Curiosity in Bodily Play Experiences

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ABSTRACT

This paper investigates perspectives on designing for curiosity as a driving factor in body-centric game design. It does so from an emotional perspective to (bodily) play experiences in digital game designs in combination with theories of play, curiosity and body-centric design. Through the emotional sequence of fun-exhilaration-gratification, the role of curiosity in the design for (bodily) play experiences is examined. The relationship between curiosity and bodily play is explored and demonstrated through theoretical exploration and analysis of several game designs. The paper ends with a remark on play as a bodily act of questioning and evoking curiosity.

CCS CONCEPTS

• General and reference, Design • Human-centered computing, Interaction design theory, concepts and paradigms • Human-centered computing, HCI theory, concepts and models

KEYWORDS

Curiosity, Bodily Play, Body-centric design, Game Design, Emotions, Restraints, Ilinx.

1 INTRODUCTION

There is a growing interest in designing for the body in both Interaction and Game Design fields [1-4]. In bodily play experiences or body-centric game design, designing for curiosity is not emphasized much, despite that it has potential to be a driving factor for bodily play. This paper introduces ways of understanding the role of curiosity for bodily play experiences.

This paper discusses some implications of curiosity for bodily play experiences and the impact these potentially have on body-centric game design. It does so by examining several body-centric game designs from the perspective of Henrick's [5] emotional pattern of play and the role of curiosity in such experiences. First a dive into relevant theory of curiosity is reviewed, followed by a theoretical discussion of the connection between play and curiosity which is continued by a brief perspective on emotions from the fields of neuroscience and game design. These theories form the basis for the analysis of curiosity as an emotional inducer for bodily play experiences by introducing the design concept of restraints. This is further exemplified through several game examples. The paper ends by theoretically discussing a few examples of how play is also an (bodily) act of questioning, highlighting the importance of encouraging (bodily) curiosity when designing for bodily play.

2 Curiosity

A comprehensive definition and exhaustive description of curiosity have been substantially investigated in the field of psychology. However, a final definition of curiosity with the cause and determinants thereof is difficult if not to say impossible to produce [6]. Thus, the theoretical perspectives explained here are selected because of their implications for the bodily play experiences illustrated in this paper. The goal is to serve as theoretical input to the design, understanding and evaluation of bodily play experiences in digital game design.

For the points treated in this paper, the main theories are Berlyne's [7] four categories on two dimensions of curiosity, the theory of incongruity [6, 8], and Deci and Ryan's approach of competence developed in their self-determination theory (SDT) [9].

Berlyne's two dimensions are: Perceptual/epistemic, and specific/diversive. The perceptual dimension is concerned with bodily stimuli. Perceptual curiosity is aroused by novel stimuli, which in turn are *reduced by continued exposure* [7]. Perceptual curiosity is a precursor to epistemic curiosity which is driven by the desire for knowledge. Specific curiosity is the need for a specific piece of information to e.g. solve a puzzle, and it's counterpart is diversive curiosity which is a more general seeking of stimulation.

In incongruity theories, curiosity is seen as derived from a conflict imposed as violated expectations which must be resolved [8, 10]. Violated expectations are situations in which the actual experience does not concur with what was expected. Such an experience is an incongruity. Incongruity theories spring from the idea that humans have a natural need for sense making and thus, curiosity is evoked in order to make sense of the incongruity [6]: " *First, curiosity reflects a natural human tendency to try to make*

sense of the world. Second, this need is not constant but is evoked by violated expectations" [6].

As part of their self determination theory (SDT) and the related theory of intrinsic motivation, Deci and Ryan argue curiosity to be a subset of competence [9]. Competence is together with autonomy and relatedness the basic qualities of self determination theory [11]. Competence is the need and quest for feeling competent as a motivational factor for engagement. Curiosity as a subset of competence is linked to the quest for gaining or excelling in mastery. SDT has been widely applied in game studies, especially within serious game research and development [12-18].

Loewenstein [6] developed the information-gap theory: When a person is confronted with a problematic or unfamiliar situation in which new information is needed in order to either resolve the situation or move further, curiosity is evoked [6].

3 Play and Curiosity

Play has been described in many ways; as a pathway of behavior [19], a mindset [20-23], an activity [5, 24, 25], culture ([26, 27], an experience [28] to only mention a few. The focus on play and not so much on game in this paper is quite deliberate. By doing so, the author wants to emphasize play as a broader term than game.

