order of *sub-experiences* they choose. Once they had reached a designed sub-experience, participants had to find the exact location of the content and match a frame in order to merge the real with the virtual content. We witnessed a number of different methods to solve this. Some participants, for example, covered the camera to see

Fictional Universe Element	Original Content	Interaction Design Choices
Genre	Expressionist Horror Genre	Create a feeling of tension, curiosity and 'Black-Humoured' horror
Theme	Vampire Theme	
Setting	18the Century Germany	Using public physical objects that match setting and existence to create a pervasive experience [22] though hybrid spaces [1].
Existence	Turn of century architecture, park, graveyard, grave stones and crosses	
Concept	Mysterious deaths in ancient Germany	Motivate curiosity and afford Speculative Play [24] to resolve conflict
Conflict	Killer on the lose	

Table 1. RON Experience Design Choices

the content without the real world. Other participants stretched, ran, even got down on their knees or hid in certain contexts. Speculation on events that lead to the climax of the story was one of the main effects we wanted to afford with Speculative Play. We aimed to determine if harnessing the power of Speculative Play as part of constructing a story will ensure participant engagement, or if it may disrupt or break their already constructed narrative. However, in order to advance a story (i.e., to provide some drama and closure to the experience), we positioned the single *sub-experiences* (i.e., locations) in a circle around the 'climax area' (the graveyard), see figure 5 where we gave some clear instructions how to interact.

The circular positioning of the sub-experience was organized based on the idea of the Dramatic Arc [11]. The exposition phase positioned at the outer circle was designed to get to know the characters, speculating over events etc. The rising action area was designed for a feeling of urgency. The conflict finally peaked at the climax area, positioned at the center of the circle (the graveyard) where the participant became more important for the story and had to interfere. We placed the content in a real environment so that participants had to physically locate *sub-experiences* in order to advance in the story. However at the same time we wanted participants to find a natural end of the holistic experience at the climax area (i.e. the graveyard). For the non-linear storytelling approach it was necessary to carefully pick a suitable location and match the existing video material with the natural frames available within that location. Speculative Play allowed participants to take various paths. For the alternative walks it was necessary to

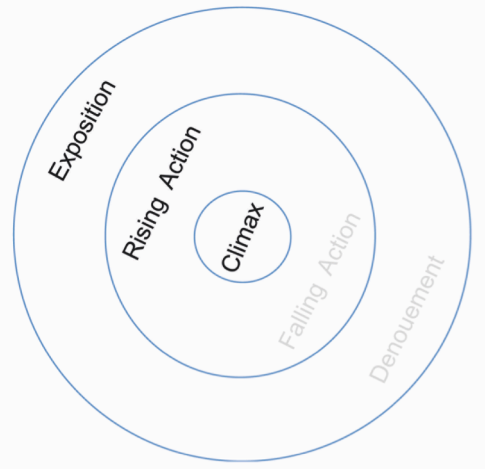

Figure 5. Non-Linear Storytelling based on Locations

test all possible paths for narrative logic and flow [5] in order to ensue a rich and meaningful holistic experience.

EMPIRICIAL STUDY

Approach

Since we were primarily interested in how our designed experience unfolds and maintains for the experiencer, we took a phenomenological approach [26], focusing on participants' lived experiences.

We ran 21 explorations with volunteer participants (8 female, the average age was 30 (Min=18, Max=62). We provided a time limit of 40 minutes. On average the participants tested the prototype for 33 minutes. We designed and evaluated 12 *sub-experiences* (locations). The participants were free to choose the order of *sub-experiences* and the duration of stay.

To better understand how emerging experiences correspond to design elements, we applied a variety of data collection methods. In retrospective interviews, we probed the lived experience of participants, supported by prompts such as '*How would you describe today's overall experience in your own words?'* or '*How immersed did you feel in this particular sub-experience?*' To understand each individual usage, such as order of *sub-experiences* (i.e., the trajectory taken), we tracked the movements of each participant using a GPS tracking software. We further filmed and observed experience from a distance in order to note points of interest, emergent themes or exploratory comments. Additionally, we captured each experience using screen capture software on the device used by the participants (see figure 3 and 4).

Data Analysis

We followed the thematic analysis approach to analyze our data, making multiple passes through each data source to categorize observed design issues and effects on participants [6]. After transcribing all interviews we generated an initial code by researching where and how patterns occurred. Here our main area of interest was meaning making and the phenomenological world of the participants during the overall experience and within each sub-experience. For the purpose of combining codes we mapped existing participant knowledge, using HCI methods such as *experience materials* [17]. Including presentation, content, interaction and functionality that may be related to a participant's phenomenology. After combining codes into over-arching themes that accurately depicted the data, we collected, grouped and added additional research data in a multimedia table (containing video, sound, text and GPS data). Each participant's account was approached individually to maintain an idiographic focus. We constantly compared the patterns emerging from and across these resources to ensure validity of our study through triangulation [31]. For example if a particular player described the overall experience as fragmental or bizarre we looked at the GPS tracking data to look at the order of events the participant took, as well as at the video reports and the post experience survey. We framed our analysis in order to uncover strategies to improve designed experiences. In a further step, we combined the major findings from each participant to summarize the most common findings.

Results

Table 2 illustrates the experience trajectories taken by the 21 participants. Participant 1, for example, started with sub-experience A continued his personal trajectory with location C, D, E and finally visited the climax locations M and N. In addition Table 2 illustrates if the quality of the holistic experiences, and each *sub-experiences* by itself, was perceived as open or closed

Many topics emerged during analysis of our data. The needs perspective [17] for example revealed the overall need for more stimulation with material. Here, 14 out of 21 participants wanted to engage more with the material. For example, IT Student (P 21) suggested *'...I started to think of opportunities to add sensor based objects within the environment maybe because I study imbedded technologies at the moment… e.g. the carnivorous plant seemed to invite for more physical interaction… I don't know… I wanted to search and pluck it and see if I can use it later on…'* Here we found evidence for the theory of own meaning making [29] or relatedness [17]. However we wanted to explore how meaningful or pleasurable the experiences were for the participants. Here the most potent theme emerging from the analysis was a difference between 'open' and 'closed' [8] experiences because it helped us to further understand the differences in perceived quality and subsequently how to design meaningful transmedia experiences in future.

Participants used two contrasting ways to describe the quality of the different *sub-experiences*: (1) more abstract and open type of experiences (highlighted in yellow in Table 2, and (2) more closed or prescribed type of experiences (highlighted in blue in Table 2).

Participant	Profession & Age	Duration	Experience Trajectories												Holistic Experience	Haptic Needs
			A	B	C	D	E	F	G	H	I	J	M	N		
1	Concert Event Manager (42)	28	1		2	3	4						5	6		
2	Graphic Designer (27)	34		1			3			2	4	5		6		*
3	Retired Researcher (62)	44		2				1	3	4		5	7	6		
4	Copywriter in a Marketing Agency (33)	30		4			2	1	3	5		6	8	9		*
5	Lawyer (44)	29	1		2	3	4				5	6	7	8		*
6	Student- UXD (27)	39		1		2	3		4	6	5		7	8		*
7	Student- Media Management (24)	47	7	2		6	5	1		3	4		8	9		*
8	Social Worker (30)	26	1	2			3				4		5	6		
9	Cinematographer (23)	28						1		2		3	4	5		*
10	Student –Sport (31)	34		2			3	1		5	4	5		6		*
11	Media Agency Admin (39)	32	1		2	3					4		5	6		
12	Architect (26)	35						1	2	3	4	5	6	7		*
13	Game Designer (25)	25	1		2	3					4		5	6		*
14	Concept Designer (28)	27	1		3	2			4			5	6	7		
15	Student- Cinematographer (33)	44	6	2	7	8	5	1		3	4		9	10		*
16	Key Account Manager (24)	27	1		2	3					4	5	6	7		
17	Student IT (22)	30		2	3			2			4	5	6	7		*
18	Student Mobile Media (22)	29	1		2	3					4	5	7	6		*
19	Musician (32)	39		4			2	1	3	5		6	7	8		
20	Pupil (18)	33	1		3			2		4				7		*
21	Student- IT (22)	28			2	3		1				4	6	7		*

Table 2. Participants Experience Trajectories

Annotations:

Quality of Experience: Closed / Open

* Expressed need for more haptic interactions

Open qualities of experiences were described as *a distant dream* or *a greeting from the past*, and in some cases as *unrelated, confusing* or *bizarre*; while closed qualities of experience were described as *clear, instructive* or *obvious* and in some cases as *boring, forced,* or *too obvious*. Two participants voiced a preference for either more open or closed styles of quality. Participant 5 summarized '… *the video that was placed at the window of the university with the professors speculating over the cause of the deaths was the best fit… that felt very real to me… I didn't know what to make of the woman on the bridge that seemed unrelated…*'

Interestingly, we found that while participants may described the quality of the overall experience as open, participants individual encounter of each sub-experience may have differed from the overall quality. This is also supported by the fact that 19 out of 21 participants described the experience as fragmental.

Sub-Experience A and M were almost unanimously described as closed type of experiences. Here everything necessary to understand was explained. Sub-experience A revolved around the loving relationship of a couple and M was part of the climax, where Nosferatu attacks the player. A was perceived as explanatory and left little room for speculation. M called for a clear action, i.e., finding a specific cross in time to destroy Nosferatu. All participants understood and accepted the sub-experience as if factual, even if it did not fit into the world they constructed earlier.

