

The Paradox of Addiction Neuroscience

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Abstract Neuroscience has substantially advanced the understanding of how changes in brain biochemistry contribute to mechanisms of tolerance and physical dependence via exposure to addictive drugs. Many scientists and mental health advocates scaffold this emerging knowledge by adding the *imprimatur* of disease, arguing that conceptualizing addiction as a “brain disease” will reduce stigma amongst the folk. Promoting a brain disease concept is grounded in beneficent and utilitarian thinking: the language makes room for individuals living with addiction to receive the same level of compassion and access to healthcare services as individuals living with other medical diseases, and promotes enlightened social

and legal policies. However such claims may yield unintended consequences by fostering discrimination commonly associated with pathology. Specifically, the language of neuroscience used to describe addiction may reduce attitudes such as blame and responsibility while inadvertently identifying addicted persons as neurobiological *others*. In this paper, we examine the merits and limitations of adopting the language of neuroscience to describe addiction. We argue that the reframing of addiction in the language of neuroscience provides benefits such as the creation of empowered biosocial communities, but also creates a new set of risks, as descriptive neuroscience concepts are inseparable from historical attitudes and intuitions towards addiction and addicted persons. In particular, placing emphasis on the diseased brain may foster unintended harm by paradoxically increasing social distance towards the vulnerable group the term is intended to benefit.

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Introduction

Addiction¹ is one of the most pressing public health emergencies facing Western society, and, along with various mental illnesses, is one of the most

¹ There is currently no universally agreed upon definition for addiction, and some have argued that the term is “conceptually chaotic”. See, for example, Shaffer [1].

stigmatized human conditions. Scientists and mental health advocates have long championed the view that enhanced biological understanding of mental illness, addiction, and other behaviours will reduce stigma amongst the lay public [2]. Recent advances in neuroscience are indeed influencing a major shift in prevailing views, as the dissemination of neuroscientific claims into various aspects of society have a significant influence on how addiction is conceptualized by the folk.²

Modern research in addiction neuroscience has spawned a “brain model” of addiction that describes the brain systems, mechanisms and processes involved in craving, reward, dependence, and withdrawal. The model supports the notion that addiction is an organic neurobiological condition, and the way the brain responds to the influence of this or that substance³ is consistent with causal theories in biology, pharmacology, and neuroscience. Conversely, the communication of the brain model by experts to a lay audience has birthed a coexisting “brain disease model” of addiction, which also describes the neurobiological and pharmacological mechanisms, but frames the language of these processes in terms of brain pathology. Advocates of this view argue that modeling the language in terms of brain disease makes room for individuals living with an addiction to receive the same level of compassion and access to healthcare services as individuals living with other medical diseases, and promotes enlightened social and legal policies. The brain disease model serves to highlight

the difference between “addicts” and “normals” in neurological identity.

In this paper, we examine the merits and drawbacks of adopting the language of neuroscience to describe addiction. We argue that the reframing of addiction in the language of neuroscience not only provides benefits but also creates a new set of risks, as descriptive neuroscience concepts are inseparable from historical attitudes and intuitions towards addiction and addicted persons. In particular, placing emphasis on the diseased brain may foster unintended harm by increasing social distance on the vulnerable group the term is intended to benefit. We speak to the issue of neuroscience communication and conclude with cautionary words for those who are focused on the necessary and practical challenge of reducing addiction-related stigma. As a recent article in the *New York Times* indicated, “even as we have congratulated ourselves for becoming more ‘benevolent and supportive’ of the mentally ill, we have steadily backed away from the sufferers themselves. It appears, in short, that the impact of our worldwide antistigma campaign may have been the exact opposite of what we intended” [5].

The Brain Model of Addiction

The study of addiction has reaped the benefits of developments in neuroscience, with researchers employing technologies and methods such as molecular and intracellular signaling in animal models, and brain imaging procedures in living human participants. Studies of the neurobiology of addiction have represented an active and productive area of neuroscience research for decades, yet the underlying neuronal modifications that occur as a result of either occasional or prolonged drug use remain incompletely understood. It is generally accepted that psychoactive substances affect perceptual, emotional, and motivational processes in the brain. In addition to the emerging understanding of the contribution of neurogenetic factors in addiction, collectively this knowledge has contributed to what we refer to in this paper as the *brain model* of addiction.