However, games is a term highly related to play [5, 20, 21, 24, 26, 28]. In the English language games are played[1], pinpointing a connection and interrelation between the two. Without diving further into the huge discussion of the connection and relation between the two terms, an overall understanding chosen for the focus of this paper is that play is the more informal and unstructured way of game [29, 30]. In this paper, the focus is on curiosity and bodily play experiences in game design, hence the emphasis on (bodily) play in digital game design.

Following the focus on play in relation to curiosity, the author quotes Henricks description of the emotional sequence of play: "*Play's distinctive disposition is curiosity; its emotion sequence is fun-exhilaration-gratification. Both within the event and beyond the event, play feature an ascending pattern of meaning construction. It opens up, rather than restricts, interpretive possibility*." [5]. Henricks provides us with a model to understand and evaluate play. This model is not meant to be exhaustive, neither has it been proven or developed as a model to be used as a formal test. Such an intention has not been the behind the inclusion of the model in this paper. However, it does provide an insight into the experience of play. Thus, looking for an emotional sequence like the one described by Henricks is useful as an indicator of a play experience (but not necessarily the opposite).

Other than the emotional sequence itself, what is also noticeable in this quote is how play "*opens up, rather than restricts, interpretive possibility*". To Henricks, curiosity (for the experience of play) is linked to interpretive possibilities [5]. Relating this point to the curiosity theory from the previous section, experiencing violated expectations will force the player to start opening up potential possibilities – if it is a situation of play[2].

4 The Body and Emotions

According to neuroscientist Damosio, emotion is rooted in the representation of the body [36]. Meaning that emotion is a complex process occurring as interactions between the body and the brain and neither can do without the other [37].

Emotions are evoked when an organism (here a player) experiences an unbalance. The organism reacts to this unbalance with efforts to get back in balance (homeostasis). Emotions are evoked by unbalances caused by inducers. Inducers can be internal (hunger, thirst, disease, etc.), or external (fear, sadness, happiness) or any of which humans have learned as social and cultural beings (shame, guilt, etc.). For the purpose of this paper, curiosity is dealt with as an external inducer created through the game design as either perceptual, epistemic, specific, diversive, a violated expectation or a drive for competence and skill development.

Following the point above, the game design provides an environment (containing inducers) in which the player acts. And to act in this environment direct bodily actions are central for the emotional processing:

> "*Perceiving the environment, then, is not just a matter of having the brain receiving direct signals from a given stimulus, … The Body proper is not passive. Perhaps no less important, the reason why most of the interactions with the environment ever take place is that the organism requires their occurrence in order to maintain homeostasis, […] The organism continuously* ***acts*** *on the environment (actions and exploration did come first), so that it can propitiate the interactions necessary for survival*." [36].

In this quote, Damasio explains how the organism, through bodily actions, learns and adjusts to the environment through interactions which challenge the state of homeostasis. By challenging the state of homeostasis, the complex processes of emotions take place and are processed into feelings, altering the bodily as well as cognitive state. Similar to the incongruity theorists, Damasio is also of the view that humans are drawn to reasoning: "*It is as if we are possessed by a passion of reasoning*." [36].

Within the combination of games and emotions, Isbister [38] examines how body movement enhances emotions in game experiences (triggering the perceptive curiosity as well as violated expectations of own bodily competence): "*Movement that puts players' bodies into new or unexpected physical configurations can trigger strong social and emotional experiences*.". She further explains the emotional power of mastering a new physical skill and how physical gestures themselves create emotions. She refers to several studies where physical movements like the smile and

[1] In some languages and scholarly viewpoints, play and game are two fully separate, though related terms [25-27, 30-32]. However, a discussion into the linguistic differences and the meaning these have on the fundamental understanding of the terms is out of scope for this paper.

[2] What constitutes a situation of play is yet another huge discussion. See [33-35]

power poses (bodily positions) affect the emotional state positively [39, 40] as perceptive stimuli. This is also a point put forth by Mueller, Byrne, Andres, and Patibanda [3]; designing with such movements enhances the experience of bodily play.

In the following sections we will investigate how curiosity is evoked in the game designs as emotional inducers for bodily play experiences.

5 Restraints

Restraints is a design concept complementing Norman's [41] physical constraints from his book *Design of Everyday Things*. Restraints are directly imposed physical limitations implemented in the design to limit the player's physical abilities [42] – whereas constraints limit the player's contextual possibilities. The role of restraints in play design works as what Suits [25] refers to as unnecessary obstacles that the player voluntarily overcomes as part of the play activity. Similarly, Caillois [24] refers to arbitrarily chosen obstacles to overcome in the pursuit of a play or game experience. In play design, restraints work as those unnecessary and arbitrarily chosen obstacles that the players voluntarily engage with in such experiences – or emotional inducers evoking curiosity.

