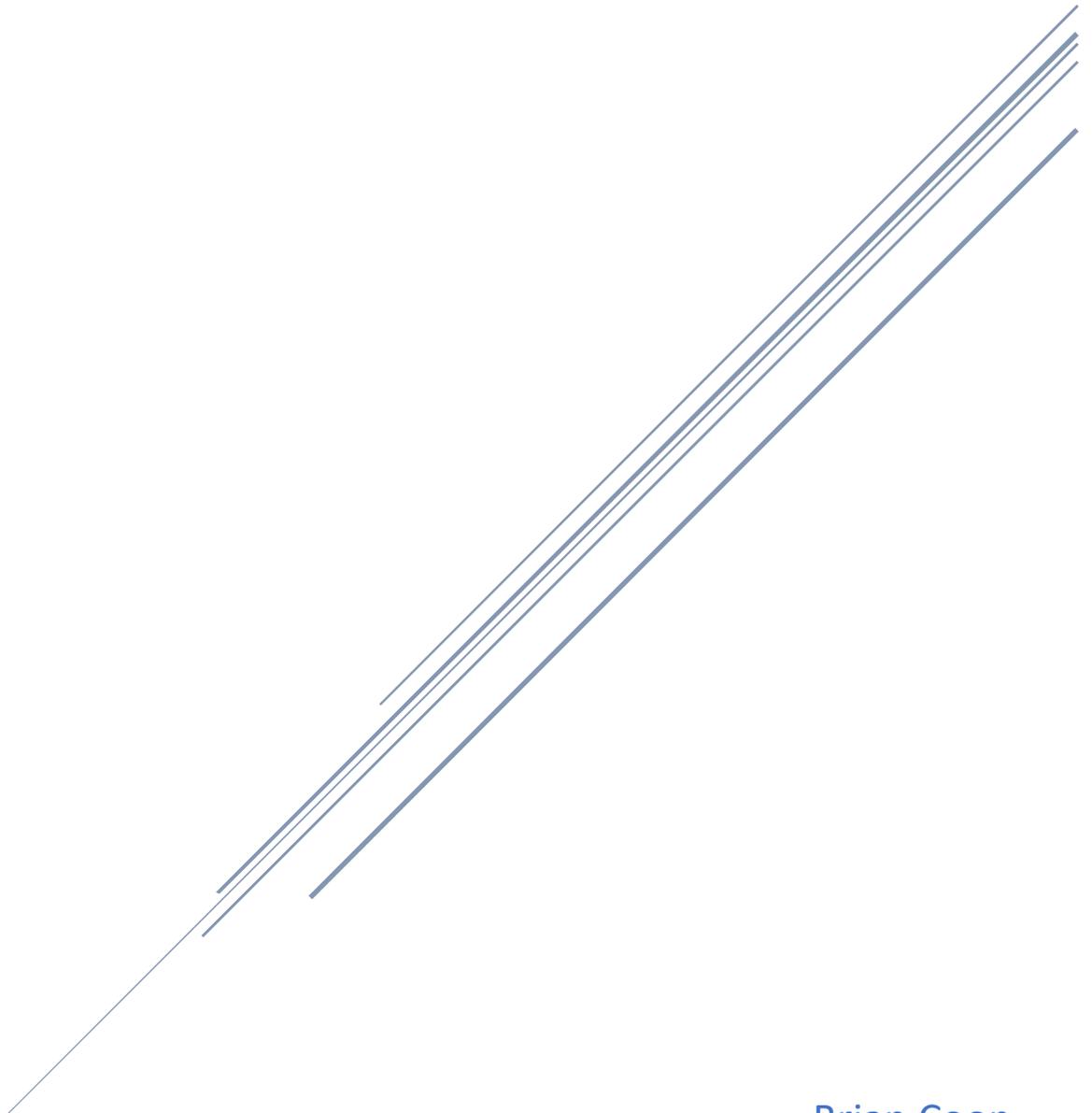


CONDITIONING THEORIES OF ADDICTIONS:

An introduction to theory, research, and practice



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A Story

Hold the following story in mind as you read this monograph. I'll refer to it on a few occasions.

Going over to their friend's place, they arrive and seem to land in a different scene. The beads hanging in the doorway are parted. The lava lamp is on. And that certain album is playing. A package of taped-up cellophane holds powder, and is sitting on the avocado-colored kitchen counter. The ritual of cooking and injecting the heroin begins. Their friend has taken off like this for years. But this is their first time. A long while after taking their shot, they realize what a relief it was – relief from their socially awkward character. And from the low mood they've carried around for years. And from their worries about life and how to make it in the world. Not only did that shot feel great, but it's also like they found friends without even trying.

Each time they go over to their friend's house to take part in this ritual, they find their body is a bit more squeamish than the last – but only a little. So little, in fact, that they talk themselves out of thinking the squeamishness is real at all. But eventually the gut cramps are strong enough, and the breathing and agitation are real enough, that they start taking off at home instead – just to save time and have less hassles. Less hassles in their body.

When their friend says they're going out of town for a few weeks, they panic. "What?!? What am I going to do? Will I run out?" They stock some extra packages for the time their friend will be out of town. But oddly, the sight of that bundle of packages becomes a picture in their mind they just can't seem to shake. And they keep a bundle of packages for themselves from that day on. It's almost like they *can* make it on their own now, even if their friend is missing for a while.

Years into this self-destructive process of injecting heroin, they go off to treatment. After a few months, they arrive door-to-door at the sober residence that was recommended. At long last, the monkey is off their back. And the "job" of keeping a supply is no more. Walking into the kitchen area of the sober residence, their body "sees" the avocado-colored counter top before their mind even realizes what they're looking at. They barely make it to the bathroom. And when the music is turned on they have to stay in the bathroom, for a lot of reasons.

"If I tell my new roommates about what just happened they'll think I'm weak. I'll just shake it off and not say anything."

In the middle of the night they awake from a using dream. The dream began with a set of beads hanging in the bedroom doorway. And a lava lamp on the nightstand. Was it real? Awakening, and looking at the nightstand, it was not – there's no lava lamp there. And there aren't any beads hanging in the doorway. But dreaming of completing the ritual downstairs in the kitchen, on the avocado-colored counter top, got their breathing so shallow and their guts moving so bad, they actually did go into the real bathroom after the dream was over. And then outside and down to the sidewalk at 2:35 am for a walk.

Returning from their walk, they went back to bed. And wondered how on earth they'll ever be able to butter their morning toast on that dreaded avocado-colored kitchen counter downstairs.

Conditioning Theories of Addictions: An Introduction to Theory, Research, and Practice

Over 100 years of empirical work with human and animal subjects conducted in research laboratories, the natural/real-world, and clinical settings, has produced a body of knowledge known as the *Conditioning Theories of Addictions*.

That work has included experiments:

- in psychophysics during the late 1800s examining phenomena such as the detectability of candlelight outdoors by humans on a moonless night;
- in the early 1900s finding smooth muscle reactions in animals to survival-based cues and application of this information to opioid use patterns in laboratory animals;
- and in the mid-to-later 1900s applying these lessons to understanding patterns of self-administration of opioids among humans.

The body of work is remarkable in that over that time no meaningful previous findings have been wholly overturned, and new findings have been incorporated. This leaves us with a very well-developed and robust area of knowledge.

Most clinical addiction treatment professionals of today know nothing or very little of this body of literature, its practical clinical relevance, importance, or its use. This exemplifies the all too common research-to-practice gap.

My aim in this monograph is to help the reader: (1) understand the stages of drug use problems from initial behavioral acquisition to later development of acquired motivations; (2) recognize processes of reinforcement, avoidance, and classical conditioning in laboratory and clinical applications for substance use disorders; (3) be prepared to discuss the range of impacts of drug use cues based on properties of stimuli and their associative contexts; and (4) apply these theories in the consideration of relapse prevention therapy, continuing care planning, and recovery planning.

The reader will notice the writing is unconventional in that it does not provide a citation for each claim presented. This is intentional. Rather, the major schools of thought, authors, and key references are themselves major points of discussion. A list of those resources is presented, including key citations. Overall, the reader is encouraged to undertake a level of self-study in this important area of knowledge.

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Disclaimers:

Nothing in this document should be taken or held as clinical instruction, clinical supervision, or advisory concerning patient care.

Stories in this document have been modified to protect against divulging any identifiable information.

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The “Just Noticeable Difference”

Within the universe of knowledge held by *the conditioning theories of addictions*, where should we begin?

I’d like to begin with the “just noticeable difference.”

The Just Noticeable Difference (JND) is the amount of any stimulus that is just barely able to be detected, compared to not being detectable at all.



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For example, imagine gazing across a lake from one shore to the other on a moonless night, and trying to see a candle as it is lit. Imagine that you know the correct direction to look. And that you know your colleague in the project will light one candle per minute, in one small location, on that other side of the lake. And your colleague will keep doing so until you signal that you just barely noticed a tiny bright spot – the moment the speck of brightness first seems to appear. That’s the JND for a candle of that brightness, at that distance, against a blank background. I wonder how many candle flames were needed in that group of candles before the flame could first be seen?

The JND can pertain to any of our senses, not just vision. For example, the JND can pertain to physical weight. Imagine holding both hands out in front of your body, with your palms facing up toward the ceiling. Imagine not being able to feel anything on your skin, maybe due to wearing mittens or gloves. And now imagine one paper clip being added to one glove, and not the other, while you keep your eyes closed. After enough paper clips are slowly added, one at a time, you might just barely be able to detect a weight difference. That’s the JND.

Something interesting about the JND is how it changes with the intensity of the background. The size of the JND is a geometric (not arithmetic) function of the intensity of the initial stimulus. This means that as the amount of background stimulus increases (brightness of the sun, weight already in your hand) the size of the stimulus needed to detect a JND increases even more.

Many people already know an example of an intense background stimulus where the whole point is to detect a JND. The popular visual called “Where’s Waldo?” turns the JND into a challenge that becomes a game. Can you detect Waldo against a background of many very similar looking characters densely packed in a large space? It’s hard to find Waldo and can be fun to try. With an intense background stimulus Waldo can be very hard to find. Against a blank background Waldo’s much easier to find. The difficulty of the game escalates in greater proportion than the increase in background intensity or clutter, as the psychophysics of the JND would predict.

From the opening story, one could ask if the music in the room is playing loud enough for your conscious mind to consciously hear it?

The JND is central to understanding the area of knowledge and method called “psychophysics”. And the findings in that area from over a century ago are still relevant today.

Psychophysics

Ernst Weber (1795-1878) examined the ability of subjects to discriminate differences in the weights of objects by lifting them, with the limit or threshold being the “just noticeable difference” (JND).

Weber noticed the ability of subjects to make the discrimination was dependent upon the ratio of one weight to the other, and that the size of the JND was not an absolute amount. This principle, which became known as Weber’s Law, was stated in a formula by Gustav Fechner (1801-1887).