The neurobiological underpinnings of the behaviours of drug seeking, consumption, withdrawal and relapse are generally viewed by experts in the field within the broader neurobiological context of the dopamine (DA) reward system. Many drugs of

² We believe that it is important for neuroethics to probe the ways in which the general public, i.e. *the folk*, understand neurobiological concepts as they apply to their lived experiences. We suggest that this is a worthy endeavor in so far as it allows for the development of empirically grounded normative claims, which can then be used to at least partially democratize policy decisions regarding the introduction of new technologies in the neurosciences. Our advocacy of the value of investigating folk psychology is not intended to diminish arguments that it represents an inadequate theory of understanding psychological predicates (see, for example, P.M Churchland [3] and P.S. Churchland [4]) but rather to highlight the fact that folk psychological concepts exist in the real world and that as neuroethicists, understanding those concepts is informative.

³ In this paper we only speak to addiction as it applies to substance use, however we accept that addiction is not restricted to psychoactive substances and may include behaviours such as gambling, shopping, sex, and so forth.

addiction block reuptake of DA after it is released from the presynaptic terminal. Consistent with this model, DA is the neurotransmitter most commonly associated with the positive rewarding and reinforcing effects of both substances and hedonic experiences. Thus, increasing DA neurotransmission, particularly within the mesocorticolimbic DA system, is widely viewed as a key consequence of administering substances with addictive properties. It has also been shown in animal studies that psychoactive substances increase extracellular DA in the shell of the nucleus accumbens, an important structure involved in motivation, learning, and reinforcement [6]. Buttressing the dopamine model are findings from positron emission tomography studies in humans in which increases in D2 DA receptor binding have been observed in the nucleus accumbens during drug-induced euphoria [7].

A Meaningful Distinction

Uncovering the mechanisms involved in neural adaptations to addictive drugs has produced important information about how the brain functions in addiction, however the brain is not the sole determinant of addiction. Many other factors are involved in addiction's "symphonic causation"[8]. Although this paper does not provide a comprehensive review of the psychological, social, economic, and political determinants involved in the initiation of drug use or the onset of addiction, it does not mean that these complexities are not relevant. What this evolving research calls into question, however, is what *addiction* actually means.

In a recent article in the journal *Addiction*, Harold Kalant [9] draws attention to this issue:

"...[O]ne still finds in the experimental literature many studies carried out with the most sophisticated modern techniques, but with the basic flaw that animals are presumed to have been rendered 'addicted' by continuous exposure to alcohol vapour in a closed chamber, or by repeated intraperitoneal or intravenous injection of an opioid, or cocaine, or some other presumably 'addictive drug'. Such experiments may yield *important information about biological mechanisms of tolerance or physical dependence, but these are not the same as addiction*" [9: 781; emphasis added].

Kallant's observation that a distinction ought to be made between describing biological mechanisms and calling something 'addiction' is important. To clarify, the brain model describes the way in which the brain adapts to drugs of addiction just as the brain would also adapt to other types of modifications to its neural circuitry [9]. What 'addiction' describes, as Kallant suggests, encompasses more than just the underlying change in neurobiological function.

The Brain Disease Model of Addiction

Alan Leshner's article in *Science* is often cited when references are made to addiction as a brain disease given the provocative title of his article: "Addiction is a brain disease: and it matters" [10]. Since then, other researchers [11–16] have also used the words 'brain' and 'disease' in succession to describe a similar position. For example, Dackis and O'Brien state, "the dissemination of understandable information about this brain disease could change public perceptions and hence public policy toward addictive illness" [13:1451]. Through the use of a particular set of words, concepts and knowledge from neuroscience, these authors aim to instigate a paradigm shift from a moral to a medical understanding of addiction. Promoting a shift in thinking about mental health and mental illness has come to be known as mental health literacy, originally defined as "knowledge and beliefs about mental disorders which aid their recognition, management or prevention" [17]. To enhance the mental health literacy amongst the public, proponents place a significant emphasis on the brain to explain addiction.

Radically different perspectives on the best way to conceptualize addiction in Western nations—whether as a disease, criminal behaviour, social construction, weakness of character, genetically determined condition, or some combination of these—have always existed side-by-side without resolution. Lying at the heart of the debates are the ethical problems of free will, responsibility, choice, determinism, treatment, and retribution. Although both the brain model and the brain disease model of addiction rely on emerging neurobiological evidence, a brief look at the history of the language employed provides guidance in understanding the conceptual confusion created by years of moral discourse around addicted persons.

