Rat Park

by Stuart McMillen comics

From the home page of cartoonist Stuart McMillen
Our understanding of addiction...

...our understanding of drugs is built on many assumptions.

One of the biggest assumptions is that drugs are seductively addictive...

...with drug addiction caused by mere exposure to these bewitching substances.
In the 1950s and 60s, the scientific ’proof’ of chemical addiction came from rat experiments.

The rats were surgically connected to self-injection apparatus...

...put into...

...isolated cages...

...and taught to self-administer drugs by pressing a lever inside the cage.
The researchers watched on as the caged rats self-injected powerful psychoactive drugs.

Dominated by their habits, some of the rats would choose drug injections in preference to food and water.

Killing themselves through neglect.
The implications were bleak and worrying.

It seemed that drugs were capable of ruinous harm to individuals’ self-control...

...and if drugs were available to people as freely as they were to the lab rats...

...mass-addiction and social crisis would be the certain result.
Professor Bruce Alexander thought differently.

He wondered how much insight into human addiction could be gathered by studying rats.

He wondered how much insight could be gathered by studying rats in solitary confinement.
Descended from wild Norway Rats, albino lab rats remain curious, gregarious social creatures...

...so the sensory deprivation of the classical drug experiments must have been akin to torture.

Alexander wondered if he too would retreat into a drugged haze, if locked in a box and given no other option.
In 1977, Prof. Alexander assembled a team of Simon Fraser University researchers.

Bruce Alexander, Barry Beyerstein, Robert Coombs, Patricia Hadaway.

The team decided to repeat the classical rat-drug studies...

...but with some crucial differences.
Their experiment would test the power of drug addiction using morphine...

...a close cousin to the notoriously 'irresistible', 'life-destroying' heroin.

The team ventured bravely into the dark domain of addiction, wondering what they would find.
The researchers took over a large room within the university and began preparing a carefully-controlled experiment.

In one part of the room they placed an array of standard wire mesh cages (18 x 25 x 18cm).

The metal cage walls would isolate these rats, preventing them from touching or seeing each other.

In the other part of the room, the researchers constructed a large plywood enclosure.

Measuring 8.8m², the enclosure had over 200x the area of the standard laboratory cages.
The researchers painted the walls with scenes of woodlands, and natural environments.

They covered the floor with fragrant cedar shavings for the rats to nest in...

...and scattered boxes and cans for the rats to hide and play in.

Importantly, the researchers gave the rats other rats to play, fight, mate, and interact with.

Satisfied they had created a rodent paradise...

...they named the enclosure 'Rat Park'...

...and began experimenting on the rats.
The 'seduction' experiment

32 rats (16 male / 16 female) were randomly assigned into isolated cages, or colony housing in Rat Park.

The researchers gave both groups of rats the choice of two liquids...

...and measured their intake.
The team learned that both groups of rats loved sugary fluids (a sucrose syrup)...

...and hated bitter fluids (a non-drugged quinine solution).

The researchers also tested both groups' taste for the bitter-sweetness of a non-drugged quinine-sucrose solution.
Now understanding the rats' taste buds, the researchers began trying to seduce the rats into drinking morphine.

Wondering if the rats would avoid the drug because of its bitter taste, the team 'sweetened the deal'...

...adding various ratios of sugar to tempt the rats into drinking the morphine.
The researchers ‘stepped down’ the mixtures every 5 days.
Gradually transforming the bitter narcotic fluid into a sweeter, but nonetheless drugged brew.

Alexander and team keenly observed how much the rats would tolerate this bad taste in order to experience the effects of the morphine drug.

Would the two groups of rats consume the drugs at different rates?
Days 9-13: At first, all rats avoided the extremely bitter morphine-sugar solutions...

...but as the researchers lowered the morphine (Days 14-18), the rats began to experiment with the sweeter fluids.

The isolated cage rats began drinking the morphine far earlier than the Rat Park rats...

...and in much higher volumes.

Cage consumption was up to 19x higher than Rat Park at certain dosages.
While the caged rats seemed happy to drift into a drugged haze...

...the Rat Park rats resisted.

The freely-available morphine went largely untouched within Rat Park...

...with the rats seemingly preferring a social life uninterrupted by the morphine's effects.
Days 19-23

The researchers upped the sugar... ...and the caged rats slipped further into their narcosis.

But still the Rat Park rats avoided the freely available morphine.

Rat Park's consumption rose, but still remained a fraction of their isolated neighbours.
Finally, Alexander’s team tipped the sugar/drug ratio to a cocktail that none of the rats could resist.

Days 24–28

The rats which had avoided the heavily-drugged brews began drinking the sweet syrup with ‘light’ narcotic content.

The researchers were confident the rats had been avoiding the effects of the drugs, not the taste.
In a side-experiment, the team found that rats’ aversion to morphine-sugar water could be reversed by adding Naltrexone to the liquid.