Fechner noticed an arithmetical increase in sensation magnitude of JNDs required a geometric increase in physical magnitude to produce the effect, establishing a logarithmic relationship between the two: Fechner’s Law.

JNDs were determined experimentally by three methods.

1. Weber and Fechner used a method called the *method of constant stimuli* in which variable stimuli were compared with a standard stimulus, and the JND thus determined.
2. Fechner used the *method of average error*, in which a person could adjust one stimulus to meet the standard of a constant stimulus; the JND was the amount of average error after many attempts.
3. Fechner’s *method of limits* employed two identical stimuli, one of which was changed until a difference was detected; the average threshold was the amount of the JND.

It’s important to note that the intensity of the initial or background stimulus determines the size of the JND. The smaller the intensity of initial stimulus, the smaller the JND. The larger the intensity of the initial stimulus, the larger the JND.

For example, if a blindfolded subject holds a 16-pound bowling ball in each hand with arms outstretched, how many paper clips (how much weight) must be added to one of the hands before a just noticeable difference is detected? Or, if a blindfolded subject holds 10 paper clips in each hand with arms outstretched, how many paper clips (how much weight) must be added to one of the hands before a just noticeable difference in weight is detected?

Alternatively, imagine staring into a bright light while trying to detect the addition of a slightly brighter light added to that space.

How can the basic approaches of psychophysics that have been discussed be applied in the context of clinically significant heroin use?

1. The *method of constant stimuli*. What variable stimulus is compared with a constant stimulus? Testing (tasting) the variable quality of several bags of heroin against the constant of the best bag the individual has ever sampled.
2. The *method of average error*. How does the person with a heroin addiction adjust one stimulus to meet the standard of a constant stimulus? Setting up correctly prepared doses of heroin to meet the perceived constant intensity of the withdrawal syndrome.
3. The *method of limits*. What two identical stimuli are compared, with one changed until a difference is detected? To prevent overdose and/or to avoid selling or giving away too

good a shot, the person with a heroin addiction is motivated to detect the slightest increase or decrease in the quality of a bag or shot.

In short, the individual with a heroin addiction lives in a perceptual experience (relative to the general population) characterized by: extreme reference points for pleasure and pain; reduced limits of frustration tolerance; and a motivation characterized by pursuit of euphoria, or at least escape from and/or avoidance of pain. The rewards of addictive behaviors generalize to reinforce addictive thinking. And the punishing consequences of not participating in the addiction are rather large.

From the opening story, we could state that as the “party” part of the “party” winds down, and people start to leave, the music that’s playing in the background suddenly seems louder. And it’s in this context that the more intense rituals begin. And that one specific ritual seems to bring relief, to say nothing of the pleasure caused directly by the drug itself.

Next, let’s explore some dimensions of perceptual reality that pertain to these kinds of experiences. To do so we’ll examine some of the work of Pavlov and the area known as Pavlovian Conditioning.

Pavlovian (Classical) Conditioning

Ivan Pavlov (1849-1936) is well known outside of academic psychology. And even within academic psychology he's much better known than Weber and Fechner.

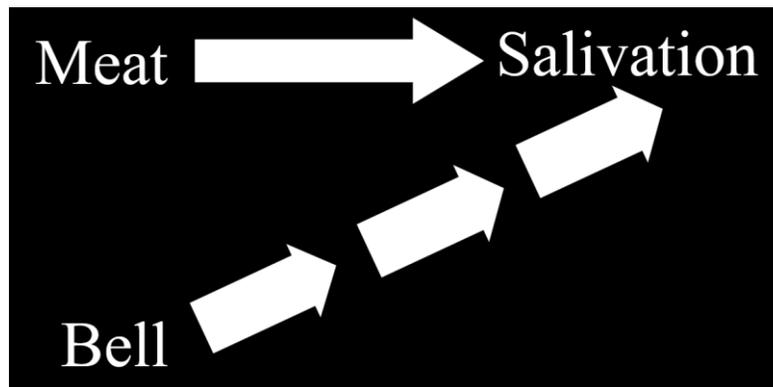
What were some of Pavlov's main contributions relevant to the topic of this work? In short, it's the area called "Pavlovian Conditioning", also known as "Classical Conditioning."

Before we get into that material, I want to say that academics who are rather deeply connected to this area of conditioning are fond of pointing out that his word "conditional" in his original Russian writing was mistranslated to "conditioned" in English. And that his original word in Russian, "unconditional", was mistranslated as "unconditioned" in English. Some students of this material have found that if they read, consider, or even meditate on this content using the correct two words, the claims and exact statements tend to make sense more naturally and intuitively. As we proceed I'll tend to use the correct words, *conditional* and *unconditional*.

Pavlov's conditioning paradigm consisted of an initially neutral cue reliably preceding a stimulus that unconditionally produces a response. And after repeated pairings, the once neutral cue eventually comes to produce a *conditional response* that is very similar to the *unconditional response*. The originally neutral cue by that point has become a *conditional stimulus*.

The famous preparation of this paradigm included a bell as the conditional stimulus (CS), meat as the unconditional stimulus (UCS), salivation in response to the meat as the unconditional response (UCR), and salivation in response to the bell alone as the conditional response (CR).

Salivation in response to the meat happens unconditionally. Thus, the direct arrow shown below.



But salivation in response to the bell is conditional upon repeated pairings of the bell and the meat – such as ringing the bell just before presentation of the meat. Over repeated pairings, the originally neutral bell comes to elicit salivation when presented alone.

Further, the reader may find it interesting that Pavlov himself suggested drug use fits the Pavlovian conditioning paradigm.

For example, the pharmacological action of heroin would be the unconditional stimulus (UCS,

such as the presence of meat), the unconditional responses (UCR's, such as salivation to meat) would include euphoria and a warm sensation, and the conditional stimuli (CS, such as the bell) would be the drug-related environmental cues such as money, spoons, syringes, lava lamps, and music that might be playing.

As stated by Corty and Coon (1995), "Pavlov (1927/1960) noted a serendipitous finding that the presentation of stimuli associated with drug administration (e.g., the sight of the experimenter or of a syringe) came to elicit conditioned responses similar to the unconditional responses caused by the injection of the drug. In other words, the experimenter and the syringe became cues or conditioned stimuli (CS) for a conditioned response (CR) that was similar to the unconditioned response (UCR)."

Here, the reliable presence of the lava lamp, turned on before the ritual gets started, signals what is about to come. The beads while entering the room, and the music in the background, are also being paired with what's delivered as well.

While this may be clearly understood, one may ask if transferring an automatic and reflexive smooth muscle response (such as salivation or blood pressure to the control of a previously neutral cue), is the only area of conditioning relevant to the onset and progress of drug use? Hardly. It turns out that *pleasure* and *aversive states* are also central to the topic.

We will look at those areas next.

Skinnerian (Operant) Conditioning

B. F. Skinner (1904-1990) was interested in the impacts of consequences (e.g. rewards and punishers) on the frequency of behavior, among other similar topics, in what he called radical behaviorism. His focus was on instrumental behavior (done by skeletal muscle) and what increases or decreases it. This is different from the focus on autonomic responses (smooth muscle reactions, such as glandular secretions of saliva) found in Pavlovian conditioning, and what transfers those reactions from one cue to another.

By definition, “reinforcement” means to increase the frequency of a response (a behavior). Likewise, by definition, a “reinforcer” is anything that produces reinforcement as an effect. What an individual experiences as reinforcing, another individual may not find reinforcing. And what a certain individual finds initially reinforcing, they may not find reinforcing later. For example, perhaps the first cookie that one is offered serves as a reinforcer, while the 10th cookie may not seem appealing in any way.

If the consequence (being given a cookie) of a behavior (providing a negative urine sample) increases the frequency of the response (providing a negative urine sample), then the consequence (being given a cookie) was reinforcing, by definition. Alternatively, if the consequence (cookie) of a behavior (negative urine) did not increase the frequency of the response (negative urine), then the consequence (cookie) was not a reinforcer, by definition.

To examine the effects of hedonic and aversive consequences on behavior, Skinner invented what is now commonly called the “Skinner box.” An example of the Skinner box is shown below.

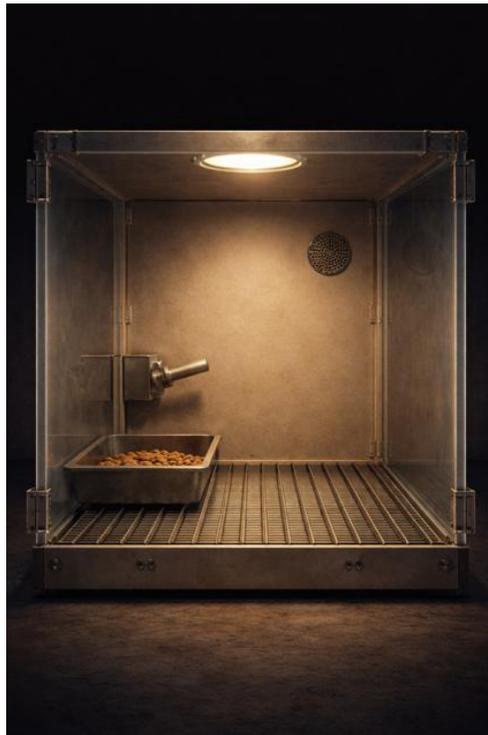


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In operant conditioning, whether or not *a thing* (like a cookie) or *a consequence* of a behavior (like the arrival of a cookie), is reinforcing or punishing, is determined by the subject's behavioral response. It is not a property of the thing in itself. That is to say, a cookie is not a "reinforcer" or a "punisher" per se. And in fact, nothing is.

Thus, we would never say that any one particular consequence is a reward, or a punisher, until we see the results. And even then, we would only limit that observation and its conclusion to that one single instance.

For example, do we all like the same music? Do we always enjoy the same one album the same amount as it's being played over and over all night?

As research in this area progressed over time, exploring the nature of both classical conditioning and operant conditioning advanced even further. And the application of this entire body of knowledge to substance use disorders also advanced, including with human subjects.

Researchers observed that reactions to drug-use cues sometimes compensated for the anticipated effects of drug use, even before the drug was consumed.

It's to that body of work we now turn.

Drug-Compensatory Conditional Responses

The next person in the development of this area of knowledge within the substance use disorder arena is Abraham Wikler (1910-1981). One of Wikler's main contributions was the identification of conditional responses that are drug-compensatory.

As Corty and Coon (1995) state, "Wikler differed from Pavlov in that he thought that the CR was compensatory, i.e., opposite in direction to the direct effect of the drug. Drug UCRs are complex, and determining the direction of a CR is not an easy task. The compensatory view, because it explains tolerance and withdrawal phenomena is more generally accepted in the cue exposure literature."

