

# Engagement in Digital Games

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## 1 Playing and Engaging

There is substantial debate around many aspects of digital games. Which games are actually games [65]? For example, is *The Sims* a game, a toy, a simulator or something else entirely? Secondly, what are the basic genres of games, for example, are they platform, role-playing, first-person shooters or more? [2]. Lastly, why do people play games? Despite differing views on what games are and people's motivations to play, what is clear is that games are hugely popular and an increasing part of everyday life [25]. And even when games are uncontroversially games, they can be very different from each other, for example, *Candy Crush* and *Heavy Rain*. These two games have very little in common in terms of gameplay, controls, platform, aesthetics, fun and so on. Nonetheless, in order to play these games, the player must be engaged with the game. In that sense, engagement is one of the more fundamental attributes of digital games. Indeed, the notion of engagement comes out in many studies of digital game experience (GX) and is expressed in various forms such as immersion [12], flow [19], as well as engagement itself [11]. It should be noted that despite engagement being widely acknowledged as central to GX, it is not always referred to as such. There is a pluralistic approach to engagement, reflecting a pluralistic approach to the research of GX: different words for engagement are used interchangeably by some people, the same words being used by different people to mean different things and in other cases, to reflect subtle nuances of meaning in different contexts.

The goal here is not to dictate which is the “correct” way to think of engagement in digital games. Indeed, the conceptual debates around the nature of digital games [65] do rather suggest that there is not a one-size-fits-all approach. Instead,

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this chapter aims to think about games in terms of the process of engagement as modelled by [55]. In order to facilitate this, the next section describes the elements of the model and illustrates with reference to a particular (idiosyncratic) experience of playing a digital game. The example shows that, even with a single player engaging with digital games on a single platform, the unit of analysis for engagement needs to be carefully considered. For instance, engagement in a digital game can be a part of a single play session or a whole play session or protracted across a large number of playing sessions. Depending on which unit of analysis is intended, the process of engagement differs. The remainder of the chapter then reviews our current understandings of engagement of digital games in the context of this model. However, understandably, a great deal has been written on what it means to play digital games and therefore what engagement is in this domain. In order to constrain the focus of this chapter, the emphasis is on empirical work that is supported either through qualitative or quantitative studies that go beyond anecdotal or individuated experiences. While many game designers and game players have valid views on the nature of playing digital games based on their own experiences, such claims for generic relevance are inherently limited. Through focussing on empirical work, the goal here is to provide a view on engagement in digital games that has more general relevance as a result of being based on more objective evidence.

Before proceeding, it is also perhaps worth declaring a personal perspective. My own work in digital games has looked extensively at the concept of immersion and uses a definition of immersion that I was heavily involved in developing [12]. However, for this chapter (and generally), I view my understanding of immersion as just one way of thinking about engagement in digital games. Elsewhere I have aimed to position immersion conceptually among the variety of related concepts [15]. Here, immersion is just one concept among many similar concepts that are of equal relevance and equal merit, objectively speaking at least. Immersion just happens to be the one that I have a particular preference for!

## 2 Illustrating the Process Model of Engagement

The process model of engagement [55] has four stages: point of engagement, period of sustained engagement, disengagement and (possibly) re-engagement. Each of these is associated with or even characterised by a set of attributes. As a process of engagement, players who are engaged with digital games cycle through these stages and at different levels. They may experience cycles of engagement within a single playing session or their engagement may occur over several sessions. To see this more clearly, I will illustrate this with my experience of playing the game *Infinity Blade II* (IB2). In using my own experiences of engagement, the aim is to make it easier to describe the process model rather than speaking in generalities or hypotheticals.

IB2 was released in December 2011 by Chair Entertainment and Epic Games and is for the iOS mobile platform [75]. It is primarily a third-person sword fighting game with role-playing game (RPG) elements. That is, the player sees themselves as a character, something like a medieval knight, in a virtual world, and the main action of the game is to fight with swords, or similar weapons, against other characters to gain experience (XP) and gold. As a result of gaining XP, the player is able to improve their character with statistics, for example, for their magical power or shield strengths. With gold, they can buy equipment which also enhances statistics. As a result, the player's character is able to take on increasingly difficult enemies. Eventually (and I don't think this is a spoiler as it is self-evident how this kind of game plays out), the player faces three key opponents and then gets to face one final terrible opponent and win out overall. I assume this is self-evident as at the time of writing, I have not completed the game (or even got close). I may be in for a big surprise!

I am a regular game player of the style that is often called a casual gamer [40]. That is, I don't spend large periods of time playing in any particular session nor do I tend to play Triple A titles, that is, high-price-tag games from big studios for the popular consoles like Microsoft Xbox and Sony PlayStation. Indeed, I don't have a game console but play on my iPhone or web-based games on my PC. Like many gamers when faced with the plethora of games to choose from, I rely on reviews and recommendations of games. I particularly use the [jaysigames.com](http://jaysigames.com) website as it has daily updates, and I often agree with its assessment of the games which makes me feel I can trust their recommendations. IB2 was a little different from my usual sort of games as I am not particularly into fighting games, but it looked (visually) amazing for an iPhone game and, better yet, it was recently offered for free on iTunes presumably as IB3 is due out. So I had little to lose if I didn't like it. Thus the concerns of aesthetics, my regular motivation to play games, the novelty of the game (for me) and my interest based on reviews were all relevant to my point of engagement. These are precisely the attributes specified in the process model.

