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ADDICTION AND LEARNING

Mother Nature has given to animals an amazing survival mechanism called the **Pleasure/Pain Response System**. The fact that we are able to feel **pleasure** when we encounter good things and **pain** when we encounter bad things is essential to our survival in nature. Whenever we feel pleasure or pain certain chemicals called **Neurotransmitters** are released into the brain. These **Neurotransmitters** are an essential part of the **learning process** which takes place in the brain. These **Neurotransmitters Reinforce** the newly formed **neural pathways** which are associated with the newly learned behaviors.

Let us look at a concrete example. **Pain Avoidance** is a behavior which is fundamentally tied into our survival as animals. When you touch a hot stove certain **neurotransmitters** are released in your brain which cause you to feel pain. This is a very important survival mechanism. If we did not remove our hand from a hot stove when we touched it we would suffer permanent injury which would lessen our chances of survival. Some people are born without the ability to feel pain and are very prone to suffer injuries which can lead to death.

Not only does the pain cause us to react and avoid the cause of the pain, **neurotransmitters** which are released into the brain when we react serve to **reinforce** this behavior. Whenever we react by avoiding a painful stimulus, we form a certain **neural pathway** connecting our **perceptions** to our **reactions**. **Neurotransmitters** reinforce this **pathway**. This is very much like an automobile wearing ruts in a gravel road. Each time that a car passes over these ruts they get deeper and the easier it is for the car to follow this pathway. Conversely, the harder it is for the automobile to leave this pathway. The **neurotransmitters** in our brains act just like the tires of the automobile in that they wear the rut in the **neural pathway** deeper every time we react in a similar manner to a similar stimulus. So every time that we have a close encounter with a flame, we associate the heat, the smoke, the smell and the pain with the reaction of avoiding being burned. This wears an ever deeper neural rut in our brain and helps our reactions to become more and more **automatic**.

What we have just described is a very important kind of learning which psychologists refer to as **Operant Conditioning**. **Operant Conditioning** is a very different kind of learning than, for example, memorization. We use memorization to learn or multiplication tables by rote; but this is a mere association. **Operant Conditioning** takes place on a much deeper level because the **neurotransmitters** involving pleasure and pain are involved and they wear very deep ruts in the **neural pathways**. **Operant Conditioning** could well be referred to as **Gut Learning**.

Pleasure seeking is the other behavior which is fundamentally tied into our survival as animals. It is important to Mother Nature that we survive as individuals, therefore we feel pleasure when we eat food. When we eat food, **Neurotransmitters** known as **endorphins** are released into our brain and we feel pleasure associated with the eating of the food. Since eating is essential to our survival, eating is already hardwired into our brains at an instinctual level. Sex is required for the survival of the species and pleasure from sex is also hardwired into the individual creatures.

However, the **Pleasure Neurotransmitters**, also play a major role in learning which is perhaps even greater than that of the **Pain Neurotransmitters**. When a rat in a cage learns that it can obtain a pellet of food by pressing a lever, this is also a case of the kind of learning which we call **Operant Conditioning** or **Gut Learning**. When the rat obtains the food, the **Pleasure Neurotransmitters** known as **Endorphins** are released. A **Neural Pathway** comes into existence which involves pushing the lever and enjoying the pleasure associated with receiving the food. Every time the rat presses the lever and receives the food, the **Endorphins** are released. And the **Endorphins** act like automobile tires in creating an ever deeper rut which associates pressing the lever with enjoying the food.

When we look at the use of alcohol, tobacco, or drugs we see these exact same kinds of **Gut Learning** (i. e. **Operant Conditioning**) taking place in a very similar but even more direct way.

