

# Understanding the Nature of Drug Addiction

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## Introduction

The attempt to understand the nature of drug addiction, why people become addicted and how to treat them raises many perplexing issues concerning the nature of free will, autonomy, self control, rationality, responsibility, justice and blame. The way we regard and treat drug addicts depends on the crucial question of whether drugs addicts are to a lesser or greater extent, in control of their drug taking behaviour. As researchers shed further light on these matters, we will gain a better understanding of the nature of drug addiction, which will mean that ethically appropriate and effective treatment practices can be implemented. Whilst we have a reasonably good understanding of the neurobiology of drug addiction, there is still much debate on whether drug addicts are properly regarded as sufficiently autonomous and thus in control of their addiction such that they can be held accountable for their continued addiction, or whether they have lost a sufficient degree of autonomy, such that they are unable to voluntarily refrain from further drug taking. In light of our current understanding of neuroscience as well as what we know about the behaviour of addicts, it is incorrect to conclude that drug addicts are not responsible for their continued drug taking on the grounds that they have significantly diminished autonomous agency.

## The Neurobiology of the Addicted Mind

We now have a general understanding of the common neurobiological mechanism that underlies addiction whether they are addictions associated with particular substances or behaviours. The neurobiological basis of addiction is based on the activation of common neural systems associated with "reward". The reward system is in place to subserve normal biological functions such as obtaining food and other resources for survival such as finding potential mates

(for species survival). Activities such as eating and sex are pleasurable actions and are not intrinsically addictive, however, it is by virtue of the experience of reward that such activities can become addictive. The distinguishing feature of addictive drugs is their ability to directly, and with greater intensity, activate the brain's reward system. Drugs known to be highly addictive such as cocaine, amphetamines and heroin directly activate the reward system, giving rise to feelings of pleasure as well as reinforcement of the behaviour that leads to that pleasure. Interestingly, behavioural addictions such as pathological gambling<sup>1,2</sup> and sex addiction<sup>3</sup> also involve activation of the reward system and related neurophysiological and biochemical pathways. This gives us a unified neurobiological theory of the addictive process.

The reward system is a highly complex system and is composed of sub components and several distinguishable neurobiological mechanisms<sup>4</sup>. Reward often manifests as hedonic pleasure and motivation to seek out that pleasure as well as to avoid displeasure. Motivation is best understood in terms of affinitive versus aversive moti-

- 1 Knutson, B., Adams, C., Fong, G. & Hommer, D. (2001) Anticipation of increasing monetary reward selectively recruits nucleus accumbens. *Journal of Neuroscience*, 21 RC159.
- 2 Reuter, J., Raedler, T., Rose, M., Hand, I., Glascher, J. & Buschel, C. (2005) Pathological gambling is linked to reduced activation of the mesolimbic reward system. *Nature Neuroscience*, 8, pp 147-148.
- 3 Goodman, A. (2008) Neurobiology of addiction: An integrative review. *Biochemical Pharmacology* Vol 75, (1), Pp 266-322
- 4 For example Berridge and Kringelbach (2008) refer to three sub components of reward. Firstly, there is the "liking" component which constitutes the pleasurable impact. Secondly, there is the "wanting" component which is the motivation for reward seeking behaviour and thirdly there is the "learning" component which involves associations, representations and predictions about future rewards based on past experiences. The operation of these components involves both conscious and non-conscious processing. Berridge, K.C. and Kringelbach, M. L. (2008) Affective neuroscience of pleasure: reward in humans and animals. *Psychopharmacology*. 199: 457-480.

vation, where the former involves behaviour directed towards achieving pleasure and the latter involves behaviour directed away from unpleasantness. Addiction also involves the memory and reinforcement of pleasurable experiences as well as appraisal of them, combined with the aversion to the characteristic physiological withdrawal symptoms associated with particular drugs. The manner in which this process may facilitate addiction is that over time it may render an addict depressed after their high, and unable to be motivated by normal rewards, driving the intense cravings for future drug use. Conversely and somewhat paradoxically, the reward system also becomes even more sensitive to the drugs themselves. These mechanisms of tolerance and sensitivity mean that after a period of cessation, memories of past highs, cues, and small doses could elicit strong reward responses and thus facilitate relapse<sup>5</sup>.