In contrast, F and N were almost unanimously perceived as open. F featured a woman balancing on a balustrade and N was part of the climax and showed how Nosferatu dissolved after the participant found the right cross. Here the story is not fully explained and works with relations, hints and association that may lead to more diverse interpretations. Open experiences differ, because they lack explanation and clear instructions e.g. having to find out what the involved action should be or working with symbols, metaphors or association. We found various interpretations of the content such as *... the video's hovered like a distant memory before me …'…visually beautiful it looked like a distant dream or a greeting from the past…', '…the graphics were great. The semi-transparent design was very mythical and a little odd. It made me very curious…' '…watching the video felt like a message from the past, an unsettled ghost asking me for help…'*

Speculation (Speculative Play) allowed the participants to choose the order of events and in some cases (P10, P18 and P20) this lead to an experience that lacked or altered the climactic ending. In the case of participant 18, a female student, she experienced Nosferatu dissolving into ether before he rose from the grave, leaving her with an open ending that was much appreciated by the student. *'In the end I see how the vampire rises from the grave, that felt like a cliff-hanger to me, I liked the idea of that there is more to it and that in the end I didn't manage to resolve the case'*. In the case of participant 20 where the rise of Nosferatu was skipped the overall experience seemed spoiled. '*…when I came into the graveyard I was expecting things to happen… but then nothing exiting happened…that was disappointing.*'

Additionally, triangulation of data revealed that if all materials that shape an experience [17], presentation, content, interaction and functionality, were perceived as open, such as in *sub-experience* F and N, the experience was more likely to be perceived as 'bizarre' (P 4), 'strange' (P 7) or 'unclear' (P 19). On the other hand, for others, if all materials were perceived as closed, such as in *sub-experience* A and M, the experience was perceived as 'wrong' (P 8), 'unsuitable' (P 13) or 'overly obvious' (P 15). Table 3 illustrates open and closed themes collected and assigned during data analysis.

	Open	**Closed**
Positive context	'Surprising' 'Spontaneous' 'Ethical' 'Mysterious'	*'Clear'* *'Instructed'* *'Obvious'*
Negative context	*'Unrelated'* *'Bizarre'* *'Strange'* *'Unclear'* *'Without a purpose'*	*'Wrong'* *'Unsuitable'* *'Forced'* *'Unspontaneous'* *'Overly obvious'*

Table 3: Participants Adjectives

However we also found that construing one's own experience as open or closed depended on the participants themselves. Some *sub-experiences* were perceived as open or closed by a majority of participants such as sub-experience A, F, N and M. Whereas for other experiences (e.g., H), open or closed qualities seemed to be more dependent on the particular participant. P3, for example, described all *sub-experiences* as open while P5 described most *sub-experiences* as closed. While P3 appreciated the freedom of interpretation of a specific abstract experience *'... starting with seeing the woman on the balustrade was a great start… very magical and ethereal… I felt as if she wanted to contact me…'* P5 described the same experience, within the same context of use, as unrelated and out of context. *'... and then all of the sudden without an explanation this woman appeared on the balustrade, what was this about?... Strange…I didn't get it…'.*

As part of the retrospective interview we asked participants to summarise their experiences and participant 21 explained in his retrospective interview *'... I generally don't enjoy explorer type of games. When I play a game I like clear instructions and clear goals. I found the overall experience confusing and somewhat boring… I might not be the right person to ask here since I don't enjoy explorer games in general.'* Here participant 21 explained to us that he did

not enjoy the genre of the game and raised the point of player type suitability.

Participant 3 in contrast enjoyed the open quality of the experience and explained in his retrospective interview *'... I would describe last weeks experience like a journey. One knows where and when to go but is not sure what it will feel like...On my journey I encountered various adventures and two experiences stuck to my mind. I was thinking of the woman on the balustrade and how beautiful the transparent movie was. I also thought about the experience at the university and how typical it was for university professors to sit there, talk and argue while disaster strikes.'*

Summary of Findings

All participants found the overall experience to be a holistic one, with most (67%) wanting more haptic styles of experiences (e.g. touching material such as grave stones, crosses or searching and collecting materials such as carnivorous plants). Overall we evaluated 145 *sub-experiences* out of which 41 (28%) were described as closed, 66 (45%) as open and 38 (26%) could not be assigned to open or closed qualities. Most found *sub-experiences* A (91%) and M (94%) to be more closed. A was understood as an explanatory introduction to the fictional universe and M gave some clear instructions to follow. In contrast all participants described the *sub-experiences* F and N as open. Here the participants used abstract terminology to describe the sub-experience (such as 'a distant memory', or 'mythical'), or disliked the experience because of its open quality (using adjectives such as 'unrelated', 'unclear' or 'bizarre) and were more likely to assign own meanings to the content. On average the open type of experience were described as positive by 44%, and as negative by 23% and 33% of the participants used neutral terms to describe the open type of experiences. Here we found that if all materials that shape an experience (content, presentation, interaction and functionality) were perceived as open or closed the particular sub-experience was more likely to be perceived as negative. In summary we found that 74% of the participants described the quality of each sub-experience, as either open or closed and only 26% of the participants reflections could not be assigned to open or closed type of experiences. This suggests that being more aware of open or closed experiences as a potential qualitative dimension seems helpful to improve the design of experiential systems.

DISCUSSION

Enabling-encouraging Speculative Play to allow participants to construct their own stories, their own trajectories, within a transmedia fictional universe raised two interesting issues. First, in our case the content, that is the movie Nosferatu, had to allow for fragmentation. Such fragmentation seems to call for novel script writing that looks at a fictional universe as a sandbox where a story may emerge rather then thinking in linear storylines. Second, non-linear storytelling bears some obvious risks one has to consider, narration may break if the order of events are not suitable or the participant may end in a dead end of the universe if speculation proved incorrect. Here a careful orchestration of *sub-experiences* is necessary in order to ensure flow and dramaturgy.

Many HCI methods and techniques discuss experience design. While some assume that an experience can and should be designed and then narrated through interaction with the designed artefact(s) [e.g., 18] others stress the need for ambiguity. Gaver [12, 13 and 14] for example stresses ambiguity as a resource to build one's own narratives and meaning: '*Ambiguity… can be an important factor in crafting interactive design that are engaging and thought-provoking ... ambiguity frees user to react to designs with scepticism or belief, appropriating systems into their own lives though their interpretation ... '* [12, p.240]. Here, experience is understood as an act of appropriation made possible by artefacts, but not designed in and of itself. However in later work Gaver also described the need for balancing *prescriptive* and *emergent* design orientations [14]. One example of a more prescriptive approach, understands experience designers foremost as authors of experience: *'Only after having outlined the desired emotional and cognitive content of an experience, the action involved, its context and temporal structure, (she) may start designing the 'product.' And then, each and every detail (content, functionality, presentation, interaction) has to be scrutinized according to its potential to create or destroy the desired experience…'* [18, p. 68]. In this view, experiences are deliberately designed and inscribed into artefacts as an act of design. The designer seeks to gain control over the participants experience and appropriation [29]. In practice, we used the more ambiguous design approach to add mystery and speculation at the beginning of the experience and the more prescribed design approach to ensure flow and purpose as the experience unfolded additionally we designed each sub experience focusing on the materials that shape an experience [17]. As designers we assumed a role parallel to authors in the context of texts and deploying narratives (e.g., [8]). We work here with two (of the many) different distinguishing schools of thought: authors, who aim for closed experiences, control over meaning, and guide their readers to a single interpretation versus authors, who aim for open and/or ambiguous experiences, multiple interpretations, and emphasize the active and constructive efforts of the readers themselves. Interestingly, we found evidence for both approaches in our phenomenological study. Some *sub-experiences* were experienced as closed, others as quite open. We noted the value of each type of experience is not unequivocal. While open experiences can inspire, they can also confuse, rendering the overall experience potentially meaningless. Closed experiences, while instructive and useful to advance understanding, can at times be uninteresting or too obvious. Gaver [14] also discusses how systems that had prescribed qualities are fundamental to how they are experienced (the

specificity for a location, the limitation of interaction opportunities, balancing 'drifting' and 'controlling' qualities, etc.) along with a general appreciation that human beings are agents. As such all experiences might be open to degrees of interpretation [8 and 14]. Once the work is out in the world and in the hands of the participants, participants are obviously at liberty to find their own meaning(s) [8].

DESIGN REFLECTIONS

In addition to the empirical data presented we would like to provide an insight into our involved design choices. We used a number of HCI and storytelling approaches to theoretically guide our design efforts. Our base theory for designing the transmedia experience was the idea of a fictional universe and before we focused on the interaction design we assigned the Nosferatu specific information to each element, see table 3 column two. Then we browsed for interaction design choices for each element and found that several interaction design choices would have been possible to integrate the interactive role of the participant within the physical fictional setting we aimed for. We could have picked e.g. a search and destroy game design pattern [2] giving van Helsing a more prominent role within the fictional setting adding an adventure type shooting game to the existing fictional universe. However we wanted to create something less obvious that would suit the horror genre. Many horror movies use surprise and suspense to create tension and that was the underlying experience we wanted to induce. To us it was important to invite for speculation [24] and make the participant curious so s/he could physically enter into a potentially dangerous situation, as is often the case in horror movies. Finally we used the theory of materials that shape an experience to design each sub-experience to fit into the designed transmedia fictional universe setting. Approaching content, presentation, interaction and functionality separately allowed us to, for example, design a closed type of sub-experience, such as having to find a cross within a certain time-frame, within what would otherwise have been a larger more explorative and open type of experience.

In our case study, open or ambiguous meanings appeared most suitable when the aim of the experience was to build and deepen the fictional universe. Musings, reflections and contemplation, require time and thus, slow-paced, less structured interaction. In *The Remediation of Nosferatu* this was the most suitable at the beginning, in the exposition phase, when participants probe the potential meaning and purpose of the experience. Closed experiences in contrast seemed most appropriate to provide logic, explain interactions and focus on a specific task. In our case, the closed experience at the end on the graveyard helped us to increase suspense, to instil a certain urgency requiring a speedier style of interaction, and added closure to the experience.

CONCLUSION

We presented *The Remediation of Nosferatu* a transmedia story and an empirical exploration of experiences emerging through play. Interestingly, we found people contrasted the more open to the more closed experiences to describe the quality of their individual encounters. This revealed a resemblance to the theory of open and closed work by Umberto Eco [8], using open and closed *sub-experiences* as a qualitative dimension when designing overall transmedia experiences and improving the design of experiential systems. For *The Remediation Nosferatu,* the system at hand, open *sub-experiences* were suitable for adding mystery or designing for a distant feeling of immersion, especially at the beginning (exposition) of the experience. Closed *sub-experiences,* in contrast, suggest a more guided approach perhaps seeking more control over the participants experience by suggesting particular paths to follow. In our case study closed *sub-experiences* seemed more suitable to advance the story and especially to design climax.

