Addiction: Beyond Disease and Choice

Candice L. Shelby

University of Colorado, Denver
Candice.Shelby@ucdenver.edu

ABSTRACT: While the addiction treatment industry holds steadfast to the idea that addiction is a disease, and the choice theorists maintain to the contrary that it is just a choice, the truth is not as simple as either. The idea of addiction is a social construct that evolved over the 20th century to encompass increasingly more phenomena, while becoming increasingly conceptually less clear. Taking a complex dynamic systems approach, rather than relying on either the obscure disease notion or the naive choice concept allows us to conceive of the organism , the mind, and the addiction as essentially temporal and emergent. From this perspective, physical, mental, and social causes operate within one dynamic system, allowing for genetic, developmental, and environmental effects to be understood within a single framework. Such a framework offers much greater hope for successfully addressing the issue than does either the currently dominant disease paradigm or choice theory.

OVER THE PAST 40 YEARS OR SO the basically unchallenged view has been that addiction is a psychiatric disease. The psychology profession's authoritative reference volume, *Diagnostic and Statistical Manual of Mental Disorders* (American Psychiatric Association Committee on Nomenclature and Statistics) has included addiction among the mental disorders that it recognizes since the 2nd edition was released in 1968. As it is coded in accordance with the World Health Organization's International Classification of Diseases, the medical and insurance industries officially accept the characterization of addiction as a mental disease, along with depression, anxiety, and schizophrenia. I say "officially," because although the language of disease is the currency of

contemporary discourse, physicians' attitudes toward addiction do not accord with their terminology. Even in the face of widespread institutional use of the language of disease, when asked outright, the vast majority of physicians say that they do not believe that addiction is a disease (Mignon, 333-45; Hobbes, 1) and overwhelmingly patients treated for addiction declare that they are treated with blame and disapprobation rather than with empathy, or even objectivity. Even more incongruous with the official sanction of the disease concept, patients seen for addictions, and violators of the law seen by judges for behavior connected with their addictions are virtually universally prescribed or mandated to participate in 12-step spiritual programs. For no other disease in the world in the twenty first century is God invoked as the cure.

Although the term "addiction" is used freely in the public and among treatment professionals, the DSM IV-TR, in use since 2000, uses behavioral criteria to diagnose two disorders associated with substance abuse, neither of which is identical to addiction. The DSM prior to the May, 2013 release of the 5th edition distinguished two types of what it calls Substance Use Disorders, Substance Dependence and Substance Abuse. Neither of these categories, however, seems to capture the nature of addiction. For one thing, many addicts, including all of them finishing a course in rehabilitation facilities, are not dependent on the substance to which they are addicted. But an individual might meet the criteria for the other category, Substance Abuse, merely by having recurring legal problems associated with their drug use. Since having recurrent legal problems due to drug use can be the result of age, socio-economic status, or the state in which one lives (think marijuana use), this category also seems to fail to capture the nature of addiction. This last criterion has been dropped in the newer DSM-V, however, and a new one has been adopted in its place, "craving or strong desire or urge to use a substance." This seems better, although it is widely recognized that not all addicts experience such a craving, and certainly not all do at all times (many addicts go long periods without urges or cravings), while many non-addicts experience strong desires or urges at least on occasion, perhaps for a particular food, or for sex.

According to the DSM IV-TR, the "essential feature" of substance dependence, the more serious of the two subclasses of substance use disorders, is "a cluster of cognitive, behavioral, and physiological symptoms indicating that the individual continues use of the substance despite significant substance-related problems" (DSM IV-TR, 176). But here again, context, and in particular social context, will loom large in deciding who counts as diseased. For instance, in many cases of what would we might ordinarily want to label addiction, drugs, alcohol, or activities are engaged in without "significant substance-related problems." Consider, for example, the late 1950s: during this period American men and women were buying more than 15,000 cigarettes a second (R. J. Reynolds, 3). The fact that the young smokers enjoying the institution of coffee break had not yet experienced chronic lung illness or high blood pressure, or even any difficulty quitting (because they hadn't tried), does not imply that they had not undergone the brain changes associated with addiction. We surely might say that these people were in for problems in the future, but given that they hadn't experienced any, they didn't exhibit the "essential feature" of addiction. On the other hand, many post-operative

