

Chapter 1

INTRODUCTION: JOURNEY TO THE CENTRE OF ADDICTION

This book aims to take you on a journey. The starting point is the simplest possible common-sense theory of addiction and the destination will be a theory that accounts for the available evidence on how addiction develops, who becomes addicted, what they become addicted to and how some of them recover. The path is traced by exploring with successive versions of the theory how it needs to be extended or changed to take account of the available evidence. The goal is to arrive at a theory that is comprehensive yet parsimonious, coherent, and above all useful. It aims to stimulate research and to guide clinicians and policy makers in coming up with better ways of tackling this global scourge. This is a continuing journey. As new evidence emerges and better ways of explaining the evidence are brought to light, the theory will need updating.

Preparing for the journey

Many theories but not much progress

The field of addiction is not short on theories. There are psychological theories, biological theories, sociological theories, economic theories, biopsychosocial theories and more. Almost all of the theories in the field of addiction capture important elements of the phenomenon. The problem is that each theory seems to stem from an idea or set of ideas that accounts for a part of the problem but does not account for other features that were previously addressed by other theories. They view addiction from a particular perspective and focus on what is immediately visible from that point of view. They neglect key features that are visible from other points of view. This militates against developing an 'incremental science' of addiction in which new theoretical principles build on what has gone before, correcting areas where they fail to account for data and creating new avenues for exploration.

Theory and observation

Part of the problem appears to be that we have adopted a model of science that does not quite fit the area of study. In behavioural science, we have developed our

methods from the paradigm of the natural sciences; but unfortunately, they have not always served us well. In the prevailing paradigm, the primary source of evidence is the formal study: the survey, the experiment, the semi-structured interview and so forth. Observation of behaviour in the natural habitat is considered 'anecdotal'. The problem with this is that what one might call the 'big' observations about what people do a lot or never do become less important than percentages in surveys, 'significant differences' between groups and 'correlations' between variables. In many cases, these involve rather trivial behaviours in unrealistic laboratory situations or taking at face value people's reports of their attitudes, beliefs and behaviours on questionnaires or in interviews. Very often this gives us an inaccurate portrayal of real behaviour, thoughts and feelings about things that really matter. The responses are too often a pale shadow of, and bear little relationship to, what happens in the world at large.

That is not to say that formal studies are not vital to description, and hypothesis generation and testing. Only that it is important not to lose sight of the value of careful naturalistic observation and detective work when trying to find explanations for behaviour. A simple example can illustrate this. People do not get addicted to listening to music, making the bed or taking aspirin. Listening to music can be very pleasurable; making the bed is functional; and taking aspirin provides relief from pain. A theory of addiction has to be able to explain why these pleasurable, functional and self-medicating behaviours are not addictive while gambling, smoking and drinking alcohol are. As we are aware, no formal study has been done on the addictive qualities of the former but the simple observation is potentially illuminating.

Need for a synthetic theory

The theory developed in this book aims to provide a conceptual framework within which the major insights provided by the existing theories can be placed. It is a synthetic theory in the sense that it attempts to pull together the accumulated wisdom. It does not attempt to explain *everything* there is to explain, but it does seek to explain the 'big observations' and provide a conceptual system in which the existing theories can be located. It aims to be as parsimonious as possible: that is to say, it only brings in additional elements if they are needed. It strives for coherence: the ideas should relate naturally to each other and not be just a list of unconnected assertions.

A guiding principle

In attempting this task, we are mindful of the words of Nick Heather (Heather 1998), which we can do no better than to quote verbatim:

'addiction . . . is best defined by repeated failures to refrain from drug use despite prior resolutions to do so. This definition is consistent with views of addiction that see decision-making, ambivalence and conflict as central features of the addict's

behaviour and experience. On this basis, a three-level framework of required explanation is (needed) consisting of (1) the level of neuroadaptation, (2) the level of desire for drugs and (3) the level of “akrasia” or failures of resolve . . . explanatory concepts used at the “lower” levels in this framework can never be held to be sufficient as explanations at higher levels, i.e. the postulation of additional determinants is always required at Levels 2 and 3. In particular, it is a failure to address problems at the highest level in the framework that marks the inadequacy of most existing theories of addiction.’ (p. 3)

While addiction as conceived in this book has to be broader than just drug use, Professor Heather’s point about the inadequacy of explanations at higher levels seems to us to be well made. Thus, neurophysiological models of the actions of particular addictive drugs on specific brain pathways are important and can help us design medicines to help treat the problem. But it is foolish to imagine that they are theories of addiction given their patent failure to address important observations about social and psychological determinants or indeed other brain mechanisms.

We are also aware of the fact that there already exists in the literature a scholarly and eclectic account in the form of Jim Orford’s model ‘Excessive Appetites’ (Orford 2001). The new theory seeks to build on the work of Professor Orford while paying close attention to the admonitions of Professor Heather.