In summary, we present two contributions in this paper. First our interdisciplinary design approach contributes to future holistic transmedia design by illustrating how Speculative Play may enable non-linear storytelling elements in a transmedia fictional universe. Second, we find designing for more open and closed qualities of transmedia design beneficial and suggest this approach could prove useful more generally for designing future rich, enjoyable and meaningful transmedia experiences.

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We thank participants for the valuable insight into their phenomenological worlds. We acknowledge support from the European Union Seventh Framework Programme (FP7/2007-2013) under grant agreement n601139 (CultAR). This work was supported by REMEX, a Stuttgart Media University research group.

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The Roaring Hammock

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Abstract

The Roaring Hammock is an experimental transmedia installation aimed at exploring holistic experiences through an interactive artefact and its surroundings. This interactive hammock uses microcontrollers, sensors, audio and visual feedback to create an interactive holistic experience. Participants can playfully influence the hammock by rocking or swinging and become part of the installation. With *the Roaring Hammock* we investigate speculation by inviting participants to actively explore (through their own embodied actions) to find out how the hammock works without instruction.

1 Introduction

Sensor and microcontroller technologies allow for novel more embedded holistic experiences. For *the Roaring Hammock* (figure 1) we informed our design by combining the HCI theories of Experience Design (Gaver et al. 2003, Forlizzi et al. 2004 & Hassenzahl et al. 2013), Speculative Play (Morrison et al. 2011) and Performativity (Jacucci et al. 2009) with microcontroller and sensor based technologies in order to allow for novel embedded experiences. With *the Roaring Hammock*, we extend the physicality of rocking in a hammock with interactive content presentation using ambiguity (Gaver et al. 2003). Within the HCI community ambiguity is described as a resource to build one's own narratives and meaning (Vyas et al. 2006). Here, experience is understood as an act of appropriation made possible by artefacts, in our case the interactive hammock. Since we wanted to instil a feeling of investigation and speculation while playing with the hammock we further borrowed from the theory of Speculative Play (Morrison et al. 2011) where participants are invited to actively figure out how the hammock works with a deliberate lack of instruction. For *the Roaring Hammock* we built upon the notion of experience-oriented or Experience Design (Gaver et al. 2003, Forlizzi et al. 2004 & Hassenzahl et al. 2013) by focusing on the individual hedonic qualities when experiencing this audio-visual installation. The goal of this installation is to investigate and deepen knowledge on how to design fulfilling, meaningful and engaging embedded experiences.

2 The Roaring Hammock

The Roaring Hammock (figure 1) is reminiscent of the "Roaring Twenties". It uses sensors, audio and visual feedback to create an interactive holistic experience while lying in a hammock. Participants can playfully influence the hammock by rocking or swinging. For the participant the interactive challenge with this work is to move the hammock in a rhythm that will play the music at a pleasing speed. The participant becomes part of the installation via their interactive performativity (Jacucci et al. 2009), that is, s/he can directly influence the musical experience by "dancing" in the hammock. Our goal was to create a worthwhile experience that embodies swing music and dancing as a new form of engagement with material. The defining visual metaphor of *the Roaring Hammock* is a gramophone, see figure 1. The hammock starts playing twenties swing music when participants "fall into" the hammock and begin swinging. Their movement propels a vinyl disc that is projected on a canvas above the hammock. As the participants start swinging, the vinyl disc starts turning on the canvas and music begins to play. The more and the stronger participants swing, the faster the vinyl disc spins and the faster and higher-pitched the music gets. This behaviour is analogous to a real vinyl disc player, where the rotation rate determines playback speed and tone pitch. A scale and a slider provide feedback on the canvas, indicate current playback speed and support this visualisation. The gramophone metaphor illustrates the connection between the function, interaction, visual presentation and the musical content and speed for a coherent and comprehensible composition during play.

Figure 1: The Roaring Hammock

3 Installation Set-Up

The basic setup (figure 2) consists of a commonly available net hammock, equipped with sensors to enable participant interaction with the installation, as well as loudspeakers embroidered into the hammock to render the audio content. As a projection area for the

visualisation we place a fabric canvas above the hammock. For facilitating reading and processing of sensor data, we install an open source microcontroller platform. To obtain motion data, we place a small breakout board on one end of the hammock containing both an accelerometer to measure acceleration and a gyroscope to measure orientation. The software controlling the hammock installation is spread across two computers and the microcontroller. A desktop computer is used to render the visualisation projected on the canvas along with the music and soundscape installation. A second microcontroller is used to receive the sensor data from a microcontroller.

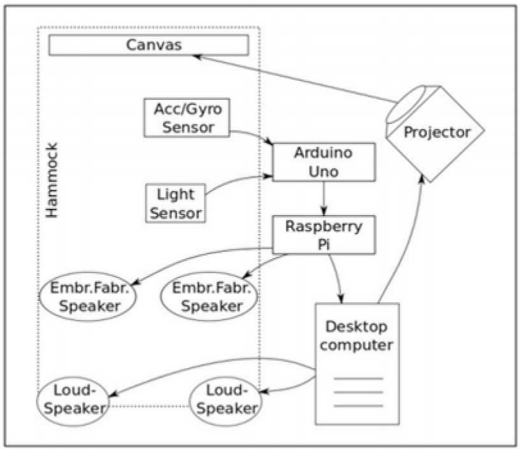

Figure 2: Installation Set-Up

4 Experience Design

For designing *the Roaring Hammock* we employed the game design theory of a magic circle. Zimmerman et al. (2003) explains that playing a game means to enter into a magic circle. In our installation "falling" into the hammock should feel like entering such a magical world that is based on a holistic all-encompassing interactive experience. This holistic experience shapes swing music into an interactive audio-visual endeavour and allows the participant to become part of an installation through actively 'performing' while lying in the hammock. However, in order to design for such a holistic experience we found it helpful to separate materials that shape an experience into functionality, content, presentation and interaction (Hassenzahl 2010). We identified the presentation as the visual feedback on the canvas above the hammock; see figure 1. The content was designed using visuals inspired by the "Roaring Twenties" featuring swing music and a gramophone with a "beat per minute feedback"- widget, see figure 1. The functionality, lying in the hammock or rocking the hammock, was used to direct the interactive experience of influencing the audio-visual content based on movement of the participant using sensor data.

5 Conclusion

Sensor and microcontroller technologies allow for novel experiences that extend artefacts into technology driven experiences and bear the potential of redefining the utility of everyday materials such as a commonly available hammock. With the installation *the Roaring Hammock* we invite visitors to experience a novel audio-visual installation by playfully interacting with our hammock. How participants move in the hammock defines the type of experience they have. We invite participants to explore this through their own initiative and embodied activities.

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The Fuzzy Front End of Experience Design – Considering Ambiguous and Prescribed Qualities

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Abstract
Little literature exists that deals with the quality of experiences, yet it is an important factor for determining what experience to aim for as an experience designer. In this paper I present *The Remediation of Nosferatu*, a location-based augmented reality horror adventure presented at Dis2014. Focusing on the phenomenological world of 21 participants, we analyse triangulated data by distinguishing between a range of more 'ambiguous' and 'prescribed' qualities of experiences. This case study contributes an example of how considering ambiguous and prescribed qualities of experience materials can improve design understandings when aiming to invent and implement fulfilling, meaningful and engaging experiences.

Author Keywords
Ambiguous, Prescribed Experiences, Installation, Speculative Play, Transmedia, Fictional Universe

ACM Classification Keywords
H.5.m. Information interfaces and presentation

Position paper in workshop "The Fuzzy Front End of Experience Design", organized in conjunction with NordiCHI'14, Oct 26-30 2014, Helsinki, Finland.

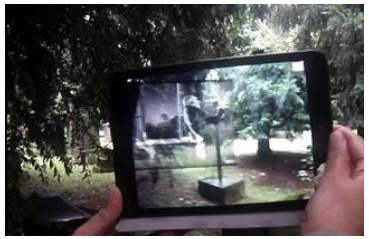

Figure 1. *The Remediation of Nosferatu*

Figure 2. *Nosferatu Rises and Attacks*

Figure 3. *Nosferatu Dissolves into Ether*

Introduction

While much research deals with processes or methods for generating meaningful experiences through technology in general [4],[7], [19] and [10], only few studies address the quality of experiences. With *The Remediation of Nosferatu* [10], an experimental location-based augmented reality horror adventure, we were primarily interested in how designed experiences unfold and are maintained for the experiencer. We applied a phenomenological approach [17], focusing on participants' lived experiences. We further linked emerging experiences to the material configurations (i.e. the design) we provided [3]. The goal of our research is to deepen knowledge of how to design fulfilling, meaningful and engaging experiences. This paper presents an interdisciplinary design approach that merges the theories of Transmedia [14] and [15], Fictional Universe, Interaction Trajectories [1] and [5], Speculative Play [16] and Experience Design by focusing on the quality of experiences [2]. While the theory of Transmedia Storytelling was used to create content, Speculative Play [16] and Interactional Trajectories [1] helped us to design the interactive elements of the fictional universe. Focusing on the phenomenological world [17] of 21 participants, we analyse triangulated data by distinguishing between a range of more ambiguous [7] and prescribed [13] meanings of interactions. Within the HCI community, ambiguity is described as a resource to build one's own narratives and meaning [7]. Here, experience is understood as an act of appropriation made possible by artefacts, but not designed in and of itself. One example of a more prescribed approach [13] regards experience designers foremost as authors of experience. In this view, experiences are deliberately designed and inscribed into artefacts as an act of design. However, while prescribed or ambiguous qualities within an interactive system may prove fundamental for how a system is experienced or played, we also acknowledge the need to appreciate the agency of the human beings interacting within a system, as such; all experiences might be ambiguous to degrees of interpretation, [8] and [9].

