Gemma Lucy Smart

(Internet) Gaming Disorder: Fact or Fantasy? A conceptual analysis of a new psychiatric classification.

School of History and Philosophy of Science
Faculty of Science
The University of Sydney

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Abstract

(Internet) Gaming Disorder ((I)GD) is one of the most problematic psychiatric disorders to be recently proposed. It is noted as a condition of further study in the DSM-5 as ‘Internet Gaming Disorder’ and is likely to be included in future editions of the DSM pending further research. Both Gaming Disorder and Internet Gaming Disorder have been added to the ICD-11.

In this multidisciplinary conceptual analysis, I have combined a philosophical approach with current research in psychiatry, psychology and neuroscience, game studies, and economic theory in the area. Presented is a Picoeconomic and Neuroeconomic (PE/NE) model of addiction centred on Disordered and Addictive Gambling. I then begin application of the model to the evidence presented for the (I)GD. I argue that it is possible that some individuals do experience a clinical addiction when they engage in specific activities within games. However, the broader conception of all (video)gaming as socially undesirable and addictive is incorrect and potentially damaging.

By pathologising game play, the psychosciences could be engaging in subjective social judgement of a leisure activity enjoyed by many millions of people of all walks of life, that forms an important part of the personal and social identity of many. Combined with negative media attention on (I)GD, this is contributing to the potentially problematic framing of such behaviour as disordered. This has direct implications for the conceptual understanding of (I)GD in psychiatry; for clinical treatment of those presenting with problematic gaming behaviour; and more broadly for game player’s self-conception – both as individuals and as a group.

(I)GD does not currently fit the PE/NE model because it tends to consider games as a singular category or set of categories. Gamers are grouped according to their negative psychological symptoms, rather than based on their gameplay. It is unclear at this point if grouping gamers in the current way makes conceptual sense, as they may not be engaging in the same behavioural regularities. Additionally, if (I)GD is a discrete disorder, it should not be better understood as a coping mechanism associated with underlying psychosocial or contextual issues.

That a minority of gamers experience negative outcomes from excessive gaming is not in dispute. In fact, such negative outcomes are crucial for understanding any individual gamer behaviour as potentially disordered. However, it is not yet clear that these problems should be attributed to a new disorder. Because of the diversity of both games and gamers, application of the PE/NE model to gaming would require specification of the structural mechanisms of games, and how gamers interact with them. I argue both that (I)GD is a good candidate for conceptual sound application of the PE/NE model of addiction, and that we should be cautious about reifying it as a legitimate, discrete disorder.
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CHAPTER ONE

Introduction, Overview and Methodology

Introduction

In the 1980s BBC series Red Dwarf, there is an episode in which the characters play a total immersion videogame called Better than Life. True to its name, Better than Life provides players with the ultimate in possible realities – your wildest fantasies and deepest desires come unfortunately true. To make it easy for you, the game is able to look into your brain and see what you want. You don’t have to ask, it just happens.

Red Dwarf – both the BBC series and the original books by Grant Naylor – were a work of science fiction. However, like with all great science fiction, there are echoes of a future reality that is potentially on the horizon. The idea that a videogame could be so good as to far surpass the experience of actually being in the real world is something we’re starting to grapple with in the context of today’s technology. In this context we’re also starting to consider the implications of this for the health of humans. We are asking the question: are videogames addictive? In the Red Dwarf novels, Naylor includes depictions of Better than Life junkies, living in squalor, slaves to the game. In this thesis I take up some of the questions that Naylor was also interested in – questions concerning the possibility of game addiction or disordered game playing, and what this means for how we wish to view videogames and their place in society.

If games can be addictive, this is something we should be at least interested in, if not concerned by. It is not my contention that games are ubiquitously addictive, nor that they necessarily have a generally negative effect on human psychology. However, my starting point was somewhat different. I was drawn to this topic as a Warcraft widow, an affectionate term used to describe someone who has experienced a relationship breakdown due to excessive game-play of World of Warcraft (WoW). My (ex) partner found WoW incredibly engaging for sure, but whether his use of it was pathological or even addictive is unclear (Smart, 2012). As a one-time gamer myself, I have experienced first-hand the way that games such as WoW are not only entertaining, but can become a way of life. The narrative of videogame addiction features regularly in popular culture and even among gamers themselves. However, teasing out the fact from the fiction is part of the work of conceptual analysis. If gamers are using games in ways which they and others consider harmful, it is important that our conception of that harm accurately reflects the reality of their experience.

In this thesis I will deal primarily with the concept of ‘addiction’ both in the clinical or formal context, and in a folk sense. Addictions are generally interesting because of the distinct and often detrimental impact they can have on the life of the addict, and the lives of those around them. As Nyquist Potter (2011, p. 201) rightly notes: “There is no doubt that the addiction construct has been seized upon and utilized in popular culture as well in theology and medicine”. Certainly it could be said that everyone either suffers from what they would label as some sort of ‘addiction’ or knows someone who does. A simple web search will make it clear that there is a widespread fascination with repetitive and compulsive behaviour.
Addictions are philosophically interesting because they raise questions of rationality, motivation and responsibility, but there is dispute among philosophers about the best way to approach them. The way(s) in which we interact with the concept vary depending on our setting, and our understanding of the term has direct implications for our experience of it. This is particularly relevant for gamers who self-identify as addicts, something I will consider in detail.

Problematic videogame play does not neatly fit into our existing understanding of addictive behaviour. At present both the Diagnostic and Statistical Manual of Mental Disorders (DSM) and the International Classification of Diseases (ICD) have included something like pathological addiction to games in their latest editions. The American Psychiatric Association (APA) took the lead on this, including it as Internet Gaming Disorder (IGD) in Section III as a “condition warranting more clinical research and experience before it might be considered for inclusion in the main book as a formal disorder” (American Psychiatric Association, 2013). The World Health Organization (WHO) has now added it as an entry for its 11th Edition of the ICD as Gaming Disorder (GD), with both online and offline definitions (WHO, 2016a; WHO, 2016b; WHO, 2016c). All entries have received a wide spectrum of both praise and critique.

While neither the DSM-5 nor the ICD-11 explicitly use the word addiction, the conceptualisation of gaming disorder reflects a field of research that has focused squarely on addiction for around two decades. This is evident in the wide range of terms used to describe Internet and game use that is considered problematic — from the very broad Internet Use Disorder (IUD) and Problematic Internet Use (PIU) to the very narrow Internet Addiction (IA) and Internet Gaming Disorder (IGD). Addiction is a type of disorder, but the use of the word ‘disorder’ instead of ‘addiction’ generally reflects a conceptualisation of problematic gaming as unique from, or broader than ‘addiction’ in general. I will return to the history of this in Chapter 2. For ease I will use (Internet) Gaming Disorder ((I)GD) to denote discussion across the whole category, with a focus on gameplay in particular. I will sometimes use the terms ‘excessive’ or ‘pathological’ to denote gameplay that is considered beyond ‘normal’ limits, and/or is identified as the cause of negative psychological outcomes respectively. I will be specific regarding terminology where necessary.

Acceptance of behavioural addictions at all is relatively new, and most research on behavioural addiction, particularly within neuroscience, has focused on gambling. While some of this research may apply to videogaming, it is not a neat fit. In this thesis I will explore what I consider to be one of the more powerful approaches to understanding addictions, the Neuroeconomic (NE) and Picoeconomic (PE) account provided by Ross and his collaborators in ‘Midbrain Mutiny: The Picoeconomics and Neuroeconomics of Disordered Gambling’ (2008). This account will serve as a starting point with which to consider the conceptual basis of videogame addiction, and indeed (I)GD more generally.

My contention will be that videogames can indeed be used in ways which are problematic or harmful and that a NE and PE approach could be useful for distinguishing between pathological
and disordered behaviour. Gameplay that consumes a player’s life, or is heavily detrimental to their overall health and wellbeing, is clearly a concern. However, I will argue that the jury is still out in terms of determining whether that harm or detriment results from a condition that is disordered or addictive. Videogames are one of the playgrounds of today and while it is tempting to dismiss them as mere ‘mindless entertainment’ it is important that we acknowledge the significant role they play in society beyond this surface-level approach. Games are richly diverse virtual spaces that allow players to engage in a range of activities including problem-solving, collaboration, artistry and competition. Gamers come together to achieve complex goals and develop wide networks and strong relationships both within games and ‘in real life’ (IRL) (Smart, 2012).

For research in gaming disorder to be conceptually sound, it must reflect the diversity inherent in gaming. It must acknowledge the wide range of games and gamers. And it must avoid unnecessary negative judgment of a pastime shared by hundreds of millions of people worldwide without a true understanding of what that pastime entails. Games may sometimes be ‘better than life’, but they can also be a substantial part of life without that being a symptom of a disorder. My work will argue that more informed and rigorous research needs to be done into problem gaming, but with these caveats in mind.

I will also suggest that in the meantime describing gamers as addicted to games may itself be harmful. Even gamers that are clearly struggling with their game use should avoid attachment to the narrative of addiction and all that it entails. To view games as either ‘harmful’ or ‘helpful’ is too simplistic, and at the moment our conception of gaming disorder is too messy, too unsure. While there is a lot of research in the area, its conceptual basis is inconsistent and in many ways problematic. It is of variable quality and there is a lack of consensus on the basic elements of the disorder (Aarseth et al., 2016). It is my intention to contribute to some conceptual ‘cleaning up’ and challenge some of the troubling assumptions in the work on gaming disorder thus far.
Aims

Before I begin with my critique, it is worth outlining my aims and methodology. What, if anything, is this thesis aiming to provide to the field of research around (I)GD or addiction?

My aim is to consider the problem of addiction within several frameworks, by using the specific case study of Internet Gaming. I do not aim to settle problems relating to the aetiology of addiction, or even addiction to Internet Games, merely to discuss the information that’s available and its possible implications for philosophy and psychiatry. That said, my work does extend beyond this narrow focus. The claims I make are directly relevant to work on (I)GD in psychiatry, psychology and neuroscience as well as related fields such as game studies and sociology.

This thesis aims to explore a phenomenon starting with a philosophical perspective, but does so carefully. I incorporate work from the sciences and social sciences, acknowledging the strength of such an approach. Empirical work is used to inform the philosophical, and vice versa. My aim is to show one possible way to conceive of (I)GD, a way that I will defend as conceptually rigorous. From there I will highlight some of the limitations of work in the field so far.

In particular, I aim to step back from work in psychiatry, psychology and neuroscience and address the lack of cohesion in current research of (I)GD. It is my contention that work thus far has suffered from a grievous lack of understanding of the complexity and diversity of both games and gamers. It is sullied by negative judgment of gameplay activity, judgment which is problematic in terms of providing sound conceptual foundations for research. My aim is to show that more research needs to be done into problem gaming, but this research needs to be informed and conceptually sound.

Ross, Sharp, Vuchinich & Spurrett (2008) have given us an account of what may indeed be the fundamental case of addiction, gambling, it is still uncertain as to how exactly (if at all) this case will be extended to other behavioural addictions such as that in question, (I)GD. Working on a case-by-case basis seems somewhat laborious; it would certainly be more useful to psychiatry, as well as philosophy, if some general requirements for addiction, and equally disorder and disease, could be defined. This does not require a radical form of reductionism:

“...one need not be in the grip of general ideological reductionism to acknowledge that when a diathesis and associations with fundamental abnormalities of a biological nature can be demonstrated for a psychopathological construct, the way in which the construct is used should be reconsidered in light of new medical and policy prospects” (Ross et al., 2008, p. 162).
A final note, on audience. In having such a broad audience, I have included some discussions and explanation within my thesis that will be considered simple or basic by any author versed in the specific field I am engaging with. Bear with this. It is necessary for me to provide a broad foundation for the claims I am making. Equally, some sections may be technically complex and hard to follow. I have attempted to make these as clear as possible and used examples and illustrations where I could. A glossary is provided at the end of the thesis to help with the many acronyms I will present.
Methods

My method is cross-disciplinary, and takes its direction primarily from Flanagan (2011, 1995) although in a somewhat adapted form. In order to critique the idea of problematic gaming I will require a multifaceted approach. As primarily a Philosopher of Psychiatry, my natural starting point is to start with the obvious. In the same way that Schroeder (2004) approaches the concept of desire, in order to understand what (I)GD is, I will start with its obvious features, and then attempt to identify the source of these features. This will mean I begin with the ideas of disorder and addiction, before I consider (I)GD more specifically.

There is a tradition in both the philosophy of science and the cognitive sciences of taking a multifaceted approach to any subject matter we engage with. It is uncontroversial to assert that there are many ways of approaching any topic, and mental disorder is particularly rich territory for a diversity of analysis. This is beautifully described by Hundert (1989, p. 2) through the metaphor of a crystal:

“A number of methodological issues may be introduced by comparing the human mind to an intricate crystal. Our task of better understanding the mind becomes that of understanding the entire shape of the crystal, which appears different from any fixed perspective. One view, for example, may suggest that the crystal has a number of different sides or edges than any other view, but such contradictions are obviously only apparent and easy to synthesize.”

Bringing together diverse approaches to mental disorder may be idealistically sound, but it is also rather difficult. It is entirely possible that in taking such a broad perspective with a wide scope of analysis I risk not saying much of value. In looking at everything, I may end up seeing nothing. An alternative approach is to suggest that there is not a single object ontologically, but potentially many different ontologies applying to broad category of behaviours and experiences related to that disorder. These are constructed both methodologically and epistemologically (Mol, 1999). As I find the multi-facet model productive, I will not address the multi-ontology model directly however it is worth noting as another way to approach the topic of mental disorder.

Methodological Naturalism

My work rests on the assumption that there are questions which philosophy is best placed to answer, that there are philosophical questions that are distinct from the kinds of questions that scientists ask. However, those questions can be placed in the context of science, and the two can and should feed into one another. Science has something to contribute to philosophy, and it is important that philosophers extend beyond a mere ‘armchair’ approach. This position is referred to as methodological naturalism.
In line with Godfrey-Smith (2003) I will contend that there is no reason to think that science can answer the kinds of questions I am asking without the aid of philosophical thought. Science takes theoretical ideas and subjects them to empirical analysis. While science engages in the construction of conceptual frameworks within which to consider empirical evidence, and aims to do so with rigour, it stands to reason that anything involving norms or epistemological claims about what constitutes good evidence would benefit from a philosophical appraisal.

‘The Natural Method’ (Adapted for (I)GD)

No one way of considering the problem of addiction, or indeed any psychiatric disorder, is trump. A comprehensive view of (I)GD will involve engagement with several perspectives including:

1. Philosophy
2. Neuroscience
3. Psychology and Psychiatry (cognitive science)
4. Economics

But also:

5. Game Studies
6. Evolutionary Biology
7. Anthropology & Sociology (Geography)
8. Phenomenology
9. Public Health
Flanagan (2011, 1995) in his studies of dreams and addiction (respectively) used what he calls “the natural method”. It is a multidisciplinary approach to understanding mental phenomena. For his study of addiction Flanagan’s approach is to begin with the phenomenological, specifically ‘what it is like’ at a first-person level to be an addict. He then examines this perspective through the lens of Neuroscience and Psychology (2011, p.284). He represents this visually as a circle of interplay (Figure 1.1).
In my work I will proceed similarly, although with different specifics. In particular, I will begin not with phenomenology, but with philosophy. Starting with a folk conception of addiction and disorder, I will provide a conceptual analysis of first addiction, then behavioural addiction (with a focus on gambling) and then (I)GD. I will incorporate Game Studies into my final analysis of (I)GD because I feel it has a lot to say when it comes to the proposed disorder, things which have been largely ignored by current research. Each strand of analysis will be treated with respect, and the interplay between them considered (Figure 1.2).

Embedded in the story of (I)GD will be theories of economics and evolutionary biology relating to addiction, as well as sociological and public health perspectives on what it means for a behaviour to be healthy, or not. I will touch briefly on the phenomenology of (I)GD, although that will not be my focus.

And it is with that in mind that my thesis proceeds.
Overview

In Chapter 1

I provide an overview of my thesis, its methodology and aims. In particular, I address the concerns of a multi-disciplinary approach to (I)GD being too broad, and provide the structural basis for my analysis.

In Chapter 2

I move on to the ideas of disorder and addiction. I explore what it means for something to be a mental disorder, and in the context of addiction what it means for someone to be an addict. Defending the view that behaviours can indeed be targets for addiction, I will argue that addiction is not likely to be a natural kind. However, we can still say some things about addiction that apply to most pathological cases of substance use or behavioural regularities of a certain kind.

In Chapter 3

Looking at the case study of gambling I outline the neuroeconomic and picoeconomic view of addiction that Ross et al. (2008) posited. This view argues that gambling is the formative case study for addiction because it shows what changes occur in the brain during addiction, without the complicating factor of substances. I suggest that this account is the most useful for conceptual analysis of (I)GD, in particular its distinction between disordered and addicted gamblers.

In Chapter 4

Here I look more closely at (I)GD specifically. I outline an overview of some of the literature on the disorder to date, and the conceptual basis for the disorder. I consider each of the listed symptoms in light of the account of addiction given in Chapter 3 arguing that there may be a case for (I)GD and even Internet Addiction, although it is not a neat fit. I use work in game studies to support this claim. I acknowledge that the state of research today is unable to provide us with a clear case for this.
In Chapter 5

I conclude by considering the implications for this research. In particular, I argue that it is important for both researchers and gamers to avoid engaging with the narrative of addiction before we know more about the potential disorder. I suggest directions for further research based on a clearer conceptual understanding of (I)GD, games and gamers.
CHAPTER TWO

The History and Philosophy of Addiction

A universal category of addiction?

While neither the DSM-5 nor the ICD-11 explicitly use the word addiction, the conceptualisation of gaming disorder is a reflection of the conceptualisation of the disorder as such, particularly in the case of the DSM. Acceptance of behavioural addictions is in its infancy, and the DSM-5 has only recently placed gambling under this category. Gambling has been the focus of most research on behavioural addiction, particularly within neuroscience. While some of this research may apply to videogaming, it is not a neat fit, and research to date is conceptually messy. In this chapter I aim to tease out some of the philosophical foundations of addiction and defend the view that some behaviours can indeed be the subject of addiction.

If there are satisfactory commonalities between types of addictions, behavioural or otherwise, then the category of addiction would be subject to theoretically and clinically useful generalisations. The starting point for such an assertion would be some agreement on what we mean when we use the word ‘addiction’. As I have already discussed, this is theoretically problematic; however, I agree with Ross and his colleagues’ assertion that “…addiction is complicated but comprehensible, subject to some robust generalizations, and potentially much more effectively treatable than is usually assumed in popular discussions” (Ross et al., 2008, p. 7). I will defend the view accordingly. Additionally for Philosophy it may be of interest to discuss whether addiction is a ‘natural kind’ – a universal and relevantly homogenous category.

In broad terms addiction can be described as a set of behaviours relating to consumption patterns. Becker and Murphy (1998) argue that people can become addicted to a wide range of behaviours such as eating, working, religion and television as well as substances such as alcohol, opiates, cannabis, sugar, food in general, and so on. There are two main problems with such a broad view. Firstly, as a conceptual critique, I have concerns about asserting that addiction is primarily a pattern of irrational preferences. Secondly, it seems unlikely that we could provide a unified explanation of addiction across such heterogeneous activities. It is unlikely that everything that fits a purely behaviourally based definition of addiction at the level of symptoms would share the same explanation at a neurological or mechanistic level. However, this does not mean we should conclude that there is no chance of a unified account of addiction at all (Murphy & Smart, 2018).

Elster (1999) and Orford (1985) take an intermediate position and characterise addiction as a group of experiences shared by addicts. Elster’s focus is on craving as the core explanatory concept, combined with a range of other symptoms. By structuring the concept of addiction to have a necessary core, Elster and Orford are able to argue that some behaviours will turn out to be the subject of addiction, and others will not. I share this view but take a different stance on what that core is, something I will outline in Chapter 3. In this chapter I will defend a
mechanistic view of addiction, one that does not require addictions to be understood as a natural kind.

I start with Flanagan’s (2011) theory that there are two distinct types of addiction:

**Addiction-1:** mental and physical compulsion.

**Addiction-2:** Addiction-1 plus the specific characteristics of an individual addiction.

This or something like it is a useful distinction to make and I will return to it at the end of this chapter. Although addictions seem similar, they can vary widely in their consequences and pathology. Some of the theoretical difficulty here arises from the complexity of the personal experience of addiction:

“Personal and social circumstances of addiction vary widely, as do the effects of various addictive substances and the manner in which they are metabolized in the individual” (Charland, 2011, p. 139).

Starting with phenomenology, or even symptomatology, may then prove difficult. Rather than follow Flanagan (2011) in starting there, I will instead turn to other strands of the cognitive sciences. There is particularly promising work in addiction coming from the neurosciences. The mechanistic model I outline in this chapter insists that science lead theory here. Instead of discarding generalisations as a whole, I propose that there is a core manifestation of addiction which is found at the neural level of analysis that can be applied to the phenomena of addiction, and to (I)GD specifically.
What is an addiction anyway?

“It seems that almost anything done to excess and felt to be necessary to manage stress can be conceptualized as an addiction.”
(Nyquist Potter, 2011, p. 201)

The question of when doing something becomes ‘doing something too much’ is one that has captured the interest of physicians, clergy, judges, poets and authors and, as it turns out, Philosophers. Behavioural regularities are of course necessary for human function. Without the ability to repeat constructive behaviours such as work, physical exercise or socialising, we would find ourselves unable to maintain any form of stability or health. Distinguishing between these regularities and what could be considered ‘harmful’ regularities such as excessive drinking, drug use or gambling is difficult. Most activities considered addictive can be enjoyed in moderation without the destructiveness of excess. Just where to draw the line between healthy enjoyment and excess becomes an interesting and complex question for theorists and clinicians. There is no consensus on exactly what this is, though most professionals would agree on three defining characteristics which exemplify unhealthy repetitious behaviour as described by Potenza (2006):

1. Craving prior to engagement in behaviour
2. An impairment of control of behaviour
3. Repeated engagement in behaviour, despite negative consequences

This chapter will focus on the many facets of ‘addiction’. I begin with some of the currents of thought on the topic, both past and present. My aim is to illucidate the difference between addictive behaviour, compulsive behaviour, habits and things we just really like to do. Simply because there is a widespread assumption of ‘addiction’ does not automatically mean that this is an accurate or helpful category. Understanding how our current folk psychology of addiction originated is a good starting point. Addictions appear to be:

“...paradigmatic causes of irrational behaviour, and becoming addicted often viewed as the insufficient regard for the long-term consequences of one's actions” (Murphy, 2006, p. 184).

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1 The DSM-5 included craving as a criterion for Substance-use Disorders but not Gambling Disorder. The DSM-IV-TR did not list craving among the symptoms of substance dependence (American Psychiatric Association, 2013; 2000). The ICD-10 includes craving among the symptoms of "Dependence Syndrome" (WHO, 1992). Craving is discussed in detail by Elster (1999), who argues that it is the core symptom of addiction.
Beginning with a brief discussion of psychiatric classification and the medical model, this chapter will explore the questions about rationality that study of addiction raises and the normative assumptions that accompany them. I will argue, like Murphy, that understanding the nature of addiction cannot rely on purely instrumental views of rationality.

Following from this, I will argue that there is a false dichotomy between substance and behavioural addiction, as per the work of Ainslie (2001) and Ross et al. (2008), and that understanding the reasons for this sheds important light on the phenomenon of addiction in a way that focusing on substances alone cannot. That it is gambling that provides the ‘clinical coalface’ of addiction is a position which I will develop and defend in Chapter 3. This will provide the framework with which to assess PIU and suggest a conceptually grounded understanding of (I)GD and IGA. I will leave discussion of the so-called ‘narrative’ of addiction to Chapter 5, in which I discuss gamers and how such a narrative may do more harm than good in cases of ambiguity (Hacking, 1999; Potter, 2011).

A (brief) History of Addiction in Modern Psychiatry

Both the DSM-5 and ICD-11 have addressed the nosological issue of the expansion of the category of addiction to include behaviours as well as substances. In particular, in their most recent revisions the DSM and the ICD have attempted to assess a range of behaviours that have been suggested to be addictive. These include both gambling and PIU (Grant & Chamberlain, 2016). They both take a different approach to including (I)GD. Determining when doing something a lot is doing it too much is at the core of defining addiction and despite our best philosophical and scientific efforts it seems that this line remains unclear. This is in part a consequence of the normative assumptions of rationality that the study of addiction thus far has made. Here I will review some of the key changes in each to addiction.

DSM-5

The term ‘addiction’ is absent from the pages of the DSM-IV. In the 1980s the committee working on the DSM-III-R (O’Brien & Volkow, 2006) attempted to avoid the cultural baggage and stigma associated with the word ‘addiction’, and hoped to provide the theoretically more neutral and clinically useful terms ‘dependence’ and ‘abuse’ in the category ‘Substance-Related Disorders’. Experience proved this to be problematic, as the terms were at once confusing and misleading. ‘Abuse’ turned out to be highly stigmatising, with drug takers being compared to other forms of abusers. This was highlighted in a study by Kelly and Westahoff (2010) that found that patients described as ‘substance abusers’ to healthcare professionals were recommended less therapy and more punishment than when they were described as having ‘Substance Use Disorders’.

‘Dependence’ too is a misleading term, as physical dependence is observed not only in addictive drug taking, but in the taking of psychoactive medication. It is possible to be
dependent on a substance without experiencing the adaptations necessary for addiction (O’Brien & Volkow, 2006). By conflating dependence and addiction, the DSM unfortunately added a level of stigma to an otherwise normal response to repeated doses of a medication.

The DSM-5 (American Psychiatric Association, 2013) reintroduced addiction in the new category of ‘Substance-Related and Addictive Disorders’. This new diagnostic category not only revives the use of the term ‘addiction’ but places substance use disorders and non-substance use addiction together, beginning with moving Gambling Disorder from ‘Impulse-Control Disorders Not Elsewhere Classified’ to the new category. The inclusion of gambling in the new category is not without critique; however, I would argue it is consistent with current research. Some argue that this is a change long overdue (Bowden-Jones & Clark, 2011), while others have expressed concerns that it opens the door to labelling normal interests and passions as mental disorders (Frances, 2012). Regardless, the move is evidence-based and generally supported (Grant & Chamberlain, 2016). There was not enough evidence for the inclusion of (I)GD as a formal disorder at the time of publication, though it was added to Section III as a “condition warranting more clinical research and experience before it might be considered for inclusion in the main book as a formal disorder” (American Psychiatric Association, 2013).