A psychological orientation

We are psychologists by training and our main field of research is tobacco. Both of these things will inevitably affect our approach and the examples we use. It is difficult for theorists to write convincingly in areas that are not their discipline (e.g. neuropharmacologists or economists writing about psychology), and equally difficult for researchers to demonstrate proficiency in areas of addiction that are not their specialty (the alcohol researcher writing about tobacco or the tobacco researcher writing about cocaine) and many do not even try. But we must try because if we do not, we will fail to grasp what addiction is all about. Since the first edition of this book, we have had the opportunity to discuss the ideas with many colleagues studying different forms of addiction and have been heartened by the extent to which those colleagues have considered that the ideas translate well to their areas of study.

In the end

So the book is a journey from the most common sense and simple explanation of addiction to one that is only as complicated as it needs to be. The narrative is punctuated with references to many of the theories that have been proposed, together with comments on these.

4 ■ Chapter 1

These are not just summaries. In any event, it is not possible to do justice to the theories in the space available; some of them take up whole volumes. We attempt to draw out the theories' unique insights or important lessons that may be drawn from them. Where possible, the developing theory uses concepts that already exist in the minds of well-informed non-specialists and use words that serve non-psychologists well in explaining and predicting each other's behaviour. We try to avoid the pitfall of needlessly constructing new terms or making up new meanings for existing ones.

This book uses the device of putting existing theories that it discusses in boxes. In some cases, the theories are described very briefly and in others, they are considered in much more detail. The level of detail is not related to the complexity or importance of the theory but only to what is required to draw out the lessons for the purposes of taking forward the journey to a comprehensive theory of addiction.

The starting definition of addiction

There are many different ways of defining addiction, by which we mean that there are many different things to which the label addiction can be applied. The next chapter will address this issue in more detail but we need to get started on the right foot, so it should be stated here that we will use the term to refer to a chronic condition in which there is a repeated powerful motivation to engage in a rewarding behaviour, acquired as a result of engaging in that behaviour, that has significant potential for unintended harm. It is not all-or-none, but a matter of degree. Its severity can be assessed, amongst other things, by the severity of subjective urges or cravings, a frequency or intensity of behaviour that is causing harm and failure of serious attempts to limit or cease the activity. This definition differs in some respects from others that are widely used. The reason is that we believe that it captures more precisely the phenomena that most of us working in the field need to be captured and excludes broadly similar phenomena that we would want excluded.

Addiction and motivation

Putting motivation at the heart of addiction means that any theory of addiction needs to be based on a theory of motivation. It makes sense to think of addiction as a disorder of motivation. Although many aspects of motivation are well understood, surprisingly there appears to be no truly synthetic theory that brings them all together. Therefore, this book attempts to provide one. Hopefully, the theory will have value outside the study of addiction.

Establishing base camp

To achieve the goals set out above is no small matter. To bring on board an expert readership made up of researchers who have their own ideas about how addiction should be construed is even more challenging. Nevertheless, the goal

seems worthwhile and if the ideas presented are logical and contain enough new insights, perhaps this theory will provide a basis from which we can start an incremental science of addiction research. We can start replacing the parts that are contradicted by evidence with new, better parts, finding more coherent or simpler accounts that explain all the things that this theory explains, or adding new theories within the structure of this one. That is what we sought to do with the draft of the theory set out in the first edition of *Theory of Addiction*. This edition continues the process of development.

What this book does

Many of the ideas in this book are quite novel and may take some getting used to. To try to help with the process of understanding it, what follows provides some pointers:

- This book develops a draft of a *synthetic theory of addiction* that draws into a single system the mechanisms underlying it: learning through reward and punishment and by associations; feelings of compulsion and desire; the exercise of self-control, beliefs, decisions and plans.

The theory is based on a *synthetic theory of motivation* that focuses on the *moment-to-moment* control of actions through causal pathways of varying lengths and levels of complexity from simple reflexes, through impulses and inhibitory forces, then desires, drives, and emotional states, to evaluations and plans. It emphasises the fact that for any element to influence behaviour, *it must do so through impulses and inhibitory forces operating at the time*.

