Science of addiction: lost in



a labyrinth

The Science of Addiction: From Neurobiology to Treatment

Carlton K. Erickson

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Reviewed by Antonello Bonci

What is addiction? Despite my many years studying the mesolimbic system, one of the key players in many drug-dependent behaviors, I still struggle to define addiction. Indeed, it is not an easy question to answer, and this is the major reason why I admire Erickson's effort.

The main purpose of this book is to raise a series of important, yet often overlooked, questions about addiction and make them interesting and stimulating to a wide audience. Although Erickson is forced to discuss difficult subject matter, he does an outstanding job of keeping the ship steady in perilous waters.

Erickson enlightens readers on many topics related to the neuroscience of addiction; there are chapters focusing on the basics of brain science, on the anatomy, genetics, neurobiology and treatment of addiction, and on future exciting directions for addiction research. Erickson makes an admirable effort to bring closure to each of the questions he raises.

Right out of the gate, in the very first chapter, Erickson aims directly at the core of some key questions: do people agree on how to define addiction? What is the difference between drug abuse and drug dependence? These terms, like addiction, are often used loosely and without general agreement among scientists, public health providers or even the general public. Here Erickson puts forward the idea that there is a crucial difference between drug abuse (which he defines as "bad judgment" in use of drugs but not as a disease) and pathological chemical dependence (impaired control over drug use, which is a brain disease). It might be argued that bad judgment is another difficult concept to define and that it has been observed in individuals suffering from unrelated conditions such as frontotemporal dementia. It could also be argued that drug abuse already represents a "brain disease" in itself, at least for some. Furthermore, pathological chemical dependence can be produced by repeated exposure to the drug to which a subject eventually becomes addicted. Although Erickson eventually alludes to this latter possibility, some statements seem a bit too clear-cut and simplistic to me.

Along these lines, Erickson introduces another interesting concept: although *pathological* chemical dependence is a brain disease, drug abuse is a *conscious* process. Thus, as Erickson refers to it throughout the book, abuse is *intentional* substance overuse or misuse—but I am not quite convinced that this is completely accurate either. Intentional, yes, but perhaps intentionally produced by the pathologically altered brain pathways that result from previous drug exposure. However, Erickson suggests that these individuals should be able to reduce or stop their drinking when they decide that the adverse consequences are worse than the desirable effects. I am sure that some people who intentionally abuse drugs might be able to stop themselves, but others do indeed fall into chemical dependence.

The rest of the book flows well, but I was somewhat confused by the different definitions used when Erickson refers to the same concept in different ways as the book progresses; more consistency would have helped. For example, it is now widely accepted that the mesolimbic system is not just a pleasure pathway but that its function is strongly related to motivation as well. Eventually, Erickson does explain that the mesolimbic system is not only about pleasure, but a once-and-for-all description and definition of it would have been useful.

Another inconsistency concerns Erickson's statement that people with a diagnosis of chemical dependence have a brain disease associated with a dysregulation of the mesolimbic system. Although this might be accurate for some people, one could argue that this is the case in only a subset of individuals, as many other brain regions or pathways (for example, the mesocortical pathway) have been shown to be equally important. Erickson also initially fails to mention that within the mesolimbic system, it is the ventral tegmental area, rather than the substantia nigra pars compacta, that is strongly involved in drug-dependent behaviors. However, the ventral tegmental area does eventually make its appearance in Chapter 3.

Inconsistencies continue when Erickson states that there is no scientific evidence that babies born of drug-using mothers have a greater likelihood of becoming addicted. This is a very complicated problem, but some scientists would disagree with such a strong statement, as recent reports have shown the opposite: there is growing evidence from long-term clinical studies that adolescents and young adults born to drug-using mothers do have a greater chance of becoming drug abusers themselves, and the best evidence thus far comes from studies on tobacco smoking and alcohol.

In sum, this is a concise book that attempts to cover an incredible wealth of work, and I suspect that this might be the reason why some concepts were perhaps oversimplified and could benefit from more rational and consistent organization. In all honesty, each of the chapters deserves a book in itself.

The age-old conundrum is to decide whether it is best to provide answers or to leave the audience with open questions. Unless there is a clear answer, I would opt for the latter, although I must admit that Erickson got my attention. He must also be praised for his effort—for the most part successful—to simplify and explain to a lay audience a very complicated, multifaceted health problem that, despite so many years of research, represents one of the most difficult challenges to modern science.

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