Topic From the Field: The "Rat Park" Experiment

Recently, I was asked if I had heard some comments about, "Almost everything you think you know about addiction being wrong…", and what I thought about those comments.

From that, my guess was that the content being referred to was the Johann Hari talk about the "Rat Park" experiment (you can easily find it on YouTube). Rather than reply by getting technical, or naming the study, or the researcher, or by saying "Rat Park", I summarized the main points from the talk as I remembered them – and asked if that was the one. **It was.**

I will point out that in later years the researcher that led the original "Rat Park" experiment did some additional studies of the same kind that served as (partial) replications of the first experiment. A 2019 paper (Gage & Sumnall) reviewing and summarizing that entire body of studies, the erroneous narratives surrounding them, and the beneficial take-aways as well, is available. However, in this work, my aim and method are for me to do my own homework, and for me to look at original work by primary authors. So, in spite of having read it, I won't be commenting here on that review paper itself.

Further, from around the time of the use of the internet becoming widespread and popular, until now, I have generally avoided any content having to do with the "Rat Park" experiment *like the plague.*

Why have I avoided the topic?

1. The first reason is my academic upbringing in radical behaviorism, the hardline version of the scientist-practitioner model, and hardline empiricism in psychology. So, when I engage with mass media-level content on this kind of subject, that content comes with what feels like an unavoidable and relatively large burden of critical thinking on my part. Reading academic journal articles in that kind of area, by comparison, is refreshing.
2. The second reason is my involvement in rat lab during my undergraduate years. I still have a great affinity for "rat lab" as a way we learned major portions of "Learning Theory" – the psychology of learning. And that environment for learning radical behaviorism was combined with a strident kind of education in physiological psychology.
3. I know classical (Pavlovian) and operant (Skinnerian) conditioning theory rather well, and that includes how they apply particularly to the onset and progression of substance use in animals and humans. Popular, mass-media content on those subjects is not appealing to me.
4. Another is my years spent reading, learning, and then later doing a little bit of experimental work in addiction theory and clinical models – all based on animal learning – and my continued reading in that area since that time.

In sum, these leave me un-interested in distorted reactions to distorted ideas about distorted applications of a paper (or series of papers) about rats and their access to water vs morphine. I would much rather read a more recent paper on the topic, or the paper itself. **So, I did.** I read the entire "Rat Park" original research article – at long last.

Have you read it? What do you make of it?

By way of review, the author was interested in investigating the potential impact of a rat's environment on the proclivity to take morphine.

- The essential variable being examined was that of a rat being isolated, vs living in a colony with other rats.
- The question was whether isolation or colony-living seemed to impact morphine intake.

Some rats were in isolation throughout the study, while others were in the colony throughout the study. Others began in isolation, and then moved to the colony, while some started in the colony and then moved to isolation.

To help dissect the topic raised by this area of interest, and seat it in a larger context, I'll cover the following areas of research/famous research papers, in order:

- Part 1: The original Rat Park study (Alexander, et. al.)
- Part 2: Vietnam veterans returning home (Robbins, et. al.)
- Part 3: Colony collapse in a mouse utopia (Calhoun)

Epigraph:

"Look ye, Starbuck, all visible objects are but as pasteboard masks."
Captain Ahab in Herman Melville's Moby Dick

Part 1: The Original Rat Park Study

In the first section of this work, I will present some **quotes** and other content from the original Rat Park paper, some of the **conditions** of experimentation within the study, and make some **comments** in response to them.

The abstract

The abstract contains the phrase **"…raised from weaning either in isolation or a large colony."**

- To me this is an unfortunate experimental arrangement because it manipulates two variables, not just one: complete vs incomplete raising, and isolation.
- And the phrase "raised…in isolation" seems to be both a literal misnomer and an oxymoronic phrase. In isolation, raising cannot occur. In a colony – even after weaning – it can.

I would prefer the paper said, "isolated after weaning" if that is what happened. The paper is not clear on this point.

- "Raising", by definition (to me), means to be raised – not just the phenomena of time passing while being utterly alone.
- I wish the paper was clear on this point, as *total isolation after weaning* would mean *two* deprivations, not just one: not being raised in total, and not having any company.
- To me, this ambiguity muddies the interpretive power of the results of this study.