**ICD-11**

Rather than add selected behavioural disorders such as gambling to the category of addiction, the ICD-11 Work Group has recommended grouping all behavioural disorders together as ‘impulse control disorders’, including gambling. At the time of writing, the Work Group has not included Internet use as an independent disorder, citing a lack of evidence (Grant and Chamberlain, 2016). They have, however included GD, with separate entries for online and offline entries, as well as a general disorder (WHO, 2016a; WHO, 2016b; WHO, 2016c).

The recommendation to keep behavioural disorders grouped separately from addiction reflects the aim of WHO in the creation of the ICD. The DSM attempts to provide a working language for mental disorders, whereas the ICD aims to provide definitions which will be more broadly useful across a wide range of settings (Grant & Chamberlain, 2016). The ICD’s focus on utility here means that it is more useful to keep behavioural disorders together, and to do so in a way more continuous with the ICD-10 (Grant et al., 2014).
A framework for addiction?

Determining where to start with a discussion of addiction is no easy task. Addiction as understood by both folk psychology and current psychiatric classification is part of a wider debate on the definition of mental disorder. Understanding what we mean when we describe some behaviour or set of behaviours as a mental disorder requires us to have a clear conceptual framework for understanding both the definition of ‘mental’ and the definition of ‘disorder’. The concepts of disease, abnormality, malady, disorder, malfunction and illness are often considered related, but they are qualitatively different. Discussion of whether alcoholism, and subsequently all addiction, should count as a disease by physicians, philosophers, legal theorists and policy makers has led the way in the context of addiction (Fingarette, 1988; Heyman, 2009; Jellinek, 1960 Lewis, 2015; Leshner, 1997; Schaler, 1999). In this section I will outline a couple of theoretical threads in both psychiatry and the philosophical literature regarding how we should think about, classify and explain mental illness and disorder – the medical model and the idea of harmful dysfunction – and critique them as they currently stand.

I will then outline the role of mechanistic accounts in the explanation of mental disorder as per Murphy and Smart (2018) with an eye to defending a mechanistic account of addiction by the end of the chapter. This is a naturalistic approach, and as such will rely on science to lead the way. As I noted in Chapter 1 though, there are several sciences which claim to understand addiction, and indeed PIU more generally. Part of the task then becomes proving some kind of general account of addiction that will suit an analysis of (I)GD.

Harmful Dysfunction

In a series of influential papers, Christopher Boorse (1997, 1977, 1976, 1975) set the scene for what we now know as the ‘medical model’ of disease. Boorse argued that we could distinguish between what was normal and pathological in a medical setting using statistical analysis. However, this was too simplistic. Normative value judgements inevitably form a part of medical judgements. The ‘harmful dysfunction’ thesis is a way to combine a statistical or mechanistic approach to disorder with a normative one. It is one of the most influential and dominant contemporary theories in the conceptualisation of mental disorder. It has achieved this position in large as a result of the work of Wakefield (1992a, 1992b, 1993, 1996, 1997a, 1997b). In brief, Wakefield’s position is that mental disorders are best conceived of as harmful dysfunctions with two distinct components. These are:

1. the failure of an internal mechanism in a person to perform a function for which the mechanism was designed by natural selection; and
2. a value judgment by society that the malfunction is undesirable or harmful (cf. Murphy & Woolfolk, 2000a, 2000b).

The first of these conditions, that there must be a malfunction, is problematic. Wakefield follows Boorse in understanding dysfunction in evolutionary terms, requiring a consistency within the life science on the definition of function, a consistency that simply doesn’t exist (Murphy, 2006). Despite this, the theory has its benefits and avoids some conceptual problems associated with the scientific task of specifying what counts as normal mental functioning versus non-scientific questioning about whether malfunctions are by necessity good or bad:

“A condition is a disorder if and only if (a) the condition causes some harm or deprivation of benefit to the person as judged by the standards of the person’s culture (the value criterion), and (b) the condition results from the inability of some internal mechanism to perform its natural function, wherein a natural function is an effect that is part of the evolutionary explanation of the existence and structure of the mechanism (the explanatory criterion)” (Wakefield, 1992, p. 384).

Criterion (a) allows for malfunctions that satisfy criterion (b) to avoid the label of mental disorder if they are not considered ‘harmful’. However, this comes at a cost. Criterion (b) requires an understanding of human psychology that is implausibly modular (Murphy, 2006). It is implausibly so because it requires us to commit a priori to the position that all causes of mental disorder are failures to perform an evolved function, a commitment that is both unnecessary to make and would restrict our understanding of mental disorder through scientific enquiry (Murphy & Woolfolk, 2000a, 2000b).

Wakefield and later Horwitz (2002) also contend that our commonsense-based folk theory of psychology guides our understanding of mental illness and disorder in a powerful way. Wakefield and Horwitz refer to an everyday body of knowledge about human behaviour similar to the concept of “folk psychology”, a term used by philosophers to denote theory of mind (Baron-Cohen 1995; Churchland 1981; Fodor 1987; Murphy 2006; Sellars 1963). Though our commonsense and folk psychology understandings of behaviour are useful indicators and starting points for science, Horwitz and Wakefield argue that their power is much greater. They suggest that folk theory may rule out behaviours in certain contexts as indicators of mental illness. Murphy (2006) contests this, arguing that we cannot figure out what is a mental disorder via our knowledge of folk psychology alone:

“This is equivalent to saying that it’s a priori whether somebody’s psychology is functioning normally. But we can’t tell when someone’s psychology is or is not functioning as designed just based on commonsense evaluation of surface features - whether someone’s psychological systems are intact certainly looks like a substantive empirical question.” Murphy (2006, p. 45).
This reading of the harmful dysfunction view of mental disorder as argued by Boorse, Wakefield and Horwitz, along with more detailed criticisms outlined by Murphy (2006, p.35) suggests their work is “deficient as conceptual analysis”. Nonetheless this is not a problem if psychiatry need not accept conceptual constraints. Separating science from questions of value is an important aspect of mapping out the direction of psychiatry, and forms the basis of the two-stage picture I will now articulate.

The Two-Stage Picture of Psychiatry

The view of psychiatry I will now outline is from Murphy (2006). It is what he calls the ‘two-stage picture’ of psychiatry, where psychiatry completes the work of discovering where and how the mind/brain can go wrong, and then hands the results of this inquiry over to various non-scientific projects for valuation and theoretical analysis. This is an objectivist picture but one that avoids the “privileging of common sense and single-minded focus on dysfunction as the cause of mental illness” (Murphy 2006, p.100). The aim is to separate matters of positive scientific fact from matters of evaluation. It requires two conditions:

1. the disciplinary divide between psychiatry and cognitive neuroscience be removed; and
2. psychiatry cannot be defined by a commonsense understanding of mental disorder (or ‘folk psychology’).

The second of these assertions I have covered in the previous section. The assertion that the disciplinary divide between psychiatry and cognitive neuroscience should be removed is predicated on understanding that the divide as it currently exists is an historical artefact that no longer has any theoretical basis. It is important because it nullifies arguments as to whether something is a mental disorder based on intuitions, or on existing disciplinary boundaries. It does not entail denying legitimate interest in psychiatry from disciplines outside of the sciences:

“I advocate the merger as necessary to develop the broadest and most fertile approach to understanding psychopathology. However, rejecting intuitive constraints and existing boundaries as legitimate shapers of inquiry is not the same as denying any legitimate social interest in psychiatry. I agree that therapeutic and legal contexts are ones in which concepts of mental illness answer primarily to our values and intuitions, but I deny that these extra-scientific contexts provide or require a general concept of mental disorder that can establish what psychiatry is.” (Murphy 2006, p.12).

The two-stage picture privileges empirical research, but it does not do so at the expense of wider conceptualisations and understandings of mental disorder. This is in line with the methodological approach based on Flanagan (2011, 1995) that I outlined in Chapter 1, and as
such it is a good place to start. Because of the way we conceptualise it, to move towards an understanding of addiction in fact requires an understanding of rationality. We are very far from having a generally accepted theory of rationality or anything like a mechanistic account of rational behaviour. This is a limitation of the two-stage picture, though it is not a fatal one, and the account of addiction I will outline in Chapter 3 works around it. I will now move onto the history of our psychiatric understanding of addiction, before returning to providing a defence of mechanistic accounts of addiction as per Murphy and Smart (2018).

**Mechanistic Explanation and Mental Disorder**

The medical model views psychopathologies as diseases. The observable symptoms of a disease are causally explained by abnormalities in underlying neurobiological systems (Murphy & Smart, 2018). Many conceptions of mental disorder, and indeed behavioural addictions more generally, understand the symptoms of a disorder as primarily behavioural or psychological. In the case of addiction, for example, the disorder then becomes defined in terms of a key phenomenon like craving (Elster, 1999). With the two-stage picture of mental disorder in mind, it is worth pushing these further. It is still worth exploring the logic of these theories in the context of the medical model, even if such psychological theories of the phenomena are correct (Murphy & Smart, 2018). As I have already indicated, the medical model requires a commitment to the view that psychiatry is a branch of medicine, specifically tying psychiatry to the commitments of cognitive neuroscience (Murphy 2006).

The general form of a mechanistic explanation is to break down a system into its component parts, and then explain the causal relevance of these components to provide an explanation of phenomena. Psychiatry’s commitment to cognitive neuroscience leads it to adopt the dominant approach in the cognitive neurosciences – that human behaviour consists of capacities that can be analysed into other personal level capacities (Cummins, 2000). From there, these can then be placed within a hierarchy of biological processes from the personal level to sub-personal system. In the neurosciences, for instance, we expect to identify processes that can be assigned to parts of the brain. The interaction of these biological components will be understood as outcomes of mechanisms (Murphy & Smart, 2018).

So the first step in providing a mechanistic explanation is identification of the phenomenon of interest. In the case of addiction, psychological symptoms like craving, tolerance or withdrawal, count as phenomena (Murphy & Smart, 2018). The clinical picture of addiction, such as that provided by the DSM or ICD, mixes up different sorts of sign and symptom. Included in its conception of addiction are paradigmatically psychological symptoms, as well as those that are more clearly physical. This is acceptable. The clinical picture defines the phenomenon we need to explain, and is largely guided by empirical study. A mechanistic explanation will understand the phenomenon as a mechanism with parts, that in turn has its own components.
Central to a mechanistic explanation is the idea of causal relevance. Craver’s influential account of mechanistic explanation in the neurosciences is the relation of causal relevance between phenomena at different levels of explanation (Craver, 2002; Craver & Bechtel, 2007). A mechanistic explanation will start with the phenomenon presented, and the sorts of explanations offered by the cognitive neurosciences, to understand it as a system of causal components at various levels related to one another in important ways. Events at one level are causally relevant if they manipulate or intervene in the system, i.e. if they make a difference at another level. A levels-based view allows for explanations to adequately encompass both psychological and physical phenomena:

“The point of such explanations is that they employ information processing systems in the brain, not that they are limited to explaining psychological phenomena. Mechanistic explanations of addiction, then, aim at understanding phenomena by showing how they arise as the result not of the operation of natural laws, but via the interaction of components within brain systems. These mechanisms can themselves be further decomposed into their own subcomponents. They are composed of cells, and the functions of those cells would receive in their turn a mechanistic explanation in cell biological theory.” (Murphy & Smart, 2018)

Exactly what should be included in any particular mechanistic explanation is an open question. Bechtel (2015) argues that the process of identifying the boundaries of the mechanism involves an element of idealisation. How an overall system gets partitioned largely depends on how the boundaries of a mechanism are set. What may count as relevant in one explanation may be ignored in another. Because biological mechanisms are, as a rule, contextually situated and casually connected to other systems, the boundaries of a mechanism reflect our understanding of this setting. The explanations we provide are a product of the hypotheses we have about how best to delineate natural phenomena for this purpose (Murphy & Smart, 2018).

Mechanistic explanations are only one specific type of causal explanation. Mechanistic explanations are distinguished from other types of explanation by the spatial arrangement of component parts and the nature of their interactions (Murphy & Smart, 2018). Not all causal explanations can be expressed in terms of mechanisms, nor will mechanistic explanations suit all phenomena. With this in mind, I will return to a mechanistic model of addiction more specifically by the end of this chapter, with an aim to providing such an explanation in Chapter 3.
The Philosophy of Addiction

The philosophical category of ‘addiction’ is a contentious one. Although there is general agreement that humans can become addicted to substances, how addictions are defined and redefined especially in relation to addiction to activities is an area of dispute (Murphy, 2006). In this section I will consider the ideas of responsibility, free will and moral disapproval and how they are discussed within the framework of addiction, before moving on to a discussion of rationality and instrumental reasoning.

When we are trying to develop a theoretical framework to demarcate between addictive and non-addictive behaviour, I argue that it is pertinent to have a rigorous philosophical theory that could stand up to the test of science. This is the metaphilosophical opinion that anyone who wants to posit a philosophical thesis must be prepared to defend it – largely through empirical science (Ross et al., 2008). Addiction requires an understanding of rationality and we do not have a generally accepted theory of rationality or anything like a mechanistic account of rational behaviour (Murphy 2006). This lack is a limit to the two-stage picture and a naturalist approach more generally, because the empirical work on addiction does not at some level have a clear conceptual framework within which to approach the task of scientific enquiry. It is to philosophy that we first turn for such a framework.

Interesting to my discussion is an understanding that only requires a restricted view of free will and concerns voluntary, involuntary and nonvoluntary behaviour as per Aristotle (Aristotle 1999, book III ch. 1). What it is about human action that is self-directed or self-governed is important to describe for a clear understanding of self-control. Perhaps the best way to do this is to look at cases where there has been a breakdown in the ability to control behaviour as in addiction. It seems that addictive behaviour is a prototypical case of self-control and self-governance breaking down in some important way.

One of the primary complicating factors in discussions of addiction is simply the definition of addiction. Addiction is difficult, if not impossible, to observe in isolation from social, political and cultural contexts. To take one example, pathological gamblers often suffer from co-morbid disorders such as substance addictions (Crockford & el-Guebaly, 1998; Feigelman, Kleinman, Lesieur, Millman & Lesser, 1995), depression (Cunningham-Williams, Cottler, Compton & Spitznagel, 1998; Dannon et al., 2004), antisocial personality disorder (Lesieur, 1987), and schizophrenia (Cunningham-Williams et al. 1998; Dannon et al., 2004). As a result of this complexity and entanglement there are numerous ways to observe and investigate the phenomenon:

“...the resolution of causal and constitutive ambiguity associated with addiction depends crucially on investigation at distinct levels of analysis, including genetic, neurophysiological, neurocognitive, neuroaffective, higher-level cognitive, phenomenological, behavioural, social,
and cultural levels. And as research is making abundantly clear, the relationships among
variables at the same and different levels of such analysis are typically dynamic and nonlinear,
making research and the models and findings they produce more and more complicated.”
(Poland & Graham, 2011, p. 3)

Within the complexity of research into addiction there lies a fundamental question – is
addiction a neurological disorder, a mental disorder, or something else? In his discussion on
addicts, Graham (2010) frames the debate on mental versus neurological disorders by means of
the questionable concept of responsibility for self. He singles out two “constituents or
elements” as instrumental in one’s responsibility for self: evaluative self-reflection and
behavioural self-control (Graham, 2010, 163). In this picture, addicts may have some
breakdown in behavioural self-control (or impulse control). Graham examines the similarities
between compulsion and addiction but denies the explanatory status that writers such as Elster
(1999) give to craving.

Graham’s focus is on the relapse stage of the typical “clinical coalface case of addiction”
(Graham, 2010, p. 160). Relapse is important to Graham because it highlights the addict’s lack
of self-responsibility, “It is difficult to explain how something that is negatively evaluated or
believed by the agent to be harmful retains a grip on behaviour.” (p. 164) Relapse is therefore
an instance of the desire to take responsibility for self but being in some important way unable
to. Significantly he asserts that, “Self-responsible people care about the future.” (p. 170) This is
a bold normative claim. It is meant, it seems, to side-step the issue of rationality seen in the
discussions on instrumental reasoning (see Ainslie, 2001; Elster, 1999; Murphy, 2006; Ross et
al., 2008, Yaffe, 2002). I will return to these shortly.

Graham says that addicts suffer from a “deficit of rational resolve” (Graham, 2010, p.184). This is
close to just saying that it’s all their fault for being so weak-willed and it doesn’t do much to
explain addiction, even though it might characterise aspects of the addictive experience usefully
(Murphy & Smart, 2010). It is very likely that self-control is a matter of degree and operates on a
spectrum. This is problematic for any conception of addiction relying on normative assumptions
about behaviour and demands a more detailed discussion of rationality and instrumental
reasoning in the context of addiction which I now turn to.
Addiction, Rationality and Instrumental Reasoning

Addictions seem like paradigmatic cases of irrational behaviour, and in philosophical discussion of addiction there is a tendency to view the addicted person as showing a lack of regard for the long-term consequences of their behaviour (Levy, 2013). This attitude towards the long term has been formalised by decision theorists and behavioural economists as a ‘rate of discounting the future’. That is, the way we value goods according to their remoteness in time to our present selves. Several different discounting rules can operate at the same time, and these compete within any theory of addiction. Becker and his students (Becker, 1976; Becker & Murphy, 1988) present a model of rationality based on tolerance and reinforcement. Tolerance is the increase over time of the amount of consumption of a good that is required for the same level of experience. Reinforcement is defined by the rise in marginal utility from increased consumption. Becker’s model accounts for abstention and addiction by varying the rate at which an agent discounts the future.

Becker’s explanation of addiction is a direct application of traditional economic models of utility to the actions of the addict. The decision to use an addictive substance or engage in addictive behaviour may itself be a result of unrelated events such as stress; however, once that decision is made the addict becomes caught in a difficult situation. Every decision to use increases the short-term benefits of using again, whilst at the same time leaving them worse off in the long run (Becker & Murphy, 1998). The downward spiral Becker’s model describes has been faulted on a number of grounds, most importantly its inability to adequately explain the phenomenology of addiction or the behaviours of addicts that are unrelated to transactional costs of activities yet are important in understanding addiction nonetheless (Elster 1999, p. 55).

Becker’s basic microeconomic model continues to be refined in the context of Behavioural Economics (BE). It is a later model from Picoeconomics (PE) that takes its lead from Herrnstein (1961), Ainslie (2001) and Ross et al. (2008) I will flesh out in more detail in Chapter 3. For now, it is sufficient to say that understanding discounting will form part of the model of addiction I defend and turn in brief to some questions of rationality that discounting raises. Becker’s addicts are rational because they have enough information about the negative consequences of addiction to make a rational decision about present consumption, and decide to consume because of their preference for present rather than future rewards. In this account mere preferences cannot be considered rational or irrational; they are a-rational (Murphy, 2006). Both the condition of full information and that of the a-rationality of preferences raise issues.

There are many reasons why first-time users may not have full information about the consequences on the likelihood of them becoming addicts. There may be systematic social and political reasons for this. Even those with a comprehensive understanding of the health risks of addiction may not accurately ascribe this risk to themselves. Most consumers of potentially addictive substances or behaviours do not become addicts and it is thus perfectly plausible that
first-time users may underestimate or incorrectly guess the probability of their becoming addicted against what they hope will be the pleasures of casual use (Orphanides and Zervos, 1995; Robinson & Berridge, 2003). People who make the initial decision to use may be acting rationally given that they may be taking a ‘reasonable gamble’ (Murphy 2006, p. 188). Even if their decision is based purely on giving substantially more weight to the present than the future this cannot be considered irrational if pure time preferences are a-rational and there is no way to distinguish between rational and irrational discounting.

There are models of discounting that are believed to be irrational and I will return to them in Chapter 3. For now, it is unclear that understanding addiction as irrational behaviour is useful:

“\text{The traditional basis for attacking addiction as irrational is that it is incompatible with human flourishing, since the addict is in thrall to the lowest part of his nature. But many things we value very much are low pleasures in the traditional sense of expressing our animality with some urgency - for example, sex.}” (Murphy, 2006, p. 191)

Where does this leave our conceptual understanding of addiction? If we do not have a mechanistic theory of rationality, scrutiny of behaviour in terms of rationality becomes based on morals rather than any neutral scientific account. Our account of addiction remains largely folk psychological in the absence of such a mechanistic account, and even if we did have one it is unclear whether that would establish whether addiction was a mental illness or a set of self-destructive behaviours. Nonetheless, there are things we know about the brains of addicts, and this along with a more comprehensive account of PE, is what I will turn to in Chapter 3. This account rests on the assertion that within Disordered Gambling (DG) we find the clinical coalface of addiction. To support this claim, it is imperative that I first defend the view that behaviours can be, in theory, addictive.

**Behavioural Addictions**

In common discussion, it seems that behavioural addiction, that is, addiction to non-drug rewards, is often considered to be metaphorical (Ross et al., 2008, p 159). When we say someone is addicted to fantasy novels, we are not speaking literally, as we are when we say our friend is addicted to nicotine. Behavioural addictions are particularly problematic for the philosophy of psychiatry because they appear to be the causes of irrational behaviour, without the obvious mediation of substances – *i.e.* alcohol, drugs and similar – on neurological processes. However, this appears to be largely an artefact of psychiatric history and not necessarily a reflection of the phenomenology of addiction. That we can become addicted to substances is generally agreed upon. Golstein (2000) argues that we can *only* become addicted to seven categories of drugs: nicotine, caffeine, cannabis, opiates, psychostimulants, alcohol and (in his view) hallucinogens. Our understanding of the effects of these drug families is relatively well-understood as largely a biochemical interaction between the substance and the
brain (Murphy, 2006), although in the case of hallucinogens the evidence supporting the claim that they are ‘addictive’ is limited at best (Ross et al., 2008). It is Goldstein’s view that addiction is a brain disease and that no matter how much one craves a habitual behaviour, it is not an addiction (Goldstein, 2000; Leshner, 1997).

On the other end of the spectrum is a very broad conception of addiction:

“‘Addiction’ in the popular sense of the term is a familiar, culturally tagged syndrome that some people adopt as a norm around which they and others can structure expectations… this norm can in principle be constructed around any perceptually and socially salient consumption pattern” (Ross et al. 2008, p. 161).

Becker and Murphy (1988, p. 675-676) assert that people can become addicted to many activities including, though not restricted to, “work, eating, music, television, their standard of living, other people, religion and many other activities.” But perhaps this definition is too broad. Certainly we don’t want to say that just any pattern of consumption can form an addiction. This view erodes the distinction that we have between addictions to things we do and things we do a lot because we really like to do them.

Elster (1999) and Orford (1985) adopt an intermediate position wherein addiction is characterised by a group of experiences shared by addicts. Elster (1999, p. 62) argues that the “most important explanatory concept in the study of addiction” is craving. Addiction is explained as craving combined with withdrawal, tolerance, euphoria, dysphoria, the desire and inability to quit, and “crowding out” which is the tendency for the addict to structure their life around their addiction (Elster, 1999, p. 59). This view allows for some, though not all, behavioural regularities to turn out to be addictions. For the purposes of this thesis I will argue like Elster that there can be at least some behavioural addictions, though I will not stick to his specific behavioural schemata. Importantly, I begin with the idea that there is something that distinguishes addictive behaviour from behavioural regularities (i.e. things we really like to do), and that this is not just a distinction between ‘good’ and ‘bad’ behaviour, or even ‘moderate’ versus ‘excessive’ behaviour. Many cases will remain undecided in lieu of adequate empirical research. I will outline an approach to this in Chapter 3, and consider the specific case of (I)GD in Chapter 4.
A Mechanistic Model of Addiction

To determine whether the category of addiction can be the subject of generalisations across both substance use and behaviours, I will argue that a mechanistic account of the phenomenon will be useful. There are several reasons I argue for this. By starting with the physical specifications of addiction, it potentially opens up the possibility of physical intervention and treatment (Murphy & Smart, 2018). Additionally, it would provide a way to integrate our understanding of addiction into a wider picture of human brain function. This may lead us to reassess our understanding of addictive phenomena by highlighting the connections to other kinds of pathology, and also their relations to one another (Murphy & Smart, 2018). Mechanistic explanations of addiction offer payoffs in terms of both explanation and the opportunity to revise our current conception of addiction.

The first step in a mechanistic explanation is to identify the phenomenon that we need to explain (Murphy & Smart, 2018). As I have already noted, there are divergences among theorists of addiction over what these are. The dominant clinical and research approach at present is that of the DSM and ICD, which view behavioural ‘addictions’ differently. Chapter 3 will provide a detailed mechanistic account of addiction, but for now here is a brief overview of the approach.

Experimental models often focus on addicts’ impaired control, and seek to explain that loss of control in terms of the neurological mechanisms that regulate behaviours related to it. As such, these models are well-suited to a mechanistic account (Murphy & Smart, 2018). They combine this with a behavioural account that is intended to explain the desire to use drugs or engage in a repetitive behaviour at a psychological, rather than neurological, level. Each experimental model focuses on impaired control but explains what has gone awry in addicts in a different way (Pober, 2013). ‘Impaired control’ or ‘loss of control’ is a broader category itself than addiction, so this only covers the type of impaired control present in addiction. How impaired control can operate as a core component of addiction is explained by Murphy and Smart (2018, p. 321) in the following way:

“At a fine grained level, impaired control is a heterogeneous property. It is unlikely to provide the kind of unification a mechanistic explanation requires for an overall account of addiction. But when considered at a coarse grain it can be argued that it could be a causally basic property. So – ‘having desire for’ and ‘having impaired control’ are both functionally relevant properties of addiction, which could receive a mechanistic explanation. They are connected to each other causally, but one cannot be reduced to the other.”

Furthermore, Sinnott-Armstrong and Pickard (2013) argue that harm is another necessary component. In their view it is the combination of impaired control and harm that provides a complete account of addiction, i.e. that addiction is pathological. It is possible to provide a
mechanistic account of addiction without making such a conceptual commitment (Murphy and Smart, 2018). However, harm is a theme I will return to in the context of (I)GD.