patients do undergo the physiological changes associated with addiction to morphine products, and fit the DSM IV-TR's criteria for drug dependence (exhibiting any two of the three elements of tolerance, withdrawal, and compulsive drug-taking) but then leave the hospital and never think about the drug again, and never have a single problem related to the drug. At the other end of the spectrum, it seems that a teenager could smoke marijuana for some time, despite significant substance-related problems, without our wanting to say that he is addicted. The teenager's recurring problems might have to do with school authorities or parents, involving behaviors such as staying out late at night or refusing to attend school regularly.. He might just happen to also use marijuana.

These difficulties and continuing shifts in the American Psychiatric Association's approach to defining addiction illuminates an important truth: there are no bright lines distinguishing the addicted from the non-addicted. Moreover, there is no definitive list of kinds of addiction that might exist. Substances only begin to tell the tale, if current research is any indication (Marks, 1389-1394). First, gambling was recognized as an activity that, as engaged in by certain people, exhibits the diagnostic criteria of addiction; it has been included in the DSM-V among the substance-related and addictive disorders (Holden, 349; Blazcznynski, et al, 179-192; Rachlin, 294-297). After gambling, research began to indicate that there could also be addiction to food, (Gearhardt et al, 808-816), then video games (Hellman, 1-11), sex, and other non-substance-related behavior patterns. The next edition of the DSM may well include many other 'behavior addictions (APA News Release 10-08). Some people say that they are addicted to work, or that they know people who are, while others attribute an exercise addiction to themselves or to friends who work out often and/or intensely. As research on addiction takes off, so does the scope of the phenomenon. What might count as an addiction in fifty years is anyone's guess.

The conclusion that sees to follow from an examination of this wandering notion of the disease of addiction is that, unlike other diseases, addiction is largely a social construct. In fact, the portrayal of addiction as disease is the result of a series of contingent social factors, including first the founding and then the popularization of AA.[1] The members of this group accepted the disease notion based on a single questionnaire study carried out in 1940 on a small group of AA participants by E.M. Jellinek, research from which Jellinek, as it happens, later distanced himself (Jellinek, 1-88). Other factors contributed to the contemporary widespread acceptance of the disease model, but most important among them was the rise of the rehabilitative treatment industry, and the AMA's 1987 endorsement of the label, largely for the purposes of securing third-party reimbursement for treatment expenses. This was followed in 1993 by the World Health Organization's including it in its disease coding. As a disease whose treatment could be paid for by insurers, addiction became a prime bed-filling means for hospitals and rehabilitation

[1] AA founders Bill Wilson and Dr. Bob Smith, incidentally, died of tobacco-related illness, although no addiction to that was ever suggested in their lifetimes. As part of the ideology necessary to repeal Prohibition, the general view in America in the 1930s was that drunkenness was a moral failing; the evil didn't lie with the alcohol, but with the man.

centers. This is just one part of the nearly ubiquitous medicalization of the unhappy parts of the human condition in recent years, but for our purposes, the point is that these facts fall far short of providing a coherent argument for counting addiction as a disease.

The main competing characterization of addiction is that it is a choice, or a continuing series of choices. The most forthright version of this theory is put forward by Gene Heyman, in his provocative book *Addiction: A Disorder of Choice*; it provokes because the disease model is so widely assumed (Heyman). Heyman offers an array of empirical arguments against characterizing addiction as a disease. According to Heyman, the key component to the DSM's definition of addiction is the point that we have noted, that "the individual continues use of the substance despite significant substance-related problems." It is behavior, Heyman notes, rather than the cluster of physiological and cognitive symptoms indicating this behavior, that is critical to the concept of addiction. Drug seeking is voluntary and rational, says Heyman, and neither a genetic predisposition to addiction nor the neural changes that come with chronic use of certain substances proves otherwise. Based on four national surveys, he argues that most addicts stop using drugs by their mid-30's without seeking treatment, most likely because of the "responsibilities, incentives, penalties and cultural values that stress sobriety" (Heyman,112). That is, when they reach the age at which their motivations change, most people stop their addictive behaviors. In other words, people freely and with reason choose their "addictive" behaviors, and we can tell that this is true because when incentives shift, so do the behaviors, at least when they are unaccompanied by other mental disorders. On this account, addicts can control themselves, but choose not to, as long as the utilities are in their favor. When the utilities change, says the research that Heyman cites, so does the behavior, all other things being equal.