As with any game that I like playing, when playing, I exemplify well the period of engagement described in the model. That is, the game holds my attention (much to the frustration of my wife, at times!) and the fights within the game are very challenging. I do not always win but I do get a sense of progress, steadily, which is clearly indicated by the feedback of the game which shows my stats and my goal and the equipment that I have bought. Also, IB2 is structured so that novelty is essential: you cannot beat the successively difficult enemies unless you buy new weapons, armour and the like. But these have different characteristics that need to be learned and understood to make the most of them. In addition, there are areas of the game world that "unlock", some in relation to the stage of the game but some in relation to the equipment that I have bought or found. So there is lots to engage with in the game itself. These attributes of novelty, attention, feedback and so on characterise sustained engagement in the process model.

Also, I have periods of disengagement and re-engagement with the game, which is an important part of the process model. Sometimes I get beaten several times by the same opponent so I stop playing partly out of boredom and partly out of

frustration. Sometimes I stop when I reach a natural break in the game as I am doing well and enjoying it but it is time to do something else. And even within a single play session, sometimes I stop the fighting part to focus on my strategy to buy equipment or to manage my stats, which can be desultory flicking through stuff I may never buy or more focused engagement in what I might buy/upgrade next. And this can be disengaged from in order to go back to hacking at opponents with my latest bit of kit. So challenge, my affective state, time and interruptions are all components of my disengagement with parts of the game within a particular session or with a particular playing session.

This model therefore captures well many aspects of the experience of engagement in digital games. However, I would also note two things that are not explicit in the process model in this particular context as these are relevant to the work that is done in understanding research into gaming experience.

First, people who play games have a disposition to play games. This could be in part represented as the motivation to play within the process model, but what exactly is that motivation? In my case, I did not have a motive to play IB2 specifically. I wanted to play something simply because I like to play generally and a combination of circumstances suggested IB2 to me, but if it had not been IB2, then it would have been something else. That it continues to be IB2 is part of the process of engagement with that particular game but there was, before that process started, a disposition to be engaged, an openness to the opportunity for engagement. This was not influenced in any way by IB2 or any other game and so must stand apart somewhat from the experience of interacting with IB2.

Secondly, within my account of the process model, which I hope faithfully reflects O'Brien and Toms account [55], there is a blurring of what might be called the unit of analysis. In the point of engagement, I was drawn to engage with IB2. But in any particular session of playing the game, I am engaged in that play session. However, outside of that play session, it is possible to still describe me as engaged with the game. Arguably, while I am not actually playing the game, I should be described as not being engaged with it, but I would disagree with this perspective. I am currently starting to find IB2 very hard. I am finding myself cash-poor (in the game) which is impairing my ability to progress, and the fights themselves are becoming more challenging. So when not actually playing, I am wondering in idler moments (e.g. walking my dog) if I need to restart my character and make some wiser decisions about how to spend my gold and how to upgrade my stats. I also checked out some websites to see if there were elements of strategy that I had overlooked. There were. This is all part of my sustained engagement with the game. However, in terms of the process model, it is tricky to characterise this aspect of my engagement: it is not related to particular challenges or feedback that the interaction is giving me. Rather, it is merely my sustained interest and desire to play games and, now that I've started it, this game.

This blurring is also seen in terms of disengagement. I stop playing on any particular session for reasons discussed, but I know that at some point, I will stop playing IB2. This may be because I complete it or the challenge is finally too much for me, which would fit with the process of disengagement. But there is another

effect related to the first point which is that I may simply drop it in preference to another game. My disposition to play games means that I may simply find another game and on occasion decide to play that over IB2, and if I repeatedly make many of those decisions, I may never play IB2 again. This is not so much active disengagement but more of a drifting off.

Of course, having stated that I would be motivated by empirically based research, I seem to have lapsed into anecdotal reflection. The intention though is to both illustrate the process model of engagement and to highlight places where the unit of analysis for engagement is unclear. This requires more careful consideration in this particular context. This variation in unit of analysis is sometimes reflected in GX research but not always or not always explicitly.

### 3 Starting to Play

The popularity of digital games alone indicates that many people have a strong inclination to play games. Since the early days of digital games research, the question has been into why do (so many) people play games. Philosophically, play has been held to be something inherent in human nature [34], indeed existing before humans, and therefore the desire to play is nothing to belittle nor even to be surprised by. However, digital games have always been marked out for the avidity with which they are played [76]. The recent proliferation of digital technology both in terms of devices and connectivity has also made it even easier for digital games to be played almost anywhere, at anytime and with anyone [32].

So if engaging with digital games is more or less expected, the question is not so much why do people engage but how do they come to be engaged with particular games. That is, what is it about specific games that makes them engaging? This has been interpreted within gaming research as understanding player styles but would also equate with player personalities, that is, the enduring individual differences between people that lead them to play some games over other games.

The earliest attempt to categorise player styles was probably Bartle's four suits [3] where he analysed the postings of players from a multi-user dungeon (MUD) and condensed their reasons for playing from their contributions to the discussion on this topic. For example, one of the types is Explorer who plays in order to find out as much as possible about the world. Bartle also called Explorers Spades after the suit from a deck of cards because they dig into the world. The four types could further be positioned on two axes: a player/world dimension and an acting/interacting dimension. Spades are driven by a desire to interact with the world in diametric contrast to Clubs (Killers) who are driven by a desire to act on players (lethally). Bartle then uses these categories to help inform what makes a good MUD.

This understanding of the motivations of players was expanded on and updated by Yee et al. [79] in the context of massively multiplayer online role-playing games (MMORPGs), specifically the paragon of the genre *World of Warcraft*. In many ways, MMORPGs are the successors to MUDs. Yee [78] developed a questionnaire

of 40 items based on Bartle's original classification and found ten underlying factors that grouped naturally into three categories: achievement, doing well in the game either against the achievements in the game or against other players; social, having the opportunity to interact with others in more or less structured activities; and immersion, moving from the real world into the game world (not just in the sense of engaging with the game). With three overarching dimensions, it extends and shifts Bartle's two MUD dimensions.