- The book argues that the functioning of the brain has evolved to be *inherently unstable*; the motivational system is built like a 'fly-by-wire' aircraft with built-in instability that requires constant balancing input to keep it 'on the straight and narrow'. This has the advantage of making us highly adaptive and creative but the disadvantage that, without balancing inputs, including devices and techniques to stabilise our mental processes, we readily develop maladaptive thought processes and behaviour patterns.
- The book argues that this pattern of activity can be understood in terms of the concepts of the '*epigenetic landscape*' proposed by Waddington (1977) to explain embryological developments, and *chaos theory*, a mathematical approach to modelling systems such as weather patterns. In chaos theory, systems can descend into particular states ('Lorenz attractors' are examples of these) but still switch apparently unpredictably to other states or even move in a *pseudo-random* fashion between them.
- The book argues that addiction develops in susceptible individuals from a failure of balancing inputs leading the *motivational system* concerned into a condition such that particular forces have an unhealthy dominance.
- The book recognises that the disorder of motivation that we call 'addiction' can arise from many different causes. The idea is that addiction is associated with widely varying underlying pathologies and a number of *different syndromes*

(such as the alcohol dependence syndrome). These pathologies involve disorders with varying combinations of abnormally strong impulses, abnormal drives, abnormal emotional states or abnormal mechanisms for restraint.

Sometimes the pathology is present in the individual quite independently of the addictive behaviour. Sometimes the pathology arises from a susceptibility of the individual to the effects of the addictive behaviour or drug. And sometimes it is the individual's environment that is pathological and most 'normal' individuals would succumb in such situations.

Often the pathology shows itself as a syndrome that goes beyond addiction *per se* but involves other classic symptoms (as in the alcohol dependence syndrome already mentioned). But across the different types of addictive behaviour, the pathologies often interact with environmental conditions to result in widely varying manifestations of the symptoms from frequent, low-intensity adoption of the addictive behaviour through to relatively infrequent bingeing. The same drug can lead to different patterns of addictive behaviour in different social and environmental conditions.

- The book proposes a change to the *diagnosis of addiction*. It argues that the assessment should focus on gathering evidence for the degree of dominance of the motivational forces underpinning a behaviour. This is the 'strength' of addiction. It is conceptually necessary to distinguish this from 'severity' which concerns the degree of harm caused by the addiction. There is a move in the American Psychiatric Association's Diagnostic and Statistical Manual V (DSM-V) to combine the two because they are so highly correlated in a given culture. But that leads us to ignore the cultural factors that generate harm from an addictive disorder. For example, if a society chooses to impose draconian punishments on behaviours such as ecstasy use, it can raise the severity without affecting the strength. For clinicians, the next step after diagnosis of addiction would be to try to determine where the pathology or pathologies lie and what are the prospects in the short and medium term for treating these. This would inform the decision about how much emphasis to place on treating the underlying pathology or simply suppressing the symptom (the addictive behaviour).

Further, if one is to treat the underlying pathology, what are the prospects for an acute treatment episode that will result in a lasting effect, will chronic treatment be required, or is the best model one where treatment episodes are repeated as required? *Symptomatic treatment* involves harnessing additional motives to bolster restraint and minimise the manifestation of the impulses to engage in the behaviour. *Treatment of the underlying pathologies* involves pharmacological and psychological interventions to treat, or permanently normalise, the disorders of the motivational system.

- The book proposes an approach to the development of *population-level interventions* to prevent or control addictive behaviour that takes account of the whole of the motivational system (impulses, desires, evaluations and plans). It states that, equally importantly, interventions should be based on a calculus of the forces operating on individuals *at times when the activity is currently occurring or being planned*.

- This book argues that our existing approach to theory development and testing is not conducive to 'incremental science' but rather a plethora of theories that have much in common but use different formulations or that focus on just one aspect of the matter in hand and fail to address other important aspects. Moreover, the methods we use to test theories, such as correlation coefficients and regression, are often not up to the job. We should also be looking for counter-examples: a single genuine counter-example means that the theory must be wrong and prompts the search for improvements.
- This second edition continues the processes started with the first in 2006 of building an incremental science of addiction, with new theoretical ideas being proposed that do a better job at explaining and predicting behaviour within a common integrative framework, rather than just drawing attention to new insights that explain some things better but fail to address other observations that were adequately explained by previous theories. It also seeks to find better ways of explaining and describing the theory and its application.

The synthetic theory of addiction in brief

To start the ball rolling the following paragraphs will outline some of the statements made by the theory. This will involve some repetition. This is deliberate: ideas often take several exposures in different contexts to be understood—this is just the beginning.

Addiction is

Addiction can arise from many different pathologies, and varies in its strength, severity and manifestations. Addiction involves a chronic condition of the *motivational system* (see next section) in which there is an abnormally and damagingly high priority given to a particular activity.

The pathologies underlying addiction come in *three basic types*:

- Abnormalities in the motivational system that were not directly caused by the addictive activity (e.g. related to chronic anxiety, depression, low self-esteem, poor impulse control, etc.).
- Abnormalities in the motivational system caused by the addictive activity acting on susceptibilities in that system (e.g. sensitisation to the effects of stimulant drugs, tolerance and withdrawal symptoms, and mood disturbance arising from social effects of the behaviour).
- Pathological environments acting on essentially normal motivational systems that are not equipped to cope with them (e.g. sometimes the lifestyle of public icons, particular social relationships and people in chronically distressing circumstances).

