

Lessons from Marge Simpson and casinos

 By [John Laurence](#)

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In an episode of season 5 of *The Simpsons* cartoon, the townsfolk of Springfield decided to legalise gambling in order to boost the town's flagging coffers. Marge - the mom whom the Simpson family normally rely on to be the voice of reason and prevent their lives degenerating into chaos - develops a gambling addiction after putting a loose coin in a slot machine. She becomes permanently glued to the machines, feeding in coins in a zombie-like fashion and consequently neglecting her family, who proceed to stir up all sorts of unconstrained mayhem.

This mechanism by which slot machines engage our brains is an interesting one. Do you think that people would be as interested in gambling if you simply handed the casino your credit card, pressed a button, and they automatically deducted or credited your day's winnings and, in so doing, bypassed the hours of game play? Not many people would, and the reason for that is the neurotransmitter, dopamine.

Dopamine has many roles in the brain, but most people know it as the brain chemical that gives us feelings of enjoyment and can be involved in addiction. For instance, the stimulant drug cocaine has the effect of increasing the amount of dopamine in the synapses of the brain.

What is generally not widely known however is dopamine's role in predicting future reward.

Interrelated but separate

Firstly, it is becoming increasingly clear that the neural pathways for feelings of liking and wanting are interrelated but separate. In other words, the brain mechanisms that provide your enjoyment of eating a chocolate bar are different from those that involve your anticipation of the reward of eating a chocolate bar. You can want something without liking it after all - a cigarette, for instance.

Dopamine's main role is a little more complicated. The dopamine reward prediction system appears to be heavily involved in signalling a difference in current value from expected value so that you can learn what to want. It is sensitive to cues in the environment and tries to predict and learn which of these will lead to a value in the future. This system is constantly trying to predict something out of the ordinary - as soon as a cue becomes predictable, it stops firing. But as soon as something changes, it starts firing again in order to learn the outcome of the new value.

The neuroscientist Read Montague uses the example of a flower and a bee. The flower serves as a marker to the bee that the plant contains nectar. The bee sees pretty blue flowers, forms a model of the amount of nectar they contain and visits them often. Should something change in the environment - red flowers now contain more nectar - then the bee needs to be

able to adjust its prediction system.

Unpredictability is crucial

Which brings us back to Marge Simpson and the slot machines. Slot machines have lights and noises - all cues which signal a potential reward should you sacrifice your cash to their beckoning slots. But the crucial element that made the slot machines so difficult for Marge to walk away from is their unpredictability.

As soon as your dopamine system can predict what is going to happen, it stops firing - it loses interest and so do you. So they place spinning