In Yee's framework, players can have a complex mix of motivations, but based on their predispositions, it is possible to predict to some extent their levels of achievement in the different aspects of the game. This suggests that players' motivations not only move them to engage with the game but also shape the way in which they engage. There have also been developments of these same ideas for role-playing games not of the MMO type [74]. It should be noted though that these results are better interpreted as correlation rather than causation. It might be that players who succeed a certain way with, say, *World of Warcraft* reflect this in how they describe their motivations to play.

Necessarily with this work, the game itself has been an important factor as all players in the different studies played the same game or style of game. At the very least, all of the games addressed so far involved the opportunity for role-playing. This is something which is not particularly present in other games, say *Tetris* or *Bejewelled*. This is not to invalidate these models of motivation as determining why people engage with digital games but rather to emphasise their scope. Interestingly, there do not seem to be similar motivational models or classifications for other genres of games. This may simply be a consequence of pragmatism: players of multiplayer online games are pretty easy to find!

Moving from a player style approach to player personality, a good place to start in understanding why players engage with certain games is to see the influence of underlying personality on playing habits. The Big Five [46] is a term for a commonly accepted quantification of personality. That is, this is not a way of understanding personality in particular contexts such as susceptibility to hypnosis [71], rather a way of understanding common sets of traits or dimensions of personality that are in some sense universal, having arisen independently from the work of many researchers [44]. The Big Five are openness to experience, conscientiousness, extroversion, agreeableness and neuroticism. A person's personality may be, to some extent, described by a set of numerical values on these five different scales and is understood to be a set of stable attributes that come into play when people act, evaluate or make decisions [44].

From this perspective, it makes sense that personality would influence the games that players choose and how they subsequently play them. Johnson and others have looked at this in a set of studies on how the Big Five relates to the genres of games that people play [37, 56]. They found some links, for instance, that extroverts prefer casual, music and party games, but that introverts prefer MMORPGs [56]. They have also found that different personalities correlate with different aspects of experiences while playing; for instance, extraversion correlates with the experience of challenge while playing [38] or with measures of competence/control [37].

Though it is appealing to think that personality leads to different gaming experiences, such results do need to be interpreted carefully for a variety of reasons. First, as the authors note, correlation is not causation, and it may be that players with different personalities experience the different genres equally or that the genres themselves are influencing their experiences. Further caution is needed because the correlations were all small,  $r < 0.2$ , which means that their effect size is very small,  $r^2 < 4\%$ , and these small effects were generally not seen in ANOVAs that tested group differences explicitly. If personality is having an effect on the motivations to play and the subsequent experiences that players have, then it is an effect that can easily be obscured by other factors.

Of course the Big Five is intended as a generic, overarching approach to personality which may be why it does not demonstrate strong effects of personality in relation to gaming behaviours. It may also be that, despite its popularity, it is not in fact an adequate description of personality [44]. More tailored measures of personality may be better suited to understanding the influences on players and why they play. To this end, the BrainHex instrument is intended to build and extend on the work of Yee and Bartle in order to produce a generic measure of player style that would have relevance for a much wider set of games, particularly beyond the RPG variants studied in earlier work [4]. The resulting model has seven distinct types of player that are further associated with underlying neurobiological responses. Some of the player types, like Socializer and Seeker, map directly to Bartle's types and Yee's motivations; some of the types like Survivor and Mastermind are specific to BrainHex (see table 15.5 in [4] for a full comparison). While this and the link to underlying neurobiology remains to be established [4], the types do seem much more likely to be relevant to understanding gamers and why they engage with digital games. Though links have been shown between BrainHex and existing personality constructs like the Big Five and the Myers-Briggs typology [51], the link to game engagement has yet to be established.

Though BrainHex is a promising development in understanding why players play particular games, I have to question the link to neurobiology. Ultimately, all experiences that we as humans are able to express boil down to neurobiology, so the need for a particular connection to particular chemicals or systems of chemicals lacks explanatory power. Some neurochemicals and some specific regions of the brain must be involved somewhere. At the same time, if, for example, the Socializer player type turns out to be completely unrelated to the oxytocin levels of players, I am not sure that this would invalidate the model. It seems to be setting the hurdle of validity rather high without any particular benefit.

Though personality types and player styles are potentially very relevant, they do not address the initial point in this section that regardless of personality or games, an awful lot of people want to play. The basic drive to play is not addressed by these models. To counter this and also to aim at general applicability like the BrainHex model, there are two approaches to understanding the desire to engage with digital games as arising from addressing basic needs of human nature.

Ryan and Rigby have drawn from extensive work in the psychology of motivation to promote the use of Self-Determination Theory (SDT) in the context of digital

games [61]. SDT holds that people are strongly motivated by feelings of autonomy, that is, feeling in control of their own fate; competence, the feeling of being able to achieve things; and relatedness, making connections with others. In their analysis, they show how games offer players all three of these experiences in a way that other things do not.

To support this understanding, the relationship between SDT and player experience has been studied using the Player Experience of Need Satisfaction (PENS) questionnaire which includes scales for measuring players' experiences of autonomy, competence and presence/immersion [62]. Like many studies that have subsequently been done, for example, [37], the analysis is primarily through regression or correlation which has the same problems as mentioned above in terms of correlation and causation. Generally though, effects seen are more substantial. This is undermined though in that the studies used to promote SDT are the same ones used to validate PENS. There is a strong degree of circularity here, and I am not aware of any independent attempt to validate PENS against the usual standards of psychometry [13, 44]. One of the original studies was done to compare PENS across two different games, one of which was commercially successful and one of which was not, and though results were favourable, it obviously lacks the experimental control where only a single variable is explicitly manipulated.

My reservations notwithstanding, SDT and PENS have had a considerable impact in the study of GX. And independent of the particular issues with PENS, SDT does provide a compelling account of why people like to play digital games.