In many cases, the underlying pathology involves more than one of these interacting with each other.

The 'motivational system'

The motivational system is the set of brain processes that energise and direct our actions. It consists of five interacting subsystems: (1) the response subsystem generates responses, (2) the impulse–inhibition subsystem generates impulses and inhibitions that feed into this, (3) the motive subsystem generates wants and needs that feed into this, (4) the evaluation subsystem generates beliefs about what is good and bad that feed into this and (5) the planning subsystem generates self-conscious intentions that feed into this.

Motives can influence behaviour only through impulses and inhibitions, evaluations can do so only through motives, and plans operate on motives and evaluations.

Impulses, motives and plans

Leaving aside simple reflex responses, actions result only from *impulses* and *inhibitory forces* operating at that moment in time, and these result from stimuli/information and from motives operating at that time. Thus, motives operate through impulses and inhibitions, and evaluations operate through motives. We think that plans influence actions primarily through evaluations but it is possible that they may act directly on desires.

The way that the motivational system is structured imparts an inherent (though not paramount) primacy to the immediate environment in terms of influences on our actions and a primacy of desires and urges over evaluations and plans.

Motives and impulses derive from interactions between *external stimuli* and *drives* (e.g. hunger), *generalised emotional states* (e.g. happiness, sadness, excitement) and *targeted emotional states* (e.g. liking, disliking). The strength of a given motive derives from the strength of associated emotions and drives. The direction of the motive derives from the nature of the drives and whether the emotions are positive or negative.

Learning by association

Occurrence and *repetition* of particular associations within the motivational system lead to facilitative links being formed so that when one element occurs the other elements are triggered more readily. This is *associative learning*.

Stimulus–stimulus associations underlie 'Pavlovian (classical) conditioning' while *stimulus–response–outcome* (reward or punishment) associations underpin what is called 'instrumental (operant) learning'. Associative learning is a general property of the brain, which underpins creative thoughts and propositional learning and habits and skills. Thus, what we have come to think of as classical and operant learning are two examples of a wide range of possible types of association between mental activities.

The term *habit* in this view refers to any activity that involves a significant element of automaticity through stimulus–impulse or stimulus–inhibition learning.

The unstable mind

The pathologies underlying addiction develop because the human mind and the physiological systems that give rise to it have evolved to be *inherently unstable* and require constant balancing input to prevent them heading off in unwanted directions. This instability is what makes humans highly responsive to environmental events, creative and adaptable but at the cost of a tendency to descend into maladaptive patterns of thought and behaviour in the absence of balancing input.

A useful way of visualising this is Waddington's '*epigenetic landscape*'. This characterises the state of an organism as a ball rolling down a contoured landscape with valleys and plains. At bifurcations in the valleys, small environmental forces can lead the ball down one path or another. Addiction represents a particularly deep valley, which would require very powerful sustained input to escape from.

In principle, this approach can be modelled using mathematical concepts of '*chaos theory*'. 'Chaotic systems' (such as weather) exhibit characteristic patterns: they involve periods of short- to medium-term stability punctuated by apparently unpredictable switches in state or periods of violent instability resulting from apparently small events; the paths that two systems follow can diverge markedly as a result of very small differences in their starting points; on occasions, the system can become fixed in a particular state without the possibility of escape under any realistic conditions, while on other occasions, it can apparently show this pattern only to suddenly switch states.

The *motivational system* seems to fit this chaotic adaptive model, and addiction represents a particular kind of activity of the system. For most people under most conditions, the motivational system has checks and balances that prevent any one set of motivational forces dominating for a protracted period. However, some circumstances (a pre-existing pathology in the system, changes to a susceptible system stemming from a given set of actions or a particular set of environmental inputs to the system) lead it to enter a state in which the inputs are not sufficiently balanced for that particular system and it is 'attracted' to an addicted state where a given set of motivational forces are inadequately balanced by competing influences.

This book is an essay. We have tried to communicate the ideas as best as we can, but each chapter could be a book in itself and this text is not attempting to include that level of detail. Instead, we aim to present a wider view of addiction theory. We hope we have done justice to the subject and, even if you do not agree with everything in the book, we still hope you find it stimulating.

References

- Heather, N. (1998) A conceptual framework for explaining drug addiction. *J Psychopharmacol* 12(1): 3–7.
- Orford, J. (2001) Addiction as excessive appetite. *Addiction* 96(1): 15–31.
- Waddington, C. (1977) *Tools for Thought: How to Understand and Apply the Latest Scientific Techniques of Problem Solving*, Basic Books, New York.