The Prefrontal Cortex (PFC) is responsible for carrying out executive functions, such as working memory, reinforcement learning, planning, adapting, inhibitory control and integration of information for goal directed guidance of behaviour. The PFC is integrated with the reward system and is involved in the encoding of reward based goals. Drug related cues and reward experiences after taking drugs can become integrated into the goal directed behaviour that the PFC is responsible for thus allowing a drug to become a valued goal above other learned goals<sup>6</sup>. Furthermore, a number of studies have also demonstrated that inhibitory control is also impaired by such drug

induced maladaptive changes to the PFC<sup>7,8,9</sup>. Gradually there is shift from conscious motivated seeking of drugs to a stimulus-response driven drug habit. The drug taking habit essentially becomes more ingrained making it harder to break. Combined with the characteristic withdrawal symptoms associated with particular drugs, the user develops both a psychological and a physiological dependence on the drug and finds themselves in the grips of addiction. Hence arises the popular notion that an addict's mind has been "hijacked". They are perhaps no longer autonomous agents who are able to have authority over their actions. Perhaps they have a disease that they cannot of their own volition overcome?

### Addiction as a "Disease"

When it comes to deciding whether addicts are sufficiently autonomous to control their addiction it is important to determine whether it is indeed the case that addicts do not have authority over their drug taking habit or to put it another way, whether they lack a basic capacity for self control. Is their free will significantly diminished due to their drug addiction? The answer to this question has significant implications for how an addict may respond to their situation and how we may wish to treat them, given that a person's beliefs will influence their subsequent behaviour. For example, believing that one is capable of flying over the edge of a cliff is detrimental given that it is indeed the case that one cannot. Though consider a corollary of this - the belief that one is incapable of passing a school exam, even though one is clearly as competent as any other person. An incorrect belief that one is helpless or that one lacks free

5 The molecular basis for this involved delta FosB, a transcription factor that may cause hypersensitivity to drugs. This is reviewed in Esch, T and Stefano, G. B. (2004) *The neurobiology of pleasure, reward processes, addiction and their health implications. Neuroendocrinology Letters* No.4 August Vol.25: pg. 240-41.

6 Montague PR, Hyman SE, Cohen JD. 2004. *Computational roles for dopamine in behavioural control. Nature* 431:760-67

7 Volkow ND, Fowler JS. 2000. *Addiction, a disease of compulsion and drive: involvement of the orbitofrontal cortex. Cereb. Cortex* 10:318-25

8 Goldstein RZ, Volkow ND. 2002. *Drug addiction and its underlying neurobiological basis: neuroimaging evidence for the involvement of the frontal cortex. Am. J. Psychiatry* 159:1642-52

9 Li, C. R. & Sinha, R. (2008) *Inhibitory control and emotional stress regulation: Neuroimaging evidence for frontal-limbic dysfunction and psycho-stimulant addiction. Neuroscience and Biobehavioral Reviews, Vol 32: 581-97.*

will can indeed be detrimental also. Hence the latter example is a detriment to oneself in a different sense than the former in that such beliefs and attitudes may give rise to what we might call “learned helplessness”<sup>10</sup>. It is a false belief that one is incapable of performing a particular task. Essentially it means that one mistakenly believes that one’s situation cannot be resolved by use of one’s free will.

This kind of deterministic view of addiction seems to be the logical conclusion to draw from a “disease model” of addiction. Empirical research by psychologist Roy Baumeister has also demonstrated that a belief that one’s behaviour is determined, rather than being the product of free will, can give rise to a number of anti-social behaviours such as increased cheating behaviour<sup>11</sup>, increased aggression toward others and reduced helpfulness<sup>12</sup>. Those in this situation are less likely to think for themselves or feel guilty or responsible for their actions<sup>13</sup>.