The Remediation of Nosferatu

With *The Remediation of Nosferatu [10]*, see video (http://vimeo.com/99461471) and figure 1, we introduce a location-based augmented reality horror adventure. Using the theory of fictional universe elements, we work with diverse material from Nosferatu's horror genre and vampire themes as a case study. In this interdisciplinary research we intertwined traditional storytelling and scriptwriting skills with interaction design methods. For the game setting, we created hybrid spaces [1] merging the fictional universe and the physical environment into one pervasive experience, centering around a variety of augmented reality activities played out at sunset. Focusing on the phenomenological world of 21 participants, we analysed triangulated data by distinguishing between a range of more ambiguous and prescribed styles of interactions. Overall, we designed and evaluated 12 single, location-based *sub-experiences*. Each featuring a unique hybrid [1] sub-experience e.g. Nosferatu rising from a physical gravestone (figure 2) or Nosferatu dissolving into ether after a player attack, figure 3. Speculative play [16] allowed each participant to shape their own holistic experience by choosing not only the sequence of the sub-experiences made available on an in-game map (figure 4) but also which sub-experience to visit and which to omit. For the design of the *sub-experiences* we cut the original movie into fragments, found suitable

Figure 4. In-Game Map

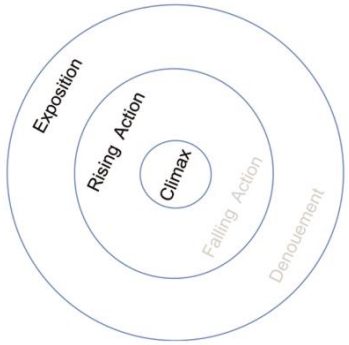

Figure 5. Circular Composition of Sub-Experiences

locations that resembled the locations in the movie, designed hybrid spaces [1] and arranged them in proximity to these locations using a circular adaptation of the dramatic arc [6], see figure 5. Speculative Play [16] encouraged participants to speculate over their resulting and emergent narrative enabling non-linear storytelling and ownership of the generated, emergent experience by allowing the participant to not only apply their own meaning making [18] but also to construct their own stories based on the order of *sub-experiences* they choose on the in-game map (figure 4). Once they had reached a designed sub-experience, participants had to find the exact location of the content and match a frame in order to merge the real with the virtual content. The overall experience lasted approximately 40 minutes. It ran on a 7.9-inch display tablet, using a semi-transparent augmented reality prototype. We aimed for an overall experience of curiosity, tension and 'black-humour' horror.

Design Reflections

Many topics emerged during analysis of our data. The needs perspective [10], for example, revealed the overall need for more stimulation with material. Here, 14 out of 21 participants wanted to engage more with the material. However, the most potent theme emerging from our phenomenological analysis was a difference between ambiguous [7] and more prescribed [13] meanings of experiences. As part of the retrospective interview participant 21 explained *'... starting with seeing the woman on the balustrade was a great start… very magical and ethereal… I felt as if she wanted to contact me…'* while Participant 3 explained: *'… the video that was placed at the window of the university with the professors speculating over the cause of deaths was the best fit… that felt very real and logical to me… I didn't know what to make of the woman on the bridge that seemed unrelated…'*.

In summary we found that 74% of the participants described the quality of each sub-experience, as either ambiguous or prescribed and only 26% of the participants reflections could not be assigned to ambiguous or prescribed type of experiences. We also found that while some sub-experiences where perceived as ambiguous or prescribed by most participants, e.g. the experience of the woman balancing on the balustrade was described by 93% of the participants as ambiguous (some liked the experience due to its ambiguous qualities and some disliked it because of it), other sub-experiences were more subject to personal interpretation. Furthermore, we found that if all materials that shape an experience [12] (i.e. content, presentation, interaction and functionality) were perceived as ambiguous or prescribed, the particular sub-experience was more likely to be perceived as negative due to its overly ambiguous or prescribed quality. This suggests that being more aware of ambiguous or prescribed experiences as a potential qualitative dimension seems helpful to improve the design of experiential systems.

For the *Remediation of Nosferatu* ambiguous meanings appeared most suitable when the aim of the experience was to build and deepen the fictional universe. Musings, reflections and contemplation require time and thus, slow-paced, less structured interaction. This was the most suitable at the beginning, in the exposition phase, when participants probe the potential meaning and purpose of the experience. Prescribed experiences in contrast seemed most appropriate to provide logic, explain interactions and focus on a specific task. In our

case, prescribed experiences helped to increase suspense, instil a certain urgency requiring a speedier style of interaction.

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Get Milk: A Comparative Study Investigating Digitised Game Design Teaching Material

(Under review for DIS2017),

ABSTRACT

We present findings from an experiment with 51 postgraduate students playing *Get Milk*, a touch-optimized, responsive, web-based learning game. We ran a comparative trial using two forms of teaching materials. The first was *digitised* and interactively displayed context-aware game design theory for players (merging established game interaction paradigms into an educational context). The second (the control group) used a paper version of the same theory for the same game. Analyses of videos, logged data, interviews, questionnaires and user-created content revealed phenomena unique to those students working with the *digitised* material. We report how the interactive *digitised* form improves understanding of game design theory, activated access to theoretical knowledge more effectively and assisted students to apply the theories to their own design thinking. We contribute *digitised* game-based teaching material that opens up opportunities for synthesis and critical thinking and teaches game design theory dynamically.

Author Keywords

Game-based learning, Dynamically Displayed Game Design Theory, Digitised, Interactive Multimodal Learning Environments, Multimodal Meaning Making Game Design Theory, Experience Design, Role of a Learner,

ACM Classification Keywords

H.5.m. Information interfaces and presentation (e.g., HCI)

INTRODUCTION

Teaching game design describes a complex interdisciplinary field that requires students to merge technological, conceptual, graphic and interactive design skills [28]. While interactive multimodal learning environments [22] introduce design principles that focus on presentation and interaction choices, such as guided activity or pacing of learning experiences; multimodal meaning making [20] refers to the processes and the outcomes of semiotic production during interaction. We designed *Get Milk,* a touch-optimized, responsive, web-based game to increase multimodal meaning making [20]. Our aim was to ensure students experience game design theory while actually playing a game. For this purpose we merged text-based game design theories [29] with custom-designed, interactive, *digitised* game mechanics [17] in order to display game design theory dynamically to the students while playing the game *Get Milk*. We then compared results to a control group sample who used a paper based approach, working from a book where the same game design theory was highlighted with post-its while playing the same *Get Milk* game. All students worked with in-class distributed iOS 8 tablets so the only difference in experience was derived from the format *(digitised* or *paper-based*) of the teaching materials.

The main educational goal was to enable postgraduate students to learn game design theories while actually playing a game and allow students to control and navigate their own learning experience and allow for synthesis [3], multimodal meaning-making [20] and afford critical game design analysis [35]. Little research exists that addresses the challenges when attempting to teach game design in a university context. However, for Zagal & Bruckman [35] there are three main challenges: (1) An extensive prior videogame experience often interferes with students' abilities to reason critically and analytically about games, (2) students have difficulties articulating their experiences and observations, (3) students must be skilled at games in order to fully experience them. In addition, students frequently criticise provided game design theory, such as Schell's game design lenses [29], as too abstract, hard to grasp and/or difficult to apply. With this study we challenged and supported the hypotheses that it would be possible to overcome these three aforesaid game analysis challenges if we embed game design theory in an imperfect game. By linking the game design theory to a specific problem and then requiring students to suggest game design improvements we anticipated an improvement in students' ability to critically assess the game, and therefore foster meaning making [20].

In 'Why Design Education Must Change' [24], Norman illustrates how design related education historically mainly focused on form and function, where today's issues are far more complex. Norman outlines how convergence of technologies requires aspiring designers to apply social and behavioural sciences, which require an understanding of

human cognition and emotion, in addition to the more traditional approaches. Although there have been a number of qualitative analyses of the use of mobile devices (such as tablets) in education [31], little research addresses design that deliberately empowers the students learning process as active, goal-driven participants in shaping their own learning experiences [21] within a learning game. *Get Milk* encourages critical and deeper thinking by making the game design theory perspective available (and acting as a learning perspective) while the students are playing the game and in this way builds up a set of novel digital learning spaces as an integral part of the game and learning experience.

In the following sections, we examine research in related fields and then detail the design considerations for *Get Milk*, a touch-optimized, responsive, web-based site-crawler game. For the purpose of conducting a comparative study, and in order to use identical content, we designed and implemented two separate teaching material versions of *Get Milk*. One version featured the *digitised* form, where theory is displayed dynamically within the game (played by Group A), introducing a novel learning space. The other version features exactly the same game play but without the *digitised* game design theory. Instead, the students received a printed copy of the featured game design theory (played by Group B). In the remainder of this paper we will refer to the two instructional formats as *'digitised'* and '*paper-based'*. We describe the experiment we set up to evaluate the effectiveness of our *'digitised'* game based learning [6] approach, where we compared the impact of both approaches. Using a grounded theory to data analysis [14], we applied a three-staged method. First we used *open coding* [8] to collect data across resources (including: observation results,, assignment results, survey result' and interview results). Then, using *axial coding* [8], we related data across resources and finally we applied *selective coding* [8] to look more specifically for evidence that support the effectivity of the *digitised* approach. After examining the implications of our findings, we discuss and conclude that the *digitised* version of Get Milk helped students to better understand and apply the provided game design theory because it was made available as and when the game experience actually happened. With this, we successfully addressed some of the challenges educators face when attempting to teach game design in a university environment including complications arising from prior knowledge, difficulty in articulating experience and required skill set as outlined by Zagal & Bruckman [35]. We believe this is the first study that successfully compares *digitised* to traditional learning materials for learning game design. We have used established game paradigms in an educational context and worked with the method games themselves provide, as the means to not only interact with game design theory but also to deliver the teaching material (in the *digitised* form).