In a way similar to which SDT draws on established work in psychology, Sherry and Lucas [68] draw on media research to understand digital games as having uses and gratifications like other media. The uses and gratifications framework however, rather than immediately offering reasons why people play digital games, is a generic structure in which to understand the individual, social and cultural impact of any media. It is more like a research approach than an existing theory. Within this approach then, Sherry et al. [68] set out to develop the set of theoretical, or potential, traits for game uses and gratifications. These emerging traits are captured in a questionnaire that has six scales: competition, challenge, social interaction, diversion, fantasy and arousal. These were shown to be predictive of the time players spend playing per week.

Understandably, the uses and gratifications framework shows similarity with the previous models. Yee's achievement could map to competition and challenge and immersion to fantasy. However, Przybylski et al. [58] make an important distinction that while there is overlap, SDT is a universal set of motivators that games may or may not fulfil, whereas the uses and gratifications are derived from people's conscious explications of why they play. They note that even when these gratifications are met, people may not exhibit persistent motivations to play because their underlying needs are not being met.

Though the uses and gratifications framework may be skewed because of this, it does address something that none of the other models address, namely, why people choose to play at a particular instance. That is, the other models talk about the unit of analysis as the game and why people choose to engage with particular games. By



contrast, the uses and gratifications has something to say about why people engage at a particular point in time. For instance, in the challenge item of the uses and gratifications model, there is the item “When I lose to someone, I immediately want to play again in an attempt to beat him/her.” And the two items of diversion are both about playing despite having other things to do.

### ***3.1 Summary and Questions***

Overall then, the point of engagement in digital games is well considered in the field both in terms of reasons for engagement with particular types of games like Yee’s work and with games in general through the uses and gratifications framework. However, such approaches do not step outside of the world of digital games. So, while they may describe what people get from playing, they do not indicate what draws people in the first place. Obviously a generic disposition to play is philosophically interesting but has no concrete implications: it is a background against which we need to differentiate individuals. General theories of personality are of some relevance, but both BrainHex and SDT set out to show specific elements of people’s make-up that leads to the need to engage with digital games and that digital games are able to fulfil those needs.

Arising from this analysis, there are clearly open questions. Though there has been a lot of interest in the motivations to play role-playing games, particularly MMORPGs, there do not seem to be other such detailed, empirical analyses of the motivations to play other styles of games such as puzzle games, first-person shooters and so on. It may be that such games do not have enduring, and thus findable, audiences unlike MMORPG, but then what are the motivations of such players to pick up games and move on from them? Indeed, what are the driving forces behind players choosing to initiate their engagement with any particular game?

As new, game-specific theories of motivation to play develop, it is important to establish their validity, not just as measurement scales but as predictors of behaviour [44]. BrainHex seems to be ripe for testing in lots of different contexts to see how the analysis of players may lead to a richer understanding of the experiences that players have in different situations. It could be imagined that any study that examines player experience could use BrainHex as a way not only to characterise the participants of the study but also to enrich any account of the findings. There is also an entirely separate project that could link BrainHex to the underlying neurobiology, which, while potentially fascinating, I am not sure is necessary for furthering research into game engagement.

By contrast, PENS needs substantial validation particularly as it seems to be gaining wide appeal as a GX measurement scale but without convincing conceptual underpinning. In particular, is it possible to develop specific manipulations of games that influence autonomy or competence and to see these effects in PENS? Part of this problem is to produce some PENS-independent mechanism of knowing that autonomy and competence in a game are being manipulated. From my experience,

players in a lab are pretty happy with almost anything they are asked to do. They seem to take even the oddest of manipulations (e.g. doing arithmetic while playing [54]) as all part of the fun. Of course, as might be expected and will be seen in the next section, relatedness in games is relatively easy to identify and manipulate.

These approaches to engagement are also essentially working at the level of the game and not at the instances of play. What are the driving forces behind why people choose to play at a particular time as opposed to doing something else? For instance, when faced with a free evening, why do sometimes people read, watch television or go out with friends and sometimes choose to play digital games? The uses and gratifications approach gives some indication of why people might choose to play as a diversion from other activities, but, outside of this, little has been done in this area. One interesting line of research has shown that playing games can act as a “depressor” for people after work, helping them to recover from the demands of the day [20]. There is much therefore to be done around this particular meaning of the point of engagement.

## 4 Engagement While Playing

It seems trivial to say that the whole point of games is to be engaged with. Games exist for the purpose of being played, that is, so that players might be engaged in playing them. Though the outcomes of games may have substantial impact, say in prize money or kudos, the actual play need have no external value whatsoever [39]. It is the act of playing and the experiences obtained from that engagement that people play for.

The incredible attraction and success of digital games as engaging activities have raised the question of whether such massive levels of engagement might be fruitfully harnessed to more productive ends such as learning, politics, crowdsourcing or other productive activities. It is this thinking that underlies serious games [47] or gamification [24] where through playing a game, something else of value outside of play is also achieved. Though these provide intriguing possibilities, it is not our concern here as such teleological approaches to gaming add a further complication to understand what it means for people to engage in the activity. Here, we consider simply what it means to be engaged in digital games for its own sake.

In this sense, engagement in gaming or indeed any experiential outcome from a game is very pure, being the end in itself of the game. It is therefore not surprising that a lot of research into gaming looks at these experiential outcomes. Unswervingly, engagement appears as a core element of GX whenever gamers talk about their experiences, for example [12, 57]. This is not to say that engagement while playing is a wholly understood concept. In their systematic review, Boyle et al. [9] demonstrate that there are several concepts that overlap around the notion of engagement, particularly flow, immersion and presence as well as engagement itself. And though there is clear overlap, there are conceptual distinctions between these different terms as detailed with particular reference to immersion in [15].