In a narrow, neurochemical, perspective, it is still an open question as to whether addictions can be generally explained by one mechanistic account. Pober (2013) argues that addiction is not a natural kind. That is, he argues that any singular mechanistic account currently available is unable to explain the whole of the category of addiction. Still, there is as yet no compelling evidence to support this view either. It is still theoretically possible that we will be able to find a mechanism whose physical interactions explain a loss of control across at least a wide range of addictions (Murphy & Smart, 2018). Even if such a mechanism were to exist, it is still the case that individual addictions have their own particular set of characteristics. Flanagan’s (2011) theory that there are two distinct types of addiction covers this usefully. He divides the core aspect of addiction from the particularities of any one type of addiction as follows:

**Addiction-1:** mental and physical compulsion.

**Addiction-2:** Addiction-1 plus the specific characteristics of an individual addiction.

There is still conceptual work to do here which I will continue in the following chapters. This view does not suggest that the experience of every addict must be the same. Furthermore, what is of particular interest to me at this point is the distinction between a ‘disorder’ and an ‘addiction’. In part it is the teasing out of these two categories that forms the basis of the Ross et al. (2008) model, which I will now explore in some detail.
CHAPTER THREE

A Picoeconomic and Neuroeconomic Account of Addiction

Image: Overwatch free loot boxes. Credit: https://www.pcgamesn.com/overwatch/free-loot-boxes-overwatch
The Science of Behavioural Addiction

It is here that I turn to the work of Ross et al. (2008) in more detail. They use as a case study the distinctly behavioural phenomena of Disordered Gambling (DG) and Addictive Gambling (AG): the difference in these terms will be explained shortly. They argue that it is both a distinct neurochemical disorder and “the core addictive phenomena on which others, specifically substance addictions, should be modeled” (Ross et al., 2008, p. 161). Gambling is explained as the direct manipulation of what is known as the ‘reward system’ of the brain – a collection of neural structures that regulate behaviour through stimulation of circuits geared for stimuli including, though not restricted to, feelings of pleasure and reinforcement signals. The circuit is controlled by the action of dopamine-containing neurons in the ventral tegmental (VTA) area, the nucleus accumbens (NA), and the prefrontal cortex (PFC) (see the Appendix for an explanation of the relevant location and function of these areas). To understand how this explains addiction, we need an understanding of the pleasure and reward systems of the brain, which will be covered in depth in the following section. For now, it is important to understand that neurologically there is a difference in the brain between pleasure and reward, which does not necessarily fit with our common use of the terms. Pleasure signals evolved most notably in primates with much less complicated reward systems than our own. They are really limited to a set of basic cues: air temperature, sexual contact, dampness etc. Everything else we normally associate with pleasure is actually associations between pleasure signals and reward signals (Kaplan & Oudeyer, 2004; Ross et al., 2008; Schroeder, 2004).

The main evolutionary adaption of the human brain has been adaptive intelligence. As such we have reward systems that were selected not to weight pleasure signals over interest and curiosity about changes in our environment. As a result, pleasure is not a reliable proxy for reward in people. The reward system requires supervision from frontal circuits to avoid excessive impulsiveness. However, because the limbic system evolved before the cognitive system, it did not evolve specific adaptations for the cognitive system. Disorders such as addictive behaviour involve neurological vulnerabilities as a result of imperfect adaption of the midbrain (limbic) system in relation to the cognitive system (Kaplan & Oudeyer, 2004; Ross et al., 2008; Schroeder, 2004).

The two important things to note here are:

- The brain has evolved to emphasise responses to *changes* in environment rather than the absence of change.
- Although pleasure and reward are connected, they are *not* the same thing and we have evolved to pursue what stimulates our reward system more conscientiously than what is pleasurable.
And it turns out that what leads people to have problems with gambling is not the money or any ‘pleasure’ based gain – but rather gambling itself is the reward. When gambling, we are ultimately paying for the possibility of a surprise, and the stimulation of our reward system (Ross et al., 2008, p166):

“Gambling is the fundamental case because the reward system stumbles on a way to naturally pair reliable cuing with surprise. [AG] demonstrates what it is about the brain itself – as opposed to the brain plus a special exogenous chemical – that gives rise to the potential for addiction. Thus [AG] is the window to the heart of the general addictive syndrome” (Ross et al. 2008, p. 163)

What is perhaps most interesting about this is that anyone who gambles avoids doing so pathologically at all (Ross et al. 2008, p.167). The gambler is paying for the most direct and untainted manipulation of their reward system available to them. So we have here a perhaps better account than the metaphysical notion of self-responsibility, but still an incomplete one. What remains lacking is an explanation of why some people become addicted and some do not. There is some work in genetics on this, as well as cultural and political geography (for work on the genetic basis of addiction see Wise, 2000). Stress in an individual’s environment is particularly implicated in the initial formation of addictive behaviour (Koob & Le Moal, 2000; Ross et al., 2008). The latter will form part of my critique of (I)GD.

Though tradition has dictated that substance use (alcohol and other drugs) are the core expression of the phenomenology of addiction, the picture Ross and his collaborators present here turns that assumption on its head. One of the reasons addiction is so easy to distinguish in the case of substance abuse is that the ‘highs’ of use are easily identifiable and as such there is a clear difference between sober and intoxicated states. Because of the social disapproval associated with heavy drug-taking there is no need for folk psychology to distinguish in any precise way between those who are addicted and those who are simply heavy users (Ross et al., 2008).

In contrast, objective attributable pathologies for behavioural addictions are relatively unclear. The model of AG as the basic form of addiction elucidates the phenomenon of addiction precisely for this reason. By removing the complicating (though certainly interesting) factors that substances bring to our understanding of addiction, it is the way that the brain changes itself that becomes the defining explanatory factor.
A note on terminology

There are three related though distinct terms I will be using in the following discussion that require some definition. These definitions are important in the way that any are in both scientific and philosophical contexts. The “... correct approach is to begin with clear, pragmatically justified, stipulations” (Ross et al., 2008, p. 31) and from there scientific discovery and empirical inquiry should guide the way the phenomena are eventually distinguished. For the case study of problematic gambling behaviour, it is useful to classify the phenomena into three distinctive categories: pathological, problem and disordered gambling. Ross and his collaborators argue that Gambling Disorder should be locally reduced to AG. For now, these terms will act as operationalisations – stipulations of what I will take to be their meaning for the duration of the task of explicating the Ross model. When I turn to (I)GD I will attempt to classify the phenomena along similar lines.

Gambling Disorder (GD; previously Pathological Gambling)

In the DSM-IV, Pathological Gambling was classified under the section titled, “Impulse Control Disorders Not Elsewhere Classified,” along with Compulsive Hair Pulling (Trichotilomania); Intermittent Explosive Disorder; Kleptomania; and Pyromania. The DSM-5 now places it in the category of Substance-Related and Addictive Disorders and has re-named it Gambling Disorder. The diagnostic criterion established in the DSM-5 (American Psychiatric Association, 2013) is that a person has gambling disorder if they exhibit four or more of the following symptoms within a 12-month period:

1. Needs to gamble with increasing amounts of money in order to achieve the desired excitement.
2. Is restless or irritable when attempting to cut down or stop gambling.
3. Has made repeated unsuccessful efforts to control, cut back, or stop gambling.
4. Is often preoccupied with gambling (e.g. having persistent thoughts of reliving past gambling experiences, handicapping or planning the next venture, thinking of ways to get money with which to gamble).
5. Often gambles when feeling distressed (e.g. helpless, guilty, anxious, depressed).
6. After losing money gambling, often returns another day to get even (‘chasing’ one’s losses).
7. Lies to conceal the extent of involvement with gambling.
8. Has jeopardised or lost a significant relationship, job, or educational or career opportunity because of gambling.
9. Relies on others to provide money to relieve desperate financial situations caused by gambling.
Problem Gambling (PG)

This term is intended to capture those who find their gambling to be a *nuisance* to them. Similar to GD, it encompasses those cases of GD that are mild. The *DSM-5* defines mild GD as someone who exhibits 4-5 of the criteria above. PG could be operationalised accordingly, though it is meant to include the ‘milder’ symptoms only such as (7), (8) and (9) though not (3).

Disordered Gambling (DG)

DG is intended as the inclusive disjunction of GD and PG. It is expected that the majority of DGs fall short of the full suite of behaviours attributed to clinical ‘addiction’.
Picoeconomics and Gambling

The rationality of turning to economics to understand addiction may be questioned at this point. Post mid-1930s economics has been typically concerned with aggregate phenomena: understanding behaviour at the level of communities. Conclusions about individual members of the community or their brains are simply not possible at that level. That being the case, it does not preclude the science of BE in collaboration with NE from contributing important insights into behavioural processes at several levels (Glimcher, 2003; Montague & Berns, 2002). BE in this context refers to research that explicitly models psychological and institutional behaviour at a more detailed level than economics generally. As such: “...BE refers to any approach that aims at theories and models of what actual people do in particular institutional settings.” (Ross et al., 2008, 46). The key concept here is choice, as it allows analysis of addiction through an understanding of economic decision-making theory:

“Describing these scenarios in terms of choices immediately raises the possible relevance of economic analysis. Economics is, in its broadest sense, the study of the way in which people (and other organisms and groups) try to promote their welfare in the face of scarcity” (Ross et al., 2008, p. 44).

This account of addiction refines this further by using what economic theorist George Ainslie dubbed ‘picoeconomics’ (PE). PE models aim to explain and predict consumption behaviour of actual agents (human or animal) that consistently choose consumption bundles in such a way that fits with what Richard Herrnstein called ‘the matching law’. The matching law states that when a subject divides their time or effort between two ongoing sources of reward, most will ‘match’ the time or effort to the expected outcome by allocating it in proportion to the rate and size of the reward, and in inverse proportion to the delays in receiving them (Baum, 1974). The matching law also suggests that an agent’s response rate to a scenario will be proportionate to the amount and/or duration of reinforcement of the behaviour (Herrnstein, 1982; 1970; 1961). Herrnstein’s basic theory and subsequent work building on it showed that we can get accurate predictions of choice behaviour in humans and animals if we model organisms as “...maximizing local rather than overall expected utility” (Ross et al. 2008, 51) and that an agent will distribute their resources to a range of activities within a given time interval based on the expected reward experiences for each activity within that time interval. Of most interest to understanding addiction is that time intervals for estimation of rewards can vary and as such so can the related valuation of rewards. This has direct implications for the behaviour of agents. It also suggests that what had been understood as mere preferences in valuing rewards at

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2 This is in contrast to the Becker basic model of utility maximization I referred to in the previous chapter. For a full explanation of why the Becker model is problematic see Ross et al. 2008, p. 48-50.
different times is more complex and related to reinforcers in the environment. Various aspects of the effects of this have been studied in greater detail with impressive results. For instance:

“This research has consistently found an inverse relation between consumption and price: consumption decreases as price increases (and vice versa). It has also consistently found an inverse relation between consumption and the availability of alternative rewards: consumption decreases as alternative rewards are more readily available (and vice versa). The generality of these relations is impressive, having been found in different species (including humans), for different abused substances, in normal and clinical (“addicted”) populations, and in laboratory and natural environments.” (Ross et al. 2008, p. 45)

PE is a molar-scale account of behavioural patterns, meaning it operates at the level of organisms and sets of organisms. As such it is only a partial explanation of DG and addiction. Factors other than those explicitly covered in this model may be involved. For instance, as with Elster (1999), Lowenstein (1999) emphasises the role of conditioned craving in addiction, suggesting that it is largely responsible for relapse among substance abusers. This need not contradict the PE account: “…no single perspective can explain every aspect of the phenomena” (Ross et al., 2008, p. 92). Evidence suggests that DG is what was once referred to as an “organic disorder” and as such it requires a molecular or neuroscientific explanation alongside the molar-scale PE account: “PE is a molar account of intertemporal choice that makes no pretence to describing any molecular mechanisms” (Ross et al., 2008, p. 94). The neuroscientific account I will later summarise is a molecular-scale NE one.

Rationality Revisited

In Chapter 2 I considered the question of whether it was rational to be an addict or not. I suggested that in the context of discounting, if an addict’s decision to use is based purely on giving substantially more weight to the present than the future, this cannot be considered irrational. Because time preferences are arguably a-rational, there may no way to distinguish between rational and irrational discounting in this model. This doesn’t seem adequate:

“From the perspective of PE, what is problematic about substance abuse and DG is the same: the person systematically and recurrently invests in both the substance or in gambling, and in measures to curtail substance use or gambling. Economists regard such manifestation of cycling preferences as problematic to a typical person for one basic reason: it allows her to be exploited by consistent agents and/or by institutional structures in such a way that extract her assets without compensation. In the standard phrase among economists, she can be used as a money pump.” (Ross et al., 2008, p. 80)

Determining the rationality of DG may give us some direction in understanding the relationship
between rationality and mental disorder. Gamblers regularly choose smaller, sooner rewards (SSRs) over larger, later rewards (LLRs), and consumption of SSRs risks future access to LLRs in ways that they find problematic. This is where it is natural to argue that they exhibit irrational patterns of consumption. Studies of the matching law that manipulate the frequency, amount or delay in rewards have yielded some interesting results. Both animals and humans showed a tendency to prefer larger rewards to smaller ones, and sooner rewards to later ones. This is put into conflict when the smaller reward is sooner and the larger later (as with SSRs and LLRs). Rachlin and Green (1972) showed that selection of an SSR (demonstrating impulsive behaviour) was more likely than selection of an LLR (demonstrating self-control) if the temporal distance from a reward was smaller.

**Figure 3.1:** Choice reversal between LLRs and SSRs is shown by means of a concrete example. Units are arbitrary. Adapted from Ross et al. (2008, p. 56)
This is described in Figure 3.1 above where choice reversal between LLRs and SSRs is shown by means of a concrete example. Time is mapped against the value of a given reward, both can be any relevant measure of unit of time and value of a reward accordingly. The reward with the highest value curve at any given time that a choice is made will be the one that is preferred. The change in reward value with delay is termed ‘temporal discounting’ because the present value of a reward is discounted below what it will valued when received in the future. For instance, at choice point Y an agent will choose an LLR whilst at choice point X the same agent will switch their preference to an SSR. This explains how someone can become a money pump by targeted exploitation of such a preference reversal (Yaffe, 2002).

Importantly, this work shows that such preference reversal is not only common, but also natural: “irrationality, in the technical sense of the economist, is in fact normal” (Ross et al., 2008, p. 57). Both humans and animals are predisposed to have inconsistent preferences for future rewards. This is problematic for the claim that preference reversal of this sort is irrational. A naturalistic account of rationality should take into account such results and if possible, avoid imposing excessive normative standards on rationality (Elster, 1999). Simply stating that intertemporal preference consistency is possible is not a normative justification that it is rational. I will return to this shortly. Perhaps at this point the question ‘why do we sometimes behave irrationally?’ is replaced with the question ‘how do we ever act in accordance with our long-term preferences?’:

“How do most people, most of the time, resist temptation and exercise self-control? More precisely, why is the LLR ever preferred to the SSR, especially when the SSR is immediately available?” (Ross et al., 2008, p. 65)

**Hyperbolic and bd Discounting**

As I introduced in Chapter 2, a basic economic model of behaviour accounts for abstention and addiction by altering the rate at which an agent discounts the future. Becker and his students describe the addict as in a downward spiral by succumbing to the SSRs of addictive targets at the expense of LLRs such as health, jobs and relationships that can be modelled generally by temporal discounting, but this is too simple. In this section I will outline more sophisticated models of discounting in detail and relate them specifically to the case of DG. Studying the choices between SSRs and LLRs can provide a framework for understanding impulsivity and hence addiction.

PE makes the prediction that differences in temporal discounting between problem substance abusers and the normal population as described in Figure 3.1 can be explained by the structures of discount functions (i.e. curvature, parametric restrictions) which are related to
variable discount rates. This is shown in Figure 3.2 where the $k$ parameter is a constant proportional to the degree of temporal discounting and varies with the rates of discounting. The prediction of PE is that $k$ values would be higher for substance abusers and lower for normal (non-disordered) individuals. This prediction has been confirmed by research on individuals with problem drinking, heroin addicts, smokers, cocaine addicts and disordered gamblers (Bickel, Johnson, Koffarnus, MacKillop & Murphy, 2014; Ross et al., 2008).

**Figure 3.2:** Hyperbolic and exponential discounting. The $k$ parameter is a constant proportional to the degree of temporal discounting and varies with the rates of discounting. Units are arbitrary. Adapted from Ross et al. (2008, p. 59)
Laibson (1997) in studying savings-related financial transactions described the *qualitative* property of hyperbolic discounting using what is known as bd (beta-delta) discounting, a useful analytical tool for analysis of intertemporal choice phenomena (see Laibson, 1998; Laibson, Repetto, & Tobacman, 1998; O’Donohue & Rabin, 1999). When combined with Loewenstein’s (1996) ideas to explain cognitive processes concerned with long-range interests, the bd model is a challenge to hyperbolic discounting³. It does not describe molecular processes, but is potentially useful for understanding them on a molar scale:

“...while (micro)economics should indeed not be collapsed into psychology, it offers a valuable, indeed essential, contribution to our understanding of substance dependence and DG. These contributions arise both on the molar scale of explanation, through PE, and on the molecular scale, through NE” (Ross et al., 2008, p. 94)

**Reward Bundling and Self Control**

Hyperbolic discounting explains why chronically impulsive individuals repeatedly surrender to temptation despite the desire not to, but it does not explain how anyone ever avoids such a situation. Ainslie (1992; 2001) outlines four processes used to subvert preference reversals and make choices consistent with LLRs: external commitment, control of attention, preparation of emotion and personal rules. Deliberate engineering of the social or physical environment to avoid or work around cues and triggers for consumption of SSRs, combined with avoidance of information about the availability of SSRs, preparing for the emotions surrounding the consumption of SSRs and the development and maintenance of personal rules will allow a person to avoid the consumption of SSRs in favour of LLRs. The most important tactic of self-control is the establishment and maintenance of personal rules. This is essentially a PE account of willpower.

To avoid preference reversal, an agent can ‘bundle’ a series of rewards together to generate a preference for a higher aggregate reward obtained by consistently choosing LLRs. To do this they adopt personal rules that operate as ‘universal’ in all choice situations where there may be conflict. Each time an agent successfully chooses an LLR over an SSR, their expectation of future reward is strengthened. Conversely, if they break a personal rule and choose an SSR, future attempts to resist SSRs will be approached with a decreased expectation of success. For a full account of how stable choices are ever made in such an environment see Ainslie (2001; 1992) and Rachlin (2000; 1995). Ainslie’s contribution here forms the final part of the PE account of disordered gambling. Hyperbolic discounting on dynamic intertemporal choice *combined* with

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³ This is sometimes referred to as a ‘neural realist complex discounting’ model. For a full explanation see McClure et al. (2004) and Rachlin (1996). Evidence for and limitations on understanding economic processes as descriptions of neural processes is covered in Kable & Glimcher (2005).
variations in intra-personal bargaining around personal rules can describe individual differences in ‘willpower’. An individual’s choices are relatively insensitive to global utility. Instead they are more sensitive to the comparison of utilities at a local level (Ross et al., 2008). We are almost all subject to our immediate desires unless we are able to engineer our environment such that we have a combination of personal rules and bundled future rewards. This explains why, although we all engage in temporal discounting, there are differences in the abilities of individuals to pursue LLRs and avoid SSRs.
The Neuroscience of Addiction

As I have already argued, the PE account is a useful but only partial account of addiction. What is needed is an explanation of the neuroscientific basis of DG. In this case study we use the emerging field of NE, which combines economic theories and modelling techniques with neuroscientific observations to understand the “relationship between valuation and behavioural control at the scale of brain processes” (Ross et al., 2008, p. 15). Along with PE, this model uses the insights of NE in understanding the reward circuit of the brain. A key component of this is the concept of valuation: the process by which feedback is provided to an organism regarding a predicted stimulus via reinforcement signals (Ross et al., 2008, p. 8). Valuations put “…meaning back into computations” (Montague, King-Cassas & Cohen, 2006, p. 20) by assigning positive or negative valuations to experiences. By applying NE models of reinforcement learning to PG, it is possible to begin to describe how things may have gone awry and lead to the disordered state4. Though some authors have stated that neuroscience will crowd out behavioural elements in explanatory importance, this is not to suggest a strong reductionist view that neuroscience will replace them altogether (Ross et al., 2008).

NE partly explains the PE phenomenon and vice versa but at different levels – namely the molar and molecular. The NE model focuses on the dopamine reward system of the brain and regards the midbrain circuit of neurons as an economic agent vying for: “…the scarce resource for which neurons compete... blood hemoglobin” (Ross et al., 2008, p. 12). In DG this midbrain circuit can be ‘usurped’ as a consequence of a number of factors including genetically-inherited vulnerability and developmental contingencies:

“In effect, this midbrain circuit commits mutiny against the normal personal control apparatus.... the dopamine mutineer, considered as an economic agent, then maximizes its utility by relentlessly pursuing goods with certain properties that the targets of addiction all share” (Ross et al., 2008, p. 16).

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4 This approach has been taken to other Psychiatric Disorders. See Dayan and Williams (2006); Williams and Dayan (2005); Williams and Taylor (2004). This has led to the development of the field of computational psychiatry. See Dayan and Williams (2006); Montague, King-Cassas and Cohen (2006).
There are two important consequences of this model, both of which I will cover in more detail in this chapter. In short, they are:

1. Our folk psychology concept of pleasure and reward does not correlate with our scientific understanding of them. This has direct implications for our understanding of the phenomenon of addiction, and fits well with the separation of wanting from liking.

2. While it has been generally assumed that it is the action of exogenous substances on the body and/or brain that results in addiction, the empirical application of the NE model of DG shows not only that it is a genuine addiction in a neuropsychiatric sense but that it is the basic form of addiction. That is, without the complicating effects of exogenous chemicals DG elucidates what it is about the brain itself that is responsible for addiction as an endogenous neuroeconomic-neurochemical phenomenon.

**Pleasure versus Reward**

To understand the neurological basis of addiction, it is imperative to have an understanding of pleasure and reward, especially in the way these often incorrectly conflated terms are defined in the philosophical and neuroscientific literature. Specifically, this is a revision of our folk conception of reward. This section will elucidate these differences before I move on to provide a neuroeconomic account of addiction.

Traditionally, the part of the brain that we share with other vertebrates is referred to as the ‘limbic system’ and the PFC the ‘cognitive system’. The latter has been an incredibly important feature of our evolution and is famous for its dramatic phylogenetic growth and role in the evolution of human intelligence. The reward system integrates both the limbic and the cognitive systems and although these terms are in some ways misleading, it is useful in this context to think of them as somewhat dichotomous, specifically because they evolved at different times and for different reasons. This dichotomy is most usefully retained when we consider behavioural control, as the reward system requires frontal circuits of the brain to take a supervisory role to prevent impulsive behaviour (Ross et al., 2008, p. 132). This is not because the limbic system is exclusively ‘emotional’ and the PFC ‘rational’; in fact, the PFC requires emotional judgments and motivations to function and the older parts of the brain do perform some rational functions. Rather it is because they are specialised that such supervision is required. In the next section I will explore how this can malfunction.

The reward system is a set of brain processes. It is associated with the neurotransmitter dopamine and its role is to compute the dopamine pulses/outputs of the VTA and SNpc. These
dopamine outputs are understood as neurological rewards and are interpreted by the hypothalamus – a portion of the brain that performs a variety of functions including the monitoring of basic proprioceptive (inwardly but unconsciously perceived) bodily states such as blood sugar and temperature levels. Information from the hypothalamus is a fundamental input into the reward system. Importantly, this information connects reward to hedonic pleasure, though pleasure and reward are not the same thing. Pleasure as it is consciously experienced is best thought of not as a reward in and of itself, but as a generally good though somewhat unreliable neurological indicator of or proxy for reward:

“...although reward and pleasure are related, they are not the same thing. This may be the single most important point on which neuroscience calls for a revision in popular “common sense” about targets of addiction and compulsive behaviour” (Ross et al., 2008, p. 137).

We tend to confuse and conflate these terms when we talk of addicts continuing to use because they ‘like’ using. When confronted with an addict who both uses and wants to stop, this no longer makes sense – how can someone both ‘like’ smoking cigarettes and simultaneously ‘not like’ it and want to stop? Though irrationality seems like a likely explanatory candidate of such contradictory behaviour, neuroscience provides a different explanation:

“Neuroscience forces us to separate not two but three kinds of psychological state: (1) the extent to which a state is hedonically pleasurable; (2) the extent to which a change of state is treated by the brain as a reward; and (3) the extent to which a person judges a change of state as improving or reducing their immediate or long term welfare” (Ross et al., 2008, pp. 137-138).

A folk conception of reward and pleasure links (1) and (2); however, it turns out that (2) and (3) are more closely related than either are with (1) (Berns, McClure, Pagnoni and Montague, 2001). This fits well with the distinction that Robinson and Berridge make in their work between ‘wanting’ versus ‘liking’ (Murphy & Smart, 2018; Robinson & Berridge, 2008; Robinson & Berridge, 2001; Robinson & Berridge, 1993). Their theory is based on the idea of incentive-sensitisation and focused on addictive substances rather than behavioural regularities. In this account neural systems are sensitised by addictive drugs. This sensitisation directly affects incentive motivation, producing compulsive patterns of drug-seeking behaviour. Importantly, the brain systems that are sensitised – the mesotelecephalic dopamine (DA) system and DA projections in the NE and accumbens-related circuitry – do not mediate pleasure-producing effects (drug liking). Instead they mediate a subcomponent of the reward system. Robinson and Berridge term this ‘incentive salience’ (drug wanting) (Murphy & Smart, 2018). Incentive salience due to drug-taking becomes pathologically amplified in addiction (Robinson & Berridge 2001, p. 109). An agent’s self-control is directly affected, and they are neurologically motivated to engage in addictive behaviour. The theory has been confirmed empirically in
several drug addiction categories except cannabis use, which seems to show the opposite effect (Pober, 2013). It is not at all clear that cannabis is addictive, for this reason (Ross et al., 2008). The distinction between wanting and liking goes some way in explaining why addicts can both continue to engage in addictive behaviour, and not find it enjoyable (Murphy & Smart, 2018).