Restraints are implemented either as direct physical limitations; not moving (a) specific body part(s), or as manipulations of the physical abilities through the use of a device. The direct physical limitation mechanism is known from the game Twister [43], in which the players, on turn, have to place a body part on a color. The body part and associated color are determined by spinning a wheel – and where the arrow stops indicates the exact combination. Or like the restraints in the Kinect game *Fru* [44] (fig. 1), in which the player must cover, with the body or part of the body, a specific area to reveal hidden parts of the game – and thereby find the missing pieces to solve puzzles.

In Twister, the evoked curiosity is perceptive; new bodily stimuli are being imposed on the player in that the restraints force the player to challenge his/her physical ability (competence). The emotional pattern is: Fun: The new obstacle to overcome (the restraint, which violates the player's expectations), forces the player to figure out a new way to position his/her body anew. Exhilaration: The violated expectations must be put in balance; the process of finding a solution and not (or maybe just that) fall or touch the other players (too much). Gratification: When the solution is found and the competence is gained or reassured.

The Fru game is similarly about new stimuli; manipulating the player to explore new bodily movements and positions. In Fru, the evoked curiosity is also specific and about finding the missing piece of information: The right position to reveal the right parts of the hidden information in order to solve the puzzle.

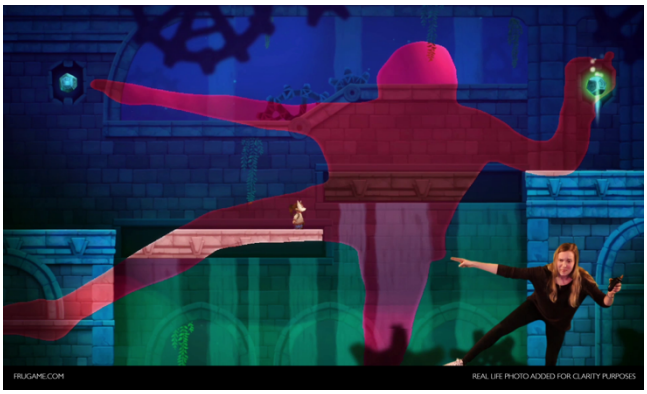

Fig 1. The Fru Game

Restraints are also imposed on the body as manipulations of the bodily senses through the use of device(s): The player's physical abilities are affected in the interaction with the smartphone [45, 46], by manipulating the balance sense through wearable devices [47, 48], or by manipulating the visual sense as it is in the VR game *Eye of the Temple* [49](fig. 2). In Eye of the Temple, the player's balance sense is manipulated visually to experience moving while physically the player is only making one step forward. The effect is created by the (visually only) moving stones. In order to move about the maze, the player must be moved around by the moving stones. The moving stones create the illusion of physical movement and the body experiences the sensation of moving. Eye of the Temple is evoking perceptive curiosity as well as competence (and probably more as well based on personal preferences): The game involves the whole body which is being bodily manipulated through the VR technology and this evokes perceptive curiosity with new bodily stimuli. The process of mastering the VR world bodily is evoking the competence curiosity.

Using restraints is a way to evoke bodily curiosity as perceptive, by violated the player's expectations and challenge the player's physical abilities. By implementing restraints in the game design, is a way to force the player to bodily explore new bodily positions and ways of moving and thereby experience new and other bodily stimuli as well – with all the experiential benefits as pointed out by Isbister [38] and Mueller, Byrne, Andres, and Patibanda [3].

In game design theory, restraints force the player to create a new (bodily) space of possibilities [28]. The (bodily) space of possibilities is created by the player based on available choices for action and interactions as well as the player's own (physical and bodily) abilities. Restraints force the player to explore other and new bodily possibilities for action and interaction, because the familiar way of doing and performing actions and interactions is changed.

Through the exploration of other and new possibilities for action and interaction, the new space of possibilities is created as the sequence of: Fun; a restraint is being imposed on the player as a violated expectations (the emotional inducer which must be set in balance), exhilaration; forcing the player to explore new and

unknown bodily possibilities, and gratification; the player eventually finds a way to adapt to the new situation and homeostasis is regained.

