

How Lack of Insight Sustains Addiction

Impaired insight may prevent dependent drug users from kicking the habit.

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A few years back, I had a constant headache that most people would recognize as a car. If it, a BMW 318, could be relied on for one thing, it was to find new ways to break down. Despite the persisting frustration, whenever I took it into the shop, the problems disappeared and the car hummed calmly and easily. Although the mechanics could find nothing wrong, the problems started anew soon after.

The trouble with this four-wheeled curse was that I never knew what was wrong with it. If the transmission failed and I had to replace it, a costly repair only a gear monkey could look forward to, at least I would have felt confident that I knew the steps to fix it. But since it was nothing consistent or certain, I couldn't put my mind at ease.

In my last [post](#) I explored the consequences, sometimes deadly ones, of athletes in extreme sports who have trouble recognizing their own emotions. Like a good car mechanic, emotions provide insight into underlying problems—necessary information to make good decisions.

A new theory on drug dependence (disclosure: one my current lab is testing, read more about it [here](#) and [here](#)) is that a similar deficit prevents users from recovering. Over 80 percent of people don't seek treatment for addiction. This does not mean they don't have a problem; more likely, they just don't recognize its severity. The lack of recognition may result from an underlying neural dysfunction. The insula, a prune sized hunk of brain buried an inch-and-a-half inside our temples, detects our current feelings—an empty stomach, a pounding heart—and uses them, along with our past emotional memories, to guide our decisions. Whether or not you hanker for a bag of Cheetos depends both on your current hunger and your past experiences with the orange, cheese-food corn puffs. If you're hungry and remember happily devouring Cheetos down to the last crumbs, your insula activation will steer you to another bag. If you've just gorged at a Chinese buffet and squirm when recalling the orange residue Cheetos leave on your hands, your insula will likely decline.

The problem, however, is that not everyone's insula functions the same. Drug dependence may manifest when diminished function of the insula prevents someone from recognizing current feelings or memories, and then cannot use that information to guide decisions.

Robert Hester, at the University of Melbourne, Australia teamed up with Liam Nestor and Hugh Garavan at Trinity College in Dublin, Ireland (it's a small world, after all) to test 16 chronic marijuana smokers and 16 nonsmokers matched on age and gender on an error awareness task. In the task, participants watched names of colors flash across a screen, and pressed a button anytime the font's color corresponded to the name, like

'green' in green font. Most of the names they saw matched the fonts, so most of the time they should have hit the button.

There were only two circumstances where they weren't supposed to hit the button: first, if the same color appeared back to back, like 'purple, purple,' or second, if the font's color did not match the name, like 'purple' in red font. If the participant pressed the button anyway, this is an error. If they realized they made a mistake, they could hit a second button to say, "oops."

Overall, marijuana smokers did not make more errors than nonsmokers. They were, however, significantly less likely to realize they had made an error. Nonsmokers pressed the second button after 91% of their errors, while smokers pressed it after only 77% of theirs. Even though marijuana smokers made just as many mistakes, they said 'oops' less.

What's more, corresponding to their lack of error awareness, smokers had diminished activation in their insula. Participants who had smoked the most marijuana in the past year had the least insular activation. Disrupted function in the insula might prevent smokers from realizing that anything has gone wrong. Whereas the insula typically guides decisions based on past positive or negative experiences, this study suggests that smokers' insulas do not recognize those negative experiences, so they can't use this information to guide behavior. This may mean they'll continue smoking during study hour even though they got an 'F' on their last test.

This result in marijuana smokers resembles findings from other drugs. Cocaine-dependent study participants have shown similar diminished activation related to decreased error awareness. Alcohol blunts the insula's response to people's facial expressions, suggesting a numbness to their emotion. Addiction might result when users fail to notice the problems resulting from their continued drug use. Like my BMW, the failure to understand the problem impedes any attempts to solve it.

Of course, this is a simplification. The insula does more than compute our desires and register errors—there are probably functions we aren't aware of currently. Further, no brain region operates in isolation; the insula must send and receive signals to and from the rest of the brain to affect our behavior.

Although we have yet to identify all the mechanisms at play in the brain, striking evidence implies the insula plays an important role in dependence. Most notably, damage to the insula can cause immediate and lasting disruptions to addiction. One man who had smoked two packs of cigarettes a day for all of his adult life recovered from a stroke that damaged his insula and at once ceased smoking. He didn't quit for health reasons or because of a New Year's resolution, he simply said that his "body forgot the urge to smoke." After taking my car to the shop a few times, I still had no explanation for what went wrong. I sold it in frustration. The guy who bought it seemed as excited to have it as I was to have it off my hands. When I talked to him a few months later, he had figured out the trouble. A wire running from the battery was shorting out and causing power to drain. Once he fixed it, the car ran just like it came off the assembly line. Of course it should have been something simple. In my case, the reason I couldn't solve the problem was because I never found the shorting wire.

References:

- Hester R, Nestor L, Garavan H. Impaired error awareness and anterior cingulate cortex hypoactivity in chronic cannabis users. *Neuropsychopharmacology*. 2009 Oct;34(11):2450-8.
- Goldstein RZ, Craig AD, Bechara A, Garavan H, Childress AR, Paulus MP, Volkow ND. The neurocircuitry of impaired insight in drug addiction. *Trends Cogn Sci*. 2009 Sep;13(9):372-80.
- Paulus MP. Decision-making dysfunctions in psychiatry--altered homeostatic processing? *Science*. 2007 Oct 26;318(5850):602-6.