Further supporting this interpretation, philosopher Benjamin Foddy argues that none of the four reasons generally given for believing that addicts act under compulsion is persuasive (Foddy, 25-31). For example, someone might say that addicts act compulsively on the grounds that they "appear to be insensitive to the costs of their drug use." This is the criterion for addiction that we find in the DSM IV. Alternatively, one might characterize an addict's actions as compulsive because she regrets her drug use, and yet fails to curtail it. Third, one might say that addicts are compelled because they "report feeling strong desires which they feel unable to control." And finally, many neuroscientists would argue that addicts act compulsively on the grounds that "their actions have identifiable neurological processes as their root cause." Although Foddy is right that the factual basis of some of these claims is far from established, let us consider whether any of the reasons given would actually provide legitimate grounds for calling an act "compelled."

First, note Foddy's claim that even if true, none of these reasons offers "uncontroversial proof" of compulsion, as he puts it, "within the philosophical discourse" (Foddy, 27). Given that very little stands as uncontroversial proof of anything in philosophical discourse, this point should not close the door on the discussion; but the fact is, none of these reasons seems even like a very good one for characterizing an act as compelled. The first is irrelevant to the question of

compulsion—many people are insensitive to the costs of the use of their credit cards, for instance, but we would not for that reason say that they are compelled to use them. The second reason for calling an act compelled, though, that the individual regrets it, and yet does it again, does appear to be true of addicts. But just because someone regrets an act and yet repeats it does not even suggest, much less prove, that the act was compelled. Chronic procrastinators provide us with a great example of people who repeatedly do something that they afterwards regret (although not all procrastinators regret their procrastination). The third reason for saying that someone is compelled is that the person feels compelled. Unless compulsion is like pain, though, and unmistakable, rather than like any of the numerous cognitive illusions that cognitive psychologists describe, the mere fact that someone feels that her desires are uncontrollable is no sure sign that they are (Logan and Cowan, 295-327; Wegner, 19-37; Bargh 2007). Addicts often in fact do control their desires when the context demands it. All we need to observe to convince ourselves of this are the multitude of non-drinking alcoholics awaiting a DUI trial. Finally, Foddy considers the possibility that addiction is a compulsion on the ground that it is correlated with changes in the brain. Correlation of behavior with brain changes, however, in no way proves that addictive behavior is compelled. Everything we do changes the brain; moreover, the direction of causality between behavior and brain changes is precisely what is at issue between the disease and the choice models, so it cannot be proof of compulsion, or disease.

I propose a third option, one derived from a process view that accommodates current research in genetics, various sub-fields of psychology, sociology, and semantics. The main reason for embracing a process philosophy here, and in particular a dynamic systems approach, is that doing so allows us to conceive of mind as essentially temporal and truly emergent, with real causal efficacy at several different levels of specificity, and without abandoning the traditional laws and conceptions of science. Although the general approach has been used since Whitehead, Pierce, and James (and even Heraclitus, for that matter), such thinkers as philosopher and roboticist Mark Bickhard (Bickard, 1-18), psychologists Jim Grigsby and David Stevens (Gribsby and Stevens), anthropologist Terrance Deacons (Deacons), and philosophers John Ross, James Ladyman, and John Collier (Ladyman and Ross) have brought it into the lab and into the forefront of philosophy of science. On this kind of approach, since there is no difference in kind anywhere, there is no "explanatory gap" between physical, mental, and social causation. There is room for real emergence, and thus for real causation and interaction at many different levels of specification.