Hedonic pleasure is not necessary for behaviour and it is “...a basic of principle of NE that people (behaviourally and neurally) ‘want’ many things they don’t (hedonically) ‘like’” (Ross et al., 2008, p. 138). Our principal evolutionary adaption has been intelligence and as such our reward systems have been selected to specifically not prioritise pleasure signals over certain other signals, namely those to do with changes in environmental reinforcers. Our reward system is stimulated when we experience unexpected changes in our environment. Very simply put, reward is associated with the release of dopamine in above-expectation levels throughout the reward system:

“As creatures whose main evolutionary adaptation has itself been adaptive intelligence, however, we have reward systems that were precisely selected so as not to give pleasure signals priority over our curiosity about changes in environmental reinforcers” (Ross et al. 2008, p. 139).

This is corroborated by evidence from brain injuries and disease. People who experience catastrophic damage to their anterior cingulate report a loss of hedonic colour from their subjective perception of the world; however, they are still capable of reinforcement learning (Berridge & Robinson, 1998; Schroeder, 2004, pp. 121-122). In contrast, damage to the reward system produces substantial breakdowns in behavioural and motor regulation, ranging from Parkinson’s disease to motivational disintegration (Berridge & Valenstein, 1991; Ross et al., 2008).

This is crucial for an understanding of addition. To take cigarette smoking as an example, many smokers find the sensations of smoking many of the cigarettes they smoke largely unpleasant while they smoke them. Given this, it cannot be said that all cigarettes induce or are the targets of hedonic pleasure and with an understanding of the reward system, it need not be. We have evolved to pursue targets of reward rather than targets of hedonic pleasure:

“The fact that we are evolved to pursue what stimulates our reward system more diligently than what makes us feel good will turn out to be a fundamental part of the neuroscientific explanation of addiction and PG” (Ross et al. 2008, p. 139).
What stimulates the reward system is unexpected changes in our environment. Our brain is a learning machine and unexpected input helps us learn. Dopamine is released when we receive information we were not expecting, stimulating the brain to pursue targets of learning. Additionally, it is “…crucial to our understanding of addiction and PG that the brain is generally more responsive to changes in the environment than the absence of change” (Ross et al., 2008, p. 136). Situations where we receive the input we expect are not neurologically important. Dopamine is not released in the way it is in response to environmental change.

A Neuroeconomic Model of Addiction

Understanding the limbic and cognitive systems of the brain as a dichotomy in the context of addiction is the first part of a neuroeconomic account of it. The specialisation of these structures is a result of their development at different times in human evolution. The reward system integrates parts of both the limbic and the cognitive system. When evolved structures require functional inputs and outputs from other structures that evolved separately there is the potential for breakdowns as the older structures were not selected for the capacity to serve the newer ones. Typically this is not a problem, as newer systems are able to work around and with older ones; however, important and predictable ‘bugs’ can and do arise resulting in pathological patterns. These bugs are known as ‘kludges’ - neurological vulnerabilities that are patched around when brain systems are working optimally. Addiction can be understood as a kludge or predictable bug that occurs in specific circumstances. That is:

“The widespread and relatively standardized pathologies of addiction may well be kludges stemming from the imperfect adaption of the midbrain to its new role as a service department for newer cortical systems” (Ross et al., 2008, p. 132).

As outlined in the previous section, the brain has evolved with a primary function of pursuing neurological reward. Monitoring of this reward is encoded in the brain through the reward system, specifically with the neurotransmitter dopamine. Dopamine is required for learning, and as such dopamine is essentially a mechanism for allocating neural resources and consequently prompting behaviour (Ross et al., 2008, p. 140). Dopamine neurons do not discriminate between the ways stimuli are delivered; they ‘care’ only about the difference between prediction and delivery of associated reward (Schultz, 2002). This can explain the phenomenon of relapse, as anything that has been a part of a person’s habitual environmental for the consumption of addictive targets acts as a trigger of relapse. When the brain learns what the predictors for reward are, it ceases to respond to the administration of the reward itself and instead responds to the trigger directly. Dopamine is a mechanism for allocating neural resources and thus prompting behaviour. This is how it operates as a tool for learning
though it is not a kind of perception (Preuschoff, Bossaerts, & Quartz, 2006). Learning in this sense is about action, and as such “...in the brain, learning is for doing” (Ross et al., 2008, p. 140). That is, reward is not simply a passive perceptual experience; rather, it is a direct impetus for behaviour. Pleasure is far more passive than reward, hence the need to separate the concepts. In addition, where reward is concerned the brain does not distinguish between ‘doing’ and ‘thinking’. It can’t tell the difference between “caring about (e.g.) gambling and getting busy preparing to gamble” (Ross et al., 2008, p. 141). Again, this is an important part of understanding relapse and triggers. Kludges in the regulation of behavioural responses to dopamine release are the fundamental basis for understanding DG neurologically:

“...dopamine’s function in integrating reward learning, attention, and seeking behaviour is the basis of gambling’s capacity to trip the circuit into runaway self-amplification. That dopamine also mediates reward perception adds to the power of the midbrain system to push alternative behaviours aside when special circumstances and the neurochemical reaction to them frees it from cortical management” (Ross et al., 2008, p. 144).

A neuroeconomic account of DG sees all decision-making behaviour as reward-dependent to some extent. The basic assumption of NE is that humans, like any learning agent, have “...goals among which trade-offs are required due to scarcity” (Ross et al., 2008, pp. 123-124). The scarce resource in the case of the reward system is dopamine. By recourse to models of learning such as the predictor-value (PV) model of Montague and Berns (2001) we can understand the reward system as an economic agent with the midbrain dopaminergic circuit when it operates in concert with the OFC and PFC as operating as the primary site of reward valuation and response. Understanding the neurochemical facts as interpreted by the neuroeconomic model explain why relapse is more problematic than withdrawal, and importantly point to DG as the coalface expression of addiction.

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6 For a full explanation of this account and its development over time see Ross et al. (2008), Chapter 5; Preuschoff, Bossaerts, and Quartz (2006); McClure, Daw and Monatgue (2003); Martin-Soelch et al. (2001) and Berridge and Robinson (1998). Though the theoretical foundations of the account including animal studies have been accumulating for decades, an integrated NE model was only possible post-2000 with the advent of fMRI investigation.
Gambling as the basic form of Addiction

Following from an NE account of addiction it is crucial to note that understanding the neurobiological basis of addiction does not suggest a reduction of NE and psychology to neurobiology. By taking AG as the template of addiction, neurobiology complements NE and psychology as well as PE: “...current science appears to vindicate the insights of both behavioural economists and proponents of internal state (or, less accurately, ‘disease’) models of addiction, dissolving the traditional tension between these views“ (Ross et al., 2008, p. 6). As I have already argued, this may not fit with our philosophical or folk psychological understanding of addiction as it stands; however, it must take precedence over it:

“...philosophy should always be antecedent to science, and ... scientific hypotheses typically get distorted when pressed into the service as philosophical exhibits” (Ross et al., 2008, p. 120).

Our traditional and folk psychological understanding of addiction has seen gambling as something of an anomaly. What is it that attracts the gambler to gamble more? Is it money, thrills or escapism? The PE/NE model of addiction suggests that this is the wrong question because what leads some people to have a problem with gambling is that gambling is inherently rewarding (Ross et al., 2008, p. 165). This is a simple but pivotal point. The distinction between reward and pleasure is vital here. As I have already stated, neurologically there is little distinction between a reward and a predictor of a reward. Rewards are units of information, and the reward system is a device that leads animals to pursue certain things over others (Wise, 2002; 2000). Humans have evolved to pursue novelty because of its direct link with learning, and the dopaminergic system of our brains is designed to respond faithfully to positive surprise. “Such understanding of addiction... depends on the idea that an addictive target has to be the consumption consequence of pursuing a reliable cue for surprise.” (Ross et al., 2008, p. 160, emphasis original). Furthermore, predictors of reward are (when of a positive and surprising type) the brain’s rewards.

Gambling in essence is paying for the possibility of a surprise. The odds cannot be too much in favour of the gambler and it may even be important that they are negative. Though the gambler may consciously prefer winning to losing, it is not what they are actually paying for. Gambling directly interacts with the brain’s reward system because the “...reward system is built for gambling, so gambling serves it” (Ross et al., 2008, p. 166). As I indicated at the start of this chapter, what is perhaps most interesting about this is that there are people who gamble who are able to avoid doing so pathologically. Because the brain is ‘built’ for gambling in this specific way, it should be clear now why the PE/NE model of addiction points to AG as the basic

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7 For empirical evidence of this see Bunzeck and Duzel (2006).
template for addiction. This is more than just saying that AG is the one stereotypical form of addiction that has no associated chemical complication. It is the stronger claim that “…gambling simply is direct stimulation of the midbrain reward system” (Ross et al., 2008, p. 167). That is, all forms of addiction are complications and variations on the core case of AG as direct stimulation of the reward system through behaviour.

Ross et al. (2008) extend this by arguing that the broad category GD should be locally reduced to the narrower addiction category (AG), while retaining a version of the broad category (DG) that is not understood as inherently a disorder of the brain. This is a stronger claim that is essentially that the NE model of addiction should apply to GD while the PE model of consumption impulsivity should not be applied to addicts exclusively, as it can produce important insights into the behaviour of both addicted and non-addicted individuals:

“It is useful, indeed important, to apply the PE model of consumption impulsivity to addicts as well as some non-addicts for the following reason. Every person whose budget constraint does not put potential objects of impulsive consumption out of reach... has incentive to learn to attach value to personal rules so as to implement bundling” (Ross et al. 2008, p. 221).

This is more than a pragmatic approach to clinical care though; it is a strong anti-reductionist claim regarding consumption impulsivity and gambling. I will return to this later in my analysis of (I)GD in Chapter 5.
Applying the model to (I)GD

A combined PE/NE model of addiction that establishes AG as the basic form of addiction while still acknowledging the explanatory power of PE for understanding the broader category of DG is a good place to start in an analysis of (I)GD for a number of reasons. Most obviously, if (I)GD were likely to be placed in future revisions of the DSM under the classification of ‘addiction’ this would be of direct importance. Section III of the DSM-5 indicates that this indeed may be the case, with tolerance and withdrawal listed as symptoms of the disorder (American Psychiatric Association, 2013). The PE/NE model of addiction certainly allows for non-substances to be the targets of addiction and (I)GD does appear to be a genuine candidate for consideration. With any addictive or addictive-like behaviour “...the person both systematically invests in the good and invests in unsuccessful efforts to consume less of it. Clearly consumption problems in this sense can arise for almost anything and can be highly idiosyncratic” (Ross et al., 2008, 160). Whether any particular consumption problem can be considered an addiction in the strong NE sense will require application of the model to the behaviour/phenomenon in question. The PE/NE model does not answer the same questions about addiction that are salient to the discussion of (I)GD and Internet use more generally:

“The [PE/NE] model does not, however, address two further questions about addiction. Without answering these, a full etiological understanding of PG/AG will remain elusive. They are (1) What distinguishes things that can be targets of addiction from things that aren’t?; and (2) What distinguishes those who become addicts from those who don’t?” (Ross et al., 2008, p. 157).

Addiction is a term that seeks to distinguish strong cases of disordered behaviour in terms of consumption impulsivity from mild ones. As the research on DG suggests, we are all susceptible to gambling. In fact, it is the case that in some regards we are programmed to pursue gambling tasks because of the way that gambling directly stimulates the reward system of our brains. Furthermore, treating AG or GD is not the same as treating DG:

“Addiction distinguishes severely recalcitrant cases of consumption impulsivity, but reversal of addiction cannot generally be expected to be sufficient for preventing consumption impulsivity” (Ross et al., 2008, p. 221).

That is, consumption impulsivity is necessary but not sufficient for addiction and the reversal of addiction necessary but not sufficient for the reversal of consumption impulsivity. Understanding consumption impulsivity in this way serves as the doorway for understanding (I)GD. The next two chapters will cover some of the scientific research on (I)GD and then apply the PE/NE model directly to (I)GD in light of this research.
The PE/NE model of addiction distinguishes between AG and DG in a way that is conceptually useful. However, its clinical application is limited by technology. It is not possible at this stage to clearly identify cases of AG from DG in a cost-effective and clinically useful way. Understanding that there may be functional differences between patients exhibiting the same symptoms is still useful information nonetheless. As a result, clinically it may be most useful to understand (I)GD as on a continuum. Kuss and Griffiths have argued this for some time, most notably in their 2012b systematic review of the empirical literature on (I)GD. The general idea is that a wide range and number of players could be affected negatively by games (i.e. DGs), but that the true prevalence of (I)GD is unknown (Hussain, Williams & Griffiths, 2015). Researchers should therefore see the activity of gamers on a spectrum – from low, to intermediate and high risk of (I)GD (Hussain, Williams & Griffiths, 2015, p. 227). Addiction-like symptoms can be viewed on this continuum. Any individual experiencing symptoms such as ‘excessive’ time spent playing, preoccupation or craving could be on the (I)GD spectrum, but it is the severity and number of these symptoms which would determine whether their experience is pathological.

The term excessive is normative and is used loosely in the literature on (I)GD. Excessive has a pejorative connotation and lacks a defined point that is exceeded. The PE/NE model is intended to provide more robust framework for distinctions between pathological and non-pathological play that do not rely on fuzzy terms like excessive. I will use the term liberally in my work, but it should be understood as ill-defined and potentially problematic, in a way that reflects its use in the literature. The PE/NE model takes the general idea that it is possible to make a distinction between pathological and non-pathological use by using symptom severity and number as a guide and extends it further, by arguing that severe cases of DG may be present, and that we should view these and only these as AG. While claiming that gambling is a legitimate addiction opens up repeated behaviours in general to scrutiny, arbitrary preferences are just that, arbitrary:

“...there is no social consensus, and no prospect of a rationally justifiable social consensus, on... how many hours a person ought to spend surfing the Internet or playing online games” (Ross et al., 2008, p. 212)

I will return to these concerns in Chapter 5. For now the important point to note is that the PE/NE model does not endorse the moralisation of people’s preferences in relation to potential behavioural addictions.
CHAPTER FOUR

(Internet) Gaming Disorder in Focus

Image: WoW Valentine’s Day event. Credit: blizzard.com
A game by any other name would smell as sweet

Games are interesting, diverse, creative and important. To those immersed in the world of gameplay this may seem to be a blindingly obvious statement. Indeed, games and game playing have held a central role in human society for thousands of years (McGonigal, 2011). Working out the possible function(s) of games in society and culture is a necessary step in determining whether they can be the cause or form of pathological behaviour. It is not enough to say ‘games can be addictive’ or even ‘games can lead to pathological behaviour’ without drilling down on what that actually means, and why we would make such claims.

Games do not fit into a coherent uniform category that lends itself to wide generalisation. While gambling, on the whole, presents as a clean case study in repeated behaviour of a certain form, it is not so clear that gameplay can be categorised as such. Heterogeneity and lack of consensus in the literature is widely acknowledged (Pontes & Griffiths, 2015). In this chapter I will cover some of the scientific research on (I)GD and then apply the PE/NE model directly to (I)GD in light of this research. Through the application of the PE/NE model to gaming I will highlight some of the problems for it, and for the concept of (I)GD more generally. By Chapter 5 I will move my discussion to the social context of gaming, to argue that at this point in the research, generalisations about the pathology of gameplay are oversimplified and potentially highly problematic.

Many terms have been used in the literature to describe the phenomenon of interest: Internet Gaming Addiction, Gaming Addiction, Videogame addiction, Problematic Internet Use, Internet Disorder and so on. To avoid confusion, I will be using the term (I)GD as per the latest editions of the DSM and ICD, but the studies I cite may have used other conceptions of the disorder and terminology. I will note where this is relevant, especially for studies that include the Internet more generally, rather than looking at games specifically. For these cases I will use the term Problematic Internet Use (PIU). In all cases what is being studied rests on a shared assumption - that playing games can indeed lead to negative medical consequences.

This chapter takes its format from a systematic review of the literature published in 2012 by Kuss and Griffiths. Work in the field has exploded since this review, particularly in the light of the inclusion of the disorder in the appendix to DSM-5. I will incorporate this new material wherever possible. However, this chapter is not intended to be a comprehensive review of the literature to date; I am more concerned with the broad themes and conceptual issues that

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1  The first written account of gameplay dates back to *The Histories* by Herodotus in 440BC. While the primary focus of the work is an historical account of the Persian Wars and the various cultures of the regions known as Northern Africa, Western Asia and Greece, Herodotus also describes in detail the counting game Mancala. Evidence of the game exists for periods well before this, but Herodotus is the first to have written about the origin and *cultural* function of the game in society. Mancala is one of the oldest games known. It is a counting game for 2 players that uses stones, bones, beans or seeds placed in holes or pits either on a board on in the earth (McGonigal, 2012).
emerge from it. The list of symptoms associated with (I)GD varies widely. Articles that focus on
the addictive nature of games focus on symptoms such as preoccupation with games, difficulty
in managing time spent on the Internet or playing games, increased irritability when gameplay
is restricted, and decreased social interaction offline (Ryding and Kaye, 2017; Tikhonov &
Bogoslovskii, 2015).

In regards to additional negative medical consequences, a list provided by Griffiths, Kuss and
King (2012, p. 311) serves as a prototypical example:2

“In addition to the reported negative psychosocial consequences, there are also many reported
health and medical consequences that may result from excessive video game playing. These
include epileptic seizures [Graf, Chatrian, Glass, & Knauss, 1994; Maeda et al., 1990; Harding and
Jeavons, 1994; Quirk et al., 1995; Millett, Fish & Thompson, 1997], auditory hallucinations
[Spence, 1993], enuresis [Schink, 1991], encopresis [Corkery, 1990], obesity [Shimai, Yamada,
Masuda & Tada, 1993; Deheeger, Rolland-Cachera, & Fontvielle, 1997; Johnson & Hackett, 1997;
tenosynovitis – also called “nintendinitis” [Reinstein, 1983; Brasington, 1990; Cassonova &
Cassonova, 1991; Siegal [sic], 19913], blisters, calluses, sore tendons, and numbness of fingers
[Loftus & Loftus, 1983], handarm vibration syndrome [Cleary, McKendrick and Sills, 2002], sleep
abnormalities [Dworak, Schierl, Bruns &Strüder, 2007; Alison, von Wahde, Shockley & Gabbard,
2006], psychosomatic challenges [Batthyany, Muller, Benker, & Wölfling, 2006], and repetitive
strain injuries [Mirman & Bonian, 1992].

Taken together, this relatively long list of potential psychosocial and medical negative
consequences clearly indicates that excessive gaming is an issue irrespective of whether it is an
addiction. It also suggests that more extensive recognition by the medical community is needed
of the wide range of potential negative and life-limiting consequences of excessive video play.”

It is evident from this list that the negative effects associated with gameplay are exceedingly
broad and heterogeneous. Although some of these may be side effects of an addictive
behaviour, it cannot be claimed that they are as a direct result of addiction. Take for instance
tenosynovitis, a painful swelling and inflammation in the tendons of the wrist. Depending on
the location it would be classified as carpal tunnel syndrome, De Quervain’s tenosynovitis or
several others (Kidd, McCoy & Steenbergen, 2005). ‘Nintendo wrist’ or ‘gamer’s wrist’ covers
multiple types of tenosynovitis. Both conditions can have a multitude of causes relating to
repeated stress and the general mechanical construction of the wrist. The likelihood of an
individual experiencing such symptoms does not necessarily correlate with extreme use, but
with a combination of factors including being female (Tanaka, Peterson & Cameron, 2001). As
someone who has suffered from De Quervain’s tenosynovitis requiring surgery, I am acutely
aware of the limitations some individuals (including myself) have when engaging in certain
types of activities that others seem to do with ease. These include not just gameplay but

2 I have decided to use this quote following its inclusion in Nielsen (2016) for the same reason. Nielsen shows that
it operates as a prototypical list of negative effects in at least twelve articles.

3 This is a typo: ‘Siegal’ is meant to be ‘Siegel’. Nielsen (2016) shows that this typo has carried through a large
number of publications over time, potentially indicating a lack of critical analysis or approach in the literature.
computer use generally, lifting in certain ways (especially holding small children), holding and using smart-phones, and duties associated with libraries and bookshops, to name a few. To list something of this type as a direct consequence of gameplay is somewhat misleading. A similar critique can be applied to every symptom on the list above, and as such any claims resting on lists of this type should be considered with caution.

That said, determining the possible range of negative effects of something is part and parcel of the process of determining its status as a potential pathological behaviour. Difference or deviance is not in and of itself a reason to consider behaviours as requiring a medical diagnosis. The DSM-5 defines a mental disorder in terms of harm. It must include a “…clinically significant disturbance in an individual’s cognition, emotion regulation, or behaviour that reflects a dysfunction in the psychological, biological, or developmental processes underlying mental functioning. Mental disorders are usually associated with significant distress in social, occupational, or other important activities… Socially deviant behaviour… and conflicts that are primarily between the individual and society are not mental disorders…” (American Psychiatric Association, 2013, p. 20). Nielsen (2016) argues that this definition has become increasingly more inclusive between editions, although whether this affects the conceptual basis of (I)GD is unclear. In the first part of this chapter I will outline the kinds of behaviours and games generally covered by the research, and research methods used, to give a sense of the scope of the area.

In regards to the psychological symptoms most associated with addiction, I will take my starting point from Kuss and Griffiths’ 2012b review of empirical research. They divide studies into a number of categories, the three major ones being Etiology/Risk, Pathology/Addiction and Ramifications/Consequences. I will use a similar schema (with a modification of Pathology/Addiction to Pathology/Phenomenology) to divide a brief overview of the literature, and also include the categories of Pathophysiology and Comorbidity separation. In agreement with Kuss and Griffiths (2012b) I will argue that (I)GD and similar disorders exist along a continuum, with ‘addiction’ being the most negative consequence, though probably less prevalent than is sometimes claimed. This suits the PE/NE model, something that could be explored as a potential conceptual framework for future research.

I will end the chapter with a discussion of recent debate in the literature regarding the difference (or lack thereof) between (I)GD and Internet Addiction as to whether the latter is conceptually redundant. I will argue that even if it is, it is still a guiding framework used in research and cannot be ignored.
Games: an overview

Videogames are a relatively recent addition to our social lives, with the first arcade videogames becoming commercially available in 1972. Since that time developments in technology - both hardware and software - have led to an explosion in the number and types of games available, and the variety of platforms they are available on. Sales of videogames reflect the wide appeal of gaming: in 2014 in the United States alone sales of videogames amounted to $15.4 billion, and total consumer spending to $22.4 billion (Entertainment Software Association, 2015). In general, the term ‘gamers’ refers to those who play video and tabletop games on a regular basis. Occasionally the term will be used for infrequent or irregular players. In this context I will use it for anyone engaging in gameplay of the sort the ICD and DSM are interested in.

The idea of videogames as a ‘playground’ for gamers is one that is widely circulated (Kuss & Griffiths, 2012b). Videogames (and games more generally) provide a space for many different forms of play, each engaging the player in a series of activities ranging from the very simple to the very complex. While games designed to be enjoyable, some games focus on more serious aspects, topics and challenges, and some even become engaging simply because they are slow or uneventful (Bertran, n.d.). For example, in Desert Bus the aim is to drive a bus across a desert. The steering veers to one side slightly, so you have to engage with the driving experience, but otherwise there is little to see or do. Gameplay is not only something gamers enjoy alone; it is also something that they can enjoy together. That is, it can be a highly social activity, fostering sociocultural protocols of behaviour across and within games (Kuss & Griffiths, 2012b). According to the Nielsen 360° Gaming Report (The Nielsen Company, 2017) gamers are spending more of their time gaming or engaging in eSports (competitive gameplay at a professional level) every year. In 2017 this amounted to 12%, as compared to 11% in 2016. This is still behind other social activities such as time with family and friends and watching TV, but it is certainly a growing trend. Challenging the stereotype of gamers as adolescent males, the average age of gamers is 34 years old, and 40% of all gamers are female (Entertainment Software Association, 2016). In light of this, I will return in Chapter 5 to the potential effect of this stereotype in the context of the broad market for games.
Games of Interest

The focus of most research on (I)GD has been on a class of games known as Massively Multiplayer Online Role-Playing Games (MMORPGs) such as WoW and EVE Online. MMORPGs are of interest for a number of reasons. First and foremost, the literature argues that they are more likely to be associated with a higher risk of (I)GD (Ng & Wiemer-Hastings, 2005). Certainly they appear to be highly engaging play environments that players are highly motivated to use (Hussain, Williams & Griffiths, 2015; Griffiths, Davies & Chappell, 2004). The social aspects of these games are particularly important, and appear to be drivers for many gamers to play them. They report enjoying the aspects of games that involved collecting distinctive objects, being helpful to other players, being a part of groups and exploration of online worlds more generally as motivating factors for play (Hussain, Williams & Griffiths, 2015; Hussain & Griffiths, 2008; Griffiths, Davies & Chappell, 2004).

MMORPGs are widely played throughout the world, with worldwide revenues reaching into the billions. MMORPGs have no spatial or temporal limitations for participation, other than those set by the game realms. As the name suggests, they are played by many players simultaneously (Kuss, Griffiths & Pontes, 2016). Players are able to play simultaneously across the planet, and often play and socialise in guilds⁴, working together to achieve aims and goals within the game. MMORPGs are likely to be the most popular type of gaming available online. 46% of online gamers play MMORPGs of some type (Nagygyörgy et al., 2013). Games associated with eSports like League of Legends are also popular, these are known as Multiplayer Online Battle Arena (MOBA) games (Nuyens et al., 2016).

Social interactions form a key component of MMORPGs, but game mechanics extend beyond this. One important aspect of the gaming environment is that gamers adopt alternate personas while they play known as avatars (Kuss et al., 2016). Combined with the range of game environments available, escapism and the exploration of fantasy is a major draw for gameplay. Games provide players with various incentives to play, and these can be quite diverse both in terms of the game structure, and in what a game can offer an individual player. Games can be tailored to the needs of an individual player (Kuss et al., 2016). The heterogeneity in game design and structure, as well as the diversity of players and player motivation, is something the research has grappled with in an inconsistent way. Other games of interest include (but are not restricted to) Open Sandbox or Open-World games (OSGs) such as Skyrim, Simulation Games (SGs) such as Second Life, First-Person or Ego-Shooters (FPSs) such as Counterstrike and Doom and Casual Browser Games (CBGs) such as DarkOrbit. In an early study on ‘addiction’ to the Internet and online gaming, Ng and Wiemer-Hastings (2005) describe the appeal of MMORPGs. MMORPGs are complex, engaging and socially focused:

“While traditional videogames end at some point or become repetitive and boring, MMORPGs are endless, because the main feature of MMORPGs is its system of goals and achievements. As

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⁴ Guilds are social groupings within MMPORGS. They are established in-game between players who have common goals (Kuss & Griffiths, 2012).
you play, your character advances by gaining experience points “levelling up” from one level to the next, while collecting valuables and weapons - becoming wealthier and strong. Social interaction in MMORPGs is highly essential, as you must collaborate with other players in the game to succeed in more complex goals. Eventually, a player must join a “guild” or “clan” of other players to advance further in the game.” (Ng and Wiemer-Hastings, 2005, p. 111).