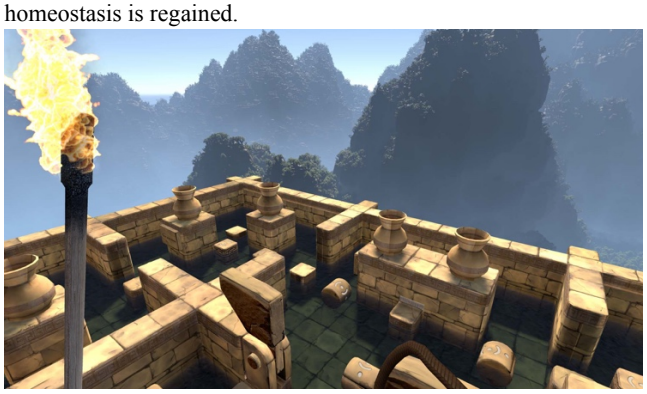

Fig. 2. Eye of the temple, view of the "labyrinth" of moving stones

6 BODILY PLAY AS QUESTIONING AND ILINX

Eicberg [27] describes play as a way of questioning, and links this perspective with the bodily movement to and fro. Eichberg explains the bodily movement to and fro as a kind of wandering around without a determined goal. Baudelaire's flaneur person and the Situationists' Derivé are good examples of this kind of play as a wandering to and fro through the city [50]. In the perspective of curiosity theory, this movement is related to diversive curiosity as argued by Berlyne [7]; a general seeking of stimulation without an articulated goal. This is also known from labyrinth games [27]. Many location based games evoke this kind of curiosity [51].

Henricks' emotional pattern of play can also be seen as such a sequence of questioning and answering in a loop of exploration: "*What do I do now? This way or that way?*" Curiosity as questioning is the fun part leading to the exhilarating activity; the exploration of the environment as the search for answers, and when there is little left to explore the gratification state is reached: "*This was how the experience of that exploration was like*".

Caillois [24] classifies play and game forms into four classifications from which the last *Ilinx* is directly concerned with bodily play. Ilinx is the classification of games and play forms which mainly are concerned about vertiginous alterations of the bodily senses. These kind of play has been scarcely investigated in digital games. However, the game researchers Byrne, Marshall, and Mueller [48] have explored this play forms in a balance game called Balance Ninja. In this game, the players compete to maintain balance while manipulating the other players' physical sense of balance. The players each control a balance board which is connected to the other player's balance organ through Galvanic Vestibular Stimulation (GVS). This kind of game is referred to as Vertigo Games [47, 48]. Vertigo games are digital versions of Ilinx.

To explain Ilinx, Caillois uses examples of the child's whirling until it falls and the dervishes and Mexican voladores [24]. "*The pleasure is on the disorder and anxiety the activities infer"*. And Caillois refers to birds' play with this kind of experience: "*They let themselves fall like stones from a great height, then open their wings when they are only a few feet from the ground, thus giving the impression that they are going to be crushed.*" [24]. This is similar to nowadays bungy jumping where the players, from a high point above the ground, let themselves fall only held by a huge elastic band which is calculated to "pull" them back up just before they would have hit the ground. It's a game of losing and regaining bodily control by manipulating the bodily senses.

In the perspective of curiosity as the driver for this kind of bodily play forms, the evoked curiosity drivers are mainly perceptive and competence. Perceptive because these experiences infer new and altered bodily stimuli to explore, and competence because the bodily and physical abilities are challenged as violated expectations of own physical abilities and bodily self-image.

The perceptive and competence curiosity that drive such experiences might be questions like (the questions function emotional inducers); Do I dare to do this (lose control, or challenge my physical skills)? In bungy jump; when, or will I "hit the ground" (think that I will hit the ground and then be pulled up just before)? How will it feel? How long time can I stand losing control? And the anxiety this play form infers stems from this questioning creating the emotional sequence explained by Henricks: **Fun**: The questioning; Do I dare? and the accompanying anxiety. **Exhilaration**: The vertiginous alteration of the bodily senses. **Gratification**: The bodily senses have returned to normal state (homeostasis) and the question(s) is(/are) answered.

8 CONCLUSION

This paper has investigated perspectives to how bodily play experiences are evoked by curiosity in (mostly digital) game designs. The paper has done so from theoretical perspectives of emotions, how emotions are rooted in the body and emotional patterns of bodily play experiences. Based on the assumption that games are played, and play is the underlying driver for playing games, the emphasis has been on play and play theories in particular.

Using the emotional sequence of fun-exhilaration-gratification as an evaluating model for the game examples and descriptions, this paper has highlighted the importance of designing for bodily curiosity to evoke bodily play experiences.

In this paper the arguments has been rooted in descriptions of bodily play experiences, but the discussion about curiosity and play is supposedly somewhat the same for most kinds of play. When designing for (bodily) play experiences, the designer must evoke the player's (bodily) curiosity.

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