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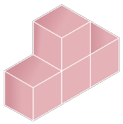

FROM "BUGS" TO EXPLORATORY EXHIBITION DESIGN – TRANSFORMING DESIGN FLAWS IN USERS EXPERIENCES

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ABSTRACT

In this paper we explore the potentials in observing how users creatively explore or hack an exhibition design and transform or scale these "abnormalities" in the users microinteractions into new explorative exhibition designs. Can we apply this notion of observing exploring user interactions and transform these microinteraction into drivers for user experience based on strategies of emergent gameplay? If we acknowledge these findings from the design process as potential enablers of superior user experiences for the end-user, and not simply as 'bugs' and 'anomalies' to be avoided or 'patched', there is a potential for scaling, transferring, and transforming new insights into new design potentials. To this end, observing hacking and creative play in user interactions might lead to a new understanding of user experiences and how unintended microinteractions can transform into foundation user experiences in an exhibition design.

INTRODUCTION

Back in 2017 Nintendo released *The Legend of Zelda: Breath of the Wild* (BotW) (figure 1) – the most recent game in a long running series of adventure role playing games. The game received much praise for its emphasis on exploration in an open and responsive world, which gives the players a set of relatively simple game mechanics, but which through a robust physical rule set achieves a wide range of gameplay situations that diverge from the games story (Gray, 2017). Furthermore, the game makes little effort to nudge users back into its pre-configured story structure, but rather lets users spend hours exploring mechanics and their possible consequences and has confidence in players to be stewards of their own experience from individual non-scripted choices during exploration.

Figure 1: Still from Legend of Zelda: Breath of the Wild – a user exploring the boundaries of what can be physically manipulated in the game's terrain. Copyright © Nintendo.

BotW, and similar games like Grand Theft Auto, Minecraft, The Sims etc. creates an alternative way of approaching and understanding user experiences in an open story world that gives users the power to personalize their experiences through emergent gameplay not scripted (or maybe even conceived) by the designers. While the degree of potential emergence differs, there is a clear pattern among current bestselling games towards giving users a simple set of mechanics to combine in personalised ways (Gray, 2017).

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Furthermore, a tendency in this wave of digital game design strategies is for the designers themselves to change their mindsets towards how to embrace unexpected user behaviour and experiences. In the past, if a player did something not planned, or found a different solution to a problem in a game, the game designers would usually label this as a 'bug' to be fixed. Today, this level of experimentation is not only allowed, but actively encouraged, and is often later transformed by the designers from a bug into a feature of the system (Brown, 2016). By focusing on these instances, of creatively exploring a storyworld, designers can identify new and unintended user interactions and experiences within our designs. One could argue, that by focusing on these "abnormalities" in user interactions, we focus on microinteractions. Saffer (2013) describes microinteractions as "… the functional, interactive details of a product […]; they are the design" (Saffer, 2013; p3). Which in this context should be understood as the unintended exploration and use of the system or user experiences interaction potentials. The potential in discovering new design and user experiences for exhibition designs lies here in observing the unintended and transforming these into a foundational user experience. As Saffer (2013) underlines; focusing on microinteractions is the way to create a superior user experience. This leads us to ask how can we transform and scale users creative exploring microinteraction to be the foundational user experience in exhibition design? Can we apply this notion of observing exploring user interactions and transform these microinteraction into a foundational user experience based on strategies and criterion of emergent gameplay?

A FOUNDATION IN EMERGENT GAMEPLAY

The characteristics of emergent narratives in virtual environments has been explored by both Aylett's (1999) and Swartjes' (2010). They argue that the foundation for providing the potential for exploration can be connected to the idea of creating space for emergent narratives in open world games. In game design, open world games leave the creation of the narrative to the gradual emergence of how a user plays the game—as opposed to the user progressing through a firmly set narrative structure (Juul 2002). Thus, in open world games, players can either follow a structured narrative or explore the game mechanics possible impact on the open world game by setting their own quests and paths.

This notion has been the foundation of studies to further research and expand the potentials of understanding and designing for exploration in digitally augmented exhibition design, as a specific approach, inspired by theory on narratives for open story world games (Madsen & Vistisen, 2019; Madsen, Skov & Vistisen, 2020). The landscape of exhibition design is currently undergoing fundamental changes; from static one-way communication, focusing on enlightening visitors, to interactive participatory exhibitions focusing on personalising meaningful experiences (Drotner et al., 2011; Skot-Hansen, 2008).

This 'flux' in the field makes it a relevant context for discussing how we can observe exploring user interactions and transform these microinteraction into a foundational user experience based on strategies of emergent gameplay.