The additive worked as an antidote to the morphine, counteracting the effects of the drugs, while sparing the sugary taste.

The rats would lap up previously-avoided drug mixes spiked with Naltrexone...

...learning that drinking would no longer dull their senses.
Another Rat Park experiment tested the 'addictive' nature of opiates from the opposite direction.

Rather than trying to tempt the rats into voluntarily beginning morphine habits...

...the researchers deliberately made junkies out of the rats, and then watched what happened when given choice again.
The researchers were testing the 'withdrawal symptoms' of drug dependence...

...a notion which suggests that the physiological effect of quitting opiate use is so unbearable that users cannot stop their drug habits.
The researchers took 32 new rats...

(10 in isolation, 22 in Rat Park)

...and put them on a fluids regime designed to produce physical tolerance and physical dependence in each and every rat.
On most days, the rats were given no fluids besides drugged morphine-water.

The team punctuated the experiment with nine ‘choice days’: days where the rats could choose between water, or morphine-water.

Would the habituated rats choose the water, or the drugs?
The results showed clear trends across the 'choice days':

The isolated rats continued their morphine stupor and actually increased their intake over the 'choice days'.

The story across the room, in Rat Park was different.

Though physically dependent on morphine, the Rat Park rats decreased their drug use on 'choice days'.

Withdrawal symptoms were noted in the twitchy rats. Yet still the Rat Park rats avoided the morphine.
Both groups of rats were physically dependent on the morphine, yet behaved in different ways.

To Alexander and team, the Rat Park rats were choosing to endure the morphine withdrawal symptoms...

...deliberately trying to return to a social life not disrupted by the drugs.

A ‘normal’ social life unavailable to the caged rats.
Bruce Alexander and his colleagues ran multiple experiments within Rat Park.

Together the team swept their searchbeams across dark corners at the foundations of drug addiction theory...

...trying to corner and confront the evidence at the heart of the arguments to criminalise drug use.
Trapped in the scrutinising glare of the researchers’ spotlights...

...the basic fears behind drug prohibition arguments looked a lot less scary.

The Rat Park studies were part of a turning tide of evidence away from boogeyman tales of ‘demonic drugs’...

...toward a more nuanced understanding of drugs and addiction.
Prof. Alexander noted three common threads from the Rat Park experiments:

1. Despite the addictive 'demon drug' reputation of heroin...

...the researchers had to strongly coax the rats into taking drugs.

Far from it being an irresistible poison...

...sugar, forced-habituation and isolation were essential to make the rats want to drink the morphine.
II: Given the chance to live in a ‘normal’ society with comfortable housing and social contact...

...the rats living in Rat Park had little appetite for opiate drugs.

III: Chemical addiction was not the strongest factor influencing the rats' habits.

Rather than becoming identically spellbound by addiction...

...the rats' drug-taking varied with physical, mental and social setting.
The university cancelled the research funding in 1982...

...the plywood was sawn up into pieces...

...the rats were taken from their paradise...

...and the researchers found other projects.
Bruce Alexander was wary of overgeneralising the findings of Rat Park...

...and making the same mistakes of the 1960s rat researchers, who applied their self-injection findings to humans.
Yet, he remained haunted by the study's findings.

What was it about 'Rat Park', which allowed its residents to avoid addiction...

...despite drugs being readily available?
And what was it about the cages, which prompted the rats to lose themselves in drug consumption?

Would humans need to be locked in a cage to feel the same way?

Or are there other types of isolation which might lead to addiction?
Bruce Alexander's work moved beyond the world of rats...

...to the world of people...

...but was shadowed by a question lingering from the Rat Park experiments.
What if the difference between not being addicted and being addicted...

...was the difference between seeing the world as your park...

...and seeing the world as your cage.
I am an Australian cartoonist, specialising in thoughtful long-form, non-fiction comics about environmental and social issues.

My comics have been read by hundreds of thousands of people and I have been flooded with feedback from readers who say that I have changed their attitudes towards these social issues.

Please help me to continue this valuable creative work by becoming my crowdfunding supporter.

Stuart McMillen
Canberra, Australia

crowdfundstu.com

Watch my 2-minute info video!
Comic about a classic experiment into drug addiction science: Rat Park. Would rats choose to take drugs if given a stimulating environment and company? More information:

- The making of Rat Park: extra information about the real-life experiments. Includes my reference list.
- Information about Bruce Alexander’s post-Rat Park research
- My Drug Period: my lessons learnt from War on Drugs & Rat Park.
- 10,000 / 1,500 / 15: Breaking the Silence on Responsible Drug Use: my personal experiences with responsible drug use.

Support my idiosyncratic comics!

crowdfund stu.com

Become a regular financial patron via my Patreon campaign!

Support my comics on a monthly basis.

Want more info? Watch my 2-minute video!