What does it mean, then, for players to be engaged while playing digital games? Turner [73] considers engagement generally as an alternative to user experience in the study of all interactive systems. In this context, engagement while playing arises when (1) games offer affordances for action to achieve goals, (2) the achievement of goals has positive emotional outcomes and (3) it has a wider meaning to the players either in terms of their identities or goals outside of the game. In other words, (1) players can play the game, (2) it makes them happy to do so and (3) it means something to them. In this formulation, goals are central to defining engagement, but what are the goals of playing digital games? With productive systems, for example, a website to buy books or book flights, activities with the system have implications outside of the activity. But with games, is the goal simply to play? If so, engagement simply collapses to the act of playing, which is not necessarily the same as being engaged in play: it is possible to be playing without particular engagement. If the goal is determined by the gameplay, for example, complete the game or win without losing a life, then it is harder to see how engagement fits with the wider meaning for players: games work because, in the magic circle of the game [63], actions have their own special meaning. There are also parallels between Turner's notion of engagement and what it means for something to be a game, for example, [39], which would also collapse engagement simply to the act of playing a game. Thus, while Turner's formulation attempts to bring an overarching structure of engagement to lots of activities, in the particular context of games, it ends up being rather simplistic.

By contrast, the process model of engagement that underpins this structure offers several attributes of engagement while playing:

- Control
- Challenge
- Feedback
- Aesthetic and sensory appeal
- Attention
- Awareness
- Interactivity
- Novelty
- Interest
- Positive affect

These are seen time and again in the operationalisation of engagement through the various questionnaires that are used to capture engagement in digital games. For example, immersion as defined by Jennett et al. [36] identifies five constituent components of immersion including cognitive involvement, emotional involvement, control, challenge and real-world dissociation. These map well onto the above attributes of engagement (if not always precisely). And where the subcomponents of a questionnaire do not so obviously map to these attributes, the individual items generally do. For example, Brockmyer et al. [11] have the subscales of the Gaming Engagement Questionnaire (GEngQ) as immersion, presence, flow and absorption (which sounds rather like engagement, engagement, engagement and engagement to me). However, the individual items of the GEngQ do map to attention, "If someone

talks to me I don't hear"; control, "Things seem to happen automatically"; and so on.

Interestingly, though many people use flow with reference to engagement in digital games [19], the general view of engagement is that it is distinct from flow. This is because flow has a very clear meaning [22] and outcomes. Engagement alone does not seem to be sufficient to be called flow partly because of the lack of clear goals in some engaging tasks [55], the fact that some engaging tasks (including aspects of gameplay) do not require high skills and high challenge [73] and simply because gamers clearly identify qualitative differences in their own experiences that suggest that flow is not the norm [12]. Indeed, flow is intended as an optimal experience where players are "in the zone" [19], but in many situations, players are engaged without the all-consuming experience of flow. And simply calling this graded, less intense experience of engagement "flow" does not make it so. Thus, without this care for definitions, there is much conceptual wishy-washiness around the use of the term in the context of digital games, something which is not always addressed, for example [26, 52].

So if the process model's attributes are a reasonable starting point for engagement in digital games, the question then becomes how do they come together to form engaging experiences for players? Here, there is a very large amount of work done, and it would be practically impossible to do anything more here than give a flavour of it.

#### ***4.1 Playing and the Process Model Attributes***

Controls, particularly with the recent innovations in controllers like Wii and Kinect and the opportunities of mobile devices, have had a lot of interest. The whole body is now a potential controller for games, and this alters not only what players can do but the social aspect of play [6]. Related to this is the notion of naturalness [70] where the actions of plays correspond to the natural actions a person might make if engaged in the real-world activity, for example, swiping a controller around like a sword or using a steering wheel for a driving game. Naturalness however is both tricky to define and does not necessarily lead to better engagement [16]. It may be that in the realm of controllers, some broader theories of interaction are needed. An important theory of interaction in mainstream HCI is instrumental interaction [5] in which any interaction between a user and a system is mediated through a set of instruments, and those instruments can be positioned across a set of dimensions that characterise how they work. This might lend the richness needed to describe game controllers and hence more easily map control in games to subsequent engagement.

Also, it is beginning to emerge that it is not necessarily that players require perfect control to play but rather that they know that, in principle, they could have an effect even if they are not skilled enough to bring that about. This is the concept of effectance and contrasts with unreliable controls where players try to do something but are unsure if their actions will have an effect [43].

Challenge is also important, but understanding what challenge is both in different games and for different players is not trivial. While many papers talk about challenge, it is not clear which aspects of a game's challenge contribute to engagement and which impair it [21] and how varying challenge over time results in the best experiences [59]. It is perhaps overly simplistic to lump the challenges that games can offer under one heading. Brandse and Tomimatsu [10] propose that challenge should be considered not so much from the perspective of difficulty to the player but from the perspective of designing for challenge. They give six characteristics of challenge, which may be distilled into saying challenges are both achievable and fair. That is, players can simply through playing learn or acquire the resources to overcome a challenge, and their ability to overcome the challenge is not artificially impaired by the game. Of course, through taking a design perspective, the question then becomes what the impact on player experience is through emphasising different aspects of the challenges in a game.

Feedback is essential in games to allow players to know how they are doing and, as such, features strongly in any heuristics around game design, for example [27], as well as being an important constituent of flow [22]. However, feedback is not widely considered in the GX literature though it does have an impact on perceived engagement [35]. This may be because feedback is simply a given in all games and there are many typical ways of presenting feedback that have established (if not proven) efficacy. However, with the move to gamification, feedback mechanisms like badges, levelling up, score and so on become very important [80]. There is much to be established in this area.