A disease model can also in some sense be rather seductive given that it provides a causal explanation of addiction at the level of biology or genetics, which may provide a convenient escape from personal level responsibility. Herbert Fingarette, had infamously argued against the disease model of alcoholism based on precisely such reasons. In his book “Heavy Drinking: The Myth of Alcoholism as a Disease” Herbert Fingarette describes the typical percep-

tion of alcoholism as a disease concept<sup>14</sup>. In the 1940s and 50s this concept became widely accepted due to the influence that Alcoholics Anonymous (A.A.) had in the US. The development of alcoholism begins with apparently innocent social drinking which inevitably leads to increased involvement with alcohol. The alcoholic loses control over his drinking and cannot stop once he has started. The alcoholic eventually hits a low point that requires an enormous effort to regain his/her senses and achieve total abstinence. Thus on this concept of alcoholism, one drink leads to more and more drinks contrary to one’s volition. Inherent in this conception of alcoholism is the idea that one has total control prior to drinking, yet there is a total lack of control thereafter. However, our understanding of the nature of self control is clearly contrary to this.

*If our righteous condemnation is not in order, neither is our cooperation in excusing heavy drinkers or helping them evade responsibility for change. Compassion, constructive aid, and the respect manifest in expecting a person to act responsibly—these are usually the reasonable basic attitudes to take when confronting a particular heavy drinker who is in trouble. (Fingarette, 1989; pp 111-112)*

Furthermore, this kind of view of alcoholism prevents us from seeing the drinking within the context of the person’s way of life. It prevents us from looking at the role that alcohol plays for that person in their life, whether it is leisure, sociability or coping with adversity. As Fingarette states<sup>15</sup>:

*The logic of the disease concept does the contrary. It leads all concerned, including the drinker, to deny, to ignore, to discount what meaning that way of life may have. Seen as an involuntary symptom of a disease, the drinking is isolated from the rest*

10 “Learned helplessness” is a theory developed by American psychologist Martin E. P. Seligman. The Wikipedia entry defines it as “a psychological condition in which a human being or an animal has learned to act or behave helplessly in a particular situation - usually after experiencing some inability to avoid an adverse situation - even when it actually has the power to change its unpleasant or even harmful circumstance”. [http://en.wikipedia.org/wiki/Martin\\_Seligman#cite\\_note-6](http://en.wikipedia.org/wiki/Martin_Seligman#cite_note-6)

11 Vohs KD, Schooler JW. 2008. The value of believing in free will: Encouraging a belief in determinism increases cheating. *Psychological Science* 19:49–54.

12 Baumeister RF, Masicampo EJ, DeWall CN. (2009) Prosocial benefits of feeling free: Disbelief in free will increases aggression and reduces helpfulness. *Personality and Social Psychology Bulletin*. Feb;35(2):260-8.

13 Vohs KD, Baumeister RF (2009) Addiction and free will. *Addiction Research and Theory*. 17(3): 231–235.

14 Fingarette, H (1989) *Heavy Drinking: The Myth of Alcoholism as a Disease*. University of California Press, Berkeley and Los Angeles, CA.

15 H. Fingarette, “Alcoholism and Self-Deception,” in *Self-Deception and Self-Understanding: New Essays in Philosophy and Psychology*, ed. M. W. Martin (Lawrence, Kans.: University Press of Kansas, 1985), pp. 60-61.

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*of life, and viewed as the meaningless but destructive effect of a noxious condition, a 'disease'. (Fingarette, 1985; pg. 60-61).*

So the crucial question is whether addicts have a sufficient degree of autonomy and self control that will enable them to be able to overcome their addiction(s)? The answer is yes, because they still retain a very basic competence for self control. No matter how strong the cravings, how stimulus driven an addict becomes, it is not necessarily the case that this persistence of the desire for drugs and the cues that elicit those desires means that an addict would inevitably give in to those persistent desires. Why not? Addicts are able to take the appropriate measures to avoid certain people, environments and drug cues which trigger the strong desires. After all it takes self control to be able to remove oneself from an environment that is conducive to drug taking behaviour. It takes some basic competence for self control to be able to recognise that one has a problem and seek help. What this demonstrates is that the capacity for self control (diachronic – longer term self control) was always present in drug addicts. What this reveals is that the diminished self control of drug addicts is essentially no different from those who we may regard to be poor at performing tasks that require self control, but yet those are people who we would regard as fully autonomous.