Historical Origins

Hippocrates was one of the first to claim that mental disorders were caused by bodily impairments, an idea he called the *somatogenic hypothesis*. The modern interpretation of disease⁴ is rooted in Hippocrates' proposition. The ordinary language concept of disease, however it may be defined or understood, has traditionally been a socially unfavorable notion: a phenomenon that ought to be resisted and controlled, like the historical treatment of those with leprosy.

The earliest indication of a disease language of addiction in modern times can be traced to social, cultural and religious attitudes about alcoholism in colonial United States and Western Europe. The dominant Puritan clergy perpetuated the notion that public drunkenness is a violation of social norms, and thus responsibility lay with the consumer: the consequences of drinking came as a result of the free will of the agent. As Conrad and Schneider [19] notice, "if there were anything 'bad' to be found in drinking, it certainly was not the drink itself" [19:78]. In the 18th century, Benjamin Rush considered inebriety a progressive disease that gave rise to a "loss of control" over drinking [20]. Yet Rush did not specify any neurobiological mechanisms by which this disease developed. The most salient feature of Rush's thinking was that his theory on the "disease of inebriety" provided an alternative to the moral perspective on alcoholism promoted by the Church [21, 22].

The creation of Alcoholics Anonymous (AA) in 1935 had a significant impact on public attitudes towards and perceptions of addiction. On their website today, AA maintains that its members have

⁴ It is perhaps worthwhile to distinguish *illness* from *disease* from *disorder*—and *mental disorder* in particular—although what constitutes each of these terms is still yet to be universally agreed upon. At this time, a provisional definition is that a disease may refer to objective pathological changes within the body that are expressed through diverse physical indicators and symptoms. Illness, on the other hand, may refer to the individual's subjective interpretation and response to these changes and symptoms. For mental disorder, we will borrow the definition from Jerome Wakefield [18] who argues that "a disorder exists when the failure of a person's internal mechanisms to perform their functions as designed by nature impinges harmfully on the person's well-being as defined by social values and meanings" [18: 373].

"the disease of alcoholism" [23] although the website does not describe what having the disease of alcoholism means specifically, nor is any reference to biology given. While others such as White [24] have suggested that the historical connection between AA and a disease view of alcoholism remains fuzzy, the popularity and pervasiveness of the AA brand has penetrated into ordinary language concepts of addiction and has a significant influence on how the brain disease concept of addiction is understood.

These important chapters in the history of addiction, which also include the historical legal and policy discourse around the criminalization of drug use [25, 26], how mass communication sources such as films perpetuate popular myths regarding substance use and addiction [27], and an emerging psychiatric taxonomy of addiction have all had an impact on stigma and warrant deeper discussion than what is provided here.

Modern Applications of Brain Disease Rhetoric

The emphasis placed on the brain by modern brain disease proponents is grounded in the assumption that a focus on a diseased brain will achieve, among other ends, a particular altruistic, if not utilitarian outcome such as a reduction in public stigma. For example, Nora Volkow, Director of the National Institutes on Drug Abuse (NIDA) in the United States and one of the more vocal proponents of a brain disease model of addiction, reinforced this position in an interview about NIDA's and HBO's documentary series on addiction entitled *Why Can't They Just Stop?*. Volkow states, "Addiction is a disease—a treatable disease—and it needs to be understood...Our goal is for HBO's *Addiction* documentary and project to educate the public about this disease and help eliminate the stigma associated with it." [28]. Another major public figure, United States Vice President Joe Biden, proposed a bill to US Congress entitled, "Recognizing Addiction as a Disease Act of 2007" [29] when he was a Senator. The bill was proposed to change NIDA's designation to the *National Institute on Diseases of Addiction*, and the National Institute on Alcohol Abuse and Alcoholism to the *National Institute on Alcohol Disorders and Health*. The text of the bill states, "[addiction] is considered a brain disease because drugs change the brain's structure and manner in which it functions." Such descriptions

involve the use of specific words to describe addiction by connecting the language of neuroscience to concepts of disease.