Gameplay is not a static thing. Statistics on current games and gameplay are constantly updated and show inconsistent trends. According to the 2017 Nielsen 360° Gaming Report, gamers vary in how many devices they play games on, with 46% playing on only one device, compared to 42% in 2016 and 45% in 2015. Gameplay on mobile devices seems to be on the rise - 62% in 2017 versus 46% in 2013; and eSports, Virtual Reality and Augmented Reality games are all on the rise.

For the PE/NE model I will be interested in games that engage players in repeated behaviours that are likely produce the same kludging effects as gambling. However, this does not necessarily dictate that the gameplay will look exactly ‘like’ gambling, just that it produces the same or similar effects.

**Research on (I)GD and Related Disorders**

As per the Ross et al. model, one of the common methods employed by research into (I)GD is to compare it against clinical criteria for substance addictions and/or gambling (Hussain, Williams & Griffiths, 2015; Griffiths, 2005). Research on MMPORGS in particular has suggested that for a minority of players, specific types of games have an addictive potential (Kuss et al., 2016). As the appeal of games is so broad, narrowing down exactly what these games are and which gamers are at risk has been difficult. Games allow for the exploration of the world in a unique way:

“(p)lay enables the exploration of that tissue boundary between fantasy and reality, between the real and the imagined, between the self and the other. In play we have a license to explore, both our selves and our society. In play we investigate culture, but we also create it.”

(Silverstone, 1999, p. 64 as cited in Kuss & Griffiths, 2012b, p. 2)

Certainly a minority of players do experience a range of symptoms typically associated with addiction, and play to levels that may be considered excessive - either by themselves or those around them. However, as addiction has such a high comorbidity rate with other disorders and research on (I)GD is so heterogeneous, establishing clear conceptual frameworks for future research is a necessity if the category is to have any validity. Although Petry et al. (2014) argue that there was a ‘consensus’ in the field of (I)GD research as it pertains to the DSM-5 criteria, it is not clear that is the case at all. The same lack of consensus is apparent in the context of the ICD-11. This chapter will cover some of that material.
Review of Current Research

My review takes its lead largely from Kuss and Griffiths’ (2012a; 2012b) review papers on empirical research and neuroimaging studies in (I)GD. The number of studies covering these has exploded since publication of their review, and it is unfeasible and largely unnecessary for me to attempt a comprehensive review of the literature to date. It is unnecessary because the broad categories outlined by Kuss and Griffiths (2012b) still hold, and conceptual analysis of the proposed disorder requires a general rather than specific knowledge of the category - the themes that emerge from the literature, and the way conceptions of the disorder have been shaped over time. I will add more recent research to each category as it is needed for conceptual clarification, or where it will be useful to expand on any particular facet in light of the PE/NE model of addiction.

In particular I will be concerned with construct validity - that is, the overall performance and robustness of a measurement or test in relation to the relevant theoretical concepts and empirical observation. If (I)GD is to be considered a robust disorder subject to diagnosis and measurement, it must satisfy at least a minimal requirement of face validity, if not complete construct validity. That is, it must be able to be measured in a way that is reflective of the phenomenon that it is meant to measure, at least on the face of it. There needs to be consistency in our conceptual construct, and reliability in the methods used to test it. It is unclear if the current work on (I)GD satisfies even this minimal requirement.

Kuss and Griffiths (2012b) argue that (I)GD is best understood as a continuum. Antecedents to the disorder are identifiable from research into risk factors and aetiology. “Full-blown” addiction, as well as the negative consequences and treatment of (I)GD are described as separate, but interdependent stages on the continuum. This is not a subscription to the AG/PG distinction of the PE/NE model, but it does not contradict it. The broad category of (I)GD as it is currently conceptualised would encompass both AG and PG, quite possibly with the appearance of a spectrum. I will stick with the spectrum concept throughout this chapter, except where the AG/PG distinction is particularly relevant. I will also focus on work that compares excessive gaming and (I)GD with pathological gambling. Research based on this comparison is common, beginning most notably with the work of Van Holst and his collaborators examining whether the behavioural tendencies related to problematic gambling were shared by problematic videogame players (van Holst et al., 2012).

My literature search was conducted by using the databases MEDLINE/PubMed and Web of Science and supplemented with additional studies found in supplementary sources such as Google Scholar. Search terms were ‘Internet gaming’ and ‘Internet use’ coupled with ‘disorder’, ‘addiction’ and ‘problem’ as well as the suite of terms used previous to (I)GD in the relevant literature. As my aim is not to provide a systematic review, I have included a wide range of studies. However, I have focused primarily on those that were:

a) peer reviewed;
b) in the English language, and;
c) specifically relevant to the diagnostic categories presented in the DSM-5 and ICD-11.

(I)GD has a very short history, beginning in the 1980s. All studies were expected to be relatively recent. In line with other reviews of (I)GD and PIU, I set a 10 year time period for my review: 1998-2018.

Etiology/Risks

Kuss and Griffiths (2012a; 2012b) identify a large number of studies focused on the aetiology of, and various risk factors for, (I)GD. They include research on relevant personality traits, motivations for playing and structural game characteristics. Their results are summarised below with a focus on studies of interest to the PE/NE model. I have included supplementary research post-2012.

Personality traits

As a risk factor, personality traits of gamers displaying problems with their gameplay have been assessed in a number of ways, from case study-based qualitative research to larger samples using a wide range of personality inventories and scales. (I)GD has been linked to several key personality traits under the broad categories of introversion, neuroticism and impulsivity (Kuss & Griffiths, 2012b). While associations like this are interesting, none appear to be unique to (I)GD. For the PE/NE model I am most interested in studies related to impulsivity. A large scale study by Kim, Namkoong, Ku and Kim (2008) explored the relationship between (I)GD and aggression, self-control, and narcissistic personality traits. A sample of 1471 online game users (males 82.7%, females 17.3%, mean age 21.30+/4.96) participated in the study. Participants completed several self-report measures and (I)GD was measured using Young’s Internet Addiction Scale (2006). Their results found self-control to be negatively correlated with ‘online addiction’, with high statistical significance (p<0.001). Such a deficit in self-control could potentially feed into problematic discounting behaviour and preference reversals relevant to addiction, although more targeted research would be required to confirm this possibility.

Littel et al. (2012) reported higher levels of self-reported impulsivity in self-selected WoW players. Their results did not confirm any substantial causal conclusions, but suggested that excessive gamers may be less sensitive to the negative consequences of gaming as a result of poor error processing, diminished response inhibition and trait impulsivity. These could also feed into problematic discounting behaviour, though again more targeted research would be required to confirm it. Also focused on impulsivity, van Holst et al. (2012) recruited adolescent male videogame players to determine if attentional bias and disinhibition toward gaming cues related to problem gaming in the group. Their findings suggested that self-reported problem gamers did indeed display signs of error-related attentional bias to game cues while engaging in two attentional bias tasks.
Groves, Skues and Wise (2015), in a nuanced study of gameplay on the social media platform *Facebook* examined the effects of hyper-competitiveness, narcissism, reward responsiveness and psychological absorption and Problematic Video Game Play (PVGP) for a group of Facebook gamers (n = 102, 84% female, average age 40.39), and compared it to a control group (n = 132, 61% male, average age 24.70). Their results showed that the only significant predictor of PVGP in Facebook gamers was an interaction between narcissism and hyper-competitiveness.

Evidence that (I)GD is correlated with personality traits such as narcissism, aggression, hypercompetitiveness and introversion do not directly support the PE/NE model, nor does it contradict it. These could simply be risk factors for (I)GD. Moreover, what it may suggest is that in some cases (I)GD is a *symptom* of other mental disorders and distress, rather than the *cause* of pathology. This is difficult to determine. I will return to this idea in my discussion of comorbidity and my critique of (I)GD in Chapter 5. Impulsivity, however, may be of interest. If (I)GD is related to attentional bias or disinhibition in the context of game cues, this will/does potentially have effects on decision making and preference reversals.

**Motivations for playing**

As with personality traits, some motivations for gameplay seem to suggest risk factors relevant to (I)GD (Kuss, Louws and Wiers, 2012). The research on this is patchy. Of note, the thirteen studies identified by Kuss and Griffiths (2012b) make no explicit reference to game type, other than studies that focused on the broad genre of MMORPGs. In these studies the motivations for gameplay were assessed using interviews and questionnaires, alongside scales relating to the quantification of (I)GD. The research showed that motivations related to dysfunctional coping, socialisation and personal satisfaction were the most likely to be correlated with (I)GD. Some studies are of particular interest to the PE/NE model as applied to (I)GD. Motivations relating to mastery, control, recognition, completion, excitement and challenge (King, Delfabbro & Griffiths, 2011; Wan & Chiou, 2006a, 2006b), intrinsic rather than extrinsic motivation to play (Wan & Chiou, 2007) and immersion (Caplan, Williams & Yee, 2009). Motivations in this spectrum may suggest the engagement of the neural reward pathways relevant to addiction. What they also point to is the diversity of tasks that games engage players in. For instance, mastery may relate to any number of tasks and gameplay, likewise with excitement or challenge. A validated framework for assessing motivational factors in MMORPGs was developed by Yee (2006, 2007). The framework has been used in successive studies of PIU, most notably Kardefelt-Winther (2014a; 2014b; 2014c) whose work I return to in my discussion of comorbidity.

As per personality traits, the correlation of (I)GD with dysfunctional coping and socialisation does not fit with the PE/NE model, but it does raise doubts about the validity of (I)GD as a discrete or causal disorder. I will return to this concern in Chapter 5. In addition to this, other research suggests that motivations for gameplay include the social benefits of gaming, especially when games are played with peers (Olson, Kutner & Wagner, 2008). This potentially contradicts the notion that games themselves cause dysfunctions in socialisation, though it may
come down to what we count as normal versus disordered social behaviour. Hellman et al. (2013) in a cross-disciplinary review of research on online game addiction directly considered the social context of gaming. Their review argued that excessive video gaming is a socially learned behaviour, but also that MMPORGS in particular provide avenues for social expression not possible in IRL. In particular the ability to perform social competency anonymously and create a social identity and appearance intentionally in-game appears important in the understanding of game playing, and indeed (I)GD. It is my position that future research needs to be more careful in regards to framing. If we understand online social activity as ‘lesser than’ or ‘not real’ in comparison to other form of IRL social activity, then we are/would be more likely to interpret online social activity as disordered. This may occur regardless of whether online social activity is indeed pathological; rather it would be as a reflection of negative judgements of non-mainstream social behaviour.

**Structural characteristics of the game**

Of perhaps the most interest to the PE/NE model when applied to (I)GD are structural characteristics of games which are correlated with clinical presentation of disordered gaming. The PE/NE model would predict that only certain kinds of repetitious behavioural tasks would be likely to produce the neurological dysfunction identified in AGs. Gameplay similar to gambling tasks would be the most obvious place to look, but there is potential for other repeated tasks to have a relevant effect. So-called ‘grinding’ tasks are the most highly correlated with gambling. Grinding is the repetition of a task within a game for gameplay advantage (Sorens, 2007; Thompson, 2008). Grinding tasks can unlock content or treasures, advance a character’s level or gain experience points. Some grinding tasks are set up so that a player repeats a task for variable or no reward, similar to a poker machine. It is a controversial part of the gaming experience, with some gamers arguing it is contradictory to good game design, while others defend the capacity of such tasks to level out a playing field and provide relaxation and enjoyment. The potential for grinding tasks to cause addiction has not gone unnoticed. The IGDA Online Games White Paper (2003) noted that level treadmills (grinding tasks) had the potential to be addictive in MMORPGs if played for more than 25 hours a week (International Game Developers Association, 2003).

Griffiths and Wood (2000), in a review of gambling and gaming argued that key structural characteristics of games provide in-built rewards and produce the kind of repetitive behaviour we see in those with behavioural addictions. A decade later, Kuss and Griffiths (2012b) were only able to identify four studies that tackled structural aspects of games directly (Chumbley & Griffiths, 2006; King, Delfrabbrro & Griffiths, 2010; SmaheL, Blinka & Ledabyl, 2008; Thomas & Martin, 2010). King et al. (2010) developed the most comprehensive structural characteristic taxonomy for videogames. None of these addressed grinding tasks specifically. The results of these four studies did suggest that structural characteristics of the game, including the taking on of a virtual character, positive reinforcement in gameplay and additional content such as adult content and rare in-game items, were correlated with addiction in gamers. The Chumbley

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5 Also known as treadmill, pushing the bar, farming or catassing.
and Griffiths (2006) study is of particular note. Negative reinforcement was shown to lead to frustration in game players, while positive reinforcement led to game persistence. As gambling tasks provide both positive and negative reinforcement, it is unclear if these findings contradict or support the position that games provide gamers with gambling-like tasks that may lead to addictive behaviour. It would be necessary to distinguish between the self-reports of players, and the neurological rewards (if any) they receive while attending to such tasks. Later studies have incorporated the structural characteristics of games into their study design. Described above, Groves et al. (2015) is a good example of this. They designed their survey to pinpoint how game structure and design could interact with personality characteristics.

Griffiths and Nuyens (2017), in their overview of structural characteristics in problematic videogame playing, argue that structural characteristics of games relevant to (I)GD are poorly understood. To date, many of the studies carried out are small scale, use self-selected participants and utilise self-report surveys or laboratory experiments out of a regular gaming context (Griffiths & Nuyens, 2017). Compared to the scale of research on the psychological and biological underpinnings of (I)GD, the structural characteristics of games have been the subject of far less research. Griffiths and Nuyens (2017, p. 280) concluded that:

“Eclectic and multitheoretical approaches are needed if we are to understand the relationship between structural characteristics and video game addiction. Based on the evidence to date, the research appears to demonstrate that some structural characteristics of video games at the very least have a contributory role in the acquisition, development, and maintenance of problematic and addictive video game playing. Clearly more research is needed to establish which structural features appear to be most associated with problematic gaming but it appears that features that take a long time to achieve in-game are (unsurprisingly) the ones rated highly by problem players (e.g., earning experience points, managing in-game resources, mastering the video game, getting 100% in-game.”

Given the significance of structural characteristics to the PE/NE account, I agree with this conclusion. Care should be taken to distinguish between tasks that simply take a long time to complete, versus tasks that lead to neurological and psychological changes associated with addiction. It is my initial position that grinding tasks specifically require increased scrutiny in the conceptual and empirical study of (I)GD.

Pathophysiology

Pathophysiology, broadly speaking, is the intersection between risk factors and the development of pathological behaviours (Kuss & Griffiths, 2012b). As the PE/NE account provides a mechanistic explanation of addiction, empirical evidence for the pathophysiology of (I)GD is the most likely to confirm or contradict the PE/NE model. Claims regarding the pathological nature of behaviours caused by a dysfunctional mechanism are an additional element of the account of addiction it provides (Murphy & Smart, 2018). Neuroimaging studies provide the bulk of empirical evidence in this category, though genetic and other physiological
(especially biochemical) studies supplement them. The focus has been primarily, though not exclusively, on the dopaminergic system and its related neurological substrates.

Research supporting the PE/NE model

Extant research on substance addictions and gambling implicates reward processing, and aspects of reward sensitivity have been the focus of some research on (I)GD. The evidence thus far suggests that advanced reward sensitivity in patients with (I)GD may promote excessive game playing (Dong & Potenza, 2014). In a small study of twenty males (9 normal users: 24.7+/−2.4 years of age, 11 overusers: 23.5+/−2.9 years of age), Park et al. (2010) showed that ‘excessive Internet game use’ may be associated with abnormal neurobiological mechanisms in the OFC, striatum, and sensory regions. These are implicated in impulse control, reward processing, and somatic representation of previous experiences. Earlier work showed stronger activation of brain areas associated with substance-related addictions and pathological gambling. Research participants identified as ‘gaming addicts’ showed stronger activation relative to healthy controls in the NA, medial frontal cortex, right OFC, left occipital lobe, bilateral anterior cingulate and the caudate nucleus (Han, Hwang & Renshaw, 2010; Hoeft, Watson, Kesler, Bettinger & Reiss, 2008; Ko et al. 2009). Similarly Dong, Huang and Du (2011) examined reward and punishment processing in ‘Internet addicts’ versus controls. They argued that ‘Internet addiction’ was associated with increased activation in the OFC in trials involving gains, and decreased ACC activation in trials involving losses.

In a follow-on study, Dong, Hu and Lin (2013) recruited 16 ‘Internet Addiction Disorder’ (IAD) subjects (21.4±3.1 years) and 15 controls (HC, 22.1±3.6 years). They compared fMRI data of participants while engaging in a gambling task. The findings suggested that brain activity in their identified IAD subjects showed lowered response to gambling losses than in controls. They concluded that IAD subjects showed a greater overall sensitivity to wins, and a lower overall sensitivity to losses. If accurate, this could lend itself to a PE/NE account. If subjects with suspected (I)GD have a tendency toward inconsistent choice behaviour as a result of variable sensitivity to wins and losses, they could be more likely to be ‘money pumps’ in a traditional BE sense.

Structural and functional neurological deficits have also been implicated in (I)GD. An example of recent work that demonstrates this is a study by Wang et al. (2018) on the role of deficits in functional and structural connectivity in the VTA. Thirty-three male students with IGD between 19 and 28 years old were recruited from the Xi’an Jiantong University. Inclusion in the study relied on subjects meeting five or more of the nine criteria listed by the DSM-5 for IGD within the twelve months preceding the study. They were all League of Legends players to control for the complicating effects of varied gameplay. Severity of IGD in research participants was measured using Young’s online Internet Addiction Test (Chinese Version) (Young, 1996). No control group was used. The study showed that dopamine pathways across the VTA, NA and Substantia Nigra (SN) were indeed impaired in regards to functional and structural connectivity. It is suggested that lowered structural connectivity may underly vulnerability to IGD, and lowered functional connectivity modulates the severity of the disorder (Wang et al., 2018). This
is similar to neuropathology from other addictions. However, the researchers were unable to determine if the structural and functional deficits were the cause or result of IGD (Wang et al., 2018).

Other studies add to a picture of (I)GD as aligned with gambling in terms of neurobiological correlates. From the very early days of research into Internet and videogame related disorders, dopamine and dopamine receptors were implicated (see Han et al., 2007; Hou et al. 2012; Kim et al., 2011; Koepp et al. 1998). The overall findings of these studies support the view that games and gameplay have the potential to hijack the dopaminergic system in a way that may be significant to understanding (I)GD as an addiction. However, no study to date has shown that videogames inherently release dopamine (Nielsen, 2017). We can be relatively confident that they do, but even this is not evidence that they do so pathologically. All of the tasks humans engage in release dopamine. If it is a task it requires attention, and if it requires attention it requires dopamine. So the fact that dopamine is released during gameplay tells us little if anything about whether (I)GD could be understood as an addiction (Nielsen, 2017). What is needed in the research is a more targeted approach, potentially using the PE/NE model, to distinguish between AG, DG and non-pathological gameplay in regards to dopamine and dopamine receptors.

**Research supporting other models of addiction**

Unsurprisingly, not all research on (I)GD supports the model I posited in Chapter 3. There are several potential reasons for this. Firstly, if the conception of (I)GD used in any particular study varies, it is a strong possibility that the results of that study will reflect a commitment to whatever conceptualisation they have made use of. This is potentially a result of confirmation bias, but also likely to be related to the complexity of addiction and (I)GD. If addiction is not, as I argued in Chapter 3, a natural kind, there is the potential that brain structures other than those covered in a PE/NE model are involved in any one addiction or addiction-like disorder. It is possible that the pathophysiology of (I)GD is not addiction at all, but some other disordered behaviour. This is one of the concerns with using the framework of addiction as a way to understand disordered gameplay.

It is possible that gender is an important factor in understanding the neurological basis of (I)GD. Hoeft et al. (2008). The findings of this fMRI study suggested that gender differences could help to explain why “...males are more attracted to, and more likely to become ‘hooked’ on videogames than females.” (Hoeft et al., 2008, p. 253). By showing that male participants had greater activation and functional connectivity in the mesocorticolimbic system during a space-infringement game with a control task, they argued that this would be likely to have impacts on reward prediction and learning reward values.
**Comorbidity**

The occurrence of diverse clinical and subclinical symptoms and disorders alongside (I)GD has been long recognised. Determining whether comorbidity is a risk factor for (I)GD, or simply an accompanying but independent condition is difficult. Few, if any, papers have tackled the direction of the relationship. Kuss and Griffiths (2012b) identify five studies assessing (I)GD and its comorbidity, with results finding it to be associated with symptoms of generalised anxiety disorder, panic disorder, depression, social phobia (Allison, von Wahlde, Shockley & Gabbard 2006; Mikuška & Vazsonyi, 2016; Peng & Liu, 2010; van Rooij, Schoenmakers & van de Mheen, 2017), school phobia (Batthyány, Müller, Benker & Wölfing, 2009), ADHD (Allison et al., 2006; Batthyány et al., 2009; Chan & Rabinowitz, 2006; Han et al., 2009; van Rooij et al., 2017;) as well as psychosomatic symptoms (Batthyány et al., 2009) and other addictions including substance addictions (Ream, Elliott & Dunlap, 2011). PIU more broadly has been associated with a wide range of negative psychosocial phenomena. Internet use has been linked to somatisation, obsessive-compulsive and anxiety disorders, depression and dissociation (Kuss & Griffiths, 2012a).

Early work debated whether (I)GD is a ‘primary condition’ or could be better understood as a manifestation of some other, underlying pathology (Griffiths, 2008; Wood, 2008). Starcevic, Berle, Porter and Fenech (2011) in their study of ‘problem’ and ‘addictive’ videogame use, used an international anonymous survey identified problem videogamers with a questionnaire known as the Video Game Use Questionnaire (VGUQ) and the Symptom Checklist 90 (SCL-90). From a sample of 1945 respondents in total they were able to identify 8.02% of respondents as problem users. They were specifically interested in whether these users were likely to have higher levels of other forms of psychopathology. Their results suggest that this was indeed the case: respondents with problem videogame use exhibited higher levels of all forms of pathology, especially among males. They refrained from any conclusions regarding causation, as their methodology did not allow for such claims.

The question of whether (I)GD is a ‘primary condition’ versus a symptom of other underlying pathology has not been satisfactorily answered by empirical or conceptual research. The idea that Internet use more generally may be a way to cope with negative feelings is commented on throughout the literature (see Kuss et al., 2012) Kardefelt-Winther (2014a; 2014b; 2014c) conceptually outline the theory of ‘compensatory Internet use’. That is, that people who play online games are motivated by the need to cope with other psychological problems they experience. His hypothesis is that:

“...excessive internet use occurs when people are motivated to go online to cope with life problems. The degree of life problems determine how strong the need and motivation to cope is, and the stronger the need the more time will be spent online to the detriment of other activities. Gaming provides certain affordances that may facilitate coping but the game itself is not the culprit, it merely acts as a potential facilitator of compensation for psychological problems.” (Kardefelt-Winther, 2014b, p. 69).

To test this theory empirically, Kardefelt-Winther surveyed 898 WoW players. 196 were
excluded as a result of missing data, the remaining 702 ranged in age from 14-60 years and 89% were male. The questionnaires were designed to specifically investigate whether stress or self-esteem moderated the relationship between escapism and negative outcomes for online gamers experiencing high negative outcomes. The results of the survey supported the hypothesis that negative outcomes would be positive for those with higher levels of stress, or lower self-esteem (Kardefelt-Winther, 2014b). The findings were limited by the survey design and scope, but suggested that life problems, escapism and negative outcomes are indeed connected. More work is necessary in the area to visit the hypothesis in the context of (I)GD more directly, and to establish a clear causal chain. While there appears to be empirical support for some version of a ‘compensatory Internet use’ theory, it is unclear whether those who experience negative outcomes from gaming do so because their motivation is to provide coping mechanisms for psychosocial problems. That could certainly be a factor determining severity of outcomes.

Pathology

Studies of the pathological characteristics of (I)GD have relied on a variety of classification and assessment instruments. Prior to the publication of the DSM-5 and ICD-11 the diversity in assessment techniques and conceptual basis of research in the area was wildly heterogeneous, something which has been noted in much of the critique of the disorder’s inclusion in the two classification manuals (Pontes & Griffiths, 2015). Prior to the publication of the DSM-5 and ICD-11, something like PIU or (I)GD was considered a viable construct worthy of investigation. Ultimately this led to its inclusion in formal psychiatric classification (van Rooij, Schoenmakers, van de Eijnden & van de Mheen, 2010). As I have already covered, some of this work supported a view of problematic game playing as lying on a continuum towards addiction, where addiction symptoms such as salience, mood modification, tolerance, withdrawal and relapse can result (Griffiths, 2010; King, Delfabbro, Zwaans & Kaptis, 2011; Salguero & Moran, 2002; Wang et al., 2018). Others such as Kim and Kim (2010) took a more direct approach, arguing that PIU is best characterised by a set of symptoms specific to the phenomenon - namely investment of time and energy in games, euphoria, denial, tolerance and preference for online relationships. This finding does not contradict the conceptualisation of PIU as an addiction (Kuss & Griffiths, 2012b), but unlike much of the work in the area it did not rely on addiction as a framework for research design.