The method

1. The method section states, **"Other environmental variables were controlled by situating both housing conditions in the same large room…"**
    A. To me this is also an unfortunate experimental arrangement because it provides a confounding factor that presents a difficulty in distinguishing those in "isolation" from those in the "colony" arrangement: mere separation.
    B. To me, saying both housing conditions were in the same large room means that the isolated rats were in fact merely separated from each other, and from the colony, but were not fully "isolated".
    C. Did the isolated rats "know" there were other rats in the room? If so, could that be a potential confounding factor? And if so, could that confounding factor evoke potential rival hypotheses to explain the results of the study?
2. Table 1 shows how there were four experimental conditions that had 4 male and 4 female subjects in each condition.
    A. The study happened in two segments of time after weaning.
    B. Following weaning, the total of 32 rats were divided into four different groups of 8 rats each, with 4 males and 4 females in each group. The four different groups experienced different housing conditions during the study. The early condition of the study (the first period of time after weaning) was between days 22 and 65, and the later condition (the later portion of time after weaning) was from day 65 onward.
        i. The 8 rats in the first group were in isolation for both the early and the later portions of the study. These are referred to as II which stands for Isolation-Isolation.
        ii. The 8 rats in the second group were in the colony during the early portion of the study, then put in isolation in the later portion. These are referred to as CI which stands for Colony-Isolation.
        iii. The 8 rats in group 3 were isolated in the early portion of the study, and then placed in the colony for the later portion of the study. These are referred to as IC which stands for Isolation-Colony.
        iv. And finally, the 8 rats in the fourth group were in the colony during both the early and later portions of the study. These are referred to as CC which stands for Colony-Colony.
    C. To me, having only 8 subjects per condition is a very small number. And having only 4 rats of each sex per condition is a very small number indeed, especially if you're going to make post-hoc comparisons based on sex differences. **And they did.**
3. Across days within each of the 2 housing conditions, liquid preparations called "phases" were available, as follows:
    A. PRE Water + 10% sucrose
    B. Quinine water + 10% sucrose
    C. 1.0 mg morphine water + 10% sucrose
    D. 0.50 mg morphine water + 10% sucrose
    E. 0.30 mg morphine water + 10% sucrose
    F. 0.15 mg morphine water + 10% sucrose
    G. POST Water + 10% sucrose

4. Interestingly, due to technical problems, of the 31 days of the varied liquid preparations used during the study, 8 days of data were lost across certain preparations.
    A. The study results were based on the remaining days of data.
    B. Of the 7 liquid preparations, some preparations lost no days of data, two preparations lost one day, and two preparations lost three days of data.
    C. Given the data losses, are we satisfied with the final data set as being sufficiently large and integrous, in order to draw conclusions from this study?
    D. What have replications of this study (hopefully with larger sample sizes and no missing data) found?
5. The method section states, "Next, Phase Q entailed access to water and to a solution of 0.06 mg quinine sulfate/ml 10% sucrose solution to check for effects of housing on preference for bitter-sweet solutions. To the human palate, this quinine-sucrose solution tasted the same as the morphine sucrose solution used later in Phase 0.3."
    A. The previous phase of the study was the first phase, and that first phase was the water + 10% sucrose solution.
    B. It may be a remote possibility, but to me this brings to mind a problem inherent in this experimental arrangement – that of an order effect. Given that the phases were not randomized, could the experimental results involving morphine be a result of the order of these first two phases?
    C. A replication of this study should overcome the problem of this non-random arrangement and inherent possibility of an order effect brought about by the non-random phases.
6. The method section discussed the lost data for various sections of the study, and includes that, "…the lost data from the Q Phase may have contributed some ambiguity to the results for females…".
    A. The small sample size in this study comes to mind for me when days of lost data are mentioned.
    B. The results of this study, in popular media, are usually not mentioned as somewhat uncertain – relative to their level of ambiguity as the authors rightly point out.
7. The method section states that, "Death of a female in group CC after completion of Phase 0.3 and a female in group IC after Phase 0.15 reduced the number to 3 for these groups in the analyses for the final phases."
    A. The number of subjects in the four groups were already small, prior to these deaths.
    B. The paper does not report the cause of death for any rat in the study.
    C. Some popular commentary on this study includes the claim that the study involved no over-dose deaths.
    D. So, a small sample size in fact shrank during the study, and days of data were lost as well.

The results

1. The results section states, "Early isolation appeared to increase morphine intake in the colony-dwelling males, but the effect reached significance only in the Phase 0.15."
    A. How interesting that a main finding the work is known for (a bad environment promotes morphine use) was only found **at the lowest dose** in the study.
    B. I wonder if the rats experienced the pharmacological effect from the doses higher than the 0.15 mg solution as aversive (too strong)? A less fundamental interpretation is the one made by popular commentators: the colony is more compelling than morphine.
2. The results section states, concerning the analysis of variances, "There were no significant Fs due to early environment alone…"
    A. How interesting that the test of statistical significance (the F score in the ANOVA) found an effect for environment, but **only as a function** of *early* environment *plus other factors.*
    B. This somewhat undermines the popular interpretation and popular comments about the impact of environment, based on this study.
3. The results section states, "…males which had been isolated early in life (IC condition) drank more…" of the morphine solution than "…males reared from weaning in the colony (CC). Differences between II and CI males, however, were not consistent between measures."
    A. How interesting that those experiencing isolation early and entering the colony later were found to drink more morphine than those in the colony their whole lives. Afterall, the popular understanding of the study is that the colony is a pure preventative or completely effective repair. But this finding does seem to broadly align with more recent work identifying Adverse Childhood Experiences (ACEs) as evocative of various problems later in life.
    B. It is interesting that those in isolation continuously, and those entering isolation later, did not look similar in results. This complicates our understanding of the impacts of these various factors, and their interactions. And that level of detail is not the popular and cartoon-like common understanding of this study.
4. The results section states, "IC females appeared to consume much more (morphine) than CC females in Phase 0.15…but the only significant F was for early environment for the proportion measure."
    A. The findings here are complex in that among female rats, early isolation was found to be associated with more morphine use, **but only at a lower dose.** And early isolation **was the only arrangement** of the housing variable with any morphine-use interaction.
    B. Some popular notions are that problematic environments lead to problematic use, and don't easily accommodate the complexity of this finding.
    C. Once again, it could be that the rats found the stronger preparations aversive.
    D. More importantly, I wonder how initially acceptable low-dose use among those exiting early isolation **loads over the long term** (prognostically)? What could that tell us about the weight of variables relevant to the course of illness?
5. The results section states, "Because of the possibility of an effect of housing on preference for bitter-sweet solutions in females, which could have affected their intake of the drug-bearing solutions, the female data…"