Style of Thought

Moving to deeper analysis of the impact of language on the perception and creation of disease, the explanation of addiction as a disease of the brain is rooted in what Rose [30] calls a *style of thought*. Rose states that a style of thought,

“is a way of seeing, a way of explaining, a way in which reasoning is embedded within certain practical and intellectual techniques, conventions about experimentation, about instruments and inscriptions, measurements and model systems. These are conventions about sense making activities themselves and about the terms under which they may be criticised, corrected and revised. A style of thought is not just a type of explanation, it is about what counts as an explanation, and it is also about what there is to explain. That is to say, it is about the very object of explanation, the set of problems, issues, phenomena that an explanation is attempting to account for” [30: 412].

Accordingly, biological psychiatry as an emerging field has been instrumental in developing the style of thought that addiction is a brain disease. In one aspect, for instance, brain mechanisms become the primary target for explanations and treatments of addiction and other mental illnesses. The language used to portray addiction, which includes taxonomies of psychiatric illness found in nosologies such as the Diagnostic and Statistical Manual of Mental Disorders also serves larger cultural, social, economic, and political agendas. For instance, the pharmaceutical industry is no stranger to influencing and shaping styles of thought, as industry research and marketing tactics have facilitated both biomedical and ordinary language concepts of what constitutes a mental illness [31].

Any style of thought about addiction extends beyond mere conceptualization. It has an influence not only those to whom the labels applies, but also families, health care systems, social services, legal systems, and communities. Derek Summerfield reminds us that the language of brain disease occurs within the style of thought of Western biological

psychiatry and is a culturally bound term with claims to aspects of human existence: “We need to remember that the Western mental health discourse introduces core components of Western culture, including a theory of human nature, a definition of personhood, a sense of time and memory, and a secular source of moral authority” [32: 76].

Potential Benefits of Neuroscience Descriptors

The justification for calling addiction “a chronic, relapsing brain disease” [33] is that it is a beneficent, and perhaps also utilitarian, act: using the set of concepts that comprise the language will help justify more effective interventions for addiction, will eliminate structural barriers within society that prevent people from accessing and receiving care, and consequently will minimize the harm addiction can cause to both the individual and society.

“Social Legitimacy Presume[s] Somatic Identity” [34: 414]

Invoking both a medicalized term such as ‘brain disease’ and knowledge claims from addiction neuroscience places addiction as having something in common with other medicalized conditions. This association is valuable, or perhaps reassuring, for those individuals living with addiction and family members who desire to have their lived experience, or the lived experience of their loved ones, medically legitimized [19]. For instance, anthropologist Emily Martin describes her own experience with bipolar disorder and how she incorporated neurobiological explanations into her illness narrative: “I often heard from my psychiatrist that my problem was related to my neurotransmitters, and I always found this comforting. I took this to mean that my problems were not entirely within my control” [35: 14]

While it remains unclear whether the language of brain disease is scientifically correct, the discourse about addiction as brain disease may still be symbolically valuable for the individual living with addiction and their loved ones. Following Wittgenstein [36: §66–§71], addiction could be said to have a ‘family resemblance’ to other diseases, even though, medically speaking, there may not be a single set of necessary and sufficient conditions that all diseases

share. In this way, concepts associated with a brain disease allow the affected person to construct an illness narrative in which they can connect their present and past experiences to the development of their diseased brain, and their place within both the medical system and the world.

Labeling addiction as a brain disease is more than a linguistic and conceptual exercise. The language used to label someone with an addiction provides a plethora of concepts (e.g., a diseased brain, ‘a chemical imbalance in the brain’, faulty genes, a weak will) by which individuals may develop knowledge and understand themselves. Thus, the individual may find benefit and meaning in his or her own relationship to their brain and the world. The term brain disease, is, *ala* Hacking [37], a “label from above,” although Hacking argues that it is when “labels from below” are applied that identities associated with the label emerge. The manner in which the brain disease label is applied, whether internalized by the individual affected, adopted from below by those initially labeled as ‘addicts’, or applied top-down by powerful public figures, may affect the duration and frequency of its use and may beneficially impact the recovery process, if the language is used in a clinical setting [38].

Biosociality and Biological Citizenship

Paul Rabinow’s term “biosociality” [39] and Novas and Rose’s term “biological citizenship” [40] represent two ways in which individuals can come together to form a collective identity based on a shared biological reality. Biosociality refers to the assemblage of individuals around categories of biological vulnerability, suffering and genetic risk. Biological citizenship connects individuals as certain types of persons to attitudes and notions concerning the biological existence of human beings and to the various social groups, such as families and cultural and social organizations, to which they belong. Establishing relationships with other individuals who identify with the same marginalized group may be empowering for those involved. Novas and Rose expand on this idea by describing biological citizenship as,

“...both individualizing and collectivizing. It is individualized to the extent that individuals shape their relations with themselves in terms of knowledge of their somatic individuality. Biological images, explanations, values and

judgments thus get entangled with a more general contemporary ‘regime of the self’ as a prudent yet enterprising individual, actively shaping his or her life course through acts of choice” [40: 441].