Spekman, Konijn, Roelofsma and Griffiths (2013) specifically addressed the question of distinguishing between pathological gameplay, and merely enthusiastic gameplay. In a study of 1004 adolescent boys measuring problematic gaming behaviour, physical game-related symptoms and gaming behaviour, they produced results that suggested it was clearly possible to distinguish between the two. Specifically, they concluded that high game exposure merely indicates enthusiasm for a game, and personality patterns related to addiction were more correlated with pathological gameplay. Király et al. (2017) in a large survey of 7757 gamers recruited online via Facebook, argued that while IGD was associated with a wide range of
symptoms, the type and severity of symptoms was important for understanding the severity of the disorder. For instance, their results suggested that ‘preoccupation’ and ‘escape’ were associated with a lower severity of the disorder, while ‘loss of control’ and ‘tolerance’ were associated with greater severity. They supported the inclusion of a threshold in diagnostic criteria. One of the ways to make sure research includes the possibility that gamers showing high levels of gameplay are not addicted is to routinely include recreational game players as controls, rather than non-gamers. This approach is argued for by Wang, Zheng and Dong (2019) and Dong, Li, Wang and Potenza (2018).

**Phenomenology**

Most studies on the experience of PIU and (I)GD have been qualitative, the majority focused on self-identified and adolescent gamers. Several themes emerge from the literature, many of which have already been covered by other forms of empirical research surveyed in this review. PIU and variations of (I)GD have been associated in varying degrees with:

- Excessive time spent playing the game i.e. up to 16 hrs per day, not necessarily related to addiction (Allison et al., 2006; Chappell, Eatough, Davies & Griffiths, 2006).
- Time loss while playing (Rau, Peng & Yang, 2006; Wood, Griffiths & Parkem, 2007).
- Preoccupation (Chappell et al., 2006; King et al., 2013; Király et al., 2017).
- Lack of sleep (Allison et al., 2006).
- Irritability or restlessness (Kaptis, King, Delfabbro & Gradisar, 2016).
- Escapism (Kardefelt-Winther, 2014b; Király et al., 2017; Kuss et al., 2012).
- Shortage of IRL relationships (Allison et al., 2006).
- Secrecy, deception or conflict (King et al., 2013; Király et al., 2017).
- Changes in sense of time, body and space (Hellman, Schoenmakers, Nordstrom & van Holst, 2013).
- Symptoms that correlate to addiction such as tolerance, withdrawal, mood modification, salience, cravings and relapse (Chappell et al., 2006; Charlton & Danforth, 2006; Hussain & Griffiths, 2009; Kaptis et al., 2016, King et al., 2013).
- A sense that gaming provides compensation for needs not met IRL (Wan & Chiou, 2006b).
- Flow states, both positively and negatively correlated with addiction (Chou & Ting, 2003; Király et al., 2017; Laffan, Greaney, Barton & Kaye, 2016; Rau et al., 2006; Wan & Chiou, 2006a; Wood et al., 2007).

What this body of research suggests is that PIU and (I)GD are complex and heterogeneous. Understanding the experience of excessive or pathological game use can be approached from many angles. To narrow down on addiction may ignore some of the more nuanced aspects of the experience of gamers. I will return to problematic aspects of the ‘narrative’ of addiction in Chapter 5.
Ramifications

The ramifications of (I)GD, including negative consequences and treatment, are no doubt serious. There is a large body of evidence to suggest that gaming to excess is correlated with a wide range of negative consequences including psychosocial problems, relationship issues, aggressive/oppositional behaviour, attention issues, stress, sleep abnormalities and so on (Kuss & Griffiths, 2012b). Some of these will be severe enough to warrant professional medical assistance. My critique of the category of (I)GD makes no denial of this. However, the existence of negative consequences is not evidence in and of itself that (I)GD is a valid construct for understanding the experience of affected individuals. What the evidence does give weight to is the understanding of (I)GD as a pathology. Recall that mechanistic models of addiction need not understand the phenomenon of interest as pathological. The aim is to provide an account of the underlying causal mechanics of the phenomenon. To classify behaviour as a pathology we need an additional element to the account: harm. Sinnott-Armstrong and Pickard (2018) flesh out what is meant by harm in the context of addiction, arguing that either serious harm to self or a loss of control (which they reconceptualise as harm) is necessary in the definition of addiction. While I am not convinced that a loss of control can be construed in this way, the idea of harm as a crucial concept in addiction is a useful one. Work on the negative consequences of (I)GD could contribute to this.

What would be of interest to the PE/NE model are negative consequences that reflect the suggested mechanistic dysfunction, and treatments that operate effectively in a way that is suggestive of that dysfunction. As I have already noted, symptoms of (I)GD are similar to those experienced by persons addicted to substances (Beranuy, Carbonell & Griffiths, 2013). The most common treatment for (I)GD is Cognitive Behavioural Therapy (CBT). CBT has been supported by peer reviewed literature for some time (Torres-Rodriguez, Griffiths & Carbonell, 2018; Kaptis et al., 2016; Young, 2013). As CBT is effective for a wide range of disorders, this evidence does not lend specific weight to any conceptualisation of (I)GD. Psycho-pharmaceutical interventions have been trialled for (I)GD with some success. Notably, the antidepressant buproprion was used with some efficacy, and when medication was given to patients with comorbid ADHD the symptoms of (I)GD diminished (Han & Renshaw, 2011; Han et al., 2010). Both these lend weight to the position that (I)GD is a symptom rather than a cause of pathology.
Summary

Claiming that (I)GD is a coherent conceptual disorder is problematic. As my review suggests, research on (I)GD is scattered and inconsistent. This certainly continues to be the case post DSM-5. Regardless, there are those who claim that some form of PIU or (I)GD has a clear conceptual grounding. Take for example this extract, taken from the abstract of Montag et al. (2016, emphasis added)

“During the last years, classic research approaches from psychology considering personality variables as vulnerability factor, especially in conjunction with neuroscience approaches such as brain imaging, have led to coherent theoretical conceptualizations of Internet addiction. Although such conceptualizations can be valuable aid, the research field is currently lacking a comprehensive framework for determining brain-based and neurochemical markers of Internet addiction.”

Given my broad survey of both PIU and (IGD) I see no grounds for such a statement. The PE/NE model of addiction distinguishes between AG and DG in a way that is conceptually useful. However application of it to new cases requires a rigorous and sceptical approach. Ross et al. (2008) discuss this in the context of ‘sex addiction’. They suggest a cautious approach to applying the PE/NE model, while maintaining a liberal stance towards the possibility that any particular behaviour can be associated with disordered engagement:

“Since hyperbolic discounting and at least occasional failures to maintain personal rules are ubiquitous aspects of human life, there are almost certainly disordered consumers of everything anyone consumes, and nontrivial members of disordered consumers of everything that is a majority taste.” (Ross et al., 2008, p. 214)

Aspects of consumptions or activities that follow patterns similar to those described by the model need not be understood as disordered. Interpersonal sex and sexual behaviour does not present a clear case for application of the PE/NE model because much of the rhetoric around sexual behaviour involves highly moralised and gendered rhetoric, which is not at this point supported by neuroscientific evidence of the sort required (Ross et al., 2008). In the case of (I)GD, there is evidence that gaming leads to changes in brain structure and function:

“Overall, the studies indicate that Internet and gaming addiction is associated with both changes in function as well as structure of the brain. Therefore, not only does this behavioural addiction increase the activity in brain regions commonly associated with substance-related addictions, but it appears to lead to neuroadaption in such a way that the brain itself actually changes as a consequence of excessive engagement with the Internet and gaming.” (Kuss & Griffiths, 2012a)

However, how to understand these changes is still an open question. Studies linking pleasure, reward and videogames have yielded inconsistent results (Laffan et al., 2016). And more
generally the appropriateness of a framework of addiction depends on narrowing down causal chains, understanding the role of risk factors, motivations and structural game characteristics, and avoiding unnecessary judgement of non-mainstream social behaviour. In particular, more work needs to be done to elucidate the difference between AG, DG and non-pathological gamers, in a way that does not over-simplify the reasons for game playing. Compensatory Internet use, for instance, has yet to be fully understood:

“...the causes of what we refer to as excessive online gaming may have less to do with compulsion and more to do with compensation... a perspective of excessive internet use as a mental disorder, as proposed in the DSM-5 [sic], may be an unfair characterization of a phenomenon that can be explained as a coping strategy for life problems.” (Kardefelt-Winther, 2014b, p. 73)

Understanding (I)GD through the PE/NE model is not yet possible. The research is too scattered and the results too unreliable at this stage. In their systematic review of treatment of IGD, King et al. (2017) outline four main critiques of clinical trials:

1. Heterogeneity in the definition, diagnosis and measurement of disordered use;  
2. A lack of randomisation and blinding in clinical trials;  
3. Lack of controls;  
4. Insufficient information regarding methodological and statistical processes.

Given my review, I argue a similar list could be produced regarding the conceptual and empirical literature on (I)GD:

1. Heterogeneity in the conceptual formulation of (I)GD;  
2. Methodological shortcomings in research on (I)GD;  
3. Insufficient evidence distinguishing between AG, DG and non-pathological gamers;  
4. Insufficient attention to causal chains in (I)GD.

Understanding (I)GD as a disorder on a spectrum, using the PE/NE account, would certainly be useful in avoiding some of these concerns in future. This is not to argue that the PE/NE approach is the only or best way to understand (I)GD. Importantly, it is not yet clear that (I)GD should be rightfully understood as an addiction. A consistent theme in the literature is the heterogeneous phenomenology of (I)GD. I agree with Griffiths and Nuyen (2017) that a multifaceted approach to research may indeed be required:

“Problematic video game playing is multifaceted rather than a unitary phenomenon. Consequently, many factors may come into play in various ways and at different levels of analysis (e.g., psychological, biological, social, situational, structural). Put very simply, there are many different factors involved in how and why people develop problems with video game playing. Central to this view is that no single level of analysis is considered sufficient to explain either the etiology or the maintenance of video game playing behaviour. The perspective asserts that all research is context-bound and should be analyzed from a biopsychosocial perspective.”
I would argue that Petry and O’Brien (2013) were correct to argue that more research on (I)GD is required before it should be considered a legitimate and coherent diagnostic category. How best to proceed with that research remains an open question:

“Studies are needed to identify the defining features of the condition, obtain cross-cultural data on reliability and validity of specific diagnostic criteria, determine prevalence rates in representative epidemiological samples in countries around the world, evaluate its natural history and examine its associated biological features.” (Petry & O’Brien, 2013, p. 1186)

In Chapter 5 I will continue my critique of the literature, and tackle the problematic narrative of addiction in the context of (I)GD.

Lastly, the clinical application of the PE/NE model is limited by technology. It is not possible at this stage to clearly identify cases of AG from DG in a cost-effective and clinically useful way. Nonetheless, understanding that there may be functional differences between patients exhibiting the same symptoms is still useful information. As a result, clinically it may be most useful to understand (I)GD as a continuum. Kuss and Griffiths have argued this for some time, most notably in their 2012c systematic review of the empirical literature on IGD. The general idea is that a wide range and number of players could be affected negatively by games (i.e. DGs), but that the true prevalence of (I)GD is unknown (Hussain, Williams & Griffiths, 2015). Researchers should therefore see the activity of gamers on a spectrum - from low to intermediate and high risk of (I)GD (Hussain, Williams & Griffiths, 2015, p. 227). In the context of neuropharmacological therapies for addiction, the spectrum approach should be treated with some care. There is a genuine worry that some gamers, especially minors, would be targeted by such treatments in a way that reflects moral judgements about time spent playing games, rather than a response to a genuine addiction (Ross et al., 2008, pg. 216). The PE/NE model provides, at least theoretically, some way to address this concern.
CHAPTER FIVE

A Critique of (Internet) Gaming Disorder

Image: A twitter exchange between Twitch streamer Hbomerguy and a concerned stranger. Hbomerguy runs their Donkey Kong 64 Twitch stream for the trans youth charity Mermaids. The player raised over $330K for the charity. Credit: Hbomerguy/Twitter
Conceptual Critique of (I)GD

How psychiatry should understand the potential impacts of the Internet on human psychology, and the need for research into the possibility of pathological outcomes was the focus of a brief but important debate in the mid-1990s. The conceptual framework of (I)GD has been constantly changing since this time. Lack of clarity in the field can lead to a number of concerns, many of them clinical. If physicians are unable to properly identify pathological cases of game use, it is likely that there will be a proliferation of diagnoses. Some of these will be based on oversimplified, poorly constructed or under-researched criteria. Others will relate to moral panics associated with new technologies (van Rooij, Schoenmakers & van de Mheen, 2017). In order for (I)GD to satisfy legitimisation as a disorder, it is important that it meets certain conceptual and scientific criteria. For the purposes of my critique I am interested in three of these, each of which I will consider in turn:

1. The construct validity of (I)GD and pathological use;
2. Congruence with our understanding of games and gamers and;
3. Avoidance of looping effects that lead to false positives and labeling errors.

Critique of Current Research: Overview

From a very early point in (I)GD research it was clear that the inconsistent and sometimes haphazard approach to study of the disorder would hamper the field. In a meta-synthesis of research between 1996-2006, Byun et al. (2009) emphasised the point, arguing that research in the field displayed an inconsistent use of nomenclature, recruiting methods that were likely to introduce sampling bias, and data analysis techniques that showed a degree of association rather than causal relationships between variables. Since the DSM-5 and ICD-11 inclusion of (I)GD, significant progress has been made to develop consistent criteria for assessing possible cases of the disorder. Development of a psychometric scale has focused on reducing the heterogeneity of gaming addiction nomenclature (Pontes & Griffiths, 2015). In a review of research following the DSM-5 inclusion of (I)GD in their appendix, Lopez-Fernandez (2015) was able to conclude that focus has, to some extent, shifted from the broader category of PIU to (I)GD as a discrete and independent clinical condition. It is likely that the ICD-11 inclusion will have the same effect. This has the potential to create more convergence and ultimately consensus in the field, something that has not been achieved to date despite claims to that effect (Aarseth et al., 2017; Griffiths et al., 2016; Petry et al., 2014).

The debate is known as “Internet and the future of Psychiatry.” The primary focus of the exchange was to establish that the Internet could have possible pathological outcomes for human psychology and brain function. It set the scene for research into all aspects of human/internet interactions in the context of psychiatry, including Internet addiction. See Huang and Alessi (1996); and the reply by Stein (1997).
Construct Validity

In this first section of Chapter 5 I am concerned with construct validity. I define construct validity as the overall performance and robustness of a measurement or test in relation to the relevant theoretical concepts and empirical observation. As I argued in Chapter 4, if (I)GD is to be considered a robust disorder subject to diagnosis and measurement, it must satisfy at least a minimal requirement of face validity, if not complete construct validity. That is, it must be measurable in a way that is reflective of the phenomenon that it is meant to measure, at least on the face of it. Conceptual consistency is required to delineate (I)GD from both other disorders and normal behaviour (Kardefelt-Winther et al., 2017). Excessive gameplay is not sufficient to warrant the label of (I)GD, even when excessive use has negative functional or psychological outcomes. The risk of ‘making a disorder’ out of normal behaviours or passions requires extra caution (Kardefelt-Winther et al., 2017). Much of the research on (I)GD focuses on correlations with known risk factors for substance and/or gambling addiction. While the PE/NE model suggests the latter to be a fruitful approach, if (I)GD is to be understood as a discrete and unique disorder such data should be understood within causal accounts of (I)GD (Kardefelt-Winther, 2013).

Quantification and Analysis

The study of (I)GD has been a messy affair. Certainly until the release of the DSM-5 there was little to no consistency across research methods, design and conceptual characterisation. These problems still exist post publication of the DSM-5 and ICD-11. One of the primary problems research has encountered relates to psychological measurement and quantification. How is it that we are to translate a diverse set of behaviour into instrumentally useful numerical data? The problems of measurement in psychology and psychiatry are not new. Measurement of psychological phenomena in a meaningful and consistent way has been a primary focus of debate since the introduction of operationism to psychology by S.S. Stevens (Hardcastle, 1995). The debate has been extended in some detail, with critics arguing to varying degrees that psychological phenomena are not well suited to measurement (see Michell, 2000; Trendler, 2009).

For the purpose of this critique I am interested specifically in the problem of quantification. That is, how psychology and related disciplines represent observable behaviours and psychological characteristics with numbers (Tafreshi, Slaney & Neufield, 2016). This is the step before statistical analysis. Statistical analysis applies to a set of numerical ‘objects’, but in psychology and psychiatry these objects are not neutral facts about the world. They have been obtained and created in ways that reflect the aims of the research, whether by the use of quantitatively coding qualitative information with scales and surveys, or measuring quantities on a ratio scale. Tafreshi, Slaney and Neufeld (2016, p. 3) argue that mainstream psychological research does not critically reflect on how the phenomena they study are best represented. It is
my contention that this is indeed the case for much of the research on (I)GD. Exceptional studies in the field clearly engage with this conceptual issue, but many do not.

Quantitative studies on (I)GD

The central concern of quantitative studies of (I)GD has been the development of a reliable psychometric scale. On the face of it, it is clear that at the very least a minority of gamers experience negative outcomes as a result of excessive gameplay. However, excessive gameplay alone does not indicate pathology (Kardefelt-Winther et al., 2017). Defining what it means to play ‘too much’ becomes the central question of quantification and analysis:

“Behaviours might be usefully defined as problematic by their frequency, but how to quantify “too much” or “too frequent” is often a major point of contention” (van Rooij & Prause, 2014, p. 208).

For instance, videogame play has been shown to induce flow states of extreme focus. Players lose track of time and find the activity intrinsically rewarding (Adachi & Willoughby, 2012; Gentile, 2011). Flow states are not generally considered pathological, nor should they be. However, their tendency to crowd out other types of behaviour could be misconstrued as a symptom of addiction if flow states are not adequately understood and quantified. Establishing a clear boundary between healthy engagement and disorder must take into account normative aspects of gaming behaviour (Kardefelt-Winther et al., 2017). Studies incorporating or focused on gamers with excessive gameplay who do not experience any problems would go some way to clarifying this (Griffiths et al., 2016). Additionally, the PE/NE account provides a clear distinction between ‘disordered’ and ‘addicted’ gamblers. The same distinction could be applied to (I)GD and inform future research by guiding sample selection and research methodology.

Another problem for quantitative studies is how to best interpret and use brain imaging studies (Rose & Abi-Rached, 2013). As I noted in Chapter 4, simply identifying the involvement of dopamine and the dopaminergic system in (I)GD says very little. First, dopamine is released during a wide range of human activities, most of them non-pathological. Second, causal chains cannot be established without a fully fleshed out and empirically supported conceptual framework situating the involvement of the dopaminergic system within a causal account. The same basic critique applies to those brain imaging studies that identified the involvement of other key areas of the brain including the PFC, OFC, ACC and so on. In their discussion of the molecular neurobiology of depression, Krishnan and Nestler (2008) argue that brain imaging studies are flawed because of simplistic ideas regarding localisation (i.e. the amygdala as the locus of fear and anxiety). To avoid this, it is absolutely necessary that empirical work proceeds with a strong conceptual grounding. Equally, in the context of addiction, I would stress that any overly simplistic account of the disorder in neurobiological terms is unlikely to capture the cause or the experience of addiction. The same applies to the specific case of (I)GD.
Qualitative studies in (I)GD

A person-centred approach to research in (I)GD could improve the validity of the (I)GD construct by placing (I)GD in context (Kardefelt-Winther et al., 2017). In Chapter 1, I argue that phenomenology is a central component of the natural method for (I)GD, a multidisciplinary approach to understanding (I)GD as a discrete and individual disorder. To date, qualitative studies have been small in size and largely confirmatory. They were conducted outside of a natural gaming context, with self-selected participants:

“Given the recent emergence of research in this particular area, it is unsurprising that many of the studies carried out to date are small-scale, comprise of self-selected convenience samples, and are tentative in their conclusions. Most of the research in the area has utilized self-report survey studies or non-ecologically valid laboratory experiments.” (Griffiths & Nuyens, 2017, p. 280).

Qualitative methods for understanding (I)GD should overall be used more critically and carefully. Case study reports are a popular form of communication and publication in medicine, and they can be used effectively to suggest or identify causal pathways in operation, create testable causal predictions and suggest similarities and differences between one disorder and another (Ankeny, 2014). To best achieve this, critical reflection on both the methodology used and role of qualitative studies is required:

“Part of the problem, we believe, is that although some methodologists may have recognized the usefulness of qualitative methods, and have also acknowledged that there exists overlap between quantitative and qualitative research practices, most psychological researchers do not critically reflect on the procedures used in their research to represent phenomena of interest.” (Tafreshi et al., 2016, p. 5).

With the exception of a handful of high quality qualitative studies, (I)GD research is yet to adequately incorporate this view. One such high quality study is the subject of a book ‘A world of excesses : online games and excessive playing’ by Karlsen (2013). Karlsen uses a games studies perspective and qualitative research methods to look at structural and contextual aspects of gameplay relating to (I)GD. I will cover his work in more detail as I now progress to the next section.

Comorbidity

As covered in Chapter 4, comorbidity between (I)GD and several other clinical and subclinical symptoms and disorders is well established. If (I)GD comorbidity correlates with other disorders, especially addiction, then we can reasonably argue that the similarity between patterns of correlations and comorbidity is an indication of construct validity (Sim, Gentile, Bricolo, Serpelloni & Gulamoydeen, 2012). What comorbidity implies is a common vulnerability
The use of discrete diagnostic categories is somewhat artificial in this sense. However, the question of whether (I)GD is a ‘primary condition’ rather than a symptom of other underlying pathology has not been satisfactorily answered by empirical or conceptual research. In Chapter 4 I explored the possibility that people who play games to excess are motivated by the need to cope with other psychological problems they experience. This has been the focus of work by Kardefelt-Winther (2014a; 2014b; 2014c) who describes such behaviour as ‘compensatory Internet use’. If gaming activity helps a person cope effectively with negative affect, it is not clear that understanding such activity as disordered would be useful (van Rooij & Prause, 2014). As I argued, more work is necessary in the area to visit the hypothesis in the context of (I)GD directly. In particular, there is a need to establish clear causal chains between (I)GD and comorbid disorders. Gaming to escape life problems should be clearly distinguished from other forms of escapism such as gaming to avoid withdrawal symptoms, as these would be relevant to (I)GD (Petry et al., 2014). Comorbidity with other psychopathology is not in itself evidence of (I)GD as a discrete psychiatric category (van Rooij & Prause, 2014).

Why Videogames?

A focus on videogames, rather than games in general, is typical of the field of (I)GD research. This may be a historical fact, rather than one based on strong conceptual foundations. Early research focused on the Internet as a whole. However, PIU is too heterogeneous as a concept to be conceptually salient. Johnson (2009) argues the term is incorrectly and too widely used:

“I am not convinced that [PIU] exits. I am convinced that there are many people who use the Internet in a problematic way. I think that the phrase ‘Pathological Internet Use’ (whether general or specific...) aptly describes overuse of the internet in people’s lives... The term ‘addicted’ is often overused in popular discourse. For instance, phrases such as ‘I am so addicted to my mobile phone’, and ‘That [x] is so addictive’, have been used in reference to inanimate objects, digital technologies, types of foods, television shows and online games. This usage is insufficient and unsatisfactory.” (Johnson, 2009, p. 127)

Focusing on the Internet itself is of little conceptual benefit (Griffiths, 2017; Ryding & Kaye, 2018). The Internet is the medium though which a repeated behaviour is undertaken. Treating the sufferer of (I)GD by changing their computer use alone is unlikely to resolve the underlying problem (Sim et al., 2012). In this sense, I agree with the ICD-11 conception of the disorder as a variation of a general GD.

Pathologising gaming behaviour in general may be incorrect. Ross et al. (2008) predict this concern in the context of concerns about the expansion of the classificatory category of addiction. Larson (2000), in his work on positive youth development, suggests that organised activities, including participation in teams or clubs elicits initiative because they involve intrinsic motivation, concentrations and cognitive effort and cumulative effort over time to achieve goals. If we understand videogames, especially online games, to include these elements, it is
apparent why so many adolescents are drawn to them. So much of the work done on (I)GD fails to acknowledge the correlations between gaming and other forms of group activity such as sports. There is no substantial difference between gaming and most other forms of entertainment (Aarseth et al., 2016), suggesting that the diagnosis of (I)GD is either a judgement of non conforming behaviour, or that the category of behavioural disorders has the potential to be too inclusive.

There is no evidence that Internet gambling is more addictive than gambling in casinos, bars and so on (Griffiths, 2003; King & Delfabbro, 2012; Kuss et al., 2016; Sim et al., 2012). If the PE/NE model holds, and gambling provides the conceptual and empirical basis for understanding (I)GD, it is likely that the same would be true for (I)GD. That is, there is likely to be no significant difference between gaming over the Internet and gaming in other settings. It is much more likely that certain games or tasks within games increase the likelihood of (I)GD (King and Delfabbro, 2012; Ng & Wiemer-Hastings, 2005). I now turn to this possibility.
Games and Gamers

The few qualitative and clinical studies of (I)GD to date certainly demonstrate that a minority of gamers experience significant psychological and functional impairment as a result of excessive game use (Kiràly & Demetrovics, 2017). Understanding gamers and what it means to play games seems central to a full and reasonable account of (I)GD as a disorder. In the ‘natural method’ I outlined in Chapter 1, game studies is an integral part of a multidisciplinary approach to understanding (I)GD, providing crucial data about game design and play. I argue this is necessary for a decent conceptual understanding of (I)GD, and certainly necessary for the application of the PE/NE account. While psychology tends to view excessive gameplay through the lens of pathology, game studies is usually more positive in its attitude towards games, and downplays the problematic sides to playing (Karlsen, 2013). However, (I)GD has attracted some dedicated attention from the field. In this section I will unpack some of the concerns raised by game studies that relate to both the construct validity of (I)GD, and to the application of the PE/NE model to excessive or pathological gameplay.

Research Bias and Lack of Complexity

Bias in sample selection

In their meta-synthesis of research between 1996-2006, Byun et al. (2009) warned that (I)GD studies were rife with bias, something that required correction in order to enable a clear understanding of the disorder. Their recommendation was to shift the focus of research from exploratory studies to ones that focused specifically on developing causal accounts of the relationship between variables:

“The use of representative samples and data collection methods that minimize sample bias is highly recommended. Further, implementation of analysis methods that can test causal relationships, rather than merely examining the degree of associations, are recommended so that antecedents and consequences of Internet addiction can be clearly differentiated.” (Byun et al., 2009, p. 206).