Digital games can present a visual and audio feast to the player with astonishing virtual worlds (such as drew me in to IB2) and rich musical scores that are appreciated outside of the context of the game [14]. Despite the enormous efforts put into achieving high definition and realism in certain sectors of game development, it is not clear that these increase engagement [30]. For instance, Andersen et al. [1] showed that differences in aesthetics, specifically animations, increased the length of time players played and made them more likely to return, both indicators of increased engagement. By contrast, music and sounds in the game did not show similar effects. Nonetheless, music can increase the immersion in the game [15], but only provided players like the music [64]. Sounds in a game can alter players' experiences, including their sense of engagement [50].

Attention to a game is obviously necessary for engagement to occur. But Jennett [35] has shown that the psychological sense of attention is not enough to account for immersion. Specifically, when playing a game with negative feedback outside of the players' control, players are less immersed but perform equally well, indicating comparable levels of attention to the game. Also, it is necessary to consider the level of attention that is related to engagement. With several students, I have looked at immersion in relation to inattentive blindness [69] and inattentive deafness [23] and found no link to these phenomena in perceptual attention and levels of immersion (forthcoming). This would suggest that immersion and engagement as a user experience are happening at a remove from low-level perceptual attention. So

while attention is a trivial prerequisite for engagement, it is clearly not in itself a sufficient description of engagement.

Similarly, awareness of factors external to a game diminishes with engagement. Players often report less of a sense of awareness of their surroundings and of time passing [11, 12] which are characteristics of engagement more generally, for example, when in flow. This is supported by the work of Jennett [35] who showed that more immersed players are less aware of external visual and audio distractors. However, extensive studies by Nordin [53] have failed to produce any relationship between immersion and time perception, as measured through a variety of established techniques [7]. This finding is consistent with a small set of existing but less controlled studies that motivated Nordin's work [72, 77] where sometimes time perception did change and sometimes it did not.

There is therefore a poorly understood relationship between established notions of engagement like immersion and flow and the actual attentional processes involved. Whereas the idea that engaged players lose a sense of their surroundings is seen in experiments, the loss of a sense of time is not. The methods used to measure time perception are weak mostly because people have a poor sense of time, particularly over the time scale of minutes and hours used in experiments and in actual occurrences of play. But then if players are saying they are losing a sense of time, what are they then referring to? This is an established feature of flow. Is it that in flow something more intense is occurring that really does interfere with time perception that does not happen in more prosaic engagement? It may be that the way forward is to more actively seek flow experiences in games.

Turning to the remaining attributes of engagement, these are perhaps less explicitly explored in digital games research. Interaction and interest are perhaps assumed attributes of playing a game but rarely explicitly considered, except indirectly, say through controls or motivations. Novelty however is perhaps more interesting, but I am not aware of it having been studied under that name. There is both novelty within a period of engagement which may correspond to the introduction of new game elements or even new challenges. IB2, for instance, has increasingly powerful weapons and armour to buy which is definitely part of its hook to keep players invested. But some games have almost no novelty. For example, traditional Tetris has no new elements beyond the first level, and the only novelty is the increasing speed of the blocks. This is a rather paltry form of novelty, if such it is, yet the game is certainly able to be engaging.

This leaves positive affect as an attribute of engagement. In the context of games, it is tempting to equate this with enjoyment or fun. Both of these are tricky concepts though. Mekler et al. [48] have conducted a systematic review of enjoyment in digital games and it does suggest that enjoyment is not necessarily associated with cognitive involvement. And fun has the implication of aimlessness that games rarely possess [8]. It may be that pleasure is a more important concept for a positive gaming outcome, but even highly engaging games can be essentially frustrating experiences, for example, the game *Flappy Bird*!

## 4.2 *Pushing the Process Model*

Though the process model does offer a good account of engagement as seen widely in the GX research, it is worth considering how completely the GX research maps to the model. As noted earlier, the process model is somewhat agnostic to the unit of analysis. GX research by contrast is quite clear about what it considers to be engagement, namely, the experiential outcome of a session of play. Almost all studies involve players playing certain games for some period of time and then measuring the outcomes for the whole period. There are two ways in which this narrow view of game engagement perhaps omits important aspects of the overall process of engagement.

First, within any particular session of play, players may feel an ebb and flow of engagement [12], and this is explicitly represented in the process model. However, it is very challenging to see this when relying on questionnaires, like PENS [62] and the Immersive Experience Questionnaire [36], which, at best, only function as aggregated measures over a protracted period of play. And if administered too frequently during a session of play, questionnaires could impair the engagement they are intended to track.

Different, less obtrusive measures of engagement may offer more fine-grained analysis of engagement while playing; in particular, there is the potential in the use of objective physiological measures. Eye tracking, for instance, may be correlated to immersion, but it was found to offer only a coarse measure in relation to the reported subjective experience [36]. Psychophysiological measures have been used to see the emotional impact of specific in-game events on players, for instance, when players die [60]. However, physiological measures are far from definitive, so while they are appealing in the detail they potentially offer, they are best used with other measures like questionnaires and game logs in order to fully understand the subjective experiences that they represent [49]. In this sense, we are still a long way from seeing how engagement varies within a single session of play.

Secondly, game engagement, as seen in my illustration of playing IB2, can be protracted beyond the playing of a single session. Players not only progress through games across multiple sessions but also engage in extra-game activities like reading online tips, creating new content [45] and posting YouTube videos [14]. There are also hidden activities like players thinking about the game while not playing. Although there is some research looking at what happens in these activities, little has related this back to the experiences had by players. In particular, does engagement via these extra-game activities influence the subsequent engagement experience of playing the game? Clearly reading up “how to play” FAQs could lead to spoiling the experience (hence the term “spoilers”). But what about less broad-brush issues like when a player uses a cheat, like a mod or a hint, to surpass a single, stubborn obstacle [29]? This could lead to a much longer period of engagement that would otherwise not have occurred. This extra-game aspect of engagement seems to be wide open.