As biological citizens, individuals living with addiction—in addition to their families, caregivers, health care professionals, and scientists—can assemble around a shared neurobiological explanation to advocate for research, treatment, and services for those living with the brain disease of addiction. Although the neurobiological facts about addiction have yet to be completely accepted within the neuroscience, medical, and healthcare communities, claiming addiction as a brain disease provides the impetus for social action, arguments for funds to be allocated for research focusing on the brain, and persuasive cases to be made for a brain diseased, or medicalized concept of addiction.

A current example of biosociality in action is evident within the Asperger’s and Autism Spectrum Disorder (ASD) communities through an emerging self-advocacy and social justice movement called “neurodiversity” [41]. The majority of individuals who subscribe to the concept of neurodiversity hold that ASD is not a disease, and even more so that it does not require treatment. Rather, ASD is just a diverse way of being and individuals with ASD ought to be treated as “neuro-equals” [42]. In this view, the difference between being neurodiverse and being “neurotypical” is that the neurodiverse brain is wired in an atypical—but not pathological—fashion.

ASD individuals represent a particularly persuasive biosocial community. The bonding narrative that surrounds these individuals can be found in the struggle for recognition of the *acceptability of their otherness*. The success of a biosocial group such as the neurodiverse, bring a new perspective on age-old debates to identity politics—namely whether one’s essential features ought to represent one’s identity [43].

Potential Drawbacks of Neuroscience Descriptions

The Addicted Brain as a Natural Kind

The introduction of brain imaging technologies such as positron emission tomography (PET) and function-

al magnetic resonance imaging (fMRI) has had a substantial impact on public perceptions of brain science. Imaging technologies have improved the ability of researchers to observe and measure hemodynamic and physiological changes in the living human brain under a variety of conditions. Most relevant to the present discussion are experiments in which investigators administer drugs of addiction and other stimuli associated with substance use. Contrasting patterns of activation allow researchers to propose neural bases for diagnostic or abnormal features.

In this way, imaging technology has provided space to re-frame working definitions of addiction, which the news media have used to transform certain folk psychological features of addiction—such as a “loss of control”—into credible biomedical facts. This effect is what Racine et al. [44] termed “neuro-realism”—how the “coverage of fMRI investigations can make a phenomenon uncritically real, objective or effective in the eyes of the public” [44:160]. Headlines such as “Shopping Urges ‘Spotted in Brain’” [45], and “Addicts and Homeless Perceived as Objects” [46] juxtaposed against a brain illuminating a neon-blue hue, emphasize the intuitive appeal of a brain model to represent human actions and oversimplify the complexity of a process such as addiction.

Hacking’s [37] concepts of “human kinds” and “natural kinds” are useful illustrations of one potential drawback of the brain model of addiction. Hacking states that human kinds are classification systems that can be applied to groups of individuals in a manner which is similar to causal laws that predict behaviours. These classification systems form the idea of a specific *kind* of person. Natural kinds are such things as chemical elements, trees or quarks that do not change in response to the ways they are classified. Human kinds, unlike natural kinds, are not static.

Neuroimaging data has been used as a particularly persuasive tool in presenting the “addicted brain” as a natural kind. Images are powerful means of representing real-world objects and processes [47]. Imaging data have been successful in rendering pathological entities and constructing kinds of brains that stand in opposition to ‘normals’ [48, 49]. Appealing to neuroscience facilitates justifying claims of pathology and naturalizes the constructed differences between “addict” and “normal” [50]. Thus attempting to demon-

strate the addicted brain as a natural kind has raised a problematic tautology: if two brains look different, one of them is abnormal [51]. In this view, addiction is a kind of neurobiological otherness. As the other, the addicted person becomes a case study of human abnormality to be studied from the perspective of normality, which then emphasizes alienation and encourages a categorical us-them distinction. Moreover, classifying the addicted brain as a natural kind constructs the difference between addicts and normals as evidence for an ontological homogeneity of addiction, and not something that occurs on a spectrum. Therefore describing the addicted brain as a natural kind reinforces the notion that the addicted person is an entity with a distinct nature.