Addiction emerges from a long series of interactions both internal to the individual and between the individual and both her local physical and social environments, and her broader, cultural environment. Neurological accounts, for instance, which emphasize the neural circuitry normally involved in experiencing pleasure, in learning, and in incentive motivation (Koob and Volkow, 217-38; Kelley and Berridge, 3306-3311, Hyman et al, 565-598), must be understood within the larger context of how individuals come to be sensitive to the effects of alcohol, tobacco, opiates, and stimulants to begin with. The individual comes into being and develops a physiology and a personality through the division and interaction of cells

according to patterns that are to some degree decided by genes and gene promotors, but always and only in interaction with the environment.[2] A number of studies are suggestive in this regard. For instance, the highly recognized Adverse Childhood Experiences Study of 2003 showed, among other things, that for each adverse experience that a child experienced, such as divorce, drug use in the home, neglect, sexual or physical abuse, etc. the likelihood that she would engage in early substance use was 2 to 4 times greater than for those who did not have such experiences. Compared to people with no such events in their childhoods, individuals with more than 5 of the listed life events were 7 to 10 times more likely to report drug use or addiction. Other research shows that children who are exposed to traumatic stressors develop "profound sensitization of the neural response patterns associated with their traumatic experiences (Perry et al, 271-291). Neurodevelopment may be affected by trauma, because stress prompts increased production of the stress hormones cortisol and epinephren, as well as neurotransmitters such as dopamine, serotonin, and norepinephren (DeBellis et al, 1259-1270), some of which prepare an organism to be on high alert, and others which try to return it to homeostasis. Dysregulation of what is known as the hypothalamic-pituitary-adrenal (HPA-axis) function, the system that controls the production of stress chemicals, and particularly glucocorticoid hormones, results from repeated or ongoing stress. The brain adapts, to put it simply, to always be ready for an emergency. Such adaptation, we should not be shocked to learn, impedes children's ability to regulate their emotions and behavior, which may in turn lead to the use of drugs and/or alcohol to cope with stress later (Perry and Pollard, 33-51).

Not only will trauma affect an individual's ability to self-regulate his emotional states and responses, and thereby his vulnerability to addiction to drugs or activities that make him feel better; simple lack of interaction can have the same effect. Psychiatrist Stuart Greenspan and philosopher Stuart Shanker make this case strongly:

> No matter how much potential his brain may have, unless a child undergoes very specific types of interactive affective experiences that involve the successive transformations of emotional experience and that are the product of cultural practices forming the very core of our evolutionary history, that potential will not be realized in a traditional sense. For that potential does not reside in the physical structure of the brain, but is defined only in the types of complex interactions between biology and experience" (Greenspan and Shanker, p. 102).

Consistent interaction with a responsive adult is necessary for normal brain development, and self-regulating capabilities. An isolated and constantly agitated

---

[2] There is much heated debate about the respective influences of nature and nurture on human sensibilities, sensitivities, and dispositions, with writers as diverse as Jesse Prinz, Gabor Mate, and Gene Heyman arguing against the behavioral geneticists against the power of genetic influences, while Matt Ridley, Peter Richerson and Robert Boyd reject the debate altogether, and argue for interactionism between genes, physical environment, and culture. Current research overwhelmingly supports the expression of genes through the influence of the environment (which geneticists will then argue operates to effect changes in the organism only by turning on and off genes).

individual is much more vulnerable to the relief that artificial means of increasing dopamine levels can have, whether in the form of drugs, alcohol, video games, gambling, or French fries.

The requirement for interaction with a responsive, calm caregiver for normal neural development and the ability to self-regulate has been shown in animal models as well. Stress responsivity in rat pups mirrors the responsivity levels of their mothers, as the mother's stronger patterns of activity entrain the offspring's (Francis and Meaney, 128-134), and just a small lack of continuity in this interaction matters a great deal. Being separated just briefly from their mothers results in heightened stress responses in offspring, as well as in other deleterious health effects. Even such small variations in maternal behavior as licking less, or nursing in a sub-optimal position, makes a difference to endocrine responses and attachment behavior in offspring. Interestingly, even though trauma experienced early in life can have devastating implications for a child's ability to cope with challenges later in life, this can be overcome through subsequent interactions with a calm, predictable and soothing caregiver. The stronger patterns of confident activity by a stable caregiver have been shown to entrain an offspring's emotional patterns, and bring the baby back to organized, and ultimately to self-soothing behavior patterns. It seems from this perspective that the best way to understand addiction is as a dynamic temporal phenomenon which can be overcome by changing other patterns, both internal and external to the addict. If even memory neuron loss and hypersensitivity can be reversed simply by changing the environment, then so surely can the neurological alterations and behavior patterns of addiction be altered.