When the chemical **heroin** hits the brain it acts exactly like the naturally occurring **Pleasure Neurotransmitters** known as the **endorphins**. This is a form of **Gut Learning (Operant Conditioning)** much like the example of the rat pushing a lever to get food, but with one very important difference. In the rat example the rat pushes a lever and gets food and the **endorphins** are associated with the food. But when one uses heroin one uses a chemical that acts like an **endorphin** and this, in effect, is to cut out the middle man, i. e. the food pellet. Cutting out the middle man this way makes the **conditioning** even more direct and hence even stronger. A second form of **Operant Conditioning** appears when one has withdrawal from heroin. In this case it is like the hot stove example and the conditioning involves avoiding pain. In other words heroin users get a double whammy of **Gut Learning** involved with their heroin use.

For alcohol users it seems that **Pleasure Conditioning** is what reinforces the drinking in most heavy drinkers. Although a few heavy drinkers do use the "hair of the dog" to avoid withdrawal symptoms or other unpleasant feeling the morning after, it seems that the majority of heavy drinkers are strongly repulsed by alcohol on the following morning. Using alcohol to stave off withdrawal symptoms seems to be the exception rather than the rule.

When a person drinks alcohol, the alcohol causes the release of **endorphins** directly into the brain. Alcohol, like heroin, cuts out the middle man and leads to direct euphoria from drinking, and direct **reinforcement** of the **learned behavior of drinking**. Every drink you take, the **endorphins** wear deeper tire tracks into the **neural pathways** associated with drinking.

Last of all let us look at tobacco. Although it seems quite clear that both **Pleasure and Pain Conditioning** are a part of the nicotine habit, it might be possible that the learning behavior associated most strongly with tobacco is that of **Pain Conditioning** via nicotine withdrawal. Much of the difficulty of quitting cigarettes may well be associated with the **delivery system** which keeps a person smoking fresh cigarettes all day long. A person is constantly lighting up a fresh cigarette to avoid feeling nicotine withdrawal symptoms. It seems much easier to be an occasional cigar smoker than an occasional cigarette smoker because the delivery system is different.

Does **conditioning theory** demonstrate that recreational drug or alcohol use is impossible? No, people do it all the time. It just means that one needs to be aware. The longer one continues in a

given behavior the more deeply it becomes **conditioned** and the more **automatic** and **unconscious** it becomes. If you ask a 30 year cigarette smoker to start making a record of each single cigarette he smokes during the day he will have a very hard time because of the fact that lighting up cigarettes has become an almost completely **automatic** and **unconscious** behavior. However, it can be done. And charting one's cigarettes or one's drinks in this way is an excellent tool to use towards changing one's smoking or drinking habits--because this forces a person to become conscious of what have become **automatic** and **unconscious** behaviors. Stephen Tiffany¹ notes that many "slips" which occur when a person is trying to stop a bad habit are not a result of conscious choices nor are they a response to "urges" or "cravings". Many slips are a result of the fact that the smoking or drinking or drugging behaviors have become totally **automated** and **unconscious**. This is one more reason why you should not beat yourself up if you happen to have a slip or a regression into old behaviors when you are trying to create good new habits--whether those habits involve abstinence or moderation or harm reduction.

There are three possible scenarios by which one might return to one's old habits:

1. One might make a deliberate choice to switch from a goal of abstinence to a goal of moderation or harm reduction. It would be inaccurate to characterize this as a slip because this is a conscious choice.
2. One might be feeling very strong cravings and urges and give in to them.
3. One might get caught by a totally automated process and pick up a drink or a cigarette at a party without even thinking about it.

It is important that one be prepared to practice damage control in any of these scenarios--we are not perfect. Sometimes when people start beating themselves up over failures they become so miserable that they drink more than ever. This is called the **Abstinence Violation Effect** and we shall discuss this trap in more detail in a later chapter.

It is also very important to note that **Operant Conditioning** is an integral part of every single activity we engage in during our day to day lives. If you watch a favorite TV show, then **endorphins** are released which reinforce the act of watching that show and which make you more desirous of watching that show again. If you watch a show that you hate then **negative neurotransmitters** are released which make it less likely that you will watch that show again.