   A. Here the authors are handling the possible order effect of their non-randomized phases involving sucrose and involving quinine + sucrose. They acknowledge it as a confounding factor.
   B. This complexity is not in the popular commentary on this work.
6. The results section states, **"…early isolation had increased (morphine) consumption in the colony females, but not the isolated females."**
   A. The finding that consumption did not increase when isolation was kept constant is interesting to me.
   B. This contradicts two popular views of this study: that isolation is despair-inducing and promotes use and problematic use; and that being in the colony is a remedy.

The discussion

1. The discussion section states, "…there was a trend toward increasing consumption of (morphine) in the IC rats and, to a lesser extent, the CC rats across the 5 days of Phases 0.3 and 0.15, suggesting that a longer period of exposure might reduce the magnitude of the housing effect."
   A. How interesting that consumption did increase for some in the colony, regardless of early isolation.
   B. Thus, it is interesting to consider that **one might grow tolerant of a euphoric environment, like a colony,** and that the early positive benefits of entering the colony might wear off with time. I've never heard that possibility raised before, whenever I've heard someone comment on this study. This possibility does come to mind, given what we know about ***the opponent process theory of acquired motivation*.** The 1980 paper by Solomon is a review of that topic. He describes ducklings when reunited with their mother initially act excited, but this soon wears off and they return to their hedonic baseline. He also describes ducklings are initially anxious upon the removal of their mother, and they return to their hedonic baseline during her prolonged absence.
   C. This reminds me of the fact that most studies are too brief, and we therefore don't get to examine the intermediate and long term impacts of interventions. And that the ACEs literature does, by contrast, examine long-term harms.
2. The discussion section states, "In addition to space and social contact, the colony environment contained cedar shavings, empty cans and boxes, and a high ceiling which allowed three-dimensional movement. Experiments underway in our laboratory should reveal the relative contributions of such factors."
   A. Here the authors acknowledge additional confounding factors – that the effects found in the study might be strictly due to the physical environment and its contents, and not only attributable to the presence of other rats.
   B. The authors seem to imply that in contrast with the colony environment, the isolation environment *did not* allow more expansive 3D movement, due to lack of a high ceiling, as *was* possible in the colony.
      i. If so, that is an additional confounding factor and would further complicate interpretation of the results.
      ii. For example, it may be that a limited opportunity for movement, rather than isolation, caused or contributed to the effects seen in the study that have been attributed to isolation per se.

iii. In behaviorism we learn a number of principles, one of which is, "Organisms love to behave." This means that depriving an organism of the opportunity to move is experienced as aversive.
iv. Wouldn't it be interesting if the famed results of the Rat Park study were eventually found to be a function of mere mobility vs immobility, and were in fact not due to isolation vs. socialization? If such a result was found, would we say, "The opposite of addiction is (the opportunity for) relatively increased movement?"

3. The discussion section states there are "…several other possible explanations for the housing effect. One of the most plausible is that morphine may reinforce isolated rats by relieving stress resulting from social and sensory isolation. This possibility, however, is contradicted by demonstrations that isolated, non-physically-dependent rats avoid drinking opiates, unless they are induced to by sweetening the opiate solution."
    A. In this portion of the discussion, the authors are describing other studies that have examined these or similar kinds of phenomena.
    B. It is interesting for me to consider that this lack of interest in morphine, and the induction to its use by sweets (a notion **not the same** as isolated rats preferring water containing morphine due to their isolation) is a rival hypothesis based on *sugar as a gateway drug*. Recent brain imaging studies have shown neural activity that resembles the neural activity found in chemical addictions, occurring during some kinds of problematic eating – not the classic eating disorders.
4. The next sentence of the discussion section states, "Isolated, non-physically-dependent rats with sectioned lingual and glossopharyngeal nerves reject morphine solution, indicating an aversion to its effects rather than to its bitter taste."
    A. It is interesting to me that even a rat that can't taste the poor flavor of morphine rejects it.
    B. Taking in content from mass media, one might think that the power of isolation and the comparative size of relief obtained by taking morphine, would be powerful enough to precipitate and maintain morphine use when its poor flavor is present – but it still isn't, even when its poor taste is removed.
5. And the next four sentences of the discussion, in sequence, state, "Isolated non-physically-dependent rats also reject presumably tasteless solutions of etonitazene. It has recently been reported that rats rejected methadone when the alternative was an equally bitter quinine solution. However, when given naltrexone injections, eliminating the pharmacological effects of methadone, the rats drank equal amounts of both solutions. Therefore the initial avoidance was not to the taste or odor of the opiate, but to its effects."
    A. This begs the question, "What does an organism find rewarding?"
    B. Along that line, one may ask, "Are the euphoric properties of various or certain opioids always superior to other consequences of taking morphine? And do they always produce maintenance of opioid-taking behavior?" Apparently, not consistently so, and not even among the isolated.
    C. This finding argues against the "chemical hooks" notion that the Rat Park narrative promulgators claim exist in our understanding of addiction, and argue against.

