

## 'Dry cleaning effect' explained by forgetful Yale researcher

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Yale researchers have described how dueling brain systems may explain why you forget to drop off the dry cleaning and may point to ways that substance abusers and people with obsessive compulsive disorder can overcome bad habits.

In *Proceedings of the National Academy of Sciences*, Christopher J. Pittenger, M.D., and colleagues describe a sort of competition between areas of the brain involved in learning that results in what Pittenger calls the "dry cleaning effect."

One area of the brain called the striatum helps record cues or landmarks that lead to a familiar destination. It is the area of the commuter's brain that goes on autopilot and allows people to get to work, often with little memory of the trip.

But when driving to an unfamiliar place, the brain recruits a second area called the hippocampus, which is involved in a more flexible system called spatial learning. The commuter must employ this system if he or she wants to run an errand before work.

"When you have driven the same route many times and are doing it on autopilot, it can be really difficult to change," said Pittenger, assistant professor of psychiatry at Yale and senior author the paper. "This is why I cannot, for the life of me, remember to drop off my dry cleaning on the way to work. If I'm not paying enough attention right at that moment, if I am thinking about something else, I just sail right on by."

Pittenger and Yale colleagues Anni S. Lee and Ronald S. Duman developed a way to study how these two modes of learning might be interconnected in mice.

In one group, they disrupted areas of the striatum in mice and discovered that their ability to complete landmark navigation tasks was impaired. However, these mice actually improved on tasks that involved spatial learning.

Conversely, when the researchers disrupted an area of the hippocampus involved in spatial learning, the animals could no longer navigate spatially but learned landmark tasks more quickly.

Pittenger speculates that the interactions between these two systems may be important for understanding certain mental illnesses in which patients have destructive, habit-like patterns of behavior or thought. Obsessive-compulsive disorder, Tourette syndrome, and drug addiction involve abnormal function of the striatum and may also involve disruption of the interactions between the two learning systems, which may make habits stronger and less flexible.

"This is part of what we are doing in cognitive-behavioral therapy when we teach patients to recognize their destructive habits, to take a step back, and to learn to do things differently," Pittenger said. "What we're really asking them to do is to use one of these systems to overcome and, ultimately, to re-train the other."

In time, Pittenger hopes his studies will lead to more effective treatments for psychiatric disease – and, maybe, help him drop off his dry cleaning.

Source: Yale University

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