Stigma and Moral Intuitions

Applying a particular concept may be well or ill intentioned, and may not always involve conscious judgment. Attitudes towards others are based on the complex interrelations between human beings’ associations with various persons and social groups, and are mitigated by sensations, emotions and cognitions. The experience of the other is affected by external observation. Kant [52] noticed that thoughts are filled with judgments because judgments are involved in the application of concepts as they relate to specific norms. As a result, if the behaviour of a person or group seems foreign, unfamiliar, or norm violating, it may lead the person to judge himself or herself differently than how he or she may evaluate the conduct of others.

One drawback⁵ of adopting a discourse in brain disease is the possibility that individuals who live with addiction, as a group, will face further marginalization, alienation, discrimination and stigma because they may be “neuro-essentialized” [54: 22] as being no more than a diseased brain and consequently become an *other*. Such are the relations of power that produce the realities of stigma. According to Link and

⁵ There are many potential drawbacks to a brain disease view, and to include them all would be to go beyond the limits of this manuscript. One concern, for example, is what Hall [53] has referred to as a disproportionate focus on “great and desperate cures”, namely, that a brain disease view may be used to justify the use of more coercive interventions to ‘cure’ addiction.

Phelan [55: 337], stigma occurs when “elements of labeling, stereotyping, separation, status loss, and discrimination occur together in a power situation that allows them.” Stigma arises in a variety of ways for persons with addiction. These may include social rejection, loss of or an inability to obtain employment, alienation from family, friends, and society, amongst many other forms of subtle or blatant discrimination [56].

It has been suggested that at least part of the biological basis of stigma is an evolutionary hang-over: *moral revulsion* towards individuals with infectious disease. This line of reasoning suggests that such intuitions served an adaptive value during the millennia when humans lived as a social species and social distance prevented infection [57, 58]. Haidt’s [59] social intuitionist model that claims that moral judgment is caused by a combination of moral intuitions and everyday moral reasoning. Key features of Haidt’s model are that the moral intuitions occur, “quickly, effortlessly, and automatically, such that the outcome but not the process is accessible to consciousness” [59: 818], while reasoning, “occurs more slowly, requires some effort, and involves at least some steps that are accessible to consciousness” [59: 818]. The model builds on Damasio’s well-known somatic marker hypothesis which suggests that decisions made in the brain result from the integration of information from multiple sources, some of which are overt and rational, and other covert and emotional [60].

Consistent with Haidt’s social intuitionist model is the body of work that suggests that the brain harbours a set of implicit attitudes—cognitive constructs—that are deeply held and generally resistant to change [61]. It seems that when human beings encounter individuals with addictions, at least two separate cognitive processes are engaged. The cortical process is relatively slow, requires substantial processing power, and is available to the type of introspective deliberation that can occur in conscious thought. The second process is likely subcortical, is quick and relatively automatic, and the processing of information in this circuit is less available to conscious perception. Together, these two cognitive processes contribute to the decision about how to evaluate an individual with addiction, and play an important role in the phenomenon that is commonly characterized as stigma.

The Paradox

The paradox of addiction neuroscience is that concluding that addiction is a brain disease may mitigate perceptions of responsibility while simultaneously arousing deep-seated intuitions of moral disgust. An unfortunate and perhaps unintended consequence of a social act with beneficent objectives, this paradox has the potential to diminish the efficacy of mental health literacy efforts in reducing the stigma that is associated with addiction.

Psychiatry, Labeling, and the Objective Self

Universally agreed upon necessary and sufficient conditions for what constitutes a disease have yet to be established in medicine, and biological psychiatry in particular. The literature currently defines substance dependence as a condition that needs to meet certain diagnostic criteria, as described in the International Classification of Diseases (ICD-10) and Diagnostic-Statistical Manual of Mental Disorders (DSM-IV). At this time, new editions of both nosologies are currently under re-development.

Both psychiatric categorization and labeling are judgments of an individual. These judgments have implications for the treatment of persons, both clinically and socially [62]. Under the biomedical gaze, being somebody experiencing problems with substance use has important consequences: the substance dependent person adopts a sick role, which is an identity that differs from the non-dependent user. Diagnostic labels of substance dependence and brain disease affect the identified individual, his or her family, and have the potential to modify both the behaviour and the meaning embedded in the label. Indeed, the brain disease label itself has been reworked because of changing neurobiological evidence in addiction. This looping effect of human kinds [63] involves scientific and technological advances, consumer advocacy and peer-support organizations, as well as the images of addiction and substance use popularized in media sources.