Perhaps our best conception of autonomy in this debate is one which allows us to say that a drug addict is able to autonomously choose to take their drug even though they may be aware of the negative implications associated with the drug. Much like a person who, in the midst of their struggle to stay on their diet, chooses to have the extra serving of cookies, even though they know that they should not. It seems that every person's capacity for self control can wax and wane, and the only clear cut cases where one can say that a person lacks this capacity is at the extreme end of the spectrum where a person no longer has the capacity or competence required for self control. Such persons are one's who genuinely lack autonomous

agency in a significant sense. Consider the example of Tourette's syndrome as a condition that manifests as involuntary physical and vocal tics. There is a genuine sense in which people with this syndrome lack the basic capacity or competence to exercise self control over such behaviours.

Furthermore, it is possible for people to hold conflicting beliefs and desires whether they are conscious of such conflicts or not. So it is always possible for a drug addict to deliberate and choose of their own volition to take a particular drug even when they know there are good reasons not to. Of course over a period of time during which the addict undergoes a process of reward related learning, they can form a habit that becomes primarily a non-deliberative (stimulus-response) driven habit, much like other skills that one can acquire through experience and practice. However, this aspect of human agency and autonomy applies to all normal human beings. Therefore, despite the neurological changes that occur in drug addicts, there does not appear to be any significant difference between the autonomous agency of drug addicts and that of normal persons who belong within the spectrum of autonomous agency, some of whom are able to exercise greater self control than others.

### **Upholding and Promoting Autonomous Agency**

The extant basic competence of a drug addict to exercise inhibitory control means that it is always possible for an addict to choose to avoid drug taking albeit under duress and against the tide of motivational salience of drug cues and the desire for drugs. Hence a crude disease model based on impaired autonomy or the "hijacking" of executive function does not do justice to what we understand about human agency and autonomy. However, this is not to say that we do not recognise the circumstances and developmental trajectory associated with drug addiction. Many drug addicts are people who find themselves in or have had

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a history of adverse social circumstances of abuse, crime and violence.

When it comes to the question of whether addicts are blameworthy in any legal or moral sense we can take into consideration the possibility that there may be mitigating circumstances. We already do take diminished autonomy seriously when it comes to justice. After all, we grant that diminished capacity to control one's conduct can be used in arguments for mitigation in criminal law. However, even if we were to conceive of drug addiction as a disease, this does not imply that the disease exculpates them. Perhaps as Voh's and Baumeister have proposed, we need to formulate a slightly more nuanced notion of a "disease" model of addiction<sup>16</sup>:

*If a disease model for addiction is to be retained, we suggest abandoning the virus or germ models in favor of something more like Type II diabetes. One does not become infected with diabetes. Rather, a natural bodily vulnerability becomes exacerbated by experiences, many of which are based on personal choices. (Voh's & Baumeister, 2009; pg. 234)*

On this view however, personal responsibility is retained and thus the appropriate treatment measures can be encouraged which therefore ought to focus on absti-

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<sup>16</sup> Vohs KD, Baumeister RF (2009) Addiction and free will. *Addiction Research and Theory*. 17(3): 231–235.

nence and the promotion of self control as Eric Matthews states<sup>17</sup>:

*Conscious choice can, however, lead to the correction of a moral disorder that was originally not consciously chosen. Therapy for such disorders would take the form of helping the sufferer to make such choices by informing him or her of what the good life for a human being is like. (Matthews, 1999; pg. 208)*

Without entering into the traditional discussions of what constitutes "the good life", it is clear that the importance of the constituent elements of, and one's development within, one's social environment, is crucial for successful recovery from addiction and a return to the "good life". Having something to do, having alternative healthier goals – both long and short term, as well as having the opportunity to train oneself to stay on track with one's goals in spite of temptations to stray, is the kind of treatment that is the most ideal for it is what upholds a person's autonomous agency. However, as Dalrymple has poignantly stated, "it is easier, after all, to give people a dose of medicine than to give them a reason for living. That is something the patient must minister to himself"<sup>18</sup>.

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<sup>17</sup> Matthews, E. (1999) *Moral Vision and the Idea of Mental Illness*. *Philosophy, Psychiatry, & Psychology* – Vol 6, No. 4, pp. 299-310.

<sup>18</sup> Dalrymple, T. (2006) *Romancing Opiates: Pharmacological Lies and the Addiction Bureaucracy*. Encounter Books. Pg. 6.