These studies on designing museum exhibitions as a space for exploration to encourage curiosity and active participation identify both four design strategies (Design driven: *by design* & *by re-design* and User Driven: *by creative play* & *by hacking)* and four criterion (*user-mindset, agency, storification*, and *narrative closure*) (Madsen & Vistisen, 2019; Madsen, Skov & Vistisen, 2020).

The *Design Driven* strategies *By design* and by *re-design* are strategies of emergent interactions, focused on creating potential for emergent interactions based on active intervention from the designers. **By Design:** Is a strategy for designing for emergent user experiences that encourage emergent behaviour by applying the four principles of emergent interactions to the design process. We see the by design strategy as the most fundamental, but potentially also the most challenging for enabling and encouraging emerging interactions. This strategy is applied when the purpose of a design endeavour is to make exploration the preferred reading for users – to find their own meaningful experiences, not because of structure but despite structure. **By re-design:** A strategy for redesigning an existing exhibit inspired by the emergent discoveries from the user driven strategies; *by creative play* and *by hacking.* We see re-design as the potential adjustment of an existing design, based on observed emerging behaviour amongst users e.g. microinteractions, and allowing users to further explore the boundaries of an exhibition. This strategy can be fuelled by insights of user studies that may be derived from the user-driven strategies; by creative play and by hacking.

Whereas the *User Driven* strategies are strategies focused on analysing and understanding emergent user behaviour in experiences, and based on this design research, assess whether or not to promote the emerging interactions into features through either *by Design* or *by Re-design strategies*. **By creative play:** *Creative play* represents the emergent interactions that happen by accident while users interact with the context they are in, negotiating their understanding of their options. By creative play is the accidental occurrence of emergent interactions that can happen when users play with or in an exhibition space. Creative play is emergent interactions that happen by chance while users interact with the context that they are in, negotiating their understanding of the user experience and playing with

the agency given to them. **By hacking**: *Hacking* is when the users understand the rules but decide to do the opposite, or at least to challenge the mechanics of their experience. The final design strategy comes close to the original game design strategy of using 'bugs' to let novel and unexpected use potentials emerge. This strategy is based on emergent interactions arising when a user challenges the structure of an exhibition to create alternative interactions - making an intended oppositional reading that can result in, for the designer, an unexpected 'hack'. Here users understand the structure and its preferred readings, but decide to do the opposite or challenge the mechanics.

Within user-centred design there are many different approaches and methods to generate user insights from different types of user observations. Some are represented in Sanders (2008) map of design research, visualising an extensive overview showing the biggest area as being user-centred design. Thus, a well-developed and researched area, with many approaches. Nevertheless, what we are aiming at with this paper is to provide a framework for opening up the approach to both identifying new user potential through hacking or creative play behaviour and understanding the users mindset towards the interactions.

Based on the research question and the thematic of scalability, we will explore the potentials of the user driven strategies creative play and hacking, and how these can be used to identifying microinteractions and potentially superior user experiences to be scaled and transformed into foundational user experiences in exhibition design based on a case study.

CASE STUDY: FROM INTERACTION "BUGS" TO EXPLORATORY EXHIBITION DESIGN

The following section will present examples from an existing interactive exhibition design process, and how the frame of microinteractions revealed new experience potentials from observed user-driven emergent interactions. The context is the danish aqua zoo 'North Sea Oceanarium' and the collaborative design process of building a new didactic learning space about the food chain and physiology of different marine animals. One of the designed installations focused on the oxygen capacity for marine animals. The guests were asked to hold their breath while holding down a big button which activated a count of time. Meanwhile, an oxygen bar would visually indicate how the guests compared with different animals (e.g. whales, dolphins seals etc.), and provided an augmented reality effect projected on the guest's face each time they surpassed one of the given animals (see figure 2).

As such, both the macro user flow, as well as the microinteractions of the specific task where rather specific, and seemingly well-understood in the initial rounds of user testing. However, when examining the first months of user analytics data from the exhibition, collected through the data analytics back-end of the digital installations, and analysed through quantitative analytics (Vistisen et al 2019) a strange pattern occurred. It seemed that the majority of users did manage to reach the final oxygen level (the sperm whale), and thus held their breath for much longer time, than was observed during the normal user testing. The data thus showed a discrepancy between an observed interaction, and the tracks they left behind in the data, leading us to inspect the pattern further for what micro-interactions might be at play in the context of use.