Questions about external validity

In experimental psychology, the term **"internal validity"** refers to the methodological integrity of a study. This involves proper controls in experimental design, careful and planned manipulation of the independent variable being researched (e.g. a type of therapy vs. a placebo or waiting list control), control of extraneous variables so the one being manipulated can be isolated as the source of change, selection of target or dependent variables to measure (e.g. mood), methods of measuring those variables (e.g. certain psychometric tests), choice of statistical methods for given data sets, operationalizing the empirical questions the study is trying to answer, etc. It aims at the control of the variables being studied so that logical deductions can reasonably be made from the study's method to the results and major findings.

By contrast, **"external validity"** basically concerns itself with the extent to which the findings from a study can be generalized to other subjects, locations, methods, etc. It looks at how broadly applicable a study is, outside of the conditions of the study.

From this study, among other considerations in external validity, I wonder:

1. Would these same findings be found with other strains of rats and their differing genetic endowment, temperament, etc.?
2. What might that tell us about generalizability to humans, or the limits of generalizability?

Part 2: Vietnam veterans returning home

The popular take shared about the Rat Park study is that it shows how almost everything we know about addiction is wrong. That's a bold statement, and I'm not sure who "we" is.

Popular commentators attached to the common narrative about the Rat Park study also commonly expound, in the context of their remarks, the relatively famous study Lee Robbins did examining Vietnam veterans returning home. In short, Robbins found that their heroin dependence appeared to spontaneously remit upon returning home. For those that might be interested, I've listed the citation to that study.

The popular commentators also emphasize that the disappearance of heroin dependence among those returning home, as Robbins found, is unanticipated and unexplained. Employing the principle that nothing more complex is needed if anything simpler is sufficient, the answer to that claim may rest in the area of knowledge broadly termed **"conditioning theories of addictions".** Few people I've ever met have a background in understanding Pavlovian/classical conditioning and its phenomenological underpinnings related to the etiology and progression of addiction illness – much less to its application in addiction treatment. Or in Skinnerian/operant conditioning similarly applied. In short, conditioning theories of addictions *would anticipate* and *can explain* that phenomena.

I've also listed a citation from Shepard Siegel that is a detailed and thorough review of the conditioning theories of addiction – examining the basic science using rat models as well as its application to the treatment of humans. Here are three examples for which conditioning theories of addictions would have a sufficiently simple explanation:

- Question: Why would it be that 10 years into sobriety and working a program of personal recovery, a person who previously had a multi-year physiological dependence to heroin via IV administration would start to feel nausea, muscle cramps, and chills while driving back to their city for the first time in 10 years?
    - Answer: Cue-evoked conditional responses in the opioid administration paradigm are **drug-compensatory** (in the opposite direction of the drug effect). If cues are encountered, even years later, for which sufficient extinction has not occurred, drug compensatory conditional responses occur. These responses occur in anticipation of the arrival of the drug, and are the body's way of maintaining homeostasis.
- Q: Why would it be that a rat in a cage with a lever who can self-administer morphine via lever pressing from a supply suspended above the cage, with a tube surgically implanted in the skull, does so while the passive yoked control partner in the other cage (who receives ½ of every dose but has no lever to press, and simply receives the morphine) **does not develop tolerance and dies** – while the one lever pressing continues to increase the dose over time and does not die?
    - A: The rat pressing the lever has an internal experience of physical sensations, rudimentary mental activity, perceiving the lever, and that of interacting with the lever. The passive-yoked partner in the other cage **does not.** Thus, the rat pressing the lever develops tolerance slowly over time, as drug use cues, both internal and external, come to reliably precede drug use, and drug use effects. The homeostatic regulatory process that maintains homeostasis grows in magnitude over time, as it would with any mammal taking opioids. By contrast, the passive yoked partner **has no way of anticipating** the arrival of a dose; it can not be anticipated by the body. The passive yoked partner experiences the full effect of every dose, does not develop the magnitude of tolerance the one lever pressing does, **and dies of overdose** – while the lever pressing rat continues to escalate its dose.
- Q: Why would it be that a rat that did all of its morphine use in a cage of a certain color, and developed high tolerance and very significant physiological dependence while self-administering in that cage, would die on the very next administration **when simply placed in a cage that looks very different?**
    - A: The lack of cues **sufficient to evoke** drug-compensatory conditional responses means the contingent level of tolerance the rat has developed in the home cage is now absent – and they die from the dose they could survive if the drug-compensatory conditional responses were present as they had been before. This is a danger of attempting a "geographic cure": overdose due to an unfamiliar environment.