The categorizing language used to describe addiction may impact stigma. Kelly and Westerhoff [64] found that referring to an individual as a “substance abuser” as opposed to an individual with a “substance use disorder” enables stigmatizing attitudes relating to perceptions that individuals labeled “substance abus-

ers” are willfully deviant. Receiving a psychiatric diagnosis, or even a label—as ‘brain diseased’ or otherwise—carries a value [65]. Values permeate the diagnosis, labels, biolooping effects [63], and their collective meaning in the human life-world [62].

Young, Norman, and Humphreys [66] tested whether using medicalized terms to label a recently medicalized disorder—impotence versus erectile dysfunction—compared to well-known medical conditions—myocardial infarction versus heart attack—would affect a change in the perception of the condition. The authors found that participants regarded the medical label of the recently medicalized disease to be more serious, more representative of a disease, and have lower prevalence than the same disease described using ordinary language, a pattern not observed in the established medical conditions. Thus, the use of medical language produces a perceptual bias.

The act of labeling someone as being brain diseased is an act with moral underpinnings that influences our implicit and explicit attitudes about such individuals and the reasons for their suffering. Furthermore, if we accept the view that addiction is only caused and affected by brain events such as modifications of dopamine and other neurotransmitters, and that this view is the only real or objective approach in conceptualizing addiction, then the meaning and perhaps role of addiction for the individual has no purpose in explaining the relationship between the individual and the world.

The brain disease label is a top-down moral concept that is used to judge the behaviour, relationships and values of that person. The rules of being in the world as a relational being are therefore modified. The discourse that frames the discussion of a person having a brain disease may affect perceptions of the objective-self [48] such that the person may fashion herself as having a different *kind* of brain, and so may integrate a new identity into her life story as being a different *kind* of human being, perhaps interpreted as a socially undesirable creature [67]. Embodying a brain disease metaphor may thus raise doubts about the meaning and value of a person’s thoughts about themselves as an individual in the world who uses substances. Nonetheless, as Hacking [37] has considered, “people classified in a certain way tend to conform to or to grow into the ways they are described, but they also evolve in their own ways so

that the classifications and descriptions have to be constantly revised” [37: 21]. Therefore every self-concept has an influential and not merely representational relation to the person to which the label is applied.

Attributions of Free Will and Responsibility

Action, free will, and moral responsibility lie at the core of vigorous debates concerning the moral status of both addiction and the addicted person. These discussions focus on intentional action and explain the person’s difficulty to forgo substance use in terms of his or her brain states; the implication is that brain states causally determine action of the addicted person. A literature on the problem of free will and determinism has been developing in recent years, using experimental methods of moral psychology to explore public intuitions regarding issues such as compatibilism, incompatibilism, and moral responsibility [68–71].

An active area of research, the neurobiology of moral responsibility brings to light many unsettled and unsettling issues. One problem occurs because people think of themselves or others—internal or external causative factors—to be morally responsible for something. Recent research indicates that people differ in their reasoning and intuitions about attributing causality to psychological and neurological mental states [72]. In an influential paper, Greene and Cohen [73] hypothesized that the threat of emerging cognitive neuroscience will challenge folk intuitions of free will. They argue that if—or perhaps when—society is socialized to neurobiological descriptions of behaviour, the “my brain made me do it” claim may be sufficient to defend a less retributive approach to criminal law. In this paper we are not concerned with the arguments concerning evaluations of responsibility and the law *per se*, but rather encourage the establishment of an empirical groundwork for exploring how brain disease judgments may affect attributions of moral responsibility amongst members of the lay public, and the potential implications of these attributions. Specifically, a possible area of empirical study would be to examine the question of whether character vice overtones historically tied to addiction in fact exist amongst the folk when participating in an experiment that includes otherwise agnostic language from addiction neuroscience.

Stigma and Social Distance

There is, in fact, some preliminary support for this research question, particularly in the developing research area of psychiatric stigma and social distance. Social distance is defined as, “the degree of proximity an individual is comfortable with in relation to a mentally ill target and it is recognized as a proxy measure of psychiatric stigma” [74: 126]. A key contributor to social distance is the degree to which one individual perceives another to be dangerous and unpredictable.