A reasonable hypothesis for why the dopamine-enhancing substances and activities to which individuals become addicted are disproportionately sought out by those raised by harsh or neglectful parents, and by those who become hyper-alert and stressed due to trauma, is that the difference between being very agitated or stressed and being high or relaxed is dramatically different from the difference between experiencing a state of relative well-being and being high or relaxed. Once this sense of relief, confidence, or otherwise powerfully pleasurable contrast is experienced by a person who has grown up experiencing the world as dangerous and frightful, it would be difficult to forget, for emotional memory far outstrips episodic memory. Not just parents, it should be noted, but also the patterns of the physical and larger social and cultural environments in which an individual is embedded will affect his ability to regulate his emotional responses. Clearly, impoverished and dangerous environments, which are correlated with higher rates of addiction and crime, influence both caregivers' and cared-for youths' abilities to self-regulate emotional responses, thereby affecting their vulnerability to addictive substances and activities. Not only developing minds are affected by other individuals, home circumstances, and cultures, of course; all minds are affected by these environmental factors. However, patterns that are instilled during development seem to be more stable and resistant to change than those settled into later.

Nevertheless, stress in adult life, as well as during development, has been repeatedly been found to be a cause for drug use, abuse, addiction, and relapse (Sinha, 343-359; Koob and Kreek, 1149-1159). In numerous studies with non-

human primates, particularly rhesus monkeys, which, are, like humans, a highly complex, socially-oriented species, social context and social stress have been shown to play critical roles in alcohol consumption, both among adolescents and among adults (Kraemer and McKinney, 182-189). "Social separation," these researchers say, "engages a deficit-triggered motivational system" in primates so potent that it that outweighs other deficits, including food and water consumption. That is, social separation for these animals has serious repercussions—so serious, in fact, that the monkeys won't eat or drink water when their social bonds are disrupted. In one study, rhesus monkeys reared without parents, in peer-only settings, showed increased physiological responses to stress, which we would expect, given our considerations so far. Additionally, during times of stress, these monkeys drank significantly more alcohol and were more likely to drink to intoxication than were their peers who were reared in non-stressed conditions, with maternal care. But the stress affected even the less reactive individuals; when social stress was introduced to even the better adapted mother-reared monkeys, their alcohol consumption increased to match that of the peer-reared group (Fahlke et al, 644-650). So, even those who enjoyed a nurturing environment during early development charged headlong into the bottle when faced with social stress.

An often-cited series of non-primate experiments, performed by researchers at Simon Fraser University, corroborated the importance of environmental stress on the development and persistence of addiction (Alexander et al,175-179). Bruce Alexander's group put to experiment the question of whether seeking relief from a stressful environment, rather than the effects of the drugs themselves, could better explain compulsive drug self-administering behavior. Alexander's insight was that laboratory animals used in addiction studies are normally raised in physically and socially impoverished environments, with none of the stimuli or nurturing necessary for the development of normal responses to daily challenges. They are then attached uncomfortably to a self-injection device and are not free to move. Alexander hypothesized that these animals might continuously self-administer drugs *not* because the drugs in themselves were addictive, but rather because the drugs provided relief from environmental stress.

To test their hypothesis, Alexander's team built an environment which for rats was scenic, spacious, and rich. They called this construction "Rat Park." Rat Park eliminated the standard stresses of cramped, isolated, boring, and painful or at least uncomfortable living conditions. As it turned out, the rats living in Rat Park had little taste for the morphine-laced water according to which their "addiction" was measured, even when they had been forced to consume significant amounts of morphine for weeks prior to the experiment, to insure that they would experience withdrawal symptoms if they did not take it. The control group was rats reared and tested in traditional cages (the team actually tested rats all 4 possible combinations of rearing and testing, in traditional and Park cages). The difference between behaviors of the sets of rats was significant. "Under some conditions," Alexander said, "animals in the cages consumed nearly 20 times as much morphine as did the rats in Rat Park."