My point in raising these empirical findings is that they go back to **Pavlov** himself who pointed out that opiate administration fit inside the model of his classical conditioning paradigm. And to **Abraham Wikler** who later found Pavlovian responses to opiate use in humans. And ultimately to **Shepard Siegel** who even later showed conditional responses to opiate use stimuli were in *the opposite direction* of the drug effect, and served *to preserve homeostasis by being drug-compensatory*. And that Shepard Siegel worked for a career-length at helping to define the

framework and parameters of these phenomena, and how to extend this area of inquiry from laboratory science using rats as a model, to formal clinical treatment methods with humans.

This, then, brings me to my final area of interest that to me is related to the popular notions of "Rat Park": the building of a Mouse Utopia and its resulting Colony Collapse.

Part 3: Colony collapse in a mouse utopia

Let's take a look at more foundational experiences of living that don't include substance use. What can we learn from those living **in a group space where all needs are met?**

In a series of experiments with rats, and later with mice, John Calhoun found that living within a utopian colony can lead to cannibalism, cessation of reproductive behavior, abandonment of parenting duties for pups, death of neglected pups due to starvation, violent domination by a few leading to sleep/wake cycle changes among the passive, large groups of individuals huddling in a pile in preference over socializing and over feeding, and patterns of violent attacks that seem arbitrary and without a goal or aim, by a few against many, and finally – extinction of the colony.

He coined a term for the concept he founded: "behavioral sink".

What caused the behavioral sink? In short, increased crowding over time.

But what's interesting is that the physical size of the utopia was more than sufficient to avoid crowding. The physical layout of the walkways, combined with the related, individually self-imposed patterns of travel to move **with maximal efficiency** from sleeping areas to feeding areas, etc., were such that territoriality, avoidance, and deviations from general species-specific behaviors emerged (including deviations survival-based behavior). Thus, as the population grew, crowding happened as a consequence of the interaction of the physical layout and behavioral adaptations to the environment, leading to behavioral sink.

One could surmise that the utopia, within which ample space was provided, along with unlimited food, water, nesting supplies, and proper air temperature controls, led to behavioral sink as the population grew, given a lack of pressure for species-specific survival behavior within which to channel impulses – as no purpose existed within which to channel one's drives.

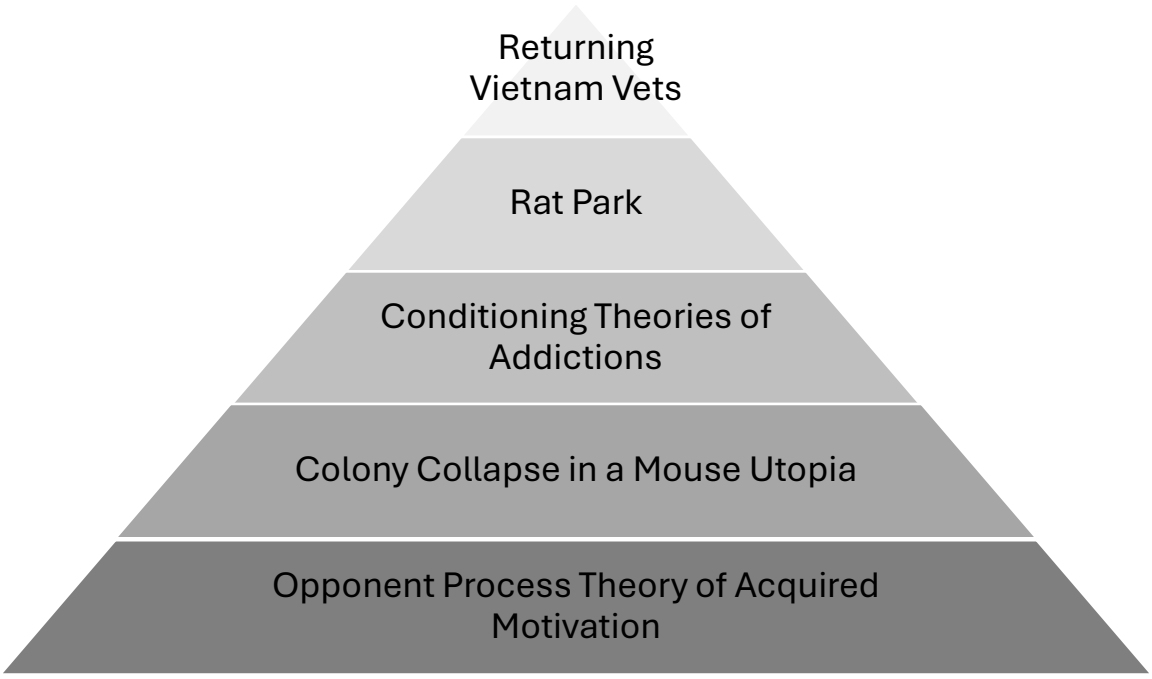
Are the hundreds of huddled rats in the center of the enclosure, choosing to stay in a thronging mass of individuals and in so doing prioritizing that kind of contact over survival (eating, drinking water, etc.), a proof of or demonstration of the notion that "connection is the opposite of addiction"? Hardly.