RELATED WORK

In the field of learning games, we find many examples [6,7,10,21,27,33], that highlight the benefits of game based learning. Learning games use elements of video and computer games to create engaging and immersive learning experiences [10,33]. For Oblinger [25], games potentially provide powerful learning environments because contemporary students have grown up with computer games and constant exposure to the internet. According to Oblinger, digital media can then shape how students receive information and learn. However, in this study we focus on how interactive multimodal learning environments [22] may improve applying game design theory successfully and explore how teaching materials that provide more immersive learning experiences can improve understanding of game design theory.

For the purposes of teaching game design theory, a number of basic game design concepts were introduced to the students in a classroom environment. For example, in the introductory lectures different game design definitions [28,29] as well as the theory of flow [9] and rules of play [28] had been introduced for the purpose of provoking discussion on what constitutes a game. Before the students were prompted with the learning game *Get Milk*, the lecturer introduced the MDA framework [17], a formal approach to understanding games that describe mechanics, dynamics and aesthetics as interrelated components of a game. MDA describes 1) *Mechanics*, as particular components at the level of data representation and algorithms of a game; 2) *Dynamics,* as the run-time behaviour of the mechanics acting on player inputs over time and 3) *Aesthetics,* as the desired emotional responses evoked in the player when interacting with a game system. Individual game mechanics can be understood as *experience-fragments* that combine to shape a holistic experience, which is defined by Hunicke et al. [17] as the dynamic that provides purpose and direction for a player. However the main theoretical framework that informs the design and development of the learning game *Get Milk* is Schell's concept of game design lenses [29]. For Schell, good game design occurs when a game is viewed from as many perspectives as possible. To this end, in 2008 Schell published a set of more than one hundred questions as 'lenses' for a game designer to consider while designing a game. In addition, and prior to this, Bjork & Holopainen [2] had introduced the idea of abstract patterns in game design, providing designers with a collection of practical design choices. These choices, called patterns, are used to illustrate the varying types of gameplay found in games and are related to the idea of game design lenses.

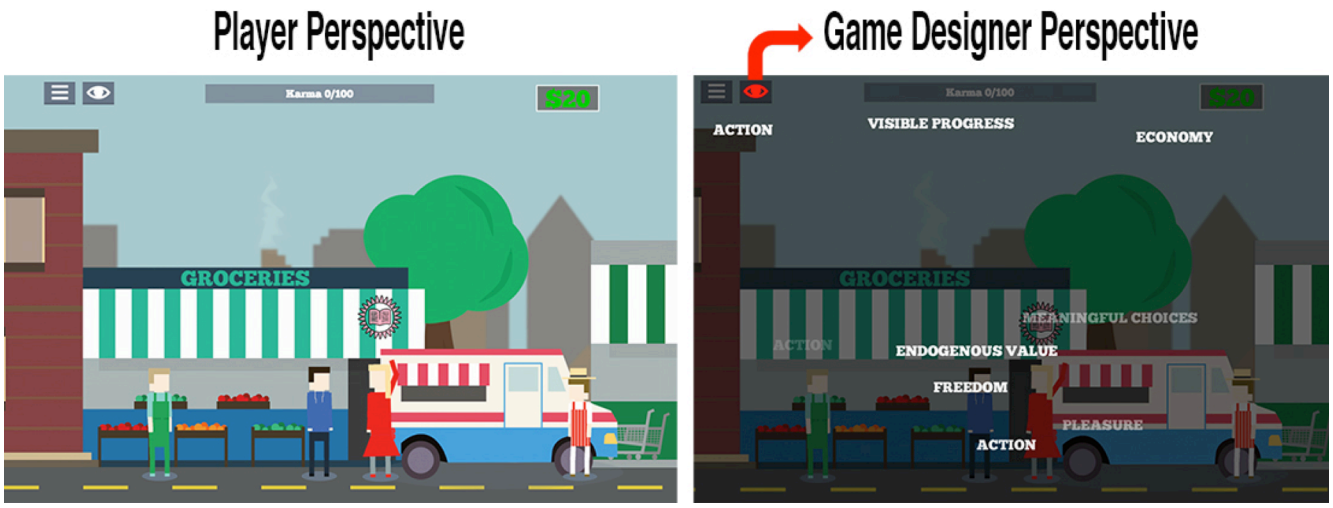

Figure 1. Left. The Game Player Perspective. Right. The Game Designer Perspective

In line with Witton's [34] suggestion that games appropriate for higher education encourage suitable learning outcomes, the main aim of the game-based learning case study for *Get Milk* is to promote critical thinking [26], evaluation and synthesis [3] by taking on the supplied multiple perspectives when perceiving, designing, critiquing, discussing and playing a game working with Schell's game design lenses [29].

DESIGNING GET MILK

Teaching game design theory using a more traditional textbook approach bears a number of challenges. We found students often find it hard to translate game design theory such as game design lenses [29] or patterns [2] into game design choices during the design process. Students often refer to game design lenses or game design patterns as too abstract to be helpful during a design process. Alexander et al., [1], on the other hand argue that design patterns in general need to be abstract in order to allow for individual interpretation of the best praxis approach during specific design challenges. The designers of *Get Milk* could see both sides of the problem: the need for more generic abstract guides, so the theories can be applied to multiple cases [1,2,29] and the difficulty for undergraduate students when attempting to apply more abstract game design theory such as for examples Schell's game design lenses [29]. As a response to this tie, we, the *Get Milk* designers investigated ways of providing examples that could help understanding abstract game design patterns while playing a game. In the past we played games or fragments of a game during seminars and then discussed game design theories based on those examples. However, playing commercial games as part of a seminar structure in a university context poses administrational and organizational challenges. With *Get Milk* we designed a game only for the purpose of providing playable examples for a number of the following selected game design lenses [29] 'meaningful choice, pleasure, action, challenge, visible progress, puzzle, problem solving, endogenous value, economy, freedom, and obstacles'. Our approach differs from other game based learning because we embedded the *digitised* game design teaching material within the format of the game (using the same interaction paradigm a game provides as the means to interact and also to deliver the teaching material) and then compared it to the more traditional paper based approach. Applying a top-down design approach, we started our design process by defining the holistic experience we wanted students to have, one that would stimulate student players to critically assess a game using easy-to-access and logically assigned game design theory. In particular, we focused on designing for the human needs [30] of competence and stimulation [15] by implementing free play [23]. By hiding the game designer view behind an 'perspective menu item' illustrating a human eye, see Figure one, top left, we wanted to make students curious to find out more about the underlying game design theory and designed to provoke a more intrinsically motivated investigation [11]. Here, our design goal was to enable students to make decisions on their own initiative, offering them autonomy in their role as player and designer. Subsequently, the students are free to choose when and if to access the game designer perspective or even whether to play the game at all, allowing for choices not only within the game but also as part of their individual learning experience. After defining the holistic experience, we carefully selected the educational content and designed its presentation, the overall interaction design with the system, and all necessary functionalities.

Game Play

We designed two versions of *Get Milk*. Both versions featured the same game dynamic with the same set of tasks including asking the player to buy milk. The one difference was that the *digitised* version had the teaching material interactively embedded into the game. During this quest, many adventures/obstacles happen to the player while walking down a street in this touch-optimized, responsive,

web-based site-crawler game, (see Figure 1 Left). For the purpose of promoting critical thinking [26], *Get Milk* was deliberately designed as an imperfect example with many flaws, leaving room for multiple game design improvements. For example, there is a missing overall game dynamic and a weak storyline; there are also more obvious mistakes, such as missing feedback in one of the introduced challenges. For the *digitised* version of Get Milk, at the moment the player (i.e., the aspiring game designer) experiences certain game elements (Figure 1, Left), s/he can access a game designer perspective (Figure 1, Right) displaying relevant portions of game design theory (and pertinent design/action choices) that are crucial for the specific moment within the game. An explicit connection is made between game experiences and relevant understanding. The goal is to enable students to think and act as a game design critic, fostering their own meaning making [32] and inviting them to reflect on implemented game experiences by invoking game design theory while playing the game. This should improve students' understanding and successful application of game design theory, specifically Schell's [29] 'game design lenses'. Here, the lenses are displayed dynamically (see Figure 2). For example, a student can activate the lens 'visible progress' at the moment visible progress is experienced in the game, which prompts students to ask key questions, such as 'What does it mean to make progress in my game?' This encourages students to critically assess their own current experience in terms of known and applied game design theories. In this way, the more abstract theory of game design lenses embeds itself into their personal active experiences. As the player progresses through the game, the game design lenses appear on screen and hover close to the area where they have been applied. However, the lenses are not directly assigned to specific interaction areas, instead they are placed in proximity for the purpose of presenting the abstract nature of design patterns [1,2] and encourage personal meaning making [32]. Through this and by applying the theory of free play [23] students could choose whether to continue playing as a player or to explore the underlying game design lens by clicking on a game-design view icon, as seen in Figure 2 and 'playing' as a designer. The game design lenses represent the same info/text as offered in the book describing game design patterns, however, the proximity to implemented design choices invites immediate interpretation/activation of the design lenses within the individual context of play. These additions invite students to critically ask how the presented lenses have been applied in the game, whether they are suitable, whether they match game aesthetics [17] and how the game could be improved using the provided game design theory. At the end of the game the learner is prompted with a game report (Figure 3) that summarises the in-game-behaviour as a gamer but also as a learner for the purpose of encouraging self-reflection. The design intention was to ensure that learners would access as many game design lenses as possible and providing the learner with a clear overview of how many lenses he/she activated. As part of student assignments, we introduced and featured the following game design lenses [29] meaningful choice, pleasure, action, challenge, visible progress, puzzle, problem solving, endogenous value, economy, freedom, and obstacles. For each lens, we designed specific game experiences to allow for critical reflection on that experience.

A control group, set up for the purpose of a comparative study played exactly the same game but without the interactive *digitised* material. Instead students used *paper-based* learning material, i.e., copies from the actual book from Schell that feature the same game design lenses highlighted with post-its. The only difference between the two groups is that Group A accessed the *digitised* game design theory dynamically, i.e. made available by accessing a button on the touch screen using a tablet, while Group B had to access the same game design theory on a printed copy, this meant leaving the game putting down the tablet and picking up the printed copies of the game design patterns to work with the teaching material.