In one study, Marie and Miles [74] used a vignette methodology to explore whether the folk make categorical distinctions between schizophrenia, depression, alcohol abuse, and substance dependence relative to desired social distance. The authors also investigated whether familiarity with mental illness impacts social distance judgments. They found that for the schizophrenia, alcohol abuse, and substance dependence conditions, perceived dangerousness negatively predicted social distance evaluations. More specifically, perceived dangerousness of the individual described in the vignette was found to be associated with participants’ desire for greater social distance.

Turning to biological attributions, investigations examining public views of people with mental illness found that moral responsibility was mitigated when individuals were described as having a mental illness based on biological rather than psychosocial factors [75, 76]. Phelan and colleagues [77] investigated the effects of describing schizophrenia as having a genetic origin and found that some dimensions of stigma were reduced while others increased, such as the belief that it was less likely that a person could be successfully treated. A later study confirmed this finding as Phelan [78] demonstrated that attributing genetic causes to mental illness increased both the perceived seriousness and persistence of mental illness. What is more, consistent with the hypothesis of moral disgust described earlier, levels of social distance from the *sibling* of the affected person were found to increase, particularly as it related to the intimacy of dating, marriage, and having children.

Attribution theory [79] predicts that attributing a neurobiological cause for developing mental illness will lead to a reduction in stigma and social distance. Accordingly, a public education campaign that emphasizes the neurobiological underpinnings of

addiction—as is the current goal of organizations such as the National Alliance on Mental Illness, the National Institutes on Drug Abuse, the Canadian Association on Mental Illness and Mental Health, and the UK organization SANE—should, theoretically, decrease blame and responsibility for developing addiction, and by extension, reduce stigma. However, current research examining this logic probes the slower, conscious and reflective processes of moral reasoning as opposed to fast, affective-laden moral intuitions.

The problem of moral responsibility and brain disease classification is ethically significant. If a person’s ‘addictive behaviours’ are deterministic because of a brain disease, then experiments that examine these perceptions amongst the public should indicate how the folk reasons about addiction and responsibility, thus providing some insight into folk perceptions of stigma and social distance. Examining moral intuitions about the process of becoming addicted versus attitudes regarding someone who is already dependent using language from cognitive neuroscience should confirm or reject the proposition put forward by Greene and Cohen [73]: namely that emerging knowledge about the brain will challenge folk intuitions of free will and responsibility.

Shifting the brain model of addiction to the brain disease model is more than modifying explanatory language. It is a paradigmatic shift that also modifies the moral gaze on both the behaviour and the person, and thus directs justifiable and acceptable means of intervention. Similar shifts in thought have been observed when definitions of deviant behaviours once restricted to the social world are adopted by the classification systems of modern biomedicine [19, 80].

Conclusion: Prospects for Ethical Science Communication

Referring to addiction as a brain disease has substantial historical, symbolic and ethical significance for the treatment of persons; as such, adopting this language risks increasing alienation, stigmatization, and social distance. The confusion around the use of language to describe addiction fails to disentangle emerging neurobiological concepts from historical, socio-cultural,

and moral concepts of disease resulting in a folk neuroscience that is conceptually confused and spuriously problematic. The power of addiction neuroscience has the potential to change societal views about addiction and the kind of interventions and policies that may be implemented in response to people living with various degrees of substance use problems. While a brain disease label may facilitate the creation of biosocial communities that can support self-advocacy, it is important to recognize that a brain disease label comes with a price. We feel that it is important for scientists, bioethicists, journalists and advocates of stigma reduction to be aware that using terms currently defined as the ‘brain model’ and the ‘brain disease model’ of addiction may bring about unintended harm. Careful and creative experimental investigation of the impact of the language of addiction neuroscience on important issues such as identity and stigma can clarify these matters, which then can be used to arrive at normative claims about tackling important issues such as stigma and social distance.

Translating neuroscience to the public represents an issue for science communication, and it has been pointed out that the words that we use to describe persons, in particular the state of their brains, have real world implications [81]. Concepts as complex as addiction can be misleading if they are not understood through multiple levels of analysis, as different explanations about addiction serve different purposes; describing addiction in terms of one set of concepts or categories precludes seeing it otherwise [82]. By affecting a shift in how addiction is conceptualized rather than downplaying the knowledge that the brain sciences impart, many of the conceptual problems of calling addiction a brain disease will fall to the wayside.

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