And what does it even mean for addiction to supposedly have an "opposite"?

To contextualize and understand Rat Park, it seems to me one could benefit from first grasping "colony collapse" as a pre-requisite in their knowledge base. Similarly, for one to understand "colony collapse" one might benefit from first understanding opponent process theory as a pre-

requisite. These taken together may form a pre-requisite to help one understand examination of similar phenomena in humans, such as Vietnam veterans returning home.

Taken differently, at an absolute level and not using Rat Park as a foundational starting point, I would order these topics as follows:



What escapes me is the idea of applying so much interpretive weight to one study:

- with 32 original subjects, 2 of whom died during the study,
- conducted for a relatively short number of days,
- in spite of missing data.

And what further escapes me is the idea of that very same one study, and its small number of follow-up studies, overturning our entire understanding of addiction on the grounds that *it exposes and includes an ignored and overlooked context*. Why does *that* escape me? Because those that argue about the study in that way (those that apply the "Rat Park" study as a device inside a narrative that "almost everything we know about addiction is wrong" and that "the opposite of addiction is connection") *commit that very error*. They do this by ignoring and overlooking key areas of scientific knowledge that would otherwise form *at least part of the context* within which the study and its results reside.

I suppose the reliable part of their approach is their fixation on context: to consider it everything, or to ignore it.

For an expanded view of context and its relevant factors, I recommend the reading of two articles. One discusses a pure drug, with easy access, at low potency, and low cost, whose use is found at all levels of social strata, culturally accepted, without stigma – and has been so for

hundreds of years – and yet causes public health nightmares nonetheless (Study Betel Nut Before You Finalize Your Public Health or Harm Reduction Policy, Coon, 2021). The other is related to defining the expanse of "cue context" and the development of parallels related to the *associations* among and between contextual cues from both Pavlovian and Freudian perspectives (Rescorla is to Pavlov as Semiotics is to Freud, Coon, 2022).

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Suggested Reading

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Coon, B. (2022). Rescorla is to Pavlov as Semiotics is to Freud. *Recovery Review.*

Acknowledgement: Thanks to Shane Phillips for providing the epigraph of this work.

Appendix: Language from Narcotics Anonymous on "The Geographic Cure"

Prior to concluding my work on this material, I asked Chris Budnick what language might be in the (approved?) literature of Narcotics Anonymous concerning "The Geographic Cure". I asked this of Chris for a number of reasons.

One is the impact Norm Hoffmann has had on me over the last 10 years or so.

Norm has impressed upon me the phrase, "If your theory doesn't match the folklore, it's time to adjust your theory."

To me, the basic notion Norm is making in that phrase is that the phenomenological observations of a large group of people over a long period of time might get prioritized and condensed into a memorable and easy to use format, like a slogan. A researcher, Norm is showing us the value of the saying, "The plural of 'anecdote' is 'data'." Nearing the end of my completion of this work, while considering that, I let my mind wander and empty, seemingly searching for some such phrase. "Geographic cure" leapt into my mind. Thus, my question to Chris.

Another from Norm is his preference, as he has stated it to me, that research be "from trench to bench".

My understanding of what he means there is that his favorite kind of empirical question is one that working clinicians identify and want researchers to answer. That is, rather than a researcher deciding what to ask and answer and then introduce to clinicians, Norm prefers to approach clinicians and ask what they wished a researcher would study and find out. Thus, my question to Chris.

One more source is my own familiarity with the learning theory literature, my enjoyment at rotating concepts, and viewing concepts from different perspectives. Could it be that "the geographic cure", which might be held in the wisdom of NA, is empirically endorsed by The Rat Park series of studies? If so, what else can we ask, answer, and validate that the legion of NA members has learned over time? Conversely, "The geographic cure" might have its limits of applicability. If so, I'd rather start with hearing from the NA literature about some of the identified limits of that idea – from their perspective. What limits might they see, and share? Thus, my question to Chris.

What follows is the exact document Chris sent me, with no changes in content or formatting – shared here in this Appendix with his permission. "Thank you, Chris!"

Analysis of select NA literature and Geographical "Cures"

There are no references to "geographical cures" in the Buff Book (1954) or White Book (1961, 1966, 1976)

Source: *Review Copy* (1981) was published after the 3rd World Literature Conference in Memphis, TN. It is the first draft of the Basic Text.

- **Why Are We Here?**

  Some of us sought cure by geographical change, blaming our surroundings and living situations for our problem. This attempt just gave us new people to take advantage of.