To understand the extent and power of the results of the Rat Park experiments, we should consider some of its details. The experiment set involved four groups of

rats reared and tested in different environmental conditions: one group was reared and tested in cages; one group was reared and tested in Rat Park; one group was reared in cages but moved to Rat Park shortly before testing began, and one group was reared in Rat Park but moved into cages shortly before testing began. Rats were exposed, in other words, to every possible combination of cage/park rearing and testing. The rats were tested continually on their choice to drink either water or a bittersweet morphine solution, with the solution being switched out every five days for a more bitter-tasting and less potent version. At each level of morphine solution tried, the caged rats, whether reared in cages or in Rat Park, drank much more morphine than did those that lived in Rat Park during the time of the testing. This suggests that the present state of distress is more indicative of drug use than earlier stress later compensated for, and that even an absence of developmental stress didn't matter when present conditions deprived the animals of stimulation and company.

The story consistently told by the research is that interactions among individuals, and between individuals and their physical and cultural environments, has just as much effect on whether one becomes addicted, and if so, whether one remains addicted, as do any lower-level patterns, including genetic and other biological ones. On the analysis offered here, this fact doesn't require any category leaps. The patterns that we find at each level of specificity are real, and occupy a scale of increasing complexity, each with causal capabilities of their own. Just as electrical oscillations in any electronic system entrain and influence others, so do the patterns of action with which an individual are involved entrain and influence hers, and be influenced by her. When the culture which shapes her world is competitive, consumerist, unsupportive, and alienating, we can expect to see an increase in the numbers of individuals who fall into repeated patterns of behavior of self-soothing or escape, even if that self-soothing or escape then in turn causes detrimental changes in those people's bodies and brains, as well in their abilities to deal effectively with their environments. And when that culture simultaneously advertises the unacceptability of pain, as has become increasingly the case in our own culture and around the world, with the development of the "plop plop, fizz fizz" response to headaches, hangovers, and nausea, and the direct marketing to patients of antidepressants and antidepressant boosters, the value and perhaps even the expectation of self-soothing or escape becomes even more powerful (Cevero, Episode 93 BSP).[3] Granting that causation in such a system is never merely top-down or bottom-up, but is mutual and multi-directional, no one thing can be pointed to as the source of addiction. Nor can addiction be pointed to as a thing; it is a pattern of acting and reacting that begins and can end in interaction with others. With its biological, psychological, social and cultural interacting levels of causes

[3] Cervero said on 1/25/13, in Episode 93 of *Brain Science Podcast* that "This is what I think has changed most in our society; certainly within my lifetime. Pain has changed enormously, from being regarded as something that you have to accept and put up with, and grin and bear it, essentially (even doctors were telling patients to do that when I started in medicine), to a position in which now society demands that pain is treated, and that it is treated by itself; that we move towards a more pain-free society." He makes similar comments about changing social attitudes toward pain and discomfort in his book *Understanding Pain: Exploring the Perception of Pain* (Cambridge, MA: The MIT Press, 2012).

and effects, addiction is clearly more complex than either a disease or a choice, and the solutions to the problems associated with it will not be single or simple.

The argument of the paper is finished. But one might seek more than just a conclusion for what addiction is not, and a suggestion for an alternative way of thinking about it. In particular, one might wonder whether the approach offered here has any application. Based on the complexity of the analysis, one might be tempted to conclude that the situation for addicts is hopeless. The truth is the opposite, however; since each emergent level, or scale, is equally real and causally efficacious, interruption of the pattern can happen at many levels. At the neurological level, the brain's seeking and reward systems could perhaps be altered in some way. K. D. Janda, for example has been working for decades on cocaine "vaccine," and has recently reported some positive results (Cai et al, 2971-2974). Additionally, new research has shown that psilocybin and other hallucinogens may be effective in generating other changes that may reduce addictive-pattern behavior. At an April, 2013 conference, for instance, Michael Bogenschutz argued that LSD had been shown to have a statistically significant effect in the treatment of alcoholism.[4] Others reported promising results with psilocybin mushrooms.[5] And it has been shown many times over that social support for those who desire change the pattern themselves is enormously helpful, as can be psychological assistance with issues that underlie the addictive pattern. Moreover, mental activities such as meditation (Hozel et al, 11-17; Lutz et al, 538-546) have been shown to reduce stress and emotional reactivity, and, just as stress can impair prefrontal cortical function, so have the development of working memory and other pre-frontal functions been discovered to be effective for controlling stress and habitual behaviors. Further research indicates that training working memory can improve resistance to addiction (Houben et al, 968-975). Ideally, addiction could be staved off to begin with, by providing social support and protection for children, and avoiding those situations that set them up for it. I daresay that we could even become more mindful about our cultural attitudes regarding the abnormality of pain and discomfort, the value of consuming over caring, and the acceptability of an ever-growing gap between rich and poor. But now we have become too radical.

