Of mice and men: Cognitive scientists find both species equally adept at assessing risk

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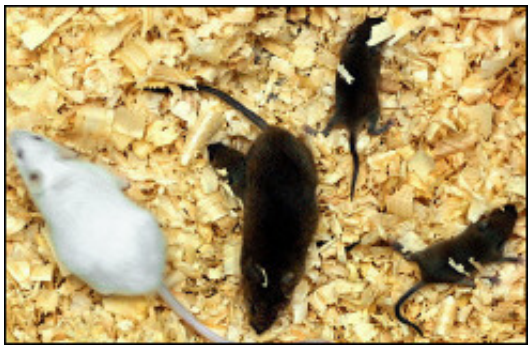

Mice exposed to polluted air have dramatically higher rates of genetic mutations in their sperm than mice that breathe filtered air, according to a study released Monday that suggests airborne pollutants may be linked to inheritable DNA damage.

Humans and mice are both good at assessing risk in everyday tasks, according to a study by Rutgers University scientists published this week in the *Proceedings of the National Academy of Sciences*.

Fuat Balci, David Freestone and Charles R. Gallistel, report that when it comes to figuring out in a few seconds which of two locations is the best place to be to collect a reward, mice and humans are about equally proficient.

The finding leads Gallistel, professor of psychology and co-director of the Rutgers University Center for Cognitive Science, to conclude that risk assessment is not basically a high-level conscious activity, but one that is programmed into the brains of animals - mice, humans and many others. Balci, was a graduate student and Freestone an undergraduate at Rutgers at the time the research was done. They are now at Princeton and Brown universities, respectively.

In the paper, Risk Assessment in Mouse and Man Balci, Freestone and Gallistel write that their finding "contrasts with the traditional view that humans are non-normative decision-makers under probabilistic conditions."

"The traditional view is that people often don't correctly estimate probabilities, and even when they're told the probabilities, they do not reason with them correctly," Gallistel said. "They do not balance probabilities and payoffs in the way a rational decision maker ought to do."

For example, consider lotteries, Gallistel suggested. The payoff of a lottery is big, but the odds of winning a lottery are infinitesimal. So, a reasonable person would invest his money elsewhere. Yet millions of people, supposedly rational, play the lottery. In other words, they don't pick the option with the best chance of success. They don't act optimally.

But Gallistel's human and rodent subjects didn't bear this view out. "Our results say, under our circumstances - and I stress, under our circumstances - not only are humans optimal, so are mice," Gallistel said.

The circumstances were analogous to deciding whether or not to go through a red light (on the assumption it is broken) based on how long one has been waiting. Subjects waited first at one location for food [or a "target"] to appear. If it failed to appear there after a known and fixed delay, they switched to another location, where it appeared after a longer delay. The relative frequency with which it appeared at either the short or the long location varied. In judging when to switch from the short to the long location, subjects had to take into account both how long they had been waiting at the short location and the probability that it was a long trial (hence, a trial on which they should switch).

"These animals [the mice] were doing something that, on the face of it, was mathematically complicated," Gallistel said. "On the one hand,

that's surprising, but then, maybe not, because risk assessment is part of life. It's risky being a mouse. There are lots of things out there trying to eat you. So the ability of these animals to do this complicated thing might actually be very primitive - the kind of basic, cognitive mechanism that you might try to understand by looking at the molecules and cells in the nervous system. Because mice do it and mice are a favorite subject for genetic work, one may be able to use the power of modern genetics to get down to the molecular and cellular mechanisms."

Source: Rutgers University

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