Contrasting the process model of engagement with GX research, a very notable omission is the role of social play. It arises as an important motivator to play as seen in both the SDT and the uses and gratifications approaches to digital games discussed earlier. It is also talked about by players as an important constituent of playing [57], something which comes through in studies of engagement in relation to social play. Players are more engaged when they think they are playing other people [21, 28] even if they are not co-located or able to have direct interactions except through the gameplay. When thinking more carefully about what it means to play with or against other players, it is clear that if your co-players do not engage as much as you, then it is possible that you are also unable to engage fully. Thus, there is a degree to which engagement must occur as a group, something Kaye has identified as group flow [42] (though as you might guess, I am not sure it really is flow). This may be able to account for an effect that we have observed in studying social play in team-based competitive games where players who are playing another team of real people experience increased collaborative presence with their own team (forthcoming). The engagement with the competitors may increase the engagement the team has with itself. The results so far are not definitive but are suggestive of the dependence of engagement on the collective experience of the players.

The process model then is a good starting point for exploring engagement in the context of existing (and missing) GX research. But also it is not the last word, as with any model, as it necessarily simplifies or omits details according to its focus. However, social play does seem to be an important attribute of the process of engagement that ought to be included in the model, at least in the context of digital games.

### **4.3 *Summary and Questions***

Much gaming experience research focuses precisely on how players engage with games through the process of actually playing. The research is wide ranging and covers many attributes of the process model but also adds to that particularly with consideration of social play. Necessarily though, with the enormous variety of games and controls that are available, there is room to revisit everything addressed so far in different games, genres, platforms and contexts.

Even though the attributes are important, it is also clear that none individually is the whole story. What then is the collection of attributes that is sufficient for engagement? Which are necessary? And are there minimal levels of both attributes and sets of attributes for engagement to be really taking place?

Alongside answering such questions, it is probably more important to move away from general meanings of these attributes to more theoretical conceptualisations of them. This would make generalising from particular studies easier while also clarifying what it is about games that lead to different experiences of engagement. For example, in control, rather than fixate on particular controllers, research might aim to develop theories of control like effectance or instrumental interaction. But



then this opens up lines of research on the theories that are being offered. For instance, is instrumental interaction an appropriate way to conceptualise control in digital games [16]? Similarly, does Brandse and Tomimatsu's [10] categorisation of challenge map to meaningful differences in engagement?

Engagement while playing is still very much analysed as the outcome of a particular session of play. What about the ebb and flow of engagement within a single session? There are methodological challenges of how to access that without destroying engagement along the way. Physiological measures seem promising but are far from being definitively associated with particular experiences. Looking beyond single sessions of play, how do players sustain their interest in a game? And how do these extra-game activities influence the engagement in play experience? Though extensively studied already, engagement while playing is currently far from fully understood.

## 5 Disengagement and Re-engagement

It is generally assumed that players do, at some point, stop playing a game. There have been tragic cases where failure to stop has resulted in the death of the player, but these are extreme cases<sup>1</sup> and mercifully few. Aside from these, there has been the recognition that playing digital games can have many of the attributes of addiction [31]. However, there is an emerging view that to call excessive gaming "addiction" is perhaps too strong. Unlike other addictions, say with gambling, alcohol or drug use, digital gaming does not have the associate pathologies [17]. There is evidence that, in heavy gamers, scoring on addictiveness traits correlates strongly with the level of engagement that players experience [67]. In this sense, addiction might just be a consequence of high engagement, but there does seem to be further evidence of a distinction between high engagement and problematic usage [18]. And interestingly, where there is high usage suggestive of addiction, it seems that games can be playing a fulfilling role in players' lives [61]. This offers a different support to the SDT approach whereby players are playing in order to obtain satisfaction of their basic needs—games far from being the source of a problem are (at least to some extent) part of a solution.

As stated though, despite extensive playing of games by large proportions of the population and very high usage by a smaller proportion, games are not the be-all and end-all of people's lives. Games are picked up, played, enjoyed and put down. Given the emphasis on engagement in GX research as being the particular period of playing a game, it is not so surprising that little has been done to understand what brings a gaming session to an end.

O'Brien and Toms noted that frustration while playing could lead to a person finishing playing [55] because the challenge is too high or the person is simply

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<sup>1</sup>For example, <http://news.bbc.co.uk/2/hi/technology/4137782.stm>.

making no progress. The extreme version of this is “rage-quitting” where the player quits in the middle of play because of being so angry with the game or the other players in the game.

Nordin has also found results that support those of the process model. In understanding how players perceive time, he conducted a grounded theory with players about their management of playing periods and developed a theory around self-consent [53]. It seems that players fit playing games into their lives such that normal events mark the end of session, for example, a bus comes or the oven pings that dinner is ready. Players also do not just wait for something to happen to tell them to stop playing, but rather they define the end point when they start as part of the process of giving themselves consent to play. At suitable junctures in the game, such as the end of a level or winning a race, players may plan to stop. At those planned stop points, there can be a further process of giving self-consent which may result in them stopping to play or in them playing longer than originally intended. In this theory, both disengagement and re-engagement are integral parts of the decision to play, though other events may intervene to bring about disengagement.

This theory presents quite a high-level, conscious view of engagement which perhaps fits with some of the results seen in attention earlier. There seems to be an active choice both to become engaged and to remain engaged, and this is independent of low-level processes such as attention. However, it may be that at a finer level of granularity, there are points during play at which a player will not ever choose to disengage and that these are connected to unconscious processes.