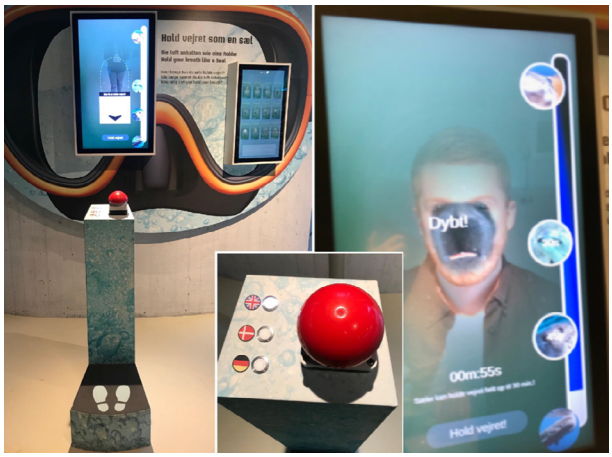

Figure 2: The 'Hold Your Breath' installation, with the big red button acting as the initiating microinteraction along with the embodied interactions of the guests.

When observed in context it was revealed that the microinteraction of holding down the big button was being re-interpreted by the users from an individual interaction of 'duration of holding my breath', to a collective interaction of 'pretending to be the unlocked marine animals'. The guests 'acted' as if they held their breath, blowing their chins up and pretended to follow the rules, while triggering the interaction, getting the desired feedback. The subtle change of 'acting' upon the rules instead of 'following' the roles showed to be enough of a microinteraction change, to radically redefine the meaning of the exhibition item to a social experience of groups (pretending to) holding their breath together and engage with the digital content in shifts.

This shows us, that the subtle 'hack' of one subtle microinteraction could change the entire feedback loop of the user experience. This situation would normally have promoted a redesigned iteration of the exhibition with more digital nudging towards actually following the rules of holding your breath and get the didactically correct badge, to ensure that the microinteractions work effortlessly as Saffer's (2013) ideal for the concept describes. But through the observed emerging 'hack' and the social empowerment it led to, the 'bug' of the

exhibition item was instead promoted to an active encourage way of using the installation by the personnel at the aqua zoo. This show us, that while the ideal microinteraction is effortless and subtle in both its triggers, its mechanics, and feedback one should take careful notice to whether the feedback loop creates potentially beneficial side-effects, before 'patching' the design through another iteration.

A similar user 'hack' occurred in another part of the new interactive exhibition design, with the design of a 100m2 interactive LED screen. The exhibition installation was able to simulate the food chain and behaviour of marine animals, with the users taking the role as a mackerel in a touch-screen controlled game on the big screen (figure 3).

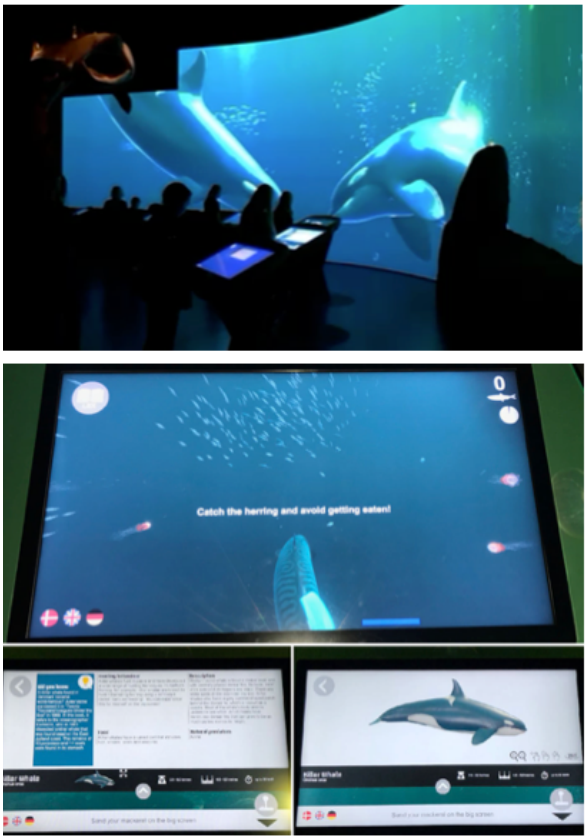

Figure 3: Images of the 'Big Ocean Window' installation. The big 100 m2 interactive LED screen (top) is interacted with through eight big touch screens (middle) which besides the game-based mackerel also includes a lexicon feature (bottom).