Works Cited

A Short History of the R. J. Reynolds Tobacco Company. 1961. Winston-Salem: R. J. Reynolds, 3.

Alexander, B.K., Coambs, R.B., and Hadaway, P.F. 1978. "The effect of housing and gender on morphine self-administration in rats," *Psychopharmacology*. Vol. 58, 175–179.

---

[4] Michael Bogenschutz, M.D., Prof. of Psychiatry and Psychology, University of New Mexico Health Sciences Center, at 2nd International Psychedelic Science Conference, April 2013, Oakland, California.

[5] Matthew W. Johnson, Professor of Psychiatry at Johns Hopkins University School of Medicine presented ongoing research on the use of psilocybin in the treatment of smoking addiction; and Steve Ross, Associate Professor of Psychiatry and Child and Adolescent Psychiatry at New York School of Medicine, presented research by several groups on the use of psilocybin in addiction treatment.

American Psychiatric Association. Feb., 2010. "DSM-5 Proposed revisions include new category of Addiction and Related Disorders. New Category of Behavioral Addictions Also Proposed." News Release No. 10-08.

American Psychiatric Association Committee on Nomenclature and Statistics. 2013. *Diagnostic and Statistical Manual of Mental Disorders* 5th ed. Washington DC: American Psychiatric Association.

Bargh, John A. ed. 2007. *Social Psychology and the Unconscious: The Automaticity of Higher Mental Processes*. New York: Psychology Press.

Bickhard, M. H. 2013. "The Emergent Ontology of Persons" in J. Martin and M. H. Bickhard eds. *The Psychology of Personhood: Philosophical, Historical, Social-Development, and Narrative Perspectives*. Cambridge: Cambridge University Press.

Blaszcznynski, A., et. al. 2008. "Withdrawal and Tolerance Phenomenon in Problem Gambling" *International Gambling Studies* 8, 179-192.

Cai, X., K.Tsuchikama, and K.D. Janda. 2013. "Modulating Cocaine Vaccine Potency through Hapten Flourination" *Journal of the American Chemistry Society*. 135: 8, 2971-2974.

Cervero, Fernndo. 2012. *Understanding Pain: Exploring the Perception of Pain.* Cambridge, MA: The MIT Press.

Deacon, Terrance W. 2012. *Incomplete Nature: How Mind Emerged from Matter.* New York: Norton.

DeBellis, Michael D., Andrew S. Baum, et al. 1999. "Developmental Truamatology Part I: Biological Stress Systems" *Biological Psychiatry*. 45:10, 1259-1270.

Fahlke, Claudia, J. G. Lorenz, J. Long, M. Champous, S. J. Soumi, J. D. Higley. 2000. "Rearing Experiences and Stress-Induced Plasma Cortisol as Early Risk Factors for Excessive Alcohol Consumption in Nonhuman Primates," *Alcoholism: Clinical and Experimental Research*. 24: 5, 644-650.

Foddy, Bennett. 2010. "Addiction and its Sciences: Philosophy" in *Addiction* 106, 25-31.

Francis, Darlene D. and M. J. Meaney. 1999. "Maternal Care and the Development of Stress Responses" *Current Opinion in Neurobiology* 9:1, 128-134.

Gearhardt, A. N. et al. 2011 "Neural Correlates of Food Addiction" *Archives of General Psychiatry* 68, 808-816.

Grigsby, Jim, and David Stevens. 2000. *Neurodynamics of Personality*. New York: The Gulford Press.

Hellman, Matilda, et al. 2011. "Is there Such a Thing as Online Video Game Addiction? Across-Disciplinary Review" *Addiction Research and Theory* Early Online: 1-11 DOI: 10.3109/16066359.2012.693222.