- **I've Come A Long Way** (Personal story appeared only in the *Review Copy*.)
  I took many geographical cures, Florida, Pennsylvania, New York, Maryland, and always losing jobs because of my addiction. No one understood me.
- **Why God?** (Personal story appeared only in the *Review Copy*.)
  Heroin saw me through a marriage, two children, a divorce, county jails, penitentiaries, and many geographic "cures."
- **Geographical Changes** (Personal story appeared only in the *Review Copy*.)
  Drinking had always appealed to me. I remember my dad and his every-present bottle. Throughout childhood, I was carried off again and again by his many geographical changes. When he died as a direct result of alcohol, I became withdrawn, silent and morbid. I lived in daydreams of my father...
  ...It was my turn to make a geographical change. I flew to a Middle Eastern country, where I married and had two children. During the following eight years, I became a responsible wife, mother, lover, cook, maid and farmer.

Source: *Approval Form* (1981) was published after the 6th World Literature Conference in advance of the 1982 World Service Conference.

- **Why Are We Here?**

  Some sought a cure by geographic change, blaming our surroundings and living situations for our problems. This attempt only gave us a chance to take advantage of new people.

Source: *Personal Stories of Recovery* (1982) is a publication containing the stories of 47 different NA members. It was compiled during the 7th World Literature Conference in Bristol, PA in January 1982.

- **Alien** (US story that was included in the 1st, 2nd, 3rd, 3rd revised, 4th, and 5th editions of the Basic Text.)

  I went from California to Florida to get clean, and when that didn't work, I went to North Carolina, and then to Connecticut and on and on. When I became uncomfortable somewhere, I moved elsewhere, The same went for my employment situation. When I didn't like my job, or I was getting close to being caught at ripping an establishment off, I would simply get another job. Geography was not adequate armor to fight the war that was taking

place in my mind, body, and spirit. I spent a summer on the Amazon of Brasil. That did net cure my addiction. Even in the Andes of Peru my addiction progressed. I learned that Customs Officials loved to see Bibles in your luggage, and they also loved to hear that your item of business in a particular country was Church and Missionary affiliated.

- **If I Can Do It, So Can You** (US story that was included in the 1st, 2nd, 3rd, 3rd revised, 4th, and 5th editions of the Basic Text.)

  As with anyone who abuses mind-altering chemicals, my life was chaotic and unmanageable. I was well aware of it, but 1 never dreamed it had anything to do with my addiction, I blamed other people, neighborhoods, jobs and cities for the problems I was having. I tried the geographic cure six times, driving across the country, alone each time. Running scared, I always ran to the same place, Minneapolis, where I was raised, and California, where I went to school. I quit jobs at random and moved frequently. I got arrested, overdosed, and finally suicidal depression set in. But I still wouldn't give up my drugs.

- **I Was Unique** (US story that was included in the 1st, 2nd, 3rd, 3rd revised, 4th, 5th and 6th editions of the Basic Text.)

  Besides institutionalization, over the years I have tried job changes, geographical relocation, self-help books, methadone programs, only using on weekends, switching to pills, marriage, health, diets and excerise, religion. None of it works other than temporarily. I was told I was incorrigible and there was not hope for me based upon my track record.

- **Sick and Tired at Eighteen** (US story that was included in the 3rd, 3rd revised, 4th, and 5th editions of the Basic Text.)

  I started drinking and using drugs when I was 13. From that point on, my whole life revolved around drugs and the people I used with. I went to any lengths to use. I slept with men tor drugs . stole from my family and friends, lied to and conned everyone and anyone I could. Within a year, I was a prostitute.

  At sixteen, l got married. We went to New York, to San Francisco and to Maine, but no geographics worked. Things only got progressively worse. My husband and 1 split up after ten months - -he didn't want to use.

- **Up From Down Under** (Australian story that was included in the 3rd, 3rd revised, 4th, and 5th editions of the Basic Text.

  I left school having failed all my examinations, not having a clue to what I should do with my life. At this time, I tried two things which I thought might help me – l became a probationary local preacher with a protestant church, and I started drinking. I soon realized that preparing the Sunday sermon in the pub Saturday night was not really the right kind of action for a budding local preacher. So gave away preaching and did more drinking. But life still wasn't working out, so l joined the Royal Navy, starting a geographical that was to last for over 10 years and 40 different countries.

Source: *Narcotics Anonymous* (1982, 1st edition)

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Source: *Narcotics Anonymous* (1982, 2008, 6th edition). The Story *I Was Unique* is referenced above. It is also in the 6th edition.

- **A Quiet Satisfaction** (Story from a member in Kenya.)

  With my willpower, self-help books, faith in God, and geographic changes, I could pull myself together and stay clean for short periods, but eventually the pain of not using would supersede the benefits of my newfound freedom from active addiction.

  I visited witch doctors, and I have marks on my chest to show for their efforts.

  Nothing worked.

- **Just Say Yes** (Story from a member from India)

  I did many geographics in active addiction to get away—from the people who loved me because I was unable to bear looking into their eyes, from the jobs I could no longer keep, from the friends I had let down.