An important element in the design was a build in lexicon feature which should be always accessible through the press of a button in the user interface of the touch screens. This was emphasised by the aqua zoo as detrimental to ensure that the digital installation did not just entertain, but also educated the guests. However, from our data analysis of the first 200.000+ use sessions of the installation we saw that only 7% of the guests had interacted with the lexicon. When observing the guests, it was revealed how the majority thought the lexicon button was a shortcut to choose a different marine animal than the mackerel, which was not possible in the design. This misinterpretation led some guests to initiate what we would label creative play in context around the installation, acting as observers and 'watch dogs' for the other guests playing the digital came. One guest, wanting to play as an Orca, thus began to spot the Orcas on the big screen in relation to the mackerels of the other players, warning them about possible dangers. The play, between guest playing and guest observing did also on multiple occasions turn into competitions and collaborations between guest who did not know each other prior to engaging with the installation. This social play outside of the digital game became an indicator, that the microinteractions of accessing the lexicon could be the starting point for a completely new social experience in the area of the exhibition. However, differently from the 'Hold Your Breath' installation this 'bug' of the lexicon was also a source of initial frustration for many guests, until the realisation of the potential social game. Thus, we here see an example of an emerging user-driven behaviour which could benefit from being approached from a design-driven perspective to transform the 'bug' into a re-design which fully encourages the social play, while avoiding misunderstandings of the digital game.

DISCUSSION

When the perspective on design flaws or bugs is changes to an exploratory approach to new insights on users emergent experiences in a context, we, as designers, are given an opportunity to understand, how user naturally interact with e.g. an exhibition design to learn and explore history. Whether this challenges the intended design through a user's creative play in the an experience or by deliberately hacking the intended microinteractions to their own experiences benefit, as seen in the cases presented.

By using the user driven strategies of emergent gameplay from a design perspective, we enable the mindset of being aware of contradictory user interactions, that can provide new insights on user experiences. While further connecting the idea of microinteractions to these strategies, the focus is set on even the smallest interactions in an exhibition design as a whole. The idea of focusing on microinteractions and contradictory user interactions, might in some way be redundant, since this should be a part of empathising or observing a situation and user behaviour. But the point here is, that if the focus is shifted towards not just observing user experiences and interactions, but actively observing for what is not intended user interaction, even at the microlevel, there is a potential to discover new types of user experience and learning potentials in contexts such as exhibitions, as identified through the

cases above. This might not always be of significant in all types of exhibitions or user experiences, nevertheless, we do argue that being aware of the design flaws as a potential can be fruitful creating or re-designing exhibitions designs, especially when discussing the topic of scalability in design. If we can identify contradicting microinteractions that supports a superior user experience, why not exploit this and scale from a microinteraction to drivers for the user experience in an exhibition.

Furthermore, the strategies discussed in this paper, by creative play and by hacking, has four underlying criterion. These can function as a tool to analyse the hacking microinteraction and pinpoint what is the driving factor in this type of interaction. Is it linked to the experiences agency, the storification, the users mindset or is it connected to the desire for closing the narrative. Thus, providing not just a frame of awareness of identifying contradicting interactions, but also helping to understand the driving factor.

A closing point of discussion is the context of this study and types of user experiences; museum exhibitions. The theory underlying the strategies and criterion for emergent gameplay or exploration, is taken from the world of games (Aylett, 1999; Swartjes, 2010) and through case studies connected to and tested in connection to museum exhibition design (Madsen et al, 2020; Madsen & Vistisen, 2019). Thus, an interesting perspective is moving the strategies beyond museum exhibition design, and exploring the strategies application in other design contexts.

CONCLUSION

Inspired by game design theory and microinteractions, the user driven strategies *by creative play* and *by hacking* provide an insight into how we can be aware of emergent user interactions throughout the design processes and let them be the foundation for transforming or scaling new types of user experiences. We argue that if we as design researchers are willing to loosen the structure of our designs, it provides us with a space for observing unintentional behaviour, microinteractions and uses that can inspire further research and redesigns. And if we acknowledge these findings from the design process as potential enablers of superior user experiences for the end-user, and not simply as ‘bugs’ and ‘anomalies’ to be avoided or ‘patched’, there is a potential for scaling, transferring, and transforming new insights into new design potentials. To this end, observing hacking and creative play in user interactions might lead to a new understanding of user experiences and how unintended microinteractions can transform into foundation user experiences in an exhibition design. The above presentation of the cases illustrates the potential for observing microinteractions effortlessness and subtleness in both its triggers, its mechanics, and feedback to identify whether the feedback loop creates potentially beneficial side-effects, before ‘patching’ the design through another iteration. By identifying these unforeseen playful or hacking microinteractions in users emergent experiences, we can as designers can transform and scale these identified user experience potentials into the underlying drivers of exhibitions design instead of fixing or removing the experience “flaws” of a design.

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