Heyman, Gene. 2009. *Addiction: A Disorder of Choice*. Cambridge, MA: Harvard University Press.

Hobbs, T. R. 1998. "Managing Alcoholism as a Disease" *Physician's News Digest*

Holden, Constance. 2005. "Gambling As Addiction" *Science* 307: 5708, p. 349.

Holzel, Britta K., James Carmody, Karleyton C. Evans, Elizabeth A. Hoge, Jeffery A. Dusek, Lucas Morgan, Roger K. Pitman, and Sara W. Lazar. 2010. "Stress Reduction Correlates with Structural Changes in the Amygdala" *Social, Cognitive and Affective Neuroscience* 5, 11-17.

Houben, K., R. W. Wiers, and A. Jansen. 2011."Getting a Grip on Drinking Behavior: Training Working Memory to Reduce Alcohol Abuse" *Psychological Science* 22: 7, 968-975.

Hyman, Stephen E., Robert C. Malenka, and Eric J. Nestler. 2006. "Addiction: The Role of Reward-Related Learning and Memory" *Annual Review of Neuroscience* 29, 565-598.

Jellinek, E. M. 1946. "Phases in the Drinking History of Alcoholics: Analysis of a Survey Conducted by the Official Organ of Alcoholics Anonymous" *Quarterly Journal of Studies on Alcohol* (1946) 7, 1-88.

Kelley, A. E. and K. C. Berridge. 2002. "The Neuroscience of Natural Rewards: Relevance to Addictive Drugs" *Journal of Neuroscience* 22, 3306-3311.

Koob, George, and Mary Jeanne Kreek. 2007. "Stress, Dysregulation of Drug Reward Pathways, and the Transition to Drug Dependence" *American Journal of Psychiatry* . 164: 8, 1149-1159.

Koob, George F. and Nora D. Volkow. 2010. "Neurocircuitry of Addiction" *Neuropsychopharmacology* 35, 217-138.

Kraemer, Gary W. and William T. McKinney. 1985. "Social Separation Increases Alcohol Consumption in Rhesus Monkeys" *Psychopharmacology* 86, 182-189.

Ladyman, James, and John Ross, with John Collier. 2007. *Every Thing Must Go.* New York: Oxford University Press.

Logan, G. D. and W. Cowan. 1984. "On the Ability to Inhibit Thought and Action: A Theory of an Act of Control" *Psychological Review* 91, 295-327.

Lutz, Antoine, D. R. McFarlin, D. M. Perlman, T. V. Salomons, and R. J. Davidson. 2013. "Altered Anterior Insula Activation During Anticipation and Experience of Painful Stimuli in Expert Meditators" *NeuroImage* 64, 538-546.

Marks, I. 1990. "Behavioral (non-chemical) Addictions" *British Journal of Addictions* 85, 1389-1394.

Mignon, S. I. 1996. "Physicians' Perceptions of Alcoholics: The Disease Concept Reconsidered" *Alcoholism Treatment Quarterly 14:4*, 333-45; T. R. Hobbs. 1998. "Managing Alcoholism as a Disease" *Physician's News Digest.*

Perry, Bruce D. et al. 1995. "Childhood Trauma, the Neurobiology of Adaptation and 'Use-dependent' Development of the Brain: How 'States' become 'Traits'" *Infant Mental Health Journal* 16:4, 271-291.

Perry, Bruce D. and R. Pollard. 1998. "Homeostasis, Stress, Trauma, and Adaptation: A Neurodevelopmental View of Childhood Trauma" *Child and Adolescent Psychiatric Clinics of North America* No. 7, 33-51.

Rachlin, H. 1990. "Why Do People Gamble and Keep Gambling Despite Heavy Losses?" *Psychological Science.* 1:15, 294-297.

Sinha, Rajita. 2001. "How Does Stress Increase Risk of Drug Abuse and Relapse?" *Psychopharmacology.* Vol. 158, 343-359

The ICD-10 Classification of Mental and Behavioral disorders: Diagnostic Criteria for Research. 1993. Geneva: World Health Organization.

Wegner, Daniel. 2005. "Who is the Controller of Controlled Processes?" in Ran R. Hassin, James S. Uleman, and John A. Bargh, ed. *The New Unconscious.* Oxford: Oxford University Press.