Embedding *Get Milk* in an Educational Context

The study was embedded within an elective game design

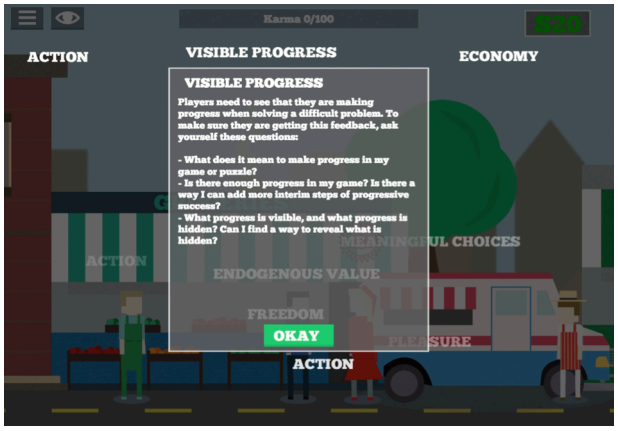

Figure 2. Group A could choose whether to continue playing or to explore the underlying game design lens by clicking on a game-design view icon and select a topic.

Figure 3. The learner is prompted with a end of the game report summarizing the in game behavior as a gamer and as a learner for the purpose of encouraging self-reflection.

seminar lasting one semester. The seminar was based on 15 weekly sessions of two hours in addition to three longer workshops with a duration of four hours each. The learning outcome requirements for the entire seminar was to understand and successfully apply game design theory in their own practical work [13] by designing a high fidelity game prototype using a player-centred design approach [5] and a free game engine and outline and justify game design choices in a game design report. *Get Milk* was introduced early in the seminar for the purpose of understanding game design theory.

In order to prevent ethical issues and to promote unbiased data accessing, the game was voluntary, and the assignments used to evaluate the effectiveness have not been marked as part of the students' assessment. Before the two instructional formats of *Get Milk* were introduced, students of both groups attended a 4-hour lecture introducing basic game design theory concepts. A critical investigation into various definitions of what constitutes a game [16,28,29] was encouraged during in-class discussions, and as a result of these discussions, the seminar focused on Schell's s definition of a game as a 'playful problem-solving activity' [29]. Next the theory of flow [9], and how flow should be considered during play test, game design balancing [4], the theory of fun for game design [19] and rules of play [28] were introduced and discussed. Following this, the MDA framework [17] and the concept of game design lenses [29] was introduced in more detail and discussed throughout the entire seminar series.

The aim of focusing on the MDA framework and game design lenses was to assist students to understand both the complexity of games as a broader concept and the theory of game design lenses [29] as concrete guidance for implementing specific game design patterns [2]. The main purpose of the exercises working with the game design theories is to foster synthesis [3], i.e., understanding how games combine multiple sources of ideas into one holistic experience, as well as critical thinking [26], i.e. questioning design choices and making informed improvement suggestions. In a next step, students were invited to an exercise that took place in a university computer lab. Here, we explained the purpose of our comparative study and the two instructional formats and asked students to select one group. We explained that students were free to choose whichever version they preferred to work with for the exercise, but they had to pick one group and stay within the group in order to compare the learning outcome for both approaches. To prevent self-selection bias and for the purpose of featuring equal group size and background (i.e., previous gaming experience and gender) we informed the students, after we collected demographic data, of the situation and 'sub-sampled' the groups after the students picked a preferred group. With all students primed in this manner, we introduced two non-assessed assignment questions and handed out tablets running iOS 8 and explained where to find the game and the assignment questions on the tablets.

The first assignment question was specifically designed to compare the learning outcome of the two groups in order to compare the effectiveness of the *digitised* approach to the *paper-based* approach. The instruction read, 'Imagine you are designing a first person mobile game called 'Grisu: The Mobile Challenge', featuring a cartoon dragon. You are considering how to entice the player to stop rather than start a fire in a forest. How could you design the game to reflect meaningful choice [29]?' For the second assignment question, in order to see if and how students would apply critical thinking [26] after playing the learning game *Get Milk*, we asked, 'If you were the designer of *Get Milk*, how would you improve the game design?' Group A (28 participants) accessed the above outlined *digitised* version of Get Milk, and the control Group B (23 participants) played the same game but without the game designer perspective, instead they worked with a *paper-based* version that included the same game design theory.

EMPIRICAL APPROACH

The main focus of this study was to create meaningful holistic learning experiences and to investigate if and how the *digitised* version of *Get Milk*, improved critical thinking [26] and synthesis [3] for the learner. For this purpose, we addressed each participants lived experience individually as part of a grounded theory method to data analysis [14]. We applied a three-staged approach [14]. First we used 'open coding' [8] to collect data across resources (assignment observation, assignment results, survey results and interview results) for the purpose of finding suitable patterns/categories within the collected data. During 'axial coding' [8] we related data across resources using the categories we defined during open coding and finally we applied selective coding [8] to look for evidence that would more specifically look for advantages and disadvantages of the *digitised* approach. Please note that even though a single investigator did the final coding (following discussion prior to, during and post experiment on emergent themes, marking and observation criteria & process with senior researchers), we used an independent tutor for data analysis of the written assignments to ensure credibility of our research.

The Participants

A total of 51 undergraduate students participated in the study (14 female; the average age was 26, ranging from 19 to 30). Of the participants, twenty-eight selected Group A, which used the *digitised* solution, and twenty-three selected Group B, which used the paper based solution. Thirty percent (15 of 51) of the participants were frequent players who played video games more than three times a week; forty-nine percent (25 of 51) played video games once or twice a week; and 21% (11 of 51) played video games less than once a week. Both groups featured identical seminar structure and learning objectives.

Data Collection

We gathered data with a triangulation of quantitative and qualitative methods (Table 1). Two groups played Get Milk (Group A played the *digitised* game and Group B played the same game but with a *paper-based* version of the game design theory) in a university computer room in an exercise session lasting 90 minutes. Both groups used a university-supplied tablet to access this responsive web based game for the purpose of answering the assignment questions. After signing a briefing and agreement to participate in the study, both groups were instructed to play *Get Milk* and access the game design theory as and when required. Students of both groups were also informed that they may replay the game as often as they wish and that they should answer the assignment questions when they felt ready for it. The students were accompanied throughout the in-class exercises and observed by one researcher taking notes. In addition, screen-capturing software tracked all movements of the participants while playing the game and recorded the assignment question answers. On finishing the game and assignment questions, participants completed a four-page questionnaire for the purpose of assessing individual game play and learning experience as well as evaluating intrinsic motivation [11]. Each participant then described their experience, highlighting aspects that had caught their attention in semi-structured one-to-one recorded interviews.

Data Collection in order of events	**Purpose**
1) Screen capturing software during game play.	For the purpose of logging activity and tracking students' playtime, and their interaction with the lenses (in case of Group A) and their gaming behaviour during three possible playing sessions.
2) Player Observation	One researcher observed the students during the exercise and took notes on how the students interacted with teaching material.
3) Assignment Results	For the purpose of comparing the learning outcome in form or written assignment of both groups.
4) Anonymous online survey	For the purpose of collecting anonymous unbiased feedback from students.
5) Semi-structured retrospective one on one interviews	For the purpose of discussing individual learning experiences, students were prompted with questions such as 'do you recall the first time you enabled the game design perspective? What did you expect to see there? How would your describe your personal learning experience? How could we improve your personal learning experience?

Table 1. Quantitative and Qualitative Data Collection

Data Analysis

For the purpose of comparing patterns emerging from and across resources, we analysed each encounter with the learning game *Get Milk* individually. First, we collected, transcribed and grouped data across resources (see above outlined means of data collection). Via 'open coding'[8] we looked for characterising codes and patterns/categories asking *what, who, how and when* type of questions and found three main categories; a temporal aspect (students using the *digitised* approach engaged longer with the game and the assignments), evidence for more intrinsic motivation [11] and demonstration of more personal meaning making [18] within the assignment results. During axial coding [8] we explored relationships and highlighted connections and relating codes (categories and concepts) to each other (e.g. we compared player observation with assignment answers). Finally, we looked more specifically for advantages and disadvantages of the *digitised* approach via selective coding [8] within the learning results. For the purpose of evaluating the effectiveness of *Get Milk* as a learning tool, an independent single instructor coded assignment results. Following post-discussions and process instructions to agree on coding formats etc., the instructor analysed all assignments by measuring if the theory was understood, applied and referenced and then challenged the findings with a chi-square of independence calculation [12].

GET MILK RESEARCH RESULTS

In the following section we introduce the findings of our comparative study focusing on three main aspects. First, we present the assignment results (Table 2). Next we describe the findings resulting from our player observation including the results from the screen capturing software and the onsite observations. We then present the students' perspective from the anonymous online survey (Figure 4) and the semi structured interviews. Finally, we present a summary of the selected findings focusing on the main goal of the study, i.e., to foster critical thinking [26] and synthesis [3] via the *digitised* game based learning material. Since we found little evidence that previous gaming experience or demographics of player/learners influenced individual learning experiences, we omitted those results.