In a large study of 1,945 survey participants with 156 respondents who identified as problem videogame users, Porter, Starcevic, Berle and Fenech (2010) suggested the following as a limitation of their methodology:

“Recruiting video gamers from online video game forums generates a sample of more avid
gamers with longer playing hours, and it is uncertain to what extent participants in the present survey are representative of video game players.” (Porter et al., 2010, p. 126)

Additionally, there is problem with the number of studies that look at self-selected or age-specific populations. For instance, recent work from van Rooij, Schoenmakers and van de Mheen (2017) on validation of an assessment tool for gaming disorder (the C-VAT 2.0) used a sample of clinical youth from 13-23 years old, which was entirely male. Likewise, Wang et al. (2018) use a sample of 33 males between the ages of 19 and 28 years old. This is typical of the field. The mean age of a gamers is somewhere in their thirties; however, there is some data to suggest that younger adolescent players play for longer than their adult counterparts (Karlsen, 2013). There is a consistent trend towards increasing numbers of female players, suggesting that the stereotype of predominately male gamers is incorrect (Karlsen, 2013; Williams, Yee & Caplan, 2008). This is not to say that the data from the groups research has focused on thus far is not useful; it is simply unclear whether it can be used to extrapolate across all gamers. Gaming has been described as an ‘emergent health issue for men’, with the claim that female gamers are less likely to suffer from (I)GD than their male counterparts (Chen, Oliffe & Kelly, 2018). This may indeed prove true; however, female players on average play more than male players (Karlsen, 2013). Given that the research focus is heavily skewed towards male participants, it is difficult to properly assess that claim.

The fact that males are more likely to be the target of (I)GD studies could be due to two factors. Firstly, they may self-select for studies more frequently, with most recruitment occurring via online targeted call-outs for participants via forums and groups. Game players could be attracted to such studies because they were concerned about their own gameplay, but this does not mean that they are a representative sample of gamers, or even gamers with (I)GD. Secondly, it may be that males are more likely to experience (I)GD. Hussain, Williams and Griffiths (2017) argue exactly this. Their empirical work suggests that males are more likely to be in “...a class of gamers who need their gameplay to handle unpleasant emotions and to exert control” (p. 228). The theory that males may be attracted to games as an arena to express emotions is one reflected in earlier research by Jansz (2005), and it is a pervasive idea. Hussain, Williams and Griffiths (2017) see the task of research to determine where this is a positive or negative aspect of gaming for males (i.e. where it could be useful, versus leading to pathological outcomes). I don’t disagree that this is useful, but argue that there is a step before that conclusion. Are we simply not seeing female gamers? The discourse around games is decidedly male-centered. One early neuroimaging study that specifically addressed gender differences was Hoeft et al. (2008). As discussed earlier, the study argued that males were more likely to become “hooked” as a result of neurological differences in the mesocorticolimbic reward system. We need to be sceptical of such studies. While the study itself appears well-designed, the conclusions rest on the assumption that males are more attracted to games, and that this attraction is biological rather than social. The evidence for this claim is unclear, or simply not there.
Geographical concerns

The DSM-5 has justified its inclusion of (I)GD using research largely from a South-East Asian context. South Korea has for some time considered Internet addiction one of its most pressing and serious health problems (American Psychiatric Association, 2008). China too considers Internet use as the cause of addiction and a serious health issue. In these countries, competitive videogaming, including eSports, is far more widespread and heavily promoted. This blurs the line between pathological and non-pathological excessive use (Starcevic, 2014, p. 16). Using data from the region, the APA argued from early on that despite cultural difference between the South-East Asian and United States contexts there remain enough similarities between (I)GD in both regions to warrant an assumption that it is the same disorder (American Psychiatric Association, 2008). The veracity of this requires further attention.

Mischievous reporting

It is possible that mischievous reporting in (I)GD research is common and associated positively with the number of (I)GD indicators reported by study participants. Present research relies heavily on self-report, and this can be easily affected by mischievous reporting (Przybylski, 2016). Future research into the disorder should be mindful of this to avoid overestimation of the prevalence and clinical impact of (I)GD.

Types of Games, Types of Gamers

There is a tendency in current (I)GD research to view gamers as a single, homogeneous archetype (Yee, 2006). While this assists in making generalisations, especially in the context of providing treatment for individuals in distress, it does not accurately reflect the fact that gamers are a diverse, heterogeneous group. People choose to play games for many reasons, and thus the way that games affect their lives varies greatly. The current criteria for (I)GD do not reflect gaming context and culture accurately, and as a result fail to adequately predict problematic and pathological outcomes from excessive gameplay (Aarseth et al., 2016). The role of context in distinguishing between excessive and disordered gamers is an important and sometimes neglected concern in (I)GD literature. High engagement alone is not sufficient for understanding gamer behaviour as pathological (Griffiths, 2017; Griffiths et al., 2016; Wood, 2008). Case study evidence for this appears in the literature, with Griffiths (2010) arguing that markers like hours spent playing were insufficient to determine whether a particular player’s gaming habits are pathological. Instead, he argues that the focus of diagnosis should be on determining if an individual’s gaming habits are having an overall negative impact on other areas of their life. The same applies when we view both games and gamers as a diverse category. It is important for research to acknowledge the range of behaviours and contexts that
Many games, many behaviours

A common thread in the research on (I)GD is the tendency to address not just gamers, but also gaming behaviour as a single entity (van Rooij & Prause, 2014). Treating games as a singular homogenous entity is akin to arguing that someone who is addicted to gambling is addicted to the local pub where they gamble. (I)GD in this sense has the potential to be at best, ambiguous. One of the missing elements in current research is an adequate acknowledgment of the scope of available games, as I outlined in Chapter 4. Most research focuses on MMORPGs. MMORPGs are often set in fantasy universes and incorporate fantastical elements including magic, heroic deeds and exploration of the game world. Cooperation with others is a consistent and sometimes required component of the games, as well as Player versus Player fighting,⁷ and raiding tasks⁸ (Karlsen, 2013). MMORPGs are a heterogenous group.

One way to get around concerns relating to a lack of specificity is by conducting research with participants in their regular gaming context:

“Future studies should perhaps explore the nature and experience of structural characteristics while gamers are actually playing in their normal gaming context, rather than via retrospective self-report surveys or playing games for unnatural restricted periods in laboratory experiments.” (Griffiths & Nuyens, 2017, p. 280).

Data from game companies are an under-utilised resource in this context. Player behaviour is consistently tracked and stored by game companies; however, access to these data has proved difficult (Karlsen, 2013). Some attempts have been made to mine these data through other means, or simulate it in research contexts. The most statistically reliable study of MMORPGs to date was given access to player data for the game EverQuest II through Sony (Karlsen, 2013). While game companies are in the dark about what gamers find engaging about games, they do know a lot about how players behave in games (Karlsen, 2013). Forging relationships between game companies and researchers has the potential to provide (I)GD research with a great deal more nuance than it currently has.

Structural characteristics of games

In Chapter 4 I argued that structural characteristics of games deserve more attention in the context of (I)GD. For the PE/NE account of addiction to be fruitfully applied to (I)GD, determining what structural characteristics of games are likely to encourage the neurological and psychological changes associated with addiction, particularly gambling, is necessary. So-

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⁷ Player versus Player fighting can be both one-on-one, or group versus group.
⁸ Raiding tasks are genre-specific to MMORPGs. They require assemblage of a large group of players working together in a tactical fashion to kill particularly tough or powerful monsters (Karlsen, 2013).
called ‘stupid games’ like *Angry Birds*, *Bejewled* and *Fruit Ninja* are simple enough that the mechanics could be rightfully compared to traditional gambling tasks (Anderson, 2012). Most games are more complex than this, and MMORPGs certainly are. Game studies is the only field of research which has adequately scrutinised game structure to be of adequate use for the PE/NE model.

Games can be designed to incorporate many types of play and pleasure. Costello and Edmonds (2007) outlined a framework of thirteen types of pleasure that can be incorporated into the design of games. None of them are inherently addictive, though they all have the potential to be deeply engaging. These are taught to game designers at an undergraduate level⁹. I have summarised them here, and adapted them for the game design context:

- **Creation**: the pleasure experienced as a result of the creation of something while interacting with a game.
- **Exploration**: the pleasure gained from exploration in a game or in the context of gaming.
- **Discovery**: the pleasure gained from making discoveries within a game, or working something out.
- **Difficulty**: the pleasure experienced as result of having to develop a skill or to exercise skill.
- **Competition**: the pleasure gamers get from attempting to achieve a defined goal, or in comparison with the performance of others. Competition can exist as a result of the game itself, as a result of play with other, or as a result of personal goal setting.
- **Danger**: the pleasure gamers get in feeling scared, anxious, uneasy as a result of a game. It is related to the experience of taking risks.
- **Captivation**: the feeling a player gets of being immersed in or captivated by a game.
- **Sensation**: the pleasure a player gets from any physical action they have to engage in as a result of the game, or from sensory input the game provides.
- **Sympathy**: the pleasure of sharing emotional or physical feelings with other players in the context of gameplay.
- **Simulation**: the pleasure of perceiving something in a game as a copy or representation of something in real life.

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⁹ With thanks to game design lecturer Dr Malcolm Ryan, Macquarie University.
• **Fantasy**: the pleasure of perceiving or creating something fantastical or imaginative.

• **Camaraderie**: the pleasure gained from developing friendships, fellowships or intimacy with other players or game characters.

• **Subversion**: the pleasure gained from rule-breaking, either as the rule-breaker or as a voyeur.

It is unclear how games designed exclusively for tasks such as exploration or creation, for instance, could be creating the kind of environment likely to foster addiction, at least as far as the PE/NE model is concerned. Lumping all games, even all MMORPGs, into a single group is of limited conceptual and empirical value. Of most obvious interest to the PE/NE model are games that incorporate variable-ratio reinforcement schedules. That is, games that pair reliable predictive cues with surprise. Some games, such as the early MMORPG *Asheron’s Call* include a high level of randomness and unpredictability in gameplay compared to other MMORPGs (Karlsen, 2013). However, even in games like *Asheron’s Call* it would be difficult and perhaps foolish to study the structural characteristics of the game that are related to addiction in isolation. Understanding the game as a whole, including the relationship between its structural, social and other game design elements, would provide a more nuanced approach to studying it in the context of (I)GD.

Karlsen’s (2013) qualitative research focused on the highly popular and much-studied MMORPG WoW. There are many gaming goals in WoW, including but not limited to the development of an avatar, cooperation in guilds, the completion of quests and raids, and engagement in grinding tasks. Karlsen was able to identify several discrete activities within the game that share some of the features of gambling tasks. He argues that none of them would, in isolation, be considered perfectly analogous with gambling:

• **Grinding**: the most obvious candidate for application to the PE/NE model, grinding tasks are repetitive and require a level of dedication to the task in order to gain rewards. Viewing them as analogous to gambling tasks may be too simplistic. Firstly, grinding tasks are often completed at the same time as other tasks, rather than in isolation. Secondly, the motivation for completing such tasks is not necessarily the reward itself, but rather the social status afforded by the reward. Unlike gambling, grinding is not a task that players view as exciting. The size of rewards does not match the size of rewards offered to gamblers, and finding rewards in a game setting is a ‘relatively uneventful’ experience. Karlsen argues that the main difference between gambling and grinding tasks is money versus time. Gambling tasks involve significant sums of money, while grinding tasks rarely, if ever, do. This does not mean that grinding tasks are not of interest. There is still a structural similarity between gambling and grinding. However,
grinding should not be understood as directly analogous.

- **Entrapment:** a phenomenon familiar to gambling, entrapment occurs in the context of games like *Lotto*. When a player faces a series of losses, they feel obliged to continue playing because of a sense that they have ‘gone too far now’ to stop. Karlsen points to raiding tasks as producing some structural resemblances to *Lotto*. Raiding activity in WoW is done in groups of different sizes to complete difficult tasks spread over a period of time. Raiding requires development and maintenance of an avatar, and a level of commitment and consistency from players, which can include raiding four or five nights a week. Goals are much more likely to be achieved in WoW than they are in *Lotto*.

- **Near miss:** when a gambler interprets a losing situation as one in which they were close to winning, this is known as a ‘near miss’. King et al. (2010) argued that a near miss is a common experience for gamers as well. The experience of failing at something that a player feels they should accomplish or are close to accomplishing appears to increase the dedication of some players. Karlsen (2013) argues that these experiences do occur in games, and seem to motivate gameplay, but the difference between near misses in games and near misses in gambling is that there is a great likelihood of gamers succeeding in their future attempts.

- **Game loyalty programmes:** while not technically an aspect of game structure, a loyalty program is a marketing device where loyal customer behaviour is encouraged and rewarded. Loyalty programmes are in use in MMORPGs, although their impact is perhaps overestimated. Game designers tend to focus on intrinsic rewards within game structure, while loyalty programmes focus on extrinsic rewards like ‘viral pressure’ and the mobilisation of social networks to promote gameplay. Barriers to exit make it difficult for players to leave games, or more attractive to remain gamers. Many MMORPGs, including WoW, balance this by building in limits to use, to restrict users from exhausting game content. It is unclear how much of an impact loyalty programmes have on (I)GD, if any.

The core elements of gameplay do not generally rely on variable-ratio reinforcement schedules. The social pressure to maintain involvement in a raid can be intense, and players show concern for missing out on big raids and events in their guilds. Players in WoW have established a semi-formal score keeping system within the game known as ‘Dragon Kill Points’ (DKP) to minimise the element of luck, and counter variable-ratio reinforcement schedules in the game structure. Used originally in *EverQuest* DKPs are designed to fairly distribute reward items among a guild when a raid is over. DKPs vary between guilds, and the distribution of prized items usually relates to player performance in the context of a raid.
So while a weak entrapment mechanism is present in raiding, it is the competitive environment of the raiding guild with contributes to the feelings of obligation and entrapment. The mechanisms of the game itself are only partly responsible for player dedication and potential excessive play.

“... core gameplay relies on steady growth and predictability rather than randomness. Players also express discontent with the randomness that exists and even take measures to eradicate it, especially in connection with loot distribution in raids. This is expressed by the player-invented DKP system, where players reduce the randomness connected to loot distribution, ensuring that loot distribution reflect [sic] effort not luck.” (Karlsen, 2013, p. 68)

Psycho-structural elements from gambling relevant to addiction do seem to occur in MMORPGs. Tasks such as grinding, entrapment and near miss do match, to a certain extent, with tasks known to cause problematic behaviour in gamblers. However, their impact appears comparatively much weaker (Karlsen, 2013). The social structure of MMORPGs is far more relevant to understanding the mechanisms that lead to excessive or pathological gameplay. Understanding how structural characteristics of games interact with overall game goals and social obligations is necessary to outline the mechanisms for (I)GD to occur (Karlsen, 2013). Even if some games or structural characteristics of games have the potential to lead to pathological behaviour, it is still necessary to be able to distinguish between high engagement players who experience negative symptoms, and those who do not (Griffiths et al., 2016). The PE/NE model suggests that a further distinction, between disordered and addictive behaviour, can also be made. Karlsen’s (2013) approach to understanding the relevant structural characteristics of games to (I)GD could be readily applied to the PE/NE model.

**Games as Social Activities**

Games are not necessarily social. Even games played over the Internet are not by definition social (Király & Demetrovics, 2017). However, many games have a strong or central social component. Understanding the social context of gamers has two parts. First, we need to view the individual gamer in the context of their life more generally. My discussion of comorbidity and compensatory Internet use tackled one of the conceptual concerns that arises as a result of this. That is, can we adequately distinguish (I)GD from other psychological disorders or life circumstances when there could be alternate adequate explanations for excessive use? This section deals with the second part of understanding the social context of gamers: if gaming is itself a social activity, then how do we best incorporate our attitude and understanding of social behaviour to our model of (I)GD? Two approaches have been taken to this question. The first approach is to view the social aspect of games as part of the mechanics of disorder - the social aspect of games is what makes them addictive (Hellman et al., 2013). I will consider that
The second approach is to view the social aspect of games alongside other positive aspects of gaming. I will consider the possibility that games do more good than harm in the next section.

**Is the social aspect of games problematic?**

Some of the empirical and conceptual work on (I)GD claims that it is the social nature of MMPORGs specifically that results in their addictive quality. Hussain, Williams and Griffiths (2015) were able to demonstrate that players of MMPORGs with particular social motivations were at a high risk of (I)GD. Other studies showed links between the social and competitive aspects of gaming, and addiction (see Cole & Griffiths, 2007; Hussain, Griffiths & Baguley, 2012; Hussain & Griffiths, 2009; Ng & Wiemer Hastings, 2005). Hussain and Griffiths (2009) found that it was in fact the social and competitive components of games that could be ‘triggers’ of addiction, along with novelty-seeking and the desire to vent negative aspects of one’s character. Certainly the reward structure of games cannot be understood properly without an appreciation of the social context it is embedded in (Karlsen, 2013). Time and context are crucial for understanding the impact excessive or pathological gameplay can have on the lives of gamers:

“The temporal dimension is important because it is very difficult, within a short time frame, to differentiate between excessive playing with or without detrimental effects. If someone plays excessively for a year and neglects schoolwork, family or friends, it does not necessarily mean they have a pathological user pattern. They may simply be in a life phase or life situation where they think playing is more important than other concerns.” (Karlsen, 2013, p. 113)

The social environment that games provide can play into this. If games are viewed as an escape from the harsh temporal reality of life, and a source of friendship and camaraderie, then they may be appealing in times of stress or transition. However, if someone returns to gameplay repeatedly in different life phases and contexts, and experiences a lack of control around gaming, then we would be more inclined to think of their behaviour as pathological. Excessive playing does not always imply a player has lost control, or that their gameplay is pathological (Karlsen, 2013). Games are intellectually and socially stimulating, and motivations for play vary such that for some players, gameplay is meaningful and the social aspect of games is psychologically helpful.

**Games as a social environment**

The typical imagined profile of a gamer describes an individual who is reclusive, decidedly antisocial and an outcast (Nielsen, Karlsen, Goggin & Aarseth, 2014). But given that so many games have a strong social component, the question of whether gamers are antisocial or social is a relevant one. This is a central question for game studies, but remains largely unexplored in the scientific and philosophical literature on (I)GD. We are set to see the rise of a generation of ‘super gamers’ – individuals who have spent at least 10,000 hours playing games in their
formative years (McGonigal, 2011). How best to define these individuals has wide-ranging importance. The social and cultural identity of a gamer can centre around a game:

“Being an EverQuest player is to become part of a virtual community which cuts across space and time and which is based around cooperative values.” (Chappell et al., 2006)

Players engage in collective tasks, and the more gamers become seriously involved in gaming the more likely they are to engage in theorycrafting\textsuperscript{10} and other complex collaborative endeavours. As an example of the kind of conclusions some researchers come to in regards to the social nature of gaming, Ng and Wiemer-Hastings (2005) in their early survey of MMORPG players argued that:

“It is clear that MMORPG users have a tendency to spend more hours devoted to their game and find social aspects of the in-game world more pleasant and satisfying than what occurs in the real world. However, MMORPG users do not seek self-confidence in-game, would find fun elsewhere if MMORPGs did not exist, and would not feel irritated if they did not have the chance to play for 1 day.” (Ng & Wiemer-Hastings, 2005, p. 112)

They suggest that the social life of gamers could be considered antisocial but go on further to conclude that:

“For most users, it would seem that MMORPGs are an alternative to other forms of social entertainment. If MMORPGs were not available or did not exist, these same users would not seek friends or social situations such as parties, bars, or clubs, but perhaps other forms of socializing online in the form of email, chat rooms, or instant messenger.” (Ng and Wiemer-Hastings, 2005, p. 113)

Despite some obvious concerns I have about overgeneralising from a small study (91 survey respondents, 88% of whom were male), these two quotes are an example of the tension between understanding the social aspects of gaming as positive or negative. I argue that this is because games are not intrinsically negative or positive. To fully apply the PE/NE model to (I)GD, it is crucial that we incorporate the view that the social aspect of games increases the complexity of the mechanisms at work in excessive or pathological gameplay. The reasons why people play games are varied, as is the value and meaning they place upon games (Karlsen, 2013). To construct an account of (I)GD that does not appreciate that complexity would be conceptually problematic, and potentially lead to overdiagnosis of (I)GD.

Positive Psychological Outcomes of Gaming

The negative effects of digital games on children, adolescents and adults have been documented in now hundreds of empirical studies. Addiction is only one of those effects.

\textsuperscript{10} Theorycrafting is a type of activity where players delve into deeper aspects of the game, in an attempt to mathematically decipher its mechanics and/or mythology (Karlsen, 2013).
Adachi & Willoughby (2012) tracked that by 2010, videogame addiction and pathological gaming were examined in over 100 empirical studies. They noted a dearth of studies focused on the positive aspects of gaming:

“Video game research in social and developmental psychology that has targeted youth has been largely focused on negative outcomes, such as aggression, risky behaviour, and video game addiction. In contrast, positive outcomes of video game play have seldom been explored, especially among adolescents.” (Adachi & Willoughby, 2012, p. 157).

Johnson (2009) in her book on IA, discusses the idea of digital technologies, including games, as a new form of leisure. Rather than being inherently negative or necessarily the cause of mental disorder, we should view digital technologies as new ways of passing time, exercising choice, escaping pressure and achieving fulfillment. Games can provide a social environment more suited to the psychological needs of people in the modern context of a busy, bustling and sometimes ‘out of control’ world:

“The massive online role playing games offer an escape to a more entertaining, joyful, but still rather schematic and controllable, living environment.” (Hellman et al., 2013, p. 104)

The number of studies on (I)GD has rapidly increased since the inclusion of (I)GD in the DSM-5 in 2013 and the ICD-11 in 2017. Games are associated with a number of positive outcomes including flow, cooperation, problem solving and reduced in-group bias (Adachi & Willoughby, 2012. McGonigal (2011) argues that games are an integral part of human behaviour. She outlines a series of types of Internet games, and the kinds of rewards that gamers get from playing each type of game (these are not always obvious). In addition, McGonigal argues that it is not gamers or the gaming environment which is inherently problematic, but rather the structure of society. Gaming requires a high level of problem solving, and much of the time collaborative enterprise. This ‘work’ is rewarded in specific ways in the gaming environment, which may be preferable when such rewards are not present in the ‘real world’. This does not automatically mean that (I)GD is a misnomer. However, it should give us pause for consideration, particularly when research from psychology and psychiatry is skewed towards seeing the world through the lens of pathology.

Moral and Media Panics

The issue of moral and media panics around (I)GD has been the subject of some debate (Aarseth et al., 2016; Bean, Nielsen, van Rooij & Ferguson, 2017; Bowman, 2016; Nielson, 2016). I will cover this only briefly. The media is especially fond of articles that focus on the negative outcomes of gaming. Headlines such as: Internet addicts guilty of starving baby to death, or in the context of PIU: It’s ‘digital heroin’: How screens turn kids into psychotic junkies are rife. Critics of (I)GD research, are portrayed as opposing general medical consensus: Could
Playing Fortnite lead to videogame addiction? The World Health Organisation says yes, but others disagree. Articles of this type tend to exaggerate the size and scale of (I)GD as a health issue, portraying it as occurring in epidemic proportions. They rarely acknowledge that the great majority of people play videogames without experiencing any kind of problems (Karlsen, 2013; Wood, 2008). Media stories have a powerful influence on the way we collectively understand ourselves. While not all media stories on the subject of games are negative, it is clear that (I)GD has been the subject of something of a media panic (Karlsen, 2013).

Moral panics and stigmatisation of Internet use and game playing are largely driven by the media, and by differences between older and younger generations (Király & Demetrovics, 2017). The ‘generation gap’ can lead to a lack of common values in relation to gameplay, and judgement from older generations regarding appropriate use of time. The media simplifies stories of (I)GD to focus on the negative outcomes of gaming, without any exploration of the context of any particular gamer behaviour. Even when it is described as a formal diagnosis, (I)GD is portrayed as a personal weakness, stemming from a ‘bad character’ or a lack of motivation and interest in other areas of life, rather than as mental disorder (Király & Demetrovics, 2017). This may not just be the product of age differences. What is treated by researchers as pathological behaviour may be a way of life that is largely misunderstood through the lens of psychology and psychiatry, by researchers who have little or no first-hand experience of gaming (Smahel & Blinka, 2012). Ingrained attitudes towards gaming that denounce gameplay as inherently problematic have the potential to feed into research in pernicious ways (Cover, 2006). How best to understand the effect of these attitudes on the conceptual construction of (I)GD is largely beyond the scope of this thesis. Associating the label of mental disorder to games will have many negative, and perhaps unpredictable, outcomes (Karlsen, 2013). It has the potential to affect how gamers are viewed by society writ large, as well as how gamers view themselves, and could have lasting impacts on the industry of gaming through regulation. Philosophy offers one way to consider these concerns which may be useful for my account. The construction of a ‘narrative’ of (I)GD is the subject of my next section.
The Narrative of (I)GD

If we are to understand the role of cultural norms and the language of addiction in (I)GD, we need a framework for analysis. Drawing on the work of Nancy Nyquist Potter (2011), I will use the concept of master narratives as the basis of my analysis. To fully critique the inclusion of (I)GD in the DSM-5 and ICD-11, I argue that it is important to go beyond a conceptual analysis of the scientific literature on its own terms. That is, while I think it is important to consider issues of quantification, bias and conceptual framework, I also argue it is critical that I take a step further back again, to more fundamental questions about how mental illness is defined in the context of (I)GD. In particular, I am interested in how the framework or narrative of addiction has been used to construct both the understanding and experience of (I)GD. Stemming from the antipsychiatry movement of the 1960s and 1970s, the idea that diagnostic categories of mental illness are, at least to some degree social constructions, still has considerable traction. The critique is broadly that psychiatric diagnosis is the outcome of a process of social labelling; that defining certain forms of behaviour as deviant or disordered is a social process rather than a scientific one (Rose, 1996; Rose & Abi-Rached, 2013). This forms the basis of a normative approach to psychiatric classification. While a full discussion and critique of the normative approach is beyond the scope of my thesis, the concerns of normativism are certainly relevant to the case study of (I)GD.