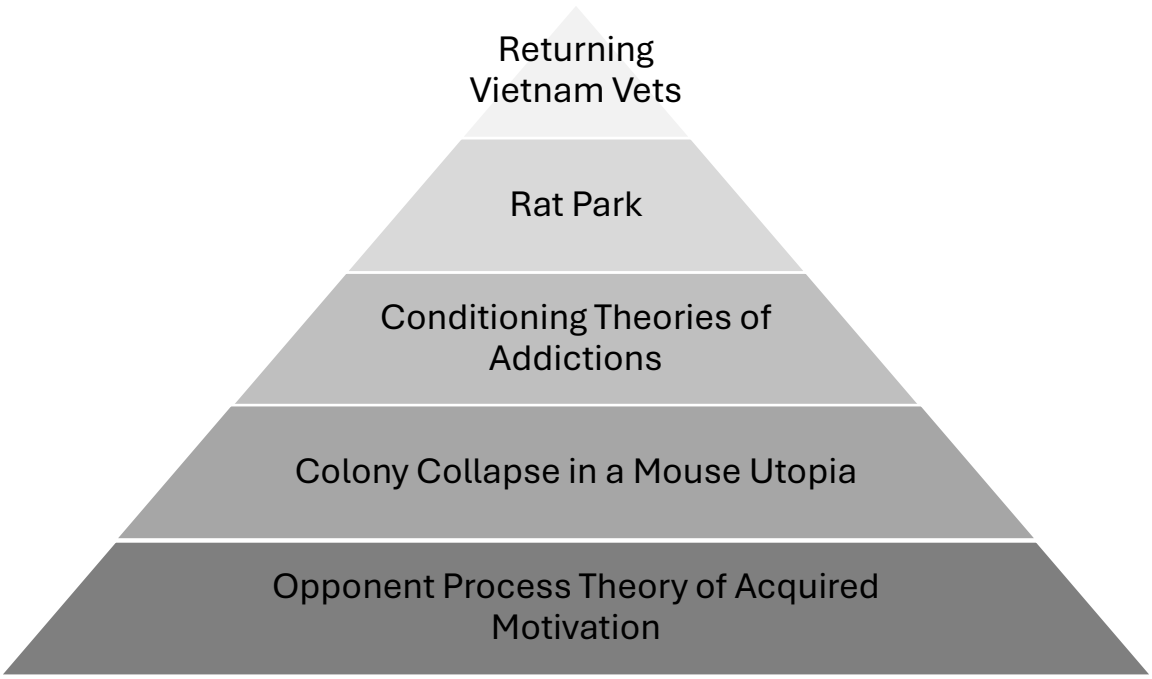
  I thought if I changed my circumstances, I would finally get my life together.

- **Mosaic** (Story from a member who grew up in a southern republic of the Soviet Union)

  I was baptized and moved as well, but neither religion nor geographical changes solved my problems.

Afterward

Below I provide examples of questions that derive from these related areas of scientific inquiry, and some that represent blends of these areas - in their content or implications – as related to this work.



Returning Vietnam Vets:

1. How stable was their wellbeing in the longer term?
2. Did some of them regard their lack of heroin-related difficulties as an opportunity to return to non-problematic use, wherein doing well was interpreted as moving backward in the course of illness, and promoted return to use?
3. Did their wellbeing differ over the long term as a function of their ease or difficulty in daily commuting within their living situation in the USA?
4. Were they able to oscillate from higher density to *low-density and rewarding* social arrangements often enough?
5. Did the relief of returning home wear off over time?
6. And what role did heroin play in these contexts and among these factors?

Rat Park:

1. After the study, as the population increased over time in the limited space of the park, I wonder if a behavioral sink emerged followed by a colony collapse?
2. And if so, what role did the available morphine play in delaying, slowing, or worsening the collapse?

Further, I imagine the so-called Rat Park study being extended to include a sequence of three housing conditions, rather than only two. Thus, imagine Colony-Isolation-Colony (CIC) and Isolation-Colony-Isolation (ICI) housing conditions and consider the following questions:

Colony-Isolation-Colony:

1. What would happen to those fully raised in the colony, extracted to live in an isolation cage while developing and maintaining a morphine dependence, and then returned to the park?
2. Would they be welcomed back?
3. What would their relationship with morphine look like? Or their relationship with other rats?
4. How would their original and acquired motivations translate in the context of returning home?
5. After returning home to the park, would their high tolerance be retained and their use continue to escalate in the familiar environment?
6. Or would they overdose at the same dose in the new cue context?

Isolation-Colony-Isolation:

1. What would happen to those raised in isolation while developing morphine dependence, later extracted to live in the colony park, and afterward returned to live in so-called isolation?
2. Would the mere separation (that is, "knowing" others are present while not being able to make physical contact) be evidenced? If so, how?
3. How would such a subject's acquired motivations, changing over the sequence of these varying contextual social arrangements, be experienced?
4. And what role would morphine play in such a scenario, when returning to familiar, separated, living conditions?