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Stop! Go! A Rogue System in the Brain

Our brain controls our decision-making, letting us know when to go forward with an action and when to stop. Scientists have learned which parts of the brain send these messages. And they know that for addicted people, these "stop" and "go" systems are impaired.

The brain's reward, or "go" system, is basic to all humans. Called the mesolimbic dopamine system, it evolved to help us pursue things necessary for survival such as food or sex. Conversely, the brain's frontal lobes or "stop" system evolved to help us weigh the consequences of our impulses. For example, this system will help keep us from driving through a red light when we're in a hurry, because the brain will tell us that doing so would be both dangerous and illegal. In this case, the "stop" system sends a message that the consequences of doing what the "go" system wants are too negative.

"When things are working right, the 'go' circuitry and the 'stop' circuitry really are interconnected and are really talking to each other to help you weigh the consequences of a decision and decide when to go or not to go," says Dr. Anna Rose Childress, a psychology researcher at the University of Pennsylvania. "It's not that they're separable. They're interactive. They're interlinked at all times." That means that even when you are in a great hurry and risk missing an appointment, you still do not run the red light. "Go" and "stop" have communicated with each other, and "stop" has prevailed.

With Childress's addicted patients, however, "it is as though [the systems] have become functionally disconnected. It is as though the 'go' system is sort of running off on its own, is a rogue system now, and is not interacting in a regular, seamless, integrated way with the 'stop' system."

When an addicted person, even one who is working to recover, gets certain signs, or triggers, such as conflict with a companion, the "go" system overwhelms the part of the brain that's telling them, "Stop! This is a very bad idea!" The trigger can be something essential to the addicted person's life: one recovered writer realized that his addiction was partly triggered by the deadline pressure of his chosen profession as a journalist, and was prompted to start a new career; other recovering people often move from their old neighborhoods to be away from triggers. But a trigger can also be something as subtle as a scent that reminds a person of the place where they used to buy drugs.

When that trigger surfaces, Childress says, "instead of being able to say, 'What? Wait a minute. Think about what happened last week. You lost your job. You almost lost your life,' the 'stop' system doesn't seem to get into the picture at all. It's all about 'go.'"

Addiction is a Physical Disease Position - From HBO.com

Addiction is a chronic, but treatable, brain disorder. People who are addicted cannot control their need for alcohol or other drugs, even in the face of negative health, social or legal consequences. This **lack of control** is the result of alcohol- or drug-induced changes in the brain. Those changes, in turn, cause behavior changes...

...For hundreds of years, people have considered addiction to be a problem of willpower or of moral failing. Now we know that addiction is a disorder much like other chronic illnesses that involve behavior and lifestyle. Some of these illnesses begin with voluntary behaviors, such as poor nutrition or failure to exercise. But then, biological changes occur in the body to make the illness a chronic condition.

...The brains of addicted people "have been modified by the drug in such a way that absence of the drug makes a signal to their brain that is equivalent to the signal of when you are starving," says National Institute on Drug Abuse Director Dr. Nora Volkow. It is "as if the individual was in a state of deprivation, where taking the drug is indispensable for survival. It's as powerful as that."

...To appreciate the grips of addiction, imagine a person that "wants to stop doing something and they cannot, despite catastrophic consequences," says Dr. Nora Volkow, director of the National Institute on Drug Abuse. "We're not speaking of little consequences. These are catastrophic. And yet they cannot control their behavior."

...Research on addiction is helping us find out just how drugs change the way the brain works. These changes include the following:

- a. *Reduced dopamine activity.* We depend on our brain's ability to release dopamine in order to experience pleasure and to motivate our responses to the natural rewards of everyday life, such as the sight or smell of food. Drugs produce very large and rapid dopamine surges and the brain responds by reducing normal dopamine activity. Eventually, the disrupted dopamine system renders the addict incapable of feeling any pleasure even from the drugs they seek to feed their addiction.
- b. *Altered brain regions that control decision-making and judgment.* Drugs of abuse affect the regions of the brain that help us control our desires and emotions. The resulting lack of control leads addicted people to compulsively pursue drugs, even when the drugs have lost their power to reward. The disease of addiction can develop in people despite their best intentions or strength of character. Drug addiction is insidious because it affects the very brain areas that people need to "think straight," apply good judgment and make good decisions for their lives. No one wants to grow up to be a drug addict, after all.