The Creation of 'Addiction'

Addiction as an interactive kind

Ian Hacking, in his seminal work The Social Construction of What (1999) distinguished between interactive and indifferent kinds. Indifferent kinds are what we generally look for when we identify natural kinds. They are stable categories of objects or entities that exist regardless of how we define them (e.g. a quark is a quark and will operate like a quark regardless of whether we identify or name it as such). Such kinds are usually found in the physical sciences. The biological and human sciences, says Hacking, struggle to identify kinds of this sort. When we attempt to classify humans in discrete categories, it readily becomes apparent that some of these categories are unstable or have fuzzy boundaries. Hacking argues that such groupings are better understood as interactive kinds. That is, the process in which they are defined, understood and experienced is interactive and changing at the level of classification. This is separate but related to biolooping, the name Hacking gives the mind/body effect. That is, the interaction between our mental states as individuals, and the way we experience the world as a result. While classification may feed into biolooping effects, the concept of classificatory looping is not specifically related to mental states at the individual level:

“We are especially concerned with classifications that, when known by people or by those...
around them, and put to work in institutions, change the ways in which individuals experience themselves - and may even lead people to evolve their feelings and behaviour in part because they are so classified.” (Hacking, 1999, p. 104)

Classificatory looping and biolooping may ‘mutually reinforce each other’ (Hacking, 1999, p. 110). Hacking makes the case that strong examples of interactive kinds can be found in psychopathology, using schizophrenia, autism and intellectual disabilities as examples. A similar case could be made that addiction is an interactive kind that is subject to classificatory looping. The way we understand, label and define addiction could change the way in which individuals experience themselves, and this in turn will feed back into the classification of addiction as a whole. I suggest here that the history of addiction I presented in Chapter 2 provides some evidence for this. In the context of (I)GD we have a moving classificatory target. As a result of the rapid changes in the field of research into PIU since the 1980s, the conceptualisation and ultimately the experience of (I)GD has been an interactive ‘work in progress’. The pervasiveness of the use of the term ‘addiction’ in relation to both PIU and (I)GD has meant that how we understand addiction has had a very real effect on the way we understand (I)GD, and also how gamers themselves understand their own experience of (I)GD. This is regardless of the exclusion of the term from the DSM-5 and ICD-11.

Master Narratives

A narrative is a way people make meaning of the events in their lives (Hänninnen & Koski-Jännes, 1999; Nyquist Potter, 2011). It is a story, a weaving together of the past, present and future. Narratives operate at a cultural as well as individual level. The Enlightenment period provided Western cultures with the grand or master narratives of science: progress and advancement. In general, narratives are a way we organise societal beliefs and expectations. They appear logical, and are rarely questioned (Nyquist Potter, 2011) Range (2008) frames narratives as familiar rhetorical scripts or cultural codes. When such scripts and codes are produced by the dominant culture of a time they can be used as ways to distinguish between normal and abnormal behaviour (and people), between ‘mad’ and ‘bad’. Nyquist Potter (2011) argues that master narratives shape all aspects of human life - interpretation, causality, responsibility and future expectations. They carry values and can negatively distort the identities of those members of society that do not easily fit into the dominant story. For example, she argues, master narratives can “…falsify many people’s experience and identity because master narratives are ones promulgated by oppressive structures” (Nyquist Potter, 2011, p. 204).

Nyquist Potter (2011) argues that master narratives are by necessity “…psychically and morally damaging and ought to be challenged and resisted” (p. 206). I do agree that they can be damaging, though not by necessity. Narratives are a tool for understanding ourselves. Most often they are employed without their potential negative consequences in mind. In the context of (I)GD it is the master narrative of addiction that is most relevant. If (I)GD is an addiction or not is a separate question to whether the idea of (I)GD as an addiction has, and continues to shape the conceptualisation and experience of the disorder.
The Addiction Narrative

The trope of addiction is culturally pervasive and powerful, and it may well be functioning as something like an interactive kind (Nyquist Potter, 2011). I aim to show that the narrative of addiction is consistently drawn on by researchers and gamers, and suggest that the narrative of (I)GD as an addiction is potentially problematic, at least at this stage of our conceptual and empirical understanding of the disorder. Nyquist Potter (2011), in her case study of self-injurious behaviour and addiction, argues that the master narrative in place is addiction and more specifically the disease model found in Alcoholics Anonymous (AA). I will argue that the same applies in the case study of (I)GD.

The narrative of addiction is a complex one. Hänninen and Koski-Jännes (1999) in their work on both substance and behavioural addictions reviewed four kinds of addiction-recovery narratives. The first three relate to the AA and 12-step program model of addiction. The fourth is more common in narratives that invoke the concept of willpower.

1. **Hitting bottom**: the key to this narrative is that the person must reach a low point in their struggle with excessive use. This story provides clear and convincing evidence that their life must change (Nyquist Potter, 2011). After hitting bottom, it is important that the protagonist shows humility, and a willingness to rely on a Higher Power, on others who have been in recovery longer or who have some insight into their behaviour that they themselves do not have.

2. **Personal growth**: in this narrative person experiences personal growth in the context of their addiction, by freeing themselves of oppressive relationships or situations, learns to accept themselves or develops their own voice. Such growth can release the protagonist from guilt by placing blame on their situational context as the cause of problems.

3. **Love story**: this narrative centres around the transformation of the protagonist from a needy or attention-seeking individual prone to intense self-criticism into a person with self-worth, able to develop intersubjective relationships. This can involve an actual love story with another person, or simply be an internal transformation.

4. **Mastery**: this narrative is about control, gaining control and taking back control. The protagonist develops mastery over their own behaviour in relation to their troubles. The common trope here is a defeat of the ‘enemy’.

These narratives play into one another, and the way that they are told can have moral consequences (Nyquist Potter, 2011). A narrative can emphasise the power of a protagonist, or their powerlessness. It can excuse behaviour or lay blame on external factors in their lives. I also argue that these kinds of narratives can shape the way that people experience their distress. The AA model of addiction is only one model. The DSM and ICD models of addiction also operate as a narratives, particularly in the context of (I)GD. The symptoms of tolerance, withdrawal, mood modification, salience, cravings and relapse etc. form the basis of the narratives. Because addiction has been central to the conceptualisation of (I)GD, I would expect
to see gamers who are experiencing problems with their game use to frame their experience through the narratives of addiction.

The Narrative of (I)GD

The language used to describe the experience of (I)GD is encumbered with the language of addiction. In part this is because of the use of the word ‘addiction’ in conceptual and empirical research to date. It is also a consequence of the narrative of addiction entering into the language of gamers themselves. In their qualitative study of MMORPG *EverQuest*, Chappell et al. (2006) surveyed 12 individuals at various stages of their *EverQuest* playing ‘career’. Their conclusion was that the accounts presented by players and ex-players constituted evidence that these players could be addicted to the game in a similar way to gambling or substances. Concerns with sample size and method aside, these conclusions were part of a suite of studies at the time which suggested such a conclusion. One of the values of the Chappell et al. (2006) and Hussain and Griffiths (2009) studies is that they both provide quotes from subjects that, although they are curated by the original authors, can now be re-examined in the light of understanding (I)GD as a narrative experience. As Chappell et al. (2006, p. 211) themselves argue:

“Without exception, meaning making as to how *EverQuest* came to dominate the lives of the people in this study centred around discourses of *addiction*. The accounts are littered with the language of addiction such as ‘cold turkey’, ‘wean myself off’ and ‘withdrawal pains’. The process of ‘becoming addicted’ is constructed variously as either becoming ‘instantly hooked’ and being ‘taken over’ or a dawning realization that there is a problem.”

While they do not conclude that their evidence is substantive enough to determine if the subjects of their study were pathologically addicted to *EverQuest* or not, they do claim this is potentially evidence of addiction. I argue that this is a result of the grand narrative of addiction entering the game playing arena. Aside from the word ‘addiction’ appearing in language used by gamers, elements of the addiction narrative frame the way gamers speak about their game use. In this extract we see elements of the ‘love story’ narrative:

“*Extract 7*: “I have been playing EQ since Christmas of 2000 when my brother game me an account as a gift because I love fantasy/RP. I became addicted when I rolled my first character. My first game session lasted 16 hours... [my sister] started reading up on [*EverQuest*] and realized I was addicted. I have deleted the game and am never going to play again after talking to her. I have cried many times over the last two years and wished I was dead, because I knew what I was doing to myself and couldn’t stop or even slow down. I am so lucky that my sister loved me enough to save me from myself.”” (Chappell et al., 2006, p. 211)

And even in cases where a gamer’s use appears to match more with obsession than addiction, addiction is still used to explain gamer behaviour:
"Extract 9: My experience with *Everquest* did not start out addictive in nature. To me, it was just like any other computer game I had played, and I generally do not spend outrageous amounts of time playing them. However, a few experiences in the game changed my behaviour with it… I started to become jealous, my power hungry side kicked in. This is where my addiction started. I eventually did get burned out, and had thoughts of quitting the game entirely. I would take breaks for a week or two, then get back on and try to make up for the hours I lost with that week break… Then it hit me that I had been obsessing over this game in the same fashion for a long time. I hadn’t even realized I had been playing in such an obsessive fashion up to that point. At that point, I started playing less and less, until I lost complete interest.” (Chappell et al., 2006, pp. 211-212)

While these extracts are taken from a formal qualitative study, anecdotes are routinely used to codify types of gaming behaviour. Susan Greenfield, in her popular science book *Mind Change* uses such anecdotes alongside data from empirical studies in her claim that videogames have the potential to be addictive:

“A friend whose son had become hooked on video games to the exclusion of much else and can himself see the appeal of, and vulnerability to, gaming tried to explain: ‘The games are designed to pull the player in, to ensure that each level is rewarded by the next level, that play never naturally stops and that if you take a break you either suffer in the game play or you feel desolate as a result of the lack of exciting and rewarding game play.’” (Greenfield, 2014, p. 161)

Sometimes these are second-hand anecdotes:

“Many of us have our own stories to tell.

‘Having had a son who lost a year of university through playing *World of Warcraft*, I nevertheless believe that the fact that he has moved on from that game and is now in a successful career (for the moment touch wood!) does not mean he is free of the gaming addiction. He is not, and I doubt he ever will be.’” (Greenfield, 2014, p. 162)

This quote demonstrates the influence of the AA narrative in (I)GD. The author’s son, she notes, will never be free of the addiction. This is consistent with AA dogma, which emphasises that the addict remains an addict forever and can best succeed ‘one day at a time’. We could dismiss such use as problematic, but ultimately not academic. Anecdotes are not data. However, books like Greenfield’s are widely read and influential. A discourse analysis of these type of texts would be useful, but is outside the scope of this thesis. I argue that these are examples of the way(s) gamers speak of themselves through the narrative of addiction. Where this narrative comes from is a separate question to whether the narrative is employed by gamers in their self-speak. I have already argued that the addiction narrative is generated through a number of means – AA, the DSM and ICD, the media and so on. Further discourse analysis would be required to understand the ways in which the narrative has been created and spread in the context of (I)GD. My claim here is that it has spread. When we experience psychological distress, we express it (consciously or unconsciously) in ways that we believe will be most readily understood by others, including medical professionals. Nyquist Potter (2011) argues
that, in the context of self-injurious behaviour, even the context of a research study can affect the way participants frame their experience:

“…it is an open question whether or not the subjects in this study themselves came up with the addictive model independent of cultural stories of addiction or whether subjects (unconsciously) framed their answers in ways they believed were most understandable to listeners.” (Nyquist Potter, 2011, p. 209)

It is also possible that the narrative is a creation of research analysis, rather than simply arising from the self-reporting of gamers. In a qualitative study of 71 WoW players from 11 countries (52 males, 19 females), Hussain and Griffiths (2009) interviewed what they classified as casual (plays 15 hours a week or less; \( n = 39 \)); regular (plays more than 15 hours and up to 30 hours a week, \( n = 21 \)); and excessive (plays more than 30 hours a week, \( n = 12 \)) gamers. The focus on attitudes, feelings and experiences concerning their day-to-day gameplay. The interviews began with a few structured questions, but were primarily unstructured. The interviews covered many aspects of the gaming experience. The interview extracts Hussain and Griffiths provide are in part intended to highlight problematic aspects of gaming. Their report did include several quotes that directly referenced ‘addiction’ in relation to their experience, though many pointed to other aspects of the gaming experience that do not necessarily relate to addiction. However, in their analysis, Hussain and Griffiths lean on the descriptions of negative aspects of game playing. For instance, in this statement the participant specifically avoids the label of addiction:

“Extract 11: I really don’t know why I play it so much. But it’s where my friends are at, and it’s just something to waste time with. I don’t see myself as addicted to WoW, even though it seems that way. (P16, male, age 18, UK, excessive gamer).” (Hussain & Griffiths, 2009, p. 749)

Hussain and Griffiths interpret this statement as showing “...how the social aspects of MMORPGs can have the negative impact of causing excessive game playing” (Hussain & Griffiths, 2009, p. 749). Clearly this is not the only available interpretation of such statements. Interpreting the statement in such a way is potentially accurate, but it is also possible that it demonstrates a research bias towards understanding non-mainstream social behaviour as disordered.

More work needs to be done in this area. I would suggest qualitative studies are required to demonstrate and understand the experience of gamers in the context of narrative. Discourse and media analysis would be necessary to examine the origins of the narrative, and the effect it has had on the gaming experience. Within the limitations of this thesis I am unable to conduct this research; however, I argue that it is crucial. As the DSM and ICD solidify the position of (I)GD as a legitimate disorder, it is important to understand how this will impact the way that gamers understand themselves, and indeed how they experience their world.

So now, on to my conclusions.
CHAPTER SIX

Conclusions

Image: Finish Him (Fatality) meme. Mortal Kombat Project 4.1 Season 2.5 - Jade Playthrough. Credit: YouTube
(I)GD is one of the most problematic psychiatric disorders to be proposed by the DSM and ICD. Does spending a lot of time doing something define an activity as pathological? Determining a way to quantify an answer to this question was the central focus of Chapters 2 and 3 of this thesis. Determining whether excessive time spent playing videogames can be defined as pathological was the focus of Chapters 4 and 5. One of the problems in the field of (I)GD research is that disputed aspects of conceptual analysis of the construct of (I)GD are yet to be resolved. This thesis was an attempt to apply a philosophically informed multidisciplinary approach to conceptual analysis of (I)GD. I called this the natural method for (I)GD.

Differences in the activity of brain areas cannot provide direct evidence of any pathology. What the empirical research can provide at this stage is, however, useful for modelling relationships between game playing, brain function, and psychological experience. I argue that one of the objectives of further study should be to determine what the basis of addiction actually is. Is it a grinding task, entrapment mechanism or near miss experience? Is it typing? The medium of communication (i.e. the Internet)? Social connections and structures between gamers? And so on. Without focused research that identifies what the repetition in behaviour is that causes negative symptoms, using the framework of addiction to understand (I)GD will continue to produce heterogeneous and potentially inconclusive results. Behavioural addictions, by definition, are defined as sets of recurrent behaviours leading to pathological outcomes. Being able to identify what those behaviours actually are is central to claims regarding (I)GD.

In Chapter 2 it was my contention that it is theoretically possible that we will be able to find a mechanism whose physical interactions explain a loss of control across, at least, a wide range of addictions. Even if such a mechanism were to exist, it is still the case that individual addictions have their own specific set of characteristics. Addiction is not a natural kind. Thus (I)GD, if considered through the lens of addiction, would be a discrete and unique disorder with a distinct set of characteristics.

In Chapter 3 I argued that a PE/NE model of addiction could be fruitfully applied to (I)GD. If (I)GD were likely to be placed in future revisions of the DSM under the classification of ‘addiction’ this would be particularly relevant. The PE/NE model of addiction allows for non-substances to be the targets of addiction, and given the consensus that excessive gameplay can result in negative or pathological outcomes, (I)GD does appear to be a genuine candidate for consideration. Whether (I)GD can be considered an addiction in the strong NE sense will require application of the model to the particular features of (I)GD. However, the PE/NE model by itself will not answer some questions about addiction that are salient to the discussion of (I)GD and Internet use more generally, including how to predict whether individuals are likely to engage in pathological use.

Chapter 4 was not intended to answer questions regarding the aetiology of (I)GD. Instead, my aim was to give pause to the current understanding of (I)GD, and begin assessment of it in the context of the PE/NE model. I argued that claiming that (I)GD is a coherent conceptual disorder is problematic. Research on (I)GD is scattered and inconsistent, despite attempts to consolidate the field following DSM-5. As a result of this, concrete understanding of (I)GD through the
The PE/NE model is not yet possible. The research is too scattered, and the results too unreliable at this stage to systematically apply the model to current data. Understanding (I)GD as a disorder on a spectrum using the PE/NE account could improve the conceptual consistency and empirical validity of research in the future. That said, it is not yet clear that (I)GD should be rightfully understood as an addiction, and I accept that (I)GD could be a heterogeneous phenomenon. Whether the addiction framework will turn out to be the best way to understand it remains to be seen.

In Chapter 5 I subjected the current state of research to what I argue is some salient critique. I argued that future research on (I)GD should improve in three areas:

1. the construct validity of (I)GD and pathological use;
2. congruence with our understanding of games and gamers, and;
3. avoidance of looping effects that lead to false positives and self-fulfilling labelling.

A lack of clarity and consistency in (I)GD research can lead to several challenges, many of them clinical. If physicians are unable to properly identify pathological cases of gameplay, it is possible that patients will be misdiagnosed, misunderstood, or receive inappropriate care. Qualitative studies are required to demonstrate and understand the experience of gamers in context, with an appreciation for the complexity and diversity of both gamers and games. The PE/NE model can only be applied once we have a better understanding of the way(s) in which psycho-structural phenomena such as grinding, entrapment, near miss and loyalty programs operate within a game. Reward structures are far less central to MMPORGS than they are to traditional gambling games, despite MMORPGs being the focus of a great deal of the research on (I)GD. Understanding the social context and environment of MMORPGs needs to be more adequately recognised in (I)GD research.

**Harm with disorder?**

That a minority of gamers experience negative outcomes from excessive gaming is not in dispute. In fact, such negative outcomes are crucial for understanding any individual gamer behaviour as potentially disordered. However, it is not yet clear that these problems should be attributed to a new disorder. It has not been demonstrated with any certainty that (I)GD is not better understood as a coping mechanism associated with underlying psychosocial and contextual issues. A diagnosis can be a comfort. It allows a gamer to describe their experiences in ways that are understood, and it validates the challenges that they may be facing as a result of their game use. However, diagnoses are not always useful; they can make change more difficult and they can feed directly into the way a person defines and understands themselves in potentially harmful ways. Over-diagnosis can have the effect of obscuring the seriousness and extent of true psychiatric disorders. A considered and fleshed-out conceptual approach, with clear exclusion criteria, would go some way to avoid this. The optimism expressed by some research on (I)GD should be tempered with realistic caution about the kinds of conclusions we can make about (I)GD at this stage.
A reason to pause

The ICD-11 conception of (I)GD appears much more conceptually sound than the DSM-5 proposal. This is not a great reason for concern, as the DSM-5 inclusion of IGD in Section 3 was intended to open discussion, not provide a definitive account. At present, the quality of the research base in the field of (I)GD is low, and there is no consensus position among scholars. The heterogeneous nature of the research, both in terms of conceptual construct and methodology, does not allow for conclusive systemic reviews and synthesis of the existing data.

By pathologising game play, the psychosciences could be engaging in subjective social judgement of a leisure activity enjoyed by many millions of people of all walks of life, that forms an important part of the personal and social identity of many. Combined with negative media attention on (I)GD, this is contributing to the potentially problematic framing of such behaviour as disordered. This has direct implications for the conceptual understanding of (I)GD in psychiatry; for clinical treatment of those presenting with problematic gaming behaviour; and more broadly for game players self-conception – both as individuals and as a group.

There may seem to be an implicit contradiction here. I argue both that (I)GD is a good candidate for conceptual sound application of the PE/NE model of addiction, and that we should be cautious about reifying it as a legitimate, discrete disorder. This is because the work has not been done yet. (I)GD as it stands is a messy, conceptually problematic psychiatric category. This does not mean that it always will be. We must remain open to the possibility that it is indeed a legitimate and unique. Here is my position then, distilled:

1. **Application of the PE/NE model to gaming** would require specification of the structural mechanisms of games. The focus would then be on those producing behavioural regularities that encourage excessive play, such that LLRs are likely to be passed over in preference for SSRs. Because of the complexity of games, further specification would be required to know whether gamers are engaging with those mechanisms and how. Carefully designed research would then focus on distinguishing between non-pathological excessive gamers, disordered gamers, and addicted gamers.

2. **(I)GD does not currently fit the PE/NE model** because it tends to consider games as a singular category or set of categories. Gamers are grouped according to their negative psychological symptoms, rather than based on their gameplay. It is unclear at this point if the current way of grouping gamers in this way makes conceptual sense, as they may not be engaging in the same behavioural regularities. Additionally, if (I)GD is a discrete disorder it should not be better understood as a coping mechanism associated with underlying psychosocial or contextual issues.
I return now to the central question of this thesis: is (I)GD fact or fantasy? My contention is that at this point in (I)GD research, it is indeed a fantasy; a useful fiction applied to categorise a type of distress experienced by a minority of gamers. It is tied to a salient set of symptoms, and mostly draws on the framework of addiction as a lens through which to view them. It is well established that some gamers experience problematic and perhaps pathological outcomes as a result of their gaming. (I)GD is our initial attempt to understand why. A multidisciplinary approach to research that includes psychology, psychiatry, neuroscience, economics, phenomenology, game studies and philosophy is required. It is only then that (I)GD will be able to move from the realm of fantasy to the realm of fact.

GAME OVER
# Glossary of Terms

<table>
<thead>
<tr>
<th>Abbreviation</th>
<th>Definition</th>
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<tbody>
<tr>
<td>ACC</td>
<td>Anterior Cingulate Cortex</td>
</tr>
<tr>
<td>AG</td>
<td>Addictive Gambling / Gaming (depending on context)</td>
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<tr>
<td>BE</td>
<td>Behavioural Economics</td>
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<tr>
<td>CBGs</td>
<td>Casual Browser Games</td>
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<tr>
<td>DG</td>
<td>Disordered Gambling / Gaming (depending on context)</td>
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<tr>
<td>DSM</td>
<td>Diagnostic and Statistical Manual of Mental Disorders</td>
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<tr>
<td>IAD</td>
<td>Internet Addiction Disorder</td>
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<td>ICD</td>
<td>International Classification of Diseases</td>
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<tr>
<td>IGA</td>
<td>Internet Gaming Addiction</td>
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<tr>
<td>IUD</td>
<td>Internet Use Disorder</td>
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<tr>
<td>LLR</td>
<td>Larger, Later Rewards</td>
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<tr>
<td>MMORPGs</td>
<td>Massive Multiplayer Online Role Playing Games</td>
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<tr>
<td>MOBA</td>
<td>Multiplayer Online Battle Arena</td>
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<tr>
<td>NA</td>
<td>Nucleus Accumbens</td>
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<tr>
<td>NE</td>
<td>Neuroeconomics</td>
</tr>
<tr>
<td>Abbreviation</td>
<td>Full Form</td>
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<tr>
<td>OFC</td>
<td>Orbitofrontal Cortex</td>
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<td>PE</td>
<td>Picoeconomics</td>
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<tr>
<td>PFC</td>
<td>Pre-frontal Cortex</td>
</tr>
<tr>
<td>PG</td>
<td>Problem Gambling/Gaming (depending on context)</td>
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<tr>
<td>PIU</td>
<td>Problematic Internet Use</td>
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<tr>
<td>PVGP</td>
<td>Problematic Video Game Play</td>
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<td>SN</td>
<td>Substantia Nigra</td>
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<tr>
<td>SNpc</td>
<td>Pars compacta of the Substantia Nigra</td>
</tr>
<tr>
<td>SSR</td>
<td>Smaller, Sooner Rewards</td>
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<td>VGUQ</td>
<td>Video Game Use Questionnaire</td>
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<tr>
<td>VTA</td>
<td>Ventral Tegmental Area</td>
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<tr>
<td>WoW</td>
<td>World of Warcraft</td>
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</tbody>
</table>
Appendix

Terminology and relevant brain regions

In this Appendix I will outline terminology that I have used, as well as provide a brief overview of the brain regions implicated in the PE/NE model. Firstly, *Neuroscience* indiscriminately refers to all the branches of science that are relevant to the brain and its mechanisms and processes. Explanations of psychological processes by neuroscience will incorporate many of the branches of science that fall under its banner.

*Neuroanatomy* studies the structural components of the brain and how they relate to one another, both in terms of their placement and the mechanisms of their interactions. *Neurochemistry and neurodynamics* respectively study the molecular and electrical basis by which the structural components of the brain handle, transform and pass on information to one another. *Neuroeconomics* is slightly more complex to define. NE is a multidisciplinary field that aims to explain decision-making in humans. Broadly, it studies how economic behaviour can shape our understanding of the brain, and how neuroscientific studies can guide and modify models of economics. It combines research from neuroscience, BE, experimental economics and cognitive and social psychology, as well as approaches from theoretical biology, mathematics and computer science where appropriate⁵.

The figures below show the regions of the brain relevant to a neuroeconomic account of addiction.

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⁵ For a full account of NE and a justification for its use in understanding addiction see Ross et al. (2008) pp. 122-131.
Figure A.1 shows the brain from the side. The dorsolateral prefrontal cortex (PFC) is the anterior part of the frontal lobes of the brain. It is an interconnected set of brain areas that are associated with most sensory and motor systems. It has been implicated in complex cognitive behaviour, including decision-making and moderating social behaviour. It also shows the motor cortex and the orbitofrontal cortex (OFC). The latter is a dedicated site of cortical reward processing. The main parts of the reward-specialised brain systems I cover lie deeper in the brain.
Figure A.2: Adapted from Ross et al. (2008, p. 134)
Figure A.3: Adapted from Ross et al. (2008, p. 134)

Figure A.2 is also a side view, but in it one hemisphere has been removed. Figure A.3 is a somewhat three-dimensional view. It faces roughly in the direction of the large yellow arrow. The nucleus accumbens (NAcc) is a small part of the brain that plays a large role in the PE/NE account of addiction. The striatum interacts closely with the ‘emotional centre’ of the brain, which is composed of the amygdala, hypothalamus and hippocampus. Below these are the areas most relevant to addiction and reward processing: the ventral tegmental area (VTA) and the pars compacta of the substantia nigra (SNpc). Separately evolved and just exterior to these is the anterior cingulate cortex (ACC).
References


Hancox, R. J., & Poulton, R. (2005). Watching television is associated with childhood obesity: but is it clinically important?


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