Assignment Results

The assignment results illustrated in Table 2 demonstrate the absolute and relative frequencies of our three main research questions for both groups (i.e., understanding theory, applying theory and referencing theory). The chi-square of independence calculation [12] revealed that even though more students grasped the theory taught after playing the game *Get Milk*, this difference was not as significant as we assumed (53% vs. 71%; chi-square-test of independence: $\chi 2(1) = 2.03$, $p > 0.10$). However, we found **significant** evidence that students using the *digitised* material (Group A) applied theory more successfully to their assignment than students who used the *paper-based* material (Group B) (79% versus 13%, $\chi 2(1) = 21.56$, $p < 0.001$). In addition, we found **significant** evidence that

	Group A *Digitised*	Group B *Paper -Based*
Understood Theory	20 (71%)	12 (51%)
Chi square test of independence: $\chi2 = 2.03$, df = 1, $p < .151$		
Applied Theory	22 (79%)	3 (13%)
Chi square test of independence: $\chi2 = 21.56$, df = 1, $p < .000003$		
Provided Ref's	11 (39%)	2 (9%)
Chi square test of independence: $\chi2 = 6.22$, df = 1, $p < .0012$		

Table 2. Learning Outcome Comparison

students were more likely to reference important literature if they played *digitised* (39% versus 9%, $\chi2(1) = 6.22$, $p < 0.001$). In sum, the *digitised* material (Group A) has had a clear and pronounced effect on the students. It activated the knowledge encapsulated in theory and helped students to apply that knowledge meaningfully to their own design thinking process. In addition, marking results revealed that students of Group A were more critical while answering the assignment questions and provided more elaborate improvement suggestions and reflected more on their individual learning experiences within the assignments. In contrast, Group B displayed less own meaning making, provided less elaborate examples and was less critical. In addition, students of Group B were more likely to confuse the meaning of mechanics and dynamics [17] and thus displayed less understanding and/or knowledge synthesis [3].

Assignment Observation

We analysed in depth how *Get Milk* was used and experienced in both groups, focusing on how the particular idea of linking first-hand game experience with game design theory played out for the students subjectively and matched the found data for axial coding [8]. Many topics emerged during analysis of the logged activity and the observation of participants. However, the most potent differences we found were in the playtime and the number of game design lenses accessed during the monitored exercise. Since we designed for free play [23], the students could decide if, when and how often to play the game. While all students started the exercise with playing the game, players of Group A replayed the game up to three times, accessing an average of 6 (min=2, max= 10) game design lenses. All participants of the control Group B played the game only once and only read an average of 2 game design lenses (min=0, max=4). In total, 24 students (86%) of Group A replayed the game, 19 students did so upon self-reflection (68%) i.e., after seeing the end of the game report, 12 students (43%) for the purpose of answering the assignment question, and 6 students (21%) for both purposes.

Students Perspective

During retrospective semi-structured one on one interviews, we found that both the initial interaction and the interaction following the assignment questions were mainly based on more extrinsic motivations [11], such as being in a better position to answer the assignment questions. However, for the self-reflection within Group A, (afforded by the end of the game report, see Figure 3), the interaction was described as more intrinsically motivated [11] where students reported feeling curious or stimulated [15] to find out more about the introduced game mechanics. In addition, students of Group A explained in the retrospective semi-structured one on one interviews that they felt '*enabled*', explaining that the *digitised* game provided them with a feeling of '*competence*' and they felt '*in control'* of their own learning experiences while playing and felt '*competence*' and '*motivation*' while answering the assignment questions. Students were invited to rate their overall gaming and learning experiences (Figure 4) in a short anonymous online survey following the assignments in order to further reflect on their own gaming and learning experience. The semi-structured interviews revealed that asking the students to distinguish their experiences as a player and as a learner in the online-survey encouraged them to reflect and question their own learning behaviour. In case of the *digitised* approach most students had ideas on how they could improve the game design. Some also reflected on their personal learning experiences, offering responses such as, '*The game is boring, but teaching game design theory through this game is great because one thinks of plenty of improvements based on the questions asked by the Lenses'*. In the *paper-based* group, the majority of students criticised the abstract nature of the game design lenses, showing less individual meaning making when discussing the personal learning effects. Figure 4 illustrates that students who used the *digitised* approach rated the learning experience higher than the fun factor of the game, and a majority of the students rated the effectiveness of the game for teaching game design theory as good or very good.

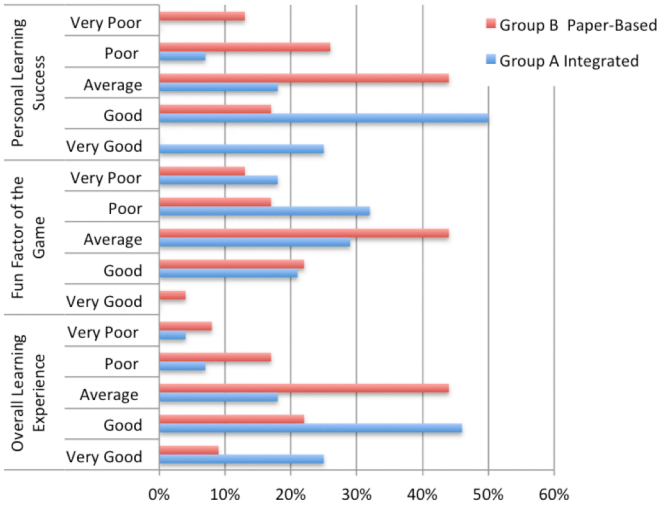

Figure 4: Student Perspective (Anonymous Online Survey Results)

For the purpose of learning more about the students reasons for choosing to change from the player perspective to game designer perspective within the *digitised* approach, we asked, *'What was your reason for accessing the game design theory perspective for the first time?*' Fifty-three percent of the students (15 of 28) claimed that they were curious to see the game designer view; twenty-seven percent (8 of 20) wanted to learn more about a specific game mechanic; and 10% (3 of 28) wanted to see how one could improve the game. Ten percent (3 of 28) did not access any game design lenses in the initial game, i.e., before seeing the game report and reflecting on their player behaviour.

Student feedback on how to improve the game design could be assigned to four main categories (please note that some feedback could be assigned to more than one category). Most students using the *paper-based* approach came up with more pragmatic suggestions, such as '*The game was optimized for a mobile touch-based device, but I decided to play it on a PC browser. I would suggest making it more responsive.'* Students using the *digitised* approach suggested more complex gameplay, such as '*I would have made a larger multiplayer game out of it, maybe an adventure game with less obvious choices, with surprise and speculation that encourage multiplayer interaction and communication—like a game designers'* chat *room where we could discuss the implemented game design mechanics and add our own improved content to the game'*. In addition, Group A students requested an even more *digitised* solution, for example, *'The information about the lenses could be implemented in the game as a type of achievement. Any time the player completes a certain area, like a 'challenge' or 'problem solving,' there could be a fade-in of the completed topic as a reminder and reward for the player. In my opinion the story line of the game could match and reflect the different kinds of lenses, and the player could read about it in detail afterwards.'*

Understanding Game Designer Perspectives of the *Digitised* approach (Group A)

In addition to the assignment observations and analysis of the knowledge transfer questions (Table 2), we asked students of the *digitised* group to explain when they began to view the game from the perspective of a game designer. A majority of the students (22 of 28, or 79%) responded that they could not identify a specific moment since all elements introduced in the seminar helped to understand the game designer perspective. When asked what had the biggest impact, 29% (8 of 28) of the students referred to the holistic experience, 20% (6 of 28) the game design task or assignment questions, and 18% (5 of 28) self-reflection, i.e., the game report at the end of the game. Six percent (2 of 28) said they viewed the game with the perspective of a game designer as soon as they started playing the game. Only 10% (3 of 28) indicated the discussion and 14% (4 of 28) the moment they accessed the game designer view for the first time.

SUMMARY OF FINDINGS

The main aim of the presented empirical study was to create more immersive holistic learning experiences that would link text/*paper-based* knowledge with related interactive elements within the game *Get Milk* for the purpose of fostering synthesis [3] and critical thinking [26] amongst undergraduate students. Our results show that, in the game-*digitised* theory approach, students played not only longer but also read more game design theory, were more immersed and activated the knowledge encapsulated in theory better during the exercises. In addition the *digitised* theory helped students to apply the theories more meaningfully to their own design thinking. We found that the *digitised* material opens up opportunities for synthesis [3] and critical thinking [26], and that it teaches game design theory dynamically and helps students to develop a deeper understanding and a wider application of the game design patterns introduced. In addition, it helped students grasp the difference between a player and a designer perspective. And perhaps, most importantly, students of Group A rated their personal learning experience much higher than the control group (see Figure 4), describing their learning experiences as '*enabling*' and '*motivating*' and reported feeling '*competent*' and '*motivated*'.

DISCUSSION AND FUTURE RESEARCH

The learning game *Get Milk* was a small snapshot of a very specific game genre. In order to provide students a wider application of game theories, a further version of *Get Milk* could include various genres, discuss player types and offer other crucial game design theories. Nonetheless, the *digitised* material increased the learning experience by illustrating how to utilise game design lenses during game design (which had been formerly misunderstood, misused or not used at all due to a lack of understanding of how to apply them). An even more *digitised* approach could, for example, help address other game-related topics in education, illustrating for example, game physics. In regard to the actual moment the students start to consider games from the perspective of a game designer, evidence suggested that a specific game design task and/or self-reflection impacted the most. However, as pointed out by the participating students, the *digitised* learning game *Get Milk* worked best as part of a seminar structure, where multiple elements had contributed to the students' appreciation of game designers' perspectives. In a next step it would therefore be necessary to translate the aspects that shaped the experience for the participating students, such as the need for discussing game design choices with colleagues or tutors, into design and technology features such as an orchestrated chat room for the purpose of promoting a participatory culture and collective intelligence.

Comparing a more traditional, *paper-based* approach with an interactive learning tool in itself raised additional research questions, which have yet to be addressed and go beyond the boundaries of this initial study. The main aim of

the study was to create more immersive holistic learning experiences that would link text/*paper-based* knowledge with related interactive elements within the game *Get Milk* for the purpose of fostering critical thinking [26] and synthesis [3] amongst undergraduate students. While the seminar structure and the material provided were identical for both groups, it would be fair to assume that some of the differences found may also be subject to the more general differences between reading texts on paper and experiencing these as part of a *digitised* more interactive experience. What these research results showed, however, is that it is possible the merge the two experiences and that this provided additional opportunities for synthesis [3] and critical thinking [26] and fosters development with teaching material using already established game paradigm methods as delivery mechanisms for the teaching material.