Wikler noted that the CR in the drug administration paradigm is in the *opposite direction* of the UCR and serves as an attempt of the body to counter the drug's effects and to preserve physiological homeostasis. For example, the UCR in the heroin use scenario would include euphoria, a warm feeling, relaxed muscles, slowed rate of heartbeat and respiration, and a "nod."

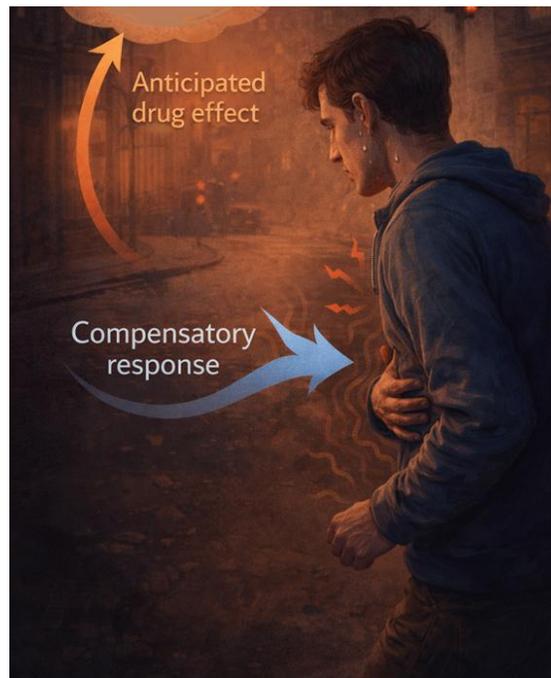


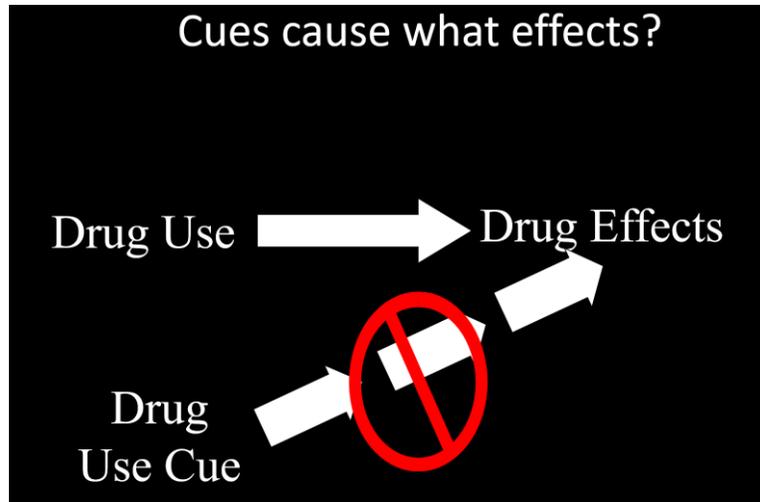
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Wikler found that exposure to drug-predictive conditional stimuli produces conditional responses that are *anticipatory* and in the *opposite direction* of the drug's effects. That is to say, the conditional responses produced by drug cues are *drug-compensatory*. Thus, in the case of opioids, things like anxiety, irritability, chills, sweats, diarrhea, and an increased heart and respiration rate would result from mere exposure to the conditional stimuli, *regardless* of whether or not the drug was actually administered. Drug-compensatory conditional responses are the body's way of keeping things neutral – preserving physiological homeostasis.

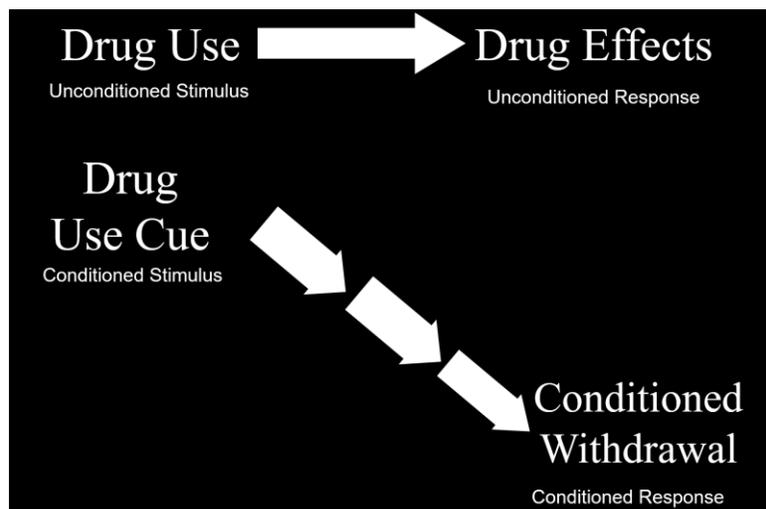
Let's take a closer look at this phenomenon. And let's ask what effects are caused by the mere presence of drug use cues.

As shown below, we know that drug use directly causes drug effects. That fact is simple and based on the direct impact of the drug itself. Those effects are driven by things like metabolism of the drug that is used.

But does a cue associated with drug use cause the *same effect* that's caused by using the drug? In short, no, it does not – as you see below.

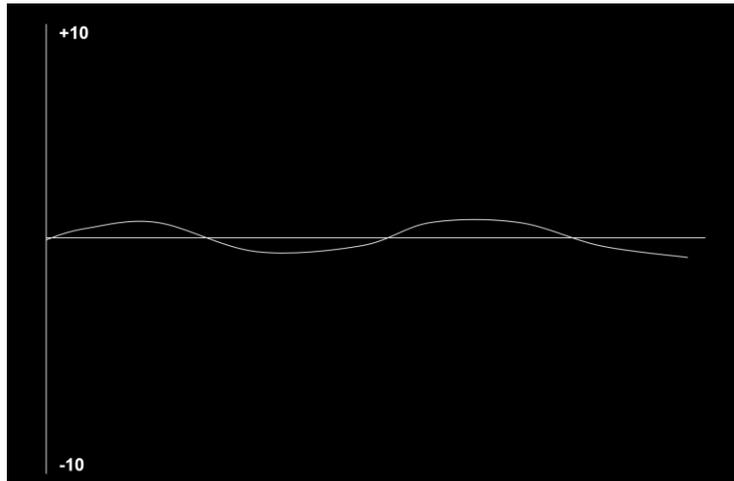


Use of the drug brings the drug inside the body, and the drug acts as a stimulus within the body. The effects of the drug on the body are produced by the drug, and are unconditional. But Wikler noticed that over repeated pairings, a drug use cue can in fact elicit *the opposite* of the drug effect. And he referred to this opposite effect as *conditioned withdrawal* (as pictured below). He named it "conditioned withdrawal" because the effects of the cue, given that they are opposite from the drug's effects, are very similar to withdrawal. And their onset is conditioned.



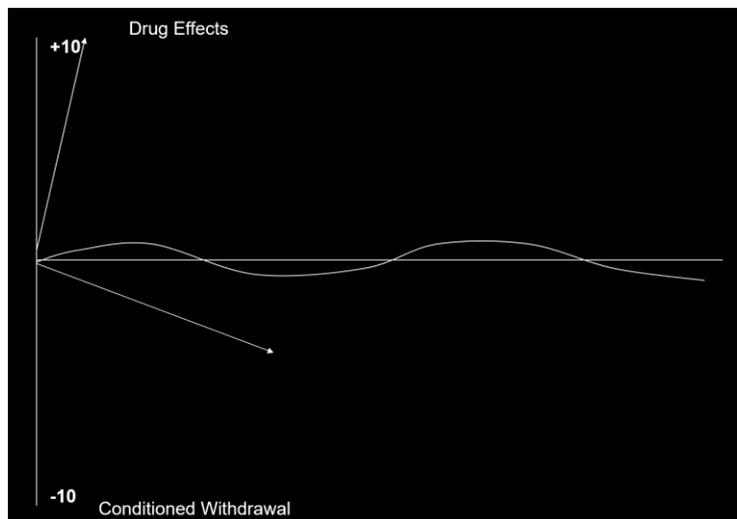
How is this so-called conditioned withdrawal explained?

In short, the body is built to preserve homeostasis. Factors like blood pressure, respiration, heart rate, and so forth, tend to remain steady over time. The body adjusts to keep them steady as circumstances change. This steadiness, or homeostasis, is shown in the figure below. Over time there is little change in key physical parameters.



But what about the impacts of drug use? Does the body adjust in order to maintain physiological homeostasis? And if so, how?

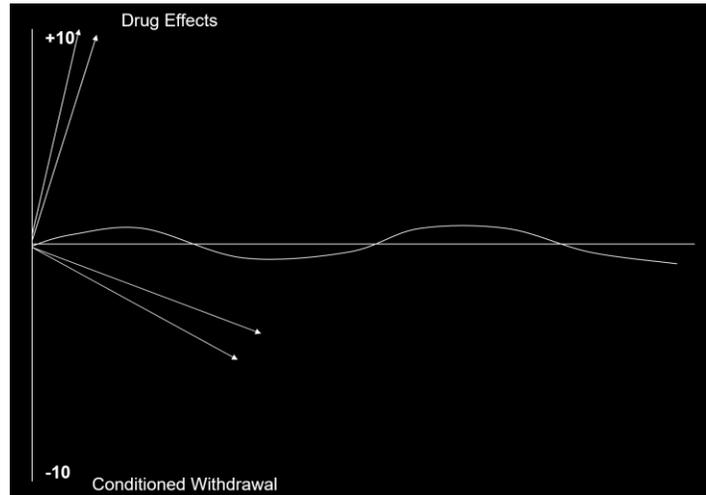
When a drug is used, and the person has not used that drug before, the drug effects tend to be large or full, as shown below. The line moving upward from the time of drug use on the left, up toward the +10 peak effect, shows the rather rapid, full effect of using that drug, as one would expect.



But the body would rather keep everything steady. And because the use of this drug is new, the body's ability to adjust is rather small and the body can only counter the full effects of the drug

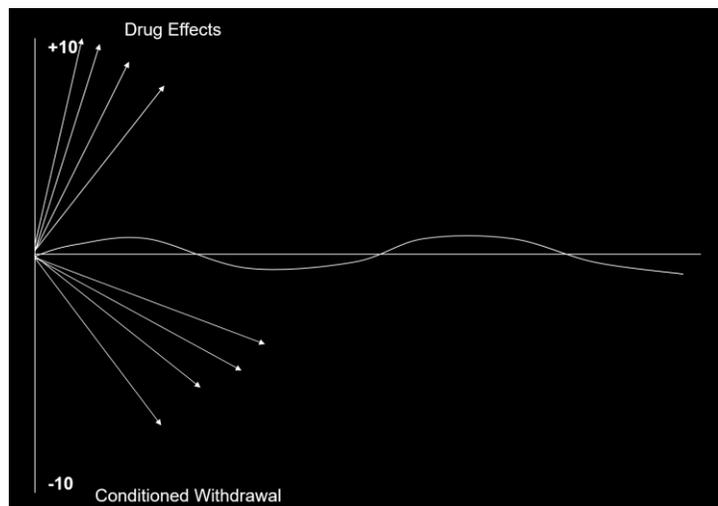
by a small amount. So, the +10 from the drug is combined with the -2 or -3 that the body naturally tries to counters with. And that difference leaves a net drug effect that is rather strong.

If you will look carefully in the diagram below, the second time the drug is used (the second arrow down in the top half of the graph) the response to the drug is slightly less. But why is it slightly less, you might ask?



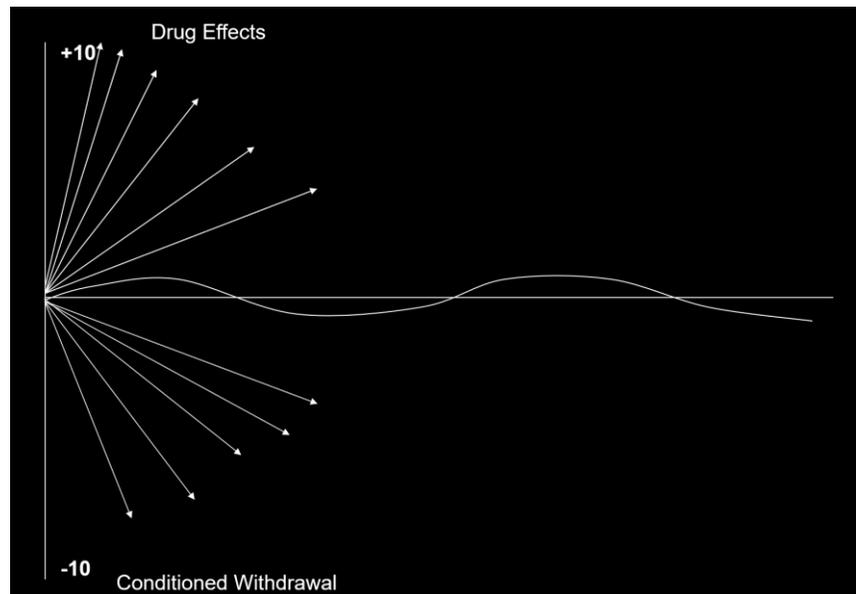
The second time the drug was used, the body adjusted by adding slightly greater conditioned withdrawal reactions compared to the previous time. That slightly greater intensity of a drug-compensatory conditioned response is shown in the bottom arrow. That bottom arrow is a little closer to the -10 end of the scale than the arrow from the previous using occasion. Thus, the net effect is closer to the homeostasis that the body would prefer, than the net result from the last time. The adjustment produces a reduced drug effect. And so on over time. The aim is homeostasis.

And remember, that drug compensatory conditional withdrawal happens *before* a using occasion, as the person encounters cues that reliably precede and signal impending use of the drug.



As using occasions become more numerous, the body learns better and better to make adjustments that are both larger and sooner – toward better preserving homeostasis.

And the net effect of each drug administration drops slightly each time. Homeostasis is being preserved.



As you can see in the diagram above, the latest use in time (the lowest arrow above the horizontal line) was accompanied by a much more intense conditioned reaction (the arrow nearly pointing all the way down at -10). And the drug effect arrow for that last instance of use looks like it's less than +5 on the graph.

Many people name that lowered drug effect “tolerance.”

Importantly, Wikler’s observations predict that conditioned physical reactions to the mere presence of drug use cues will happen regardless of whether or not the drug is used in any particular instance. And he also noticed that those conditional reactions are basically the opposite of the drug’s effects. This anticipatory reaction in the direction opposite of the drug effect can help to eventually result in a nearly zero-sum effect of using the drug, when the drug use finally happens.

But Wikler doesn’t stop there. He also notes the relief (positive reinforcement) that’s obtained from using *after* those drug-compensatory conditional withdrawal signs and symptoms have already begun. So, he points out that the classically conditioned drug-compensatory response creates an aversive experience. And when (operant) drug use happens next, using is reinforced by providing relief.

As Corty and Coon (1995) state, “Wikler noted that withdrawal symptoms occurred in opiate addicts months after physiological withdrawal had ceased and that such withdrawal was sufficiently aversive to motivate substance use to alleviate the symptoms. Wikler suggested that

two-factor theory might account for this relapse. First, via repeated exposure, environmental stimuli became conditioned stimuli that elicited withdrawal symptoms. Then, the CS-elicited withdrawal symptoms led to the operant activity of drug administration that alleviated the withdrawal symptoms and increased the probability of future drug-using behavior.”

In sum, Wikler expanded and clarified the understanding of conditional responses as being in a drug-compensatory direction. And he explained the acquisition and maintenance of some drug-use behavior based on two-factor theory (both classical and operant conditioning, happening together).

The start of our heroin using career at our friend’s house over the avocado-colored counter top, and the regular pairing of that counter top with the ritual, seems to bring a certain level of meaning to that countertop it didn’t originally have.

But to appropriately complicate the matter, one might wonder if someone can encounter drug-compensatory conditional responses to drug use cues even months or years into abstinence? The answer is yes.

Next, we will look at the researcher who followed Wikler in this lineage of inquiry and greatly expanded the scope and specificity of related research questions: Shephard Siegel.

Shepard Siegel

Shepherd Siegel's work in this area is so focused, wide-ranging, and detailed – while always resting on the body of research and theory outlined in this work up to this point – he serves as a topic all on his own.

What did he examine in his career-length laboratory work on the intersections of conditioning and addictions? Nearly everything, it seems.

Below are some of my favorite studies and findings in his copious body of work.

The passive yoked control

Imagine a rat in a Skinner box that's arranged so the rat can self-administer morphine at the press of a lever. When the lever is pressed, a certain amount of morphine in the bag up above the lever is allowed to drop down into a tube. And the tube enters the rat. In that arrangement the rat's tolerance to morphine will slowly grow over time. Why? Drug-compensatory conditional withdrawal tends to increase over time, if the cues are reliable, preserving homeostasis.

But now imagine an alternative arrangement where the tube descending from the morphine supply splits into a downward Y-shape before it reaches the rat. When released, the dose of morphine drops down the initial part of the tube, reaches the Y-shaped split, and divides evenly into two separate amounts. And a portion of the initial amount drops down each side of the split. Approximately one half of the amount goes to the rat with the lever. And the other half travels down the other side of the split and goes into a rat in a neighboring cage. And that rat has no lever.

In that arrangement, the tolerance of the rat pressing the lever will slowly increase, as usual. But the neighboring rat without a lever will eventually pass away from an overdose. And the rat with the lever does not, even when receiving the same dose that seemed to cause the passing of the other rat.

Is it true that a later, larger dose is lethal for one rat, and not lethal for the other? Especially when they have each been receiving the same amount the entire time?

In his research, Siegel determined that the rat without the lever does not encounter any internal or external cues that reliably precede arrival of the morphine. And thus, the rat without a lever does not experience any significant level of any drug-compensatory conditional response. And thus, significant tolerance does not develop.

But the rat pressing the lever experiences increasing tolerance over time, and does not pass away from overdose.

How are these findings explained?

The rat presses the lever in an environment with a number of cues that reliably precede drug administration. These cues include walking over to the lever, pressing the lever, and even the

internal activity of “deciding” to press the lever. Thus, over time, those cues come to reliably signal the immediately impending onset of morphine administration. And the rat’s body compensates prior to the lever even being pressed. It compensates with a variety of classically conditioned responses that are in the opposite direction of the drug’s direct effect. In that way, tolerance develops in the lever pressing rat, and homeostasis (of things like blood pressure, etc.) is preserved.

By contrast, the rat in the neighboring cage has no cues reliably happening just before the morphine arrives. That rat is a passive recipient of the morphine in a context that provides no cue predictably preceding arrival of any dose. And that rat therefore experiences nearly the full effect of every dose each time one is delivered. (To be clear, a very small increase in tolerance does happen simply due to biochemistry. And although measurable, that tiny increase in tolerance has no practical or clinical significance in any mammal whatsoever). As the lever pressing rat’s dose increases over time as a function of its tolerance, the passive yoked control eventually receives a dose large enough to be lethal. It is lethal because it is received in the absence of any conditional withdrawal that would otherwise mitigate the impact of the drug.

And so, Shepherd Siegel’s work shows that internal cues, external cues, and the responses to cues, all produce effects. And these effects are cue-context dependent.

Further, it is important to note that returning to substance use following a period of abstinence, also known as relapse, is oftentimes both a positive reinforcer (a hedonic) and a negative reinforcer (relief from an aversive). And that double benefit is compelling.

Given that conditional withdrawal can be experienced when the right cues are encountered, even years into abstinence, the aversive state they evoke is important to understand and mitigate. This is commonly done through addiction counseling methods such as urge surfing. Such skills can help assure that chemical relapse is predicted, appreciated, and averted.

Extinction of cued responses

But Siegel’s work also includes investigation of the *extinction* of conditional withdrawal, and exploring the optimal parameters for maximizing the extinction of these responses by careful cue exposure.

What is extinction of Pavlovian responses to cues?

Extinction refers to the diminishment of conditional responses as a function of cue exposure. This allows the responses to occur and wash out over time (be extinguished). How or why is this important? The evocation of behavioral (Skinnerian) responses (such as drug use), for relief from the aversive conditional withdrawal that follows cue exposure, is prevented.

One might wonder if medications for opioid use disorder, such as methadone or buprenorphine, prevent or otherwise block the experience of conditional withdrawal in response to use cues?

No, they do not. Neither does non-prescribed use of pharmaceutical opiates or street opiates. In fact, conditional withdrawal due to cue exposure is not even prevented by being “high” on an opiate.

I clearly recall, back in 1999, reading an empirical case report of conditioned withdrawal and craving present while the patient was on a maintenance methadone dose of 600mg (with the normal and requisite serum level, as evidence of normal drug metabolism).

Switching home cages

In another arrangement, Siegel repeated the same experiment, but made sure the interior of the home cages for the lever-pressing rat and the passive yoked control rat were painted very differently. How so? Imagine the inside of the cage with the lever being painted with a stark white paint, and the interior of the cage without the lever being painted with a jet black interior.

What happens?

Over time, the pattern remains the same. The rat pressing the lever experiences escalating tolerance that builds over time. And at some point, the rat without a lever simply passes away due to the unmitigated amplitude of the drug effect from the rising doses of morphine it receives. And that’s due to the absence of any clinically significant cue-evoked drug-compensatory conditional withdrawal.

But then, Siegel makes an interesting move.

He simply relocates the rat that’s been pressing the lever. He moves that rat from its original home cage that’s painted black, where it’s been self-administering morphine, into the cage with the interior painted white. And then he installs a lever in that white colored cage, as was originally present in the home cage painted black.

What happens?

The rat that has been pressing the lever and seems to have a high tolerance to morphine simply passes away upon administration of the very next dose.

Why?

The internal experience of “deciding”, and the activity of pressing the lever, when combined, were not sufficient to cue the entire (necessary) amplitude of conditional withdrawal that would allow survival of that dose. And so, the rat experiences a much more intense drug effect. And passes away. The combination of the absence of the black paint and the presence of the new white paint was sufficient to alter the cue context of self-administration such that the rat’s tolerance was significantly diminished. After all, tolerance *is a conditional phenomenon*, and not merely a chemical one.

How does this apply to humans during their prolonged abstinence during their course of illness or during their addiction recovery?

Drug-compensatory conditional responses (which may be considered conditional withdrawal) can be elicited by presentation of the right cue(s) under the right conditions of saliency, even when the subject has not taken the chemical *for years*. Even then, conditional responses that have not been extinguished are subject to significant display under the right cue context. And especially so if the relationship between drug use, and the cues associated with drug acquisition and drug use, still exist in a strong enough way to promote attempts by the body to preserve homeostasis. If these linkages are not extinguished or significantly altered, the experience of conditioned withdrawal (the aversive experience evoked by this arrangement) does tend to promote drug use as a natural, immediate, and effective way of obtaining relief.

That certain music. Particular household items. And that one person. Running into that person, with that music playing, and that countertop in view – might signal one's history with a certain ritual.

And eventually, over his career, Siegel showed that conditionable phenomena include: tolerance, craving, physiological withdrawal, psychological withdrawal, and overdose. Yes, each of these are *not* a mere function of the drug or drug use itself. These are *conditional* phenomena. Let that fact sink in. These are not absolute phenomena – they are displayed as a function of conditioning and cue exposure.

And going even further, we will now extend this area of inquiry to general emotion content as well, rather than strictly limiting it to the experience of drug effects.

The Opponent-Process Theory of Acquired Motivation

The seminal 1980 paper by Richard Solomon titled “The Opponent-Process Theory of Acquired Motivation: The Costs of Pleasure and the Benefits of Pain” covers material that is both foundational and essential to our understanding of the conditioning theories of addictions.

In that paper, Solomon states a few key principles in psychology and uses simple examples found in the natural real-life behavior of various animals.

He states that when an unconditioned stimulus, reinforcer, or innate releaser is repeatedly presented, three phenomena can be observed: (1) affective or hedonic contrast; (2) affective or hedonic habituation, also known as tolerance; and (3) a withdrawal or abstinence syndrome.

But what common and naturally-occurring variables could he possibly be referring to, especially in animals and birds, as being repeatedly presented? And what examples of these can be shown? We will consider each of these three phenomena in turn.

Affective or hedonic contrast

When ducklings are presented with their mother, they display behaviors and make sounds that are recognized as indicating pleasure. And that pleasure is a hedonic contrast from their resting state prior to her being presented. For example, on a scale of apparent pleasure ranging from -10 up through 0 and on up to +10, when she is presented, the ducklings might be rated in their initial reaction as +10.



Image generated by Open Access AI

Affective or hedonic habituation/tolerance

However, during the enduring presence of their mother, these behaviors and sounds that indicate pleasure slowly subside. Over an extended period of time with their mother they evidence tolerance to the initial hedonic contrast and return to their hedonic baseline. For example, they might eventually drop back to the resting state of 0 (not -10) from the earlier +10 location on the pleasure scale.

Hedonic habituation is pictured below.



Image generated by Open Access AI

Withdrawal or abstinence syndrome

But what happens when the mother is suddenly removed? Following what is called “stimulus termination” a period of withdrawal or abstinence syndrome is entered. For ducklings, in the early portion of that phase, some behavioral and vocal indicators of distress are often displayed. For example, during the initial removal of the mother they might initially be rated as -10 on that same -10 to +10 scale of apparent pleasure.



Image generated by Open Access AI

But once again, what happens when she is gone for a long enough time? After the termination (her absence) of that stimulus is long-sustained, the ducklings return to their hedonic baseline. For example, they might eventually rise back up to 0 from the earlier -10 location on the pleasure scale.

Of course, if and when the mother is re-presented, hedonic contrast occurs again. And its architecture or form will be individually unique to both the present circumstances and cue exposure history of each relevant individual duckling.

Taken together, this material can be held as a basic framework for understanding emotion as both a response and also as an internal cue.

In his paper, Solomon applies these principles to acquired motives across a range of behaviors and life experiences. These include, “drug addiction, love, affection and social attachment, and cravings for sensory and aesthetic experiences (cases in which the initial reinforcers are positive), and such acquired motives as parachuting, jogging and ‘marathoning’, sauna bathing, and a variety of self-administered, aversive stimuli like electric shocks (cases in which the initial reinforcers are negative).”

His paper explores the impact of these principles as cue presentations differ across parameters such quality, intensity, duration, and time intervals in various scenarios.

Throughout my career, many specific cases have consisted of data to which the opponent process theory of acquired motivation seemed readily applicable.

One example is the negative feedback loop that can be present in the patient/care-giver dynamic during pain management. This includes the associated phenomena commonly called “pseudo-addiction.” The erroneous case formulation that emerges in the mind of the care-giver is that the patient is “an addict who is drug-seeking.” And the judgment of the pain patient is that the care giver doesn’t care and is withholding help. If you are not familiar with this specific negative feedback loop and its role in forming “pseudo-addiction” it is well worth a read.

I have often used the framework of the opponent-process theory of acquired motivation as a way of understanding the patient with a serious and very long-standing intravenous heroin use history. And perhaps also specifically applied to their methadone maintenance, or long methadone withdrawal schedule – *before* any case history facts or additional attempts at “helping” are applied.

It may sound paradoxical or ironic, but for decades I have often found it far more beneficial to encourage the person with physical dependence and/or psychological dependence in the context of their severe, chronic, and complex opioid use disorder to “not trust us, watch us.” And then explain how nursing staff, support staff, counseling staff, and all employees including prescribers are merely human. And *to watch us*, and keep us on-point by informing us of what in their own personal opinion seems to matter and be important – rather than attempt to read our minds and assume we know. Or overly rely on our professionalism and apparent competence. In this way, encouraging the patient to *watch us* and inform us *rather than trust us* in silence, promotes a kind of calming and open door for a 2-way dialogue in each clinical encounter. And it seems to support self-efficacy in a way that is deeply resonant and congruent with their somatic and intrapsychic material.

In that vein, what advances could there be, if any, that build upon all the content presented in this work thus far?

The work and findings of the research team in the next section are rather world-famous, even if their names are not.

We will briefly examine the imaging studies done at the Philadelphia VA next.

Imaging Studies: The Philadelphia VA Research Group

Do you recognize the following names: Charles P. O'Brien, Anna Rose Childress, A. Thomas McLellan, and Ronald N. Ehrman? That was the research group at the Philadelphia VA where imaging studies were conducted as early as the 1980s, in the area of conditioning theories of addictions. During my Master's program, the chair of my thesis committee was Eric Corty, who did post-doctoral work in that research group.

That research group produced many basic ideas and images that are famous even today.

For example, let me ask you a question. In a person who uses cocaine, what does exposure to a cocaine use cue, such as igniting the cocaine and drawing it up into a pipe but not inhaling it, do to the activity in the person's mid-brain? Many of us have a visual image enter our mind as the answer. The image probably comes to mind because of the findings of this research group – even if you've never read any of their original papers.

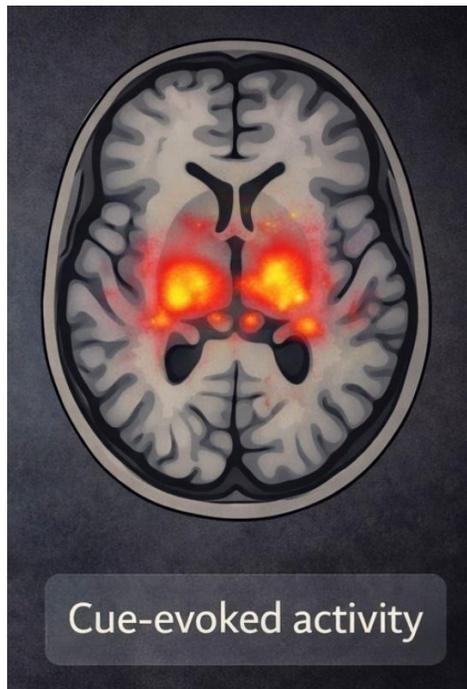


Image generated by Open Access AI

This research group has inspired me to wonder, for decades, if maybe one day our technology could be dramatically improved and also become dramatically smaller. And to imagine that in the same way computers of the last century were originally room-sized, and have become much smaller, much faster, and much more powerful - perhaps the fMRI of today could become pocket-sized. And I've even wished that such a powerful and tiny fMRI machine could simply be in the shirt pocket of every member in group therapy. And that there would be a screen of screens in another room, watched by the clinical supervisor, who would provide real-time in-ear feedback to the counselor during group. That way we could *see and know* what improvements are made, and are needed.

Yes, I dream of the day we will be able to use fMRI for clinical outcomes.

If we could advance our research agenda that far, what kinds of questions would be helpful to ask and answer in the conditioning theories of addictions? And whose work in the conditioning theories of addictions would we draw from?

And in the meanwhile, who could possibly have gone further than the Philadelphia VA research group?

The answer is Robert Rescorla.

They say if your work in psychology makes it into an undergraduate textbook in Introductory Psychology, you were a success as a psychologist.

Robert Rescorla did just that. And we'll examine his work in this area next.

Robert Rescorla

What did Rescorla examine? In some ways, it's rather simple and obvious. He considered the synergistic interaction *among and between all stimuli*. Not just the effects of one cue. And not just one cue that contextualizes another one. But among and between all.

all internal stimuli

- thoughts
- emotions
- sensations

all external stimuli

- sights
- sounds
- smells

Rescorla's work showed that the inter-relationships between and among cues affect drug-compensatory conditional phenomena as well. And that as such, a UCS may produce different UCRs, or a CS may produce different CRs, depending upon *the hierarchical context* in which the conditioning and response elicitation are produced.

Thus, one must employ careful consideration in developing an accurate cue-response synopsis for any particular patient, and attempt to eliminate bias in the process of developing it. This has proven difficult to do even for researchers working with morphine dependent rats.

Drug-related *interoceptive* (internal) cues may include thoughts of using, emotions, and sensory/perceptual content and processes. For example, the authors of one report investigating the relationship between plasma methadone levels and indications of withdrawal noted that *patient expectancies* of the effects of methadone probably existed *as a confounding factor*. Another study reports on the morphine-use state itself as a discriminative stimulus (or interoceptive cue) in the learning processes associated with drug use. Those authors discuss the relevance of state-dependent learning as a factor to consider in clinical addictions treatment.

Drug-related *exteroceptive* (external) cues are found in the environmental context of drug acquisition and drug use behaviors. Examples of cues contributing to the type and extent of conditional responses include: temptation to use, saliency of use cues such as money, syringes or neighborhoods; and whether or not the drug is self-administered or passively received such as from an automated IV drip.

Let's consider an example. When going over to a friend's house, the person (living in the active phase of severe addiction, or undergoing addiction treatment, or in early recovery, or in long-term sustained recovery), sees a kitchen counter. And the counter looks stunningly similar to a counter top upon which they chopped up, bagged, or otherwise prepared, their preferred drug. And the music playing only made the visit (accidentally) worse. By contrast, the same person's entire alcohol use history was almost exclusively characterized by drinking alone. Which does

not seem to be particularly relevant even during the person's reliable compliance with their new medication protocol when they now make runs to the corner national retail pharmacy store – alone. And when, upon expounding these events, the person seems convincing that none of these points and sub-points interrelate. They just happened. They weren't connected. And they didn't connect.

Except that the counselor *does* find it interesting that the recounting of all of these are told as one story. And that they obviously *do connect* as a set of relations within and across cues. The that the story as it is told shows the contextual frame within which the cues themselves seem to function.

With all of these areas ranging from the JND through Rescorla's work having been presented so far, let's do a review and application of the major topics and central themes held by each topic.

To do that, we will also examine cues, goals, mutual aid fellowships, real-life examples, a timeline of topics and readings, seeing with the eyes versus with the mind, and some imaginary cases for discussion.

We'll start our review and synthesis with a table of information that will provide a simple, big-picture overview of the material we've covered so far.

Review and Overview

Researchers

One way to provide a review and overview of this content is to simply list the researchers and topics in chronological order. And to consider them as building blocks in that way.

Researcher	Topic
Weber	The JND
Fechner	Putting the JND in its context
Pavlov	Smooth muscle conditioning
Skinner	Behavioral reinforcement
Wikler	Cue-compensatory reactions in humans
Siegel	Range of implications
Solomon	Opponent process/acquired motivation
Childress, McLellan & O'Brien	Brain imaging
Rescorla	Range of associative complexities

Cues

Another way to review the material is to ask, concretely, if any of the following listed items are a “cue”? And if so, to give an example of how it could be a cue relevant to this work.

Are being *nauseated* and *feeling sweaty* while having the flu, “cues”?

Yes.

How so?

Any stimulus can be a cue. However, for some people, such as those with a serious and chronic opioid use history, the mind might interpret nausea and a sweaty feeling as signaling withdrawal from an opiate. And rather intense cravings might suddenly pop out of nowhere.

Is having *a runny nose* while sick with a cold, a cue?

Yes.

How so?

Any stimulus can be a cue. However, for some people with a serious and chronic cocaine use history, a roommate wiping their nose might be just noticeable enough to awaken an expectancy of impending cocaine administration and initiate cravings. And the feedback loop might even evoke some bowel cramping. Which is also a cue. And so on.

Are *pain and body aches* cues?

Yes.

How so?

Any stimulus can be a cue. However, for some people with a serious and chronic pharmaceutical opioid use history, pain and body aches might evoke a desire for pain relief as a pre-occupying bit of thought content. And perhaps an urge for opioid administration. And for some, a feedback loop might be initiated that sets loose a cascade of mental and physiological reactions, and reactions to those reactions. And this might conclude with bowel cramping and a strong desire for their so-called withdrawal to stop. And then thinking about *the one thing* they know that will be the most effective at obtaining their desired relief.

Are *pleasant and unpleasant emotions* cues?

Yes.

How so?

Any stimulus can be a cue. Dystonic states might evoke the desire for relief. Euphoric feelings might evoke the desire to accentuate them. Fear of possible withdrawal might evoke planning and behaviors that aim to prevent withdrawal. Low self-efficacy might lead to a desire for a blanket-level or all-encompassing alternative feeling.

Overall, the implications here are many, and vast. The phenomena that happen around us and within us (the cue context of our lives), might lead to us make meaning of those events (cues). What mental constructs do we build and retain in our cue context? Regardless, what level of importance do we mentally assign to the mere phenomena we notice? And on what basis? And concerning the constructs we build and retain – do we assign varying levels of importance to those as well?

Goals

Further, one may ask what the goal of addiction counseling is, in an addiction treatment context? Or the goal of addiction counseling as a stand-alone endeavor?

The conditioning theories of addiction, if left to its own, might answer that question with the simple reply, “Transfer of control.”

In a moderate to severe, chronic SUD context, “transfer of control” refers to the relative level of stimulus-control the patient experiences that is commanded by internal and external cues. That is to say, control being transferred *to* control of self *from* being controlled by those cues. In short, self-determination would be the goal rather than being relatively determined in one’s actions by exposure to cues. A more common way to name this goal from an addiction counseling perspective would be to “identify and manage the triggered state.”

Mutual-Aid Fellowships

One might wonder what recovery fellowships have to offer in terms of therapeutic potency in that direction? And what of peer accountability? And of surrender?

Some sentences to ponder come to mind. The researcher John Kelly, Ph.D., paraphrased some statements Car Jung wrote to Bill Wilson in their correspondence. I’ll share that paraphrase here:

“I’m afraid medicine has nothing for you. I recommend three things. A protective wall of human community. Real religious insight. And a group of friends with whom you can be honest.”

That certainly outlines a rather dramatically different internal and external cue context within which one can navigate their change process.

Real-Life Examples

With that quote in mind, the reader might wonder if I can share some real-life examples of the facts and principles found in this work. We’ll turn to some real-life examples next.

I would encourage the reader to recognize these are real stories. And that means they are not artificially designed to include or demonstrate key components of the content of this monograph. Thus, the reader will have to do some work *and notice* within the stories some areas of the material found in this work. And how some areas overlap as well.

1. Counselor visited a city

During my graduate internship, a counselor who was a former member of a well-organized street gang, and worked in that gang in a very high-level position, recounted stories to me to help bring me along. I’ll always remain very grateful for that time, effort, and the stories themselves.

That counselor eventually asked me to share some areas of interest I had, or key topics I had learned within the addiction topic generally. I happily shared the macro topic of conditioning theories of addictions, and some of the key points I’ve shared here in this monograph.

While hearing me recount that material, the counselor eventually looked delighted, seemed slightly awed, and wanted to interrupt rather badly. They said, “Wow! Does this explain why after I was clean for 10 years, and off heroin, I went back to my city for the first time. And driving there a few hours away, in the summer with the windows down, the smell of the city

came in the car – a smell I hadn't smelled in a long time – and it made me sick to my stomach? And I had to get off the interstate, and get into a gas station bathroom, and get sick and then use the toilet?"

2. *Counselor writing on a pad of paper*

While working in a 9-12 month residential therapeutic community program, in the inner city, during the height of the crack cocaine and IV heroin problem, with indigent patients, I was given a few items that had been dropped off by a pharmaceutical sales representative to one of the nurses. One was a simple medium-sized pad of note paper. Very handy. I kept it on top of my desk.

One day during a routine "curbside" visit in my office with a patient (not during a session), a topic came up that needed to be written down so the details wouldn't be lost. Like, the day/date/time of an appointment with a probation officer. As I was writing the notes down, with the patient standing over the desk just across from me, making sure I was getting the stuff written down correctly, they suddenly reacted. They abruptly stood up straight, took a half step back, raised a hand to cover the top of their chest just below their throat, and began shallow breathing with their eyes widening dramatically as their mouth dropped open. They started to make me think they might faint and that they probably needed to sit down.

They did sit down.

The next few minutes seemed to be prolonged as they worked their skills to re-orient themselves to the room, regain a calm interior, and come back to the here and now – rather than stay focused on the thing they saw that caused the reaction. They told me that their whole body had reacted. They named aloud their bodily sensations, emotional feelings, and some of the thoughts that had started to race through their mind. The de-brief went really well and everything was fine.

You might be wondering what it was that cued these responses. Can you guess what the logo on the note pad said?

"Lortab."

Don't be *too* rough on me or laugh at me. The opioid epidemic hadn't even really started yet. It was all IV heroin.

3. *Created a new PharmD position*

Several years later, in the early 2000s, our CEO created a PharmD position in our large community agency. This was a brilliant move, especially with newer psychopharmacological treatments emerging, and polypharmacy methods entering the evidence-based medication algorithms. Given my role, I was told to meet with this person. By the way they also happened to be a sub-specialist in psychopharmacology within their PharmD terminal degree; at the time this was a rather rare individual.

We met and had a wonderful time. I shared important information about the programs I managed. And they described the knowledge and services they could add to help promote the effectiveness of those programs.

I was wrong when I thought that's how the meeting would conclude. After that, the pharmacist asked me what I thought was the most important thing they should know, given what I knew based on my background and experience.

I was delighted. I said, "Well, you're a discriminative stimulus. You're a 'green light' signaling the availability of a reinforcer if the lever is pressed. Your appointment is the cue context. And the lever being pressed is the answer given to you in response to your question, "How are you doing?" When they recount their symptoms, and struggles, and how much you can help – that's the lever being pressed. They know the Physicians' Desk Reference as well as you do for the compounds they are shopping for. And they know the opioid conversion tables and calculations for dose equivalences. But you will really know if any of this matters by watching for the initial involuntary smooth muscle changes when they first step up to your pharmacy counter and see your white jacket. You should consider not ever wearing that white jacket ever again while on duty here." Then I told the story about the Lortab note pad.

The pharmacist was incredulous, understood everything I said, and started reading the conditioning theories of addictions literature.

4. Laundry room soap dispenser

Our long-term residential program had a large laundry room. The washing machines had rather long hoses hooked up to 5-gallon buckets of laundry soap.

One day a patient on my caseload, who was mid-way through their treatment and doing rather well, said to me, very appropriately, "Brian, can I have permission to no longer work in the laundry? I'd rather have my job duty be in the kitchen or housekeeping."

"Why? What makes you want to switch?", I asked. Their question did have a rather mature ring to it, seemed forthright, and not at all worrisome in any way.

"It's the soap pump", they said.

"What?", I asked.

"Every time the laundry soap pump goes off it reminds me so much of the morphine pump back in the hospital. It's really bothering me a lot. And it makes me feel sick. I can tough it out, but it really does make me feel sick. It's on my mind when I go in there now. I'd just like to be in a different department."

We spent the next 45 minutes or so talking about lots of possible real-world examples of this very kind of thing. And I explained just enough Pavlov, Skinner, and Wikler without technical terminology or the researcher's names to send the message that these kinds of things are totally normal. And how to navigate their own wellbeing in the context of the real world during the rest

of their whole life. Gas station bathroom floors. Open cash drawers. And on and on. The discussion went great. After chewing on the opportunity to continue to be exposed to these cues and extinction process, or not, they ultimately did ask to move from laundry into a different department. We did make that change – supporting their self-efficacy in that context. And we processed their previous hospitalization as well, and the dreaded sound of the morphine pump.

5. Sound of paper money

I once saw an agitated patient engage with clinical staff in order to point out and argue about all the negatives in the treatment program. The patient did so with agitation and claimed they were going to leave against staff advice for all the reasons they had been stating.

What's interesting is that this was a prolonged and agitated pointing out of negatives, and they stayed in order to do the arguing. They kept threatening to leave more and more emphatically, as their negative feedback continued. And yet they stayed to say these things.

As they became even more agitated and seemingly brittle, they noticed something. What they noticed took over their entire sensorium. And they stopped talking. Their attention was fully captivated by something in the room. Silent, they eventually started to develop shallow breathing, a slight blush across their face, neck and arms, and a widening facial expression. They then said their bowels were starting to move and they would need to use the bathroom.

After a while they said the two bills of paper money I was rubbing together on the other side of the room produced a sound that they couldn't ignore or shake. And when their body initially reacted, their body and mind reacted to those initial physical reactions. And it all escalated. As they sat there with all of that happening, they realized their own body was talking them out of leaving. And so, they decided they were not ready to leave. And they decided to stay – because their body wasn't ready to make it out in the world.

6. Pumping blood back and forth

Multiple people with chronic, severe, and complex addiction to IV heroin have told me over a couple of decades one very specific area of knowledge and skill. It's when they have used their last bag, and are delayed getting another, and start to enter some early withdrawal, they can draw back some blood into the syringe, run the blood back in, and repeat that over and over several times. And doing this "fakes" out their body and holds them off from withdrawal progression – allowing them longer time and a clearer mind – to find and purchase their next bag.

7. A tattoo

I once had a patient on my caseload in the long-term residential program who had a tattoo on the back of their hand. The tattoo was a short phrase in English, and the font was large, bold-faced, very clear, and in all caps. The phrase was a rather ugly and pejorative one.

Many of that patient's individual sessions during Phase 2 contained spontaneously offered descriptions of how living with that tattoo was painful, demeaning, and set up a kind of negative self-fulfilling prophecy. The person eventually got descriptive about physically seeing the physical tattoo over many years. They recounted various small scenarios where they noticed it,

their good experience of life got interrupted, and their heart and existential awareness of life, the universe, and themselves – were seemingly tossed down a bottomless hole.

The visual stimulus with a clear consequence at the level of their core issue and resulting life scripts was just too relevant to their every-day experience of life.

Across Phase 2 and 3 we worked on re-defining the words in that tattoo. Giving them a second definition that was accurate and common (in a slang way), was very positive and did not bow down to the negativism. It was also aspirational in a good/tough way. Exercising these reframes in daily life was the work. Eventually, the very idiosyncratic and somatically rooted special and personal meaning of the second definitions really stuck. And finally, the tattoo became a rallying point – a war cry – of personal empowerment.

8. *Anxiety about withdrawal (also known as “detox phobia”).*

During the 1990s there were psychometric measures being developed to help screen for and assess what was called “detox phobia” at that time. Detox phobia could pertain to any person with a physical dependence to opioids and their concern about possible withdrawal. For example, the inability to self-administer heroin continuously enough. Or perhaps a medication protocol as set by the patient’s prescriber for the purpose of medical withdrawal management.

Imagine a kind of general hypervigilance that occurs on a constant basis in the background of one’s mental operation. It functions somewhat like a passive monitoring system that simultaneously scans both the internal environment (somatic focus, thought content, emotion content, etc.) and external environment (e.g. availability of the drug, the paraphernalia) for signals of impending withdrawal.

Early in my time in therapeutic community and methadone maintenance modalities, under the clinical practice guidelines and regulatory requirements of the late 1980s and early 1990s, I saw this phenomenon. I found it fascinating (as a radical behaviorist and cognitive-behavioral clinician) that some patients chose to know the number of milligrams of their methadone dose during their withdrawal. And some patients chose to be “blind” to their dose. And whenever I heard either preference, as chosen and explained by the patient, it was always expressed with the same level of emphatic importance.

For example, in the residential setting, the patient might say, “I just have to know my dose. Especially during my detox. If I don’t know my dose, I’ll go crazy and won’t be able to sleep.” Or, alternatively, I would hear something like, “What?!? I get to be blind to my dose if I want to? Thank goodness! Yes! Please don’t tell me the dose or when the detox begins. Just keep dosing me! If I know my dose, I’ll drive myself nuts!”

In that context, “self-efficacy” took on a whole new meaning for me.

And so, what can I say about these stories? Overall, the stories I have shared are just a few of the dozens and dozens I could share – things that I have seen and heard first-hand over my years in addiction treatment. And it occurs to me that these stories speak for themselves. I don’t really need to say anything about them.

Conditioning is happening all around us every day. That's not a "theory." And we experience the consequences of our actions every day. That's not a "theory" either.

In other words, one of the ways a clinician can learn a lot about conditioning theories of addiction is by paying attention to the patient. Personally, in this area of SUD phenomena, I like combining academic knowledge and learning with real clinical stories. And learning from the combination of both, using one to help understand and appreciate the other.

Timeline of Topics & Readings

Another way to achieve a review and overview is to provide a chronological timeline of topics and readings from which this content has been drawn. As you review the list, try to notice how the information coalesces or combines over time.

Accidental discovery that opiate use fits the Pavlovian conditioning paradigm.

Pavlov, I. (1960). Conditioned Reflexes. NY: Dover Publications. (Original work 1927).

Pavlovian responses to opiate use are found in humans.

Wikler, A. (1965). Conditioning Factors In Opiate Addiction and Relapse. In D. M. Wilner & G. G. Kassebaum (Ed.). Narcotics. (pp. 85-100). NY: McGraw-Hill.

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Seeing: with the eyes or with the mind?

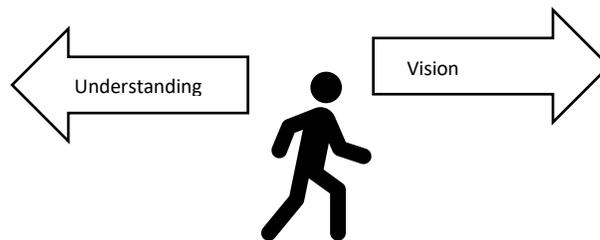
Another possible way to review this material is to consider its application to our every day apprehension of the world, through our senses like vision, or through our mind. We will examine those possibilities next.

Let's consider some possible practical applications of the material shared in this monograph.

What use can we make of the Pavlovian (classical conditioning) or Skinnerian (operant conditioning) world view? What advantages and disadvantages would *conditioning theories of addictions* find prior to or among routine techniques in addiction counseling? Below, I'll address each of those questions in turn.

But first, I would like to present one specific set of considerations concerning "seeing" with our eyes and "understanding" with our minds. Keep the JND in mind as you read what follows.

Let's keep it simple and start with the physical basics of material reality.



In the diagram above I am attempting to show something rather self-evident, simple, obvious, and yet profound, as follows. (1) We experience life *looking* out the front windshield, so to speak. (2) We do not understand in real time, in the forward direction, even though our eyes look out the front. (3) We *understand* life looking out the back. (4) Even though our eyes do not look out the back.

Prospectively, we see, but don't understand. Retrospectively, we understand, but don't see.

That is, sensory inputs are experienced in the moment, prospectively, as we move through life. And our mental/intellectual comprehension of life is after the fact.

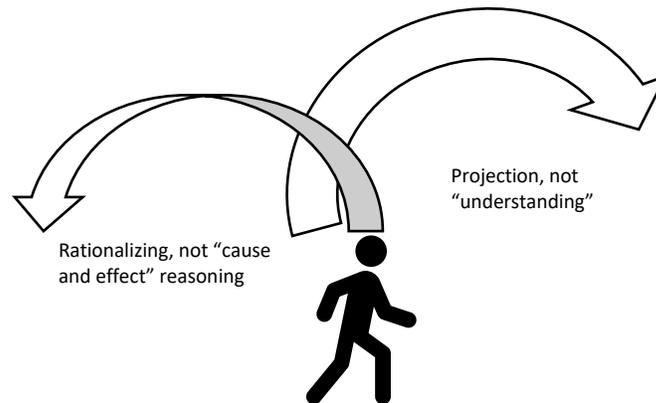
To go further, consider the following.

We cannot "understand" what we see or experience in real time. And we cannot "see" our past.

Rather, our mind seems to project an understanding into the forward position (e.g. projection). Our so-called "understanding" in the moment, prospectively, is really just a prediction, or at best a modeling, based on the past. Current understanding is projection. Or guessing. It is not "knowing" for certain.

Additionally, concerning our handling of the past, we retroactively back-fill a meaning or interpretation of events that have already happened (e.g. rationalization, intellectualization). We

are inclined to rationalize the past into a narrative or understanding – looking backward, as it were, with our mind.



As we recount the past, and attempt to make meaning of it, does the understanding of the past that we *do have* reflect the real? Or is it a rationalization?

And now I'll add the JND back in, as we have studied it.

Follow along as we consider the JND and how the JND can pertain to this topic of the mind, what we notice, what we understand about the present (looking forward), and understand about the past (considering retrospectively).

First, I'll present some exploratory questions to form a total context.

What level of sensitivity does the patient have to emotions or feelings, generally speaking? Or to particular ones specifically? These would be the JND for interior emotion content. Further, what level of sensitivity does the patient have to somatic experiences that resemble conditional withdrawal? And to the thoughts and emotions that arise from that mental content, such as anticipatory anxiety, or detox phobia?

Add to those considerations the following. What ability or limit do we have to tolerate the hedonic contrast of experiencing a hedonic emotion, or an aversive emotion, vs our proclivity to ward it off? This would be our threshold to return to emotional regulation and eventual emotional homeostasis. Where is that limit?

And when we encounter an emotion that is noticeable, and is beyond our limit of what is tolerable, what do we activate to maintain emotional homeostasis? Do we simply surf the experience, anticipate a diminishment of its intensity, and wait for tolerance of the experience to manifest? Or do we engage in "understanding", such as projection, or rationalization? Or somehow relegate that content to the unconscious? Or simply deny the facts that are the cause?

The status of the content as noticeable or not, our ability to bear its salience (such as the capacity to acknowledge and experience our own feelings, the contents of the unconscious, and the mechanisms associated with denial), I'll address in an upcoming monograph.

But the present set of realities we are considering makes the importance of identifying the potential advantages and disadvantages of clinical techniques, or personal decisions of the patient, rather apparent. And worth careful consideration.

With that in mind, let's consider a variety of opportunities to *take*, or to *withhold*. As you read the following list, keep in mind that our minds are blind prospectively, and our eyes cannot see the past.

From a ***Pavlovian perspective*** what risk vs benefit for these cue exposures come to mind?

- Pharmacist in mental health setting wearing a white lab coat (or not)
- Counselor with a pharma company note pad and pen on desk (or not)
- Relatively abrupt mention of trauma history (or not)
- Handling and hearing cash and credit cards (or not)
- Hearing the washing machine soap pump (or not)
- Fear of a steep medication withdrawal schedule (or not)
- Sleep difficulty evoking physical symptoms of anxiety (or not)
- Seeing alcohol and a pharmacy in the grocery store (or not)
- Eating at a restaurant that serves alcohol (or not)
- Emptying the medicine cabinet at home (or not)
- Going to a medical appointment (or not)
- Going to the ED (or not)
- Having physical pain (or not)
- Having cold or flu symptoms (or not)
- Taking short-term pain relievers (or not)

How does the ***reinforcement availability*** of each scenario below work for or against actions and ideas related to well-being?

- Finding a job (or not)
- Applying to school (or not)
- First attendance of a recovery support mutual aid meeting (or not)
- Involving family members in personal and family recovery (or not)
- Encouraging family members to work their own recovery (or not)
- Sharing personal story with friends (or not)
- Maintaining existing personal relationships (or not)
- Delaying return to work (or not)
- Entering sober residence (or not)
- Having access to mobile device (or not)
- Finding a recovery support sponsor (or not)
- Pay day accountability and priorities (or not)
- Telling your workplace and colleagues (or not)
- Adding continuing care and recovery support to lifestyle schedule (or not)
- Returning to or planning new fun activities (or not)

For the *clinical techniques* below, what are some advantages and disadvantages from a conditioning theories of addictions perspective?

- Symptom prescription (or not)
- Urge surfing (or not)
- Option of “blind” to medication dose (or not)
- Education about level and length of anticipated sleep disturbance (or not)
- Taking a trauma history (or not)
- Allowing release of emotion in group (or not)
- Deferring anxiety management to later in treatment (or not)
- Allowing amends-making very early in course of care (or not)
- Option of “blind” weights, or blind to medication dose (or not)
- Imagery during relaxation training (or not)
- Allowing tobacco smoking (or not)
- Including toxicology testing (or not)
- Informing patient of positive random toxicology result (or not)
- Patient given goal of bringing non-random negative toxicology results (or not)
- Psychodrama (or not)
- Art therapy project of “Negative image of self” (or not)
- Art therapy project of “Positive image of self” (or not)
- Involving family members in continuing care planning (or not)

For any one patient, in developing therapeutic strategies for relapse prevention work, planning the continuing care phase following primary treatment, or doing clinical work in personal recovery plan development, what:

- JNDs are relevant?
- Classical conditioning cues should be considered?
- Reinforcers of protective or corrosive factors are operative?
- Cues are expected to illicit Drug-Compensatory Conditional Responses?
- Relational figures evoke affective stabilization and destabilization by their mere presentation or departure?
- Cues signal the meaning of other cues?
- And how do these considerations inform our treatment planning and provision of care?

More recent findings

Lastly, before we are concluded, I wanted to extend the content of this monograph by adding some later work I’ve encountered in more recent years. I hope in this section the reader sees the continued advancement of the whole area of conditioning theories of addictions, its relevance to psychology in general, and addiction counseling specifically.

Shepherd Siegel

In the early 2000s, while the internet was still “young” I did some further reading of Dr. Siegel’s much later (at that time) work, and came away with a very specific question about conditional hyperalgesia (increased pain sensitivity). Pain sensitivity itself can function as a drug-compensatory conditioned response to use cues.

I realized I could simply email him my question, using the address on one of his papers.

I was amazed and delighted when he replied to my email, answered my question in detail, and attached a copy of his 2002 paper providing a much newer summary/update of his entire body of work.

By the way, Dr. Corty always suggested that we refer to Dr. Siegel as “Shep”, and Eric always did.

Charles O’Brien

I also wanted to add a few comments about Dr. O’Brien’s work. (By the way, Dr. Corty always said we should affectionately refer to Dr. O’Brien as “Chuck”, and Eric always did.)

One of my very favorite papers of his was one he co-authored in 1988 with Dr. Corty as the lead author. They were examining the internal behavior known as “thinking” and its possible role in evoking a kind of “temptation” that increased the likelihood of returning to drinking among alcoholics hospitalized for treatment of their alcoholism.

As Dr. Corty recounted the story of the study to me, the patients in treatment were divided into two groups — those who were given alcohol but did not know it, and those who were not given alcohol but thought they had been. When those who received alcohol but did not know it had a drink of their beverage, none lost control or drank uncontrollably. Those who believed they had received alcohol, but had not, rapidly consumed the entire drink in an uncontrolled manner. They concluded that both the “cognitive and physical settings” are critical determinants of behavior.

I did finally get a chance to hear Dr. O’Brien give an in-person lecture, and briefly meet him back in 2013. He immediately remembered Dr. Corty when I mentioned him. During his lecture, Dr. O’Brien made some especially important and interesting remarks. He said that in their review of the empirical literature in addictions, including imaging studies, specific to his leadership of the DSM workgroup for its transition of the Substance section from the DSM-IV to DSM-5, a few key things emerged.

One was that concerning problematic gambling, the imaging studies were in and were also sufficient and conclusive. And as a result, Gambling was added as an addictive disorder in the DSM-5.

He noted that imaging evidence was sufficient for Gambling Disorder, but not yet conclusive regarding sexual behaviors or certain eating patterns, though research was ongoing.

Mark Solms

Keep in mind that sensation and perception are different. Sensation simply refers to your sensory organ(s) receiving a stimulus, such as sound waves hitting your ear drum. Perception, however, refers to your mind noticing or realizing what your sense organs sensed. Sensations can be received without being consciously perceived — a common and well-documented phenomenon.

Also keep in mind that there is a limit or line, above which the sensation your sense organ received in fact is also perceived, at the level of your mind. The sensation was salient or intense enough to be noticed.

And keep in mind that it is possible for your sense organs to receive a sensation with a low enough intensity that the sensation falls below the limit of noticeability, and for your mind to not register that sensation consciously, and not perceive that it was ever received.

Do you know the name given to that limit or line? It's called the "limen." Do you know the word coined to name sensations that fall below the limit of noticeability, and are not perceived by the conscious mind — even though they were registered by the relevant sense organ? That word is "subliminal."

More recent neuroscience research has found sensations below the limit of perception that are in fact held in the mind unknowingly, and yet are accessible as accurate information. For example, studies exist where a person sees a picture for such a short length of time the person's mind didn't register as consciously having seen it. But later the subject in the study can correctly answer questions about the image they didn't know they had seen, even though they didn't "see" it.

For an update in this area, I suggest the reader investigate the books tackling the combination of the topics of neuroscience and the human mind written by Mark Solms.

Author's Bio

Brian Coon holds a BS in psychology and MA in community-clinical psychology, both from Bradley University. He is a licensed clinical addiction specialist (LCAS), certified clinical supervisor (CCS), and nationally credentialed as a master addiction counselor (MAC). He has been working full time in residential addiction treatment programs from the time of his graduate internship in 1988 to the present and in outpatient programs as well during much of that time.

The Bradley University psychology department was strongly rooted in the Scientist-Practitioner model of psychology, and radical behaviorism was the department's theoretical orientation. During his undergraduate studies his courses included a "rat lab" for Psychology of Learning; the behavior of the rat that was assigned to the student determined the student's grade. During his first year of graduate study, his assistantship was with Eric Corty, PhD. The majority of Brian's duties were clinical-applied. This included achieving the inter-rater reliability threshold for independent administration, scoring, and interpretation of the Addiction Severity Index (ASI), as Dr. Corty had achieved with A. Thomas McLellan, PhD, during his post-doctoral fellowship in the Philadelphia VA research group headed by P. Charles O'Brien, MD, PhD. Brian's Master's thesis project was original research in the conditioning theories of addictions with human subjects undergoing residential addiction treatment, under Eric Corty, PhD, his thesis committee chair. Coursework and therapeutic methods were centered in Behavior Therapy, Cognitive Therapy, Cognitive-Behavioral Therapy, Rational Emotive Therapy, Rational Emotive Behavior Therapy, Rational Emotive Imagery, and Strategic Therapy.

Following his internship, his first 19 years were spent serving in a 9-12 month residential Therapeutic Community (TC) program that shared a staff and physical plant with an outpatient methadone maintenance program. The TC included a nursery for 14 children from newborn through age 4 to live with their mother during treatment. The nursery included dedicated staff completing normed tools assessing fine and gross motor, cognitive, and social development with targeted manualized interventions matched to developmental lags, with reassessment. During all of his last 12 years in that organization, he had full clinical and managerial responsibility for the TC and outpatient methadone maintenance program. Later in those 12 years he had additional responsibility to guide a criminal justice halfway house under contract with the Federal Bureau of Prisons (FBOP), an intensive outpatient program provided inside a 300-bed city/county work release detention facility, and a one-year outpatient SUD aftercare program for FBOP, among other duties.

Notably, that organizational workplace was the community agency within which the Behavioral Health Recovery Management (BHRM) project was begun and operated. Brian served on the BHRM implementation steering committee for the entire 10-year lifespan of the BHRM project starting in 1998. The BHRM project was the living clinical laboratory where the principles and practices of recovery orientation for clinical services, recovery coaching, and approaches that later came to be known as "Recovery Management" and "Recovery-Oriented Systems of Care" were innovated and developed. Throughout its 10-year lifespan the BHRM steering committee also led change in the area of co-occurring SUD and MH disorders by identification of national experts in best practices and promising practices and contracting those experts in: authorship of clinical practice guidelines for the organization, provision of training within the organization, and on-going consultation in implementation of their protocols in a multi-year state-funded effort within that organization. During the BHRM project Brian underwent continuing education training and consultation within that agency from Robert Myers, PhD, resulting in conversion of the TC to a patient-driven model based on the Community Reinforcement Approach. Similarly, Brian modified the outpatient methadone maintenance program based on a practice guideline Nancy Petry, PhD, wrote for the BHRM project on Contingency Management, with consultation.

Since 2008 he has worked in a freestanding interdisciplinary program that includes specialized services for public safety-sensitive professionals and young adults. He assisted that organization's senior leadership with transformation in 2013 to a smoke-free approach to addiction treatment. His routine duties include the clinical supervision of clinical supervision, and of counseling. He led re-development of the young adult program through addition of Eriksonian stages, length of stay additions by patient choice, Node-Link Mapping, and experiential activities.

Brian has given continuing education presentations at state, regional and national conferences as well as various clinical organizations. He has authored or coauthored a variety of publications including peer-reviewed literature. He has a strong life-long interest in biology and philosophy. In his spare time, he has written as a Contributor at recoveryreview.blog and serves as an Affiliate at addictionandbehavioralhealthalliance.com.