Operant Conditioning is not just about rewards of food pellets or sex. Every single activity in your life from knitting to dancing to playing cards to doing math involves the release of **neurotransmitters** and hence involves **Operant Conditioning**. And man is unique in that a decisional process can be involved. For example, we may feel that we hate math and undergo **negative conditioning** every time we are forced to do a math problem. Then some event may come along which makes us change our mind about math and decide that we like it. From that point on we will undergo **positive conditioning** every time we do a math problem.

¹ Tiffany, S. T. (1990). A cognitive model of drug urges and drug use behavior: Role of automatic and nonautomatic processes. *Psychological Review*, 97, 147-168.

Just as we can make decisions about doing math, we can make decisions about using tobacco or alcohol or other drugs. We are always the masters of our own minds. No one is ever truly a slave to a drug. Even though every habit we have is tied in with the **neurotransmitters** in the brain, every habit we have can be changed.

And the longer a period of time that a habit is changed the less of a grip will that habit have on us. A man who quit smoking last week will think about smoking a lot more often than will the same man after he has stayed off cigarettes for a year. The longer you are away from a habit the fewer **neurotransmitters** are released when you think about that habit.

The technical name for "forgetting about a bad habit" is **behavioral extinction**, and **behavioral extinction** is essentially what the Prochaska group is talking about when they speak of the **Termination Stage** of change. They mean that the habit is no longer a part of a person's life and the person is not going to go back to it or even think about it very often.

One aspect of 12 step groups which can be problematic is that they block the **extinction** and **termination** of the alcohol habit because 12 step meetings never stop dwelling on alcohol. In 12 step talk this is referred to as "keeping it green". This is like keeping a wound open by digging in it constantly. This guarantees that it will never heal.

Before we leave this topic we would like to make a note of the fact that **Setting** is very important to the use of tobacco, alcohol, or drugs. Most people have their favorite places and times to drink, and they may find that alcohol has a totally unexpected and even unpleasant effect if consumed at an unaccustomed time or place. This effect is due to the workings of **Operant Conditioning** and **Neurotransmitters** once again. The accustomed **setting** by itself helps to trigger the appropriate **neurotransmitters** and helps the alcohol to have its desired effect. **Setting** and **drug** become intimately tied together by habitual use.

This effect of the association of the **drug** with the **setting** can be so strong that regular users of heroin who take their usual dose in a strange setting can die of overdose. Even though they used the same amount of the drug, the effect was totally different because the **setting** was different. And this is true not only of humans but of animals as well. Lab rats given their usual dose of opiates in strange settings also often die of overdose.

So the effect of the **Setting** on a person's drinking is always an essential factor to take into consideration when a person is working on changing his/her drinking.

Just how powerful is this **Conditioned Response** to alcohol or tobacco or drugs that we have been discussing here? The results of the **Rat Park Experiment**² are very interesting in this respect. The rats who were kept isolated in cages with absolutely nothing to do but administer dope to themselves often gave themselves fatal overdoses--whereas the rats who were free to wander around and have sex and eat what they chose and to act like rats in nature showed much less interest in self-administering drugs--and did not give themselves overdoses.

² Alexander, B.K., Coombs, R.B., and Hadaway, P.F. (1978). "The effect of housing and gender on morphine self-administration in rats," *Psychopharmacology*, Vol 58, 175-179. PMID 98787

What this should tell us as a society is that if we want to see fewer people indulging in heavy drug or alcohol use the solution is to make a rich environment available to every citizen of our society--rich emotionally and intellectually and aesthetically.

For ourselves as individuals we also can choose to enrich our surroundings. Even those of us in the direst of economic straits can still use the public libraries and visit the museums on free days.

Changing your drinking is only hard if you believe it to be so. If you believe in yourself it is much easier. And enriching your life is a major thing that you can do to help yourself.

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