In addition, the free-play [23] strategy implemented in the game *Get Milk* seduced a number of students into playing the game without viewing or accessing the offered game designer view. Subsequently, it took those students longer to achieve the learning experience we were aiming for. However, designing for curiosity, in this case by showing there was more to the game than they had so far experienced by results displayed in the end of the game report worked very well. It not only enticed the students to play the game again and access the game designer view, it also provided them with a strong, more personal intrinsic learning motivation [11]. Despite the success of the *digitised* material, learning and reading about game design theory is an essential part of higher education, and one should not make the mistake of trying to replace 'books' with 'games' while teaching game design. We suggest rather that educators merge the two modalities and expertise to exploit the benefits of both approaches. Here, we see an opportunity for *digitised* learning experiences to use both approaches by using the features of state-of-the-art handheld devices, such as tablets or e-books and work with established game paradigm methods as delivery mechanisms for the teaching material in tandem with lectures, seminars and texts.

CONCLUSION

In this first comparative study, we competed two forms of teaching materials, in order to research the effectiveness of a more immersive *digitised*, interactive, multimodal learning form (using and extending established game play mechanisms) and explore innovative digital learning spaces. We found that embedding *digitised* game design theory as part of a game clearly showed an increase in students' understanding of and engagement in the learning and game design process. We found that students who played the *digitised* version participated with a more personal involvement and were able to make more critical reflections on specific game design elements. In turn, this stimulated students to be more critical in discussing the suitability and application of multiple game design patterns, and students reported feeling 'competent' and 'motivated' while doing so.

We demonstrated that by merging established game interaction paradigms with educational material into the *digitised* version of Get Milk, we were able to successfully display game design theory *dynamically*. In turn, this activated critical thinking and opened up additional opportunities for synthesising game theory into the action of playing a game. We contribute a *digitised* form of teaching material merged from methods used in established game interaction paradigms into an educational context. This successfully utilised the methods games provide to interact with content while also efficiently delivering the teaching and learning material. The *digitised* teaching material effectively activated the knowledge encapsulated in game theory and enabled the students to apply these theories meaningfully to their own design thinking.

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Appendix B. Research Material

In this appendix I present all research material used for the evaluation of the three case studies The Remediation of Nosferatu, The Interactive Hammock and Get Milk. Because all case studies have been conducted in German all research material has been translated.

The Remediation of Nosferatu

This appendix presents the research material used for the evaluation of The Remediation of Nosferatu. The interviews have been conducted in German and have been translated for the purpose of this report.

Evaluation Strategy

Why am I evaluating?	How can a holistic dramaturgical experience, which is based on several *experience-fragments* that are spread across space and time, be *designed and how does this relate to the interpretative role of an experiencer, i.e. ambiguous vs. prescribed quality of experiences?*
What type of data do I want to collect?	- Semantic Differential Scale - Interview Results (looking for attributes to define *ambiguous vs. prescribed* qualities of experiences) - GPS coordinate during play - Video material of the experience - Retrospective think aloud data
What am I evaluating?	The interpretative nature of *experience-fragments* and holist experiences
What constrains do we have?	We do not have a user-friendly illustration of the journey (only the raw GPS data). I may have to remind the participant of the *experience-fragments* they visited and the order s/he took.

Demographic Data

Age	**Free text**
Education	Standardized selection field
Occupation	Free text
How often do you play Games a week	Selection field offering: • Less then once a week • 1-5 times a week • More then 5 times a week
What kind of games do you play?	Selection field offering game genres
What is the last game you played?	Free text
Do you own a Tablet?	Yes/No Answer
If yes do you use it to play games?	Yes/No Answer

Semi-Structured Interviews

1.) Thank you for participating in this study. First of all we would like to give you an opportunity to express your impressions, walk us through your journey and ask any questions you might have. (Encourage a Retrospective Think Aloud)
2.) If you had 3 adjectives to describe your experience what would they be?
3.) Next we would like to ask you a couple of questions regarding how immersed you felt in the game: Was there a moment when you felt bored/exited/entertained/annoyed/scared/disrupted, if yes when was this?
4.) How did you find out about this project?
5.) Would you play a commercial version of Nosferatu?
6.) If you were the designer of Nosferatu what would you change? What kind of features would you add?
7.) For the purpose of our case study we would like to ask you to rate your experience using the following chart (Semantic Differential Scale, see Chapter 4), to assist you with this task we will inform you about the route you took today. It would be very helpful if we could talk about your overall impression and then look into each location individually.

The Interactive Hammock

This appendix presents the research material used for *The Interactive hammock* case study. All material presented has been used for *The Forces of Nature* and *The Roaring Hammock* Installation. Please not the interviews have been conducted in German and have been translated for the purpose of this report.

Evaluation Strategy

Why are we evaluating?	Explore the difference of *ambiguous vs. prescribed* quality of experiences of an tangible interface
What type of data do we want to collect?	- Retrospective Think Aloud - Semantic Differential Scale - Interview Results (looking for attributes to define *ambiguous vs. prescribed* qualities of experiences)
What are we evaluation?	The lived experience of the participant and if and how s/he assigns meaning making.
What constrains do we have?	Because I want to evaluate the experience as close to the encounter as possible the participant will be evaluated while s/he is still in the hammock. Need to observe the participants closely to make sure we approach participants at the right time (when s/he has noticed and tried all the featured of the hammock).

Basic Demographic Questioner

Age	Free text field
Education	Standardised selection field

Profession	Free text field

Evaluation Instructions

Please wait until the participants has slowed-down after having tried out all the features of *The Interactive Hammock* (when the participant seems to have noticed how to influence he hammock, the sound, images and the embroiled speaker) and s/he looks like is about to leave the hammock.

Interview

May we ask you a couple of research questions while you remain in the hammock?

1.) Thank you for participating in this study. First of all we would like to give you an opportunity to express your impressions or ask any questions you might have. (Think Aloud while still interacting with the hammock)
2.) What kind of adjectives would you use to describe you personal experience in the hammock?
3.) How would you describe the functionality of the hammock?
4.) Would you use the hammock and if yes where (in what kind of surrounding would you use it)
5.) Next we would like to ask you a couple of questions regarding how immersed you felt in the hammock: Was there a moment when you felt bored/exited/entertained/annoyed/scared/disrupted, if yes when was this?
6.) How did you find out about this project?
7.) If you were the designer of The Hammock what would you change? What kind of features would you add? Are there any features you would leave out or reduce
8.) For the purpose of our case study we would like to ask you to rate your experience using the following chart, to assist you with this task we will inform you about the route you took today. It would be very helpful if we could talk about your overall impression and then look into each location individually:
9.) For the purpose of our case study we would like to ask you to rate your experience using the following chart (Semantic Differential Scale, Chapter 4)
10.) Thank you very much, do you have any questions or are there any more comments you would like to make?

Get Milk

This appendix presents the research material used for the *Get Milk* case study. Please note the interviews have been conducted in German and have been translated for the purpose of this report.

Evaluation Strategy

Why am I evaluating?	Investigate if 'ambiguity' may foster a more intrinsic motivation within an interactive multimodal learning environment.
What type of data do I want to collect?	- Screen capturing software (Quick Time player for iOS 8) - Video Observation - Personal Observation - Assignment Results - Online Questionnaire - Interview Results (looking for motivation and personal learning experiences)
What am I evaluation?	Comparing the lived learning experiences of two groups to evaluate the difference between a 'digitized' (featuring an *ambiguous* dynamic display of game design theory) and a 'paper-base' approach.
What constraints do I have?	The interaction with the 'paper-based' approach (interaction with the books) will not be captured with the screen capturing software. I need to observe and film the learning behaviour of the participants using the paper based approach.

Demographic Questioner

Age	Free text
Education	Standardized selection field
Emphasis of your Study	Free text
How often do you play Games a week	Selection field offering Less then once a week 1-5 times a week More then 5 times a week
What kind of games do you play?	Selection field offering game genres
What is the last game you played?	Free text
Do you own a Tablet?	Yes/No Answer
If yes do you use it for learning?	Yes/No Answer

Anonymous Online Questioner

How would you rate you personal learning experience?	Rating Scale (Very poor, Poor, Average, Good, Very good)
Comments:	Optional free text
How would you rate the fun factor of the game?	Rating Scale (Very poor, Poor, Average, Good, Very good)
Comments:	Optional free text
How would you rate your overall learning experience?	Rating Scale (Very poor, Poor, Average, Good, Very good)
Comments:	Optional free text
How often do you play Games?	Selection field offering: • Less then once a week • 1-5 times a week • More then 5 times a week
Comments:	Optional free text

Assignment Questions

1. If you were the designer of *Get Milk*, how would you improve the game design, please refer to the game design theory learned and justify your suggestions for improvement

2. Imagine you are designing a first person mobile game called 'Grisu: The Mobile Challenge', featuring a cartoon dragon. You are considering how to entice the player to stop rather than start a fire in a forest. How could you design the game to reflect meaningful choice?

Semi-Structured One on One Interview

1.) Thank you for participating in this study. First of all we would like to give you an opportunity to express your impressions or ask any questions you might have. (Retrospective Think aloud)

2.) If you had 3 adjectives to describe your learning experience what would they be?

3.) Next we would like to ask you a couple of questions regarding how immersed you felt in the learning experience: Was there a moment when you felt bored/exited/entertained/annoyed/disrupted, if yes when was this?

4.) Digitized Group Only: Do you remember the first time you accessed the game designer view? If yes, please describe it. What was your reason for accessing it? Was it what you expected? If not, what did you expect or hoped for?

SUMMARY

With this research, I contribute evidence to support the importance of understanding and awareness of ambiguous vs. prescribed qualities.

Working with a three staged grounded theory process I analyse the following three case studies:
- The Remediation of Nosferatu: Exploring Transmedia Experiences.
- The Interactive Hammock: Investigating two Contrasting Tangible Interface Installations.
-Get Milk: A Comparative Study Investigating Digitised Game Design Teaching Material.

Expanding on the theory of 'ambiguity as a resource for design' and 'open vs. closed text' I propose designers consider the interpretative role of an experiencer as part of an iterative design process.

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