Schoenau-Fog is notable in directly addressing what brings gamers back to games. He has drawn in the idea of continuation desire, the intrinsic desire of gamers to play more, as a way to understand the re-engagement process [66]. Understandably, the process model he produces has much in common with that of O’Brien and Toms. External motives such as a novelty or social play bring a player to start a game, and they set themselves objectives, such as win a race, which they then engage with. Their activities lead them to achieve their accomplishments, or not, and the subsequent affects lead to further play or disengagement.

In continuation desire, objectives are key drivers of play. This is not entirely certain to me. Players may well report having clear objectives, but did they have them at the point of engagement or is this an a posteriori justification? And if objectives are necessary, could the inability to set new or interesting objectives be a reason (or *the* reason) to entirely disengage from a particular game? This may also be a summative process where the objectives of the current play session are compared with those of previous sessions (not necessarily explicitly). Players may then make decisions about continuation not just on the basis of the current session, whether successfully meeting objectives or not, but across the totality of their playing experiences, possibly even extending to similar experiences with different games.

Affect is also strongly linked to disengagement. Positive affect leads to continuation desire (and re-engagement as in the process model), but substantial negative affect leads to disengagement (though some level of frustration can be a spur to continue). So what level of negative affect is motivating? Or are there different

types of negative affect that lead to differing continuation desire? For example, being fairly beaten due to lack of skill is different from being unfairly beaten due to dice that always roll against you or a trick that your opponent suddenly produces. Are such distinctions integral to continuation desire?

Even accepting a general continuation desire in players, Nordin's theory perhaps complements this by saying that even when the experience is positive and successful, players may override their desire to continue with a refusal to (self) permit further play. They prioritise other activities over playing further. How do players make such choices and when do they break down?

Thus, the theory of continuation desire has some merit in the context of digital games. It meshes well with the process model of engagement that has been used here, and it at least makes progress towards understanding disengagement and re-engagement. However, it is far from widely validated and, with Nordin's theory, opens up questions about how it plays out in the practices of individual players, individual playing sessions and across games.

## 6 Methodological Note

With a focus in this chapter on empirical studies, the results discussed here necessarily come from particular styles of studies. Most that relate to engagement while playing are lab-based studies, that is, experiments that look a lot like psychology experiments with dependent variables, an experimental manipulation and a task to do (play a game). Survey studies are also strongly represented, particularly in the motivations to play work where questionnaires are used to link personality to the experiences of play. These bring a particular slant to the study of gaming experience generally, including engagement, that should be noted.

Surveys often lack strong control as it is impossible to know the circumstances in which a person completes a questionnaire. This may simply add to the general noise of measurement or it may have particular influences that skew the results. It is hard to be sure. Furthermore, surveys are only self-reports on recollections of experiences. They are prey not only to what people recall but also to how they want to represent themselves. And in the end, at best, the analysis can only show that some measures correlate with others. It is tempting to make causal associations, "clearly personality proceeds the gaming experience", but this is false. Personality may be causally connected to gaming experiences or there may be underlying factors not measured that influence both.

Experiments offer the control that surveys lack. However, they bring with them their own problems, particularly in the context of digital games. One such problem was seen above with measuring GX through the use of questionnaires and other techniques, all of which bring their particular problems. Another major problem with experiments is the lack of ecological validity. The duration of play in experiments is typically short and rarely more than 20 min. Play takes place in a controlled environment. Here at York, we make some efforts to do our experiments

in our HomeLab so people play games sitting in a room that looks like a living room with a comfy sofa, an ordinary television, bookcases of books and so on. But at the end of the day, even this is still a lab and participants are surely aware. Further, contextual features are also absent, for instance, the motive to play is that the participant signed up for a study. Overall, even with the best of efforts, playing a game in a lab is not like playing a game in everyday life. Kaye [41] calls this methodological mayhem. She also notes the problems of sampling bias where opportunity samples of undergraduates are used.

However, I think the consequences of the problems with experiments are not so severe. Yes, experiments are not ideal, but no experiment, regardless of field of study, truly captures what happens in the real world or everyday life. Nonetheless, disciplines like physics, chemistry, psychology and so on make progress through the steady accumulation of knowledge that experiments permit. An experiment is not intended to be like the real world but rather to isolate a phenomenon that would otherwise be hard to see [33]. And as a consequence of isolating it and thereby studying it, we are able to develop mastery that allows the phenomenon to be exploited even in real-world situations. To take an example from physics, until Faraday produced the first, simple electric motor as an experimental device, there was nothing in the natural world that exhibited behaviour anything like that (with the possible exception of the Earth's magnetic core which required Faraday's experiments to be understood). His experiments led directly to the theoretical understanding of electromagnetism and the daily exploitation of it in motors and dynamos which constitute fundamental technology in modern life. This is not to say that GX experiments are destined to be so profoundly important (though I live in hope) but rather that, despite experiments being unrealistic in some ways, it is only through such experiments that the important underlying relationships that drive GX can be discerned.

## 7 Conclusions

Research on engagement in digital games is thriving. This perhaps reflects the centrality of engagement to the formulation of gaming experience. The process model of engagement has helped to structure where research is currently focused. Not unsurprisingly, the process model has a good fit with existing research as it was developed based on data from players of digital games. However, it is also clear that the model is somewhat agnostic to the unit of analysis that is being considered. There is both engagement with a particular game and engagement while playing that are distinct considerations in this context. The research that addresses the point of engagement is often concerned with the former and the research on engagement while playing with the latter. Furthermore, disengagement is not extensively considered at either level of analysis. The solution may be to be clearer about which analytical level of engagement is being considered, but it may also be that, at least in the context of digital games, the process model of engagement needs

to be enhanced or adapted. I would also claim that any questions that arise in the “pure” context of engagement in digital games most surely must have more complex analogues in other domains. But how such issues manifest themselves and whether there is unified solution in terms of a single process model remains to be seen. There is much work still to be done to really understand what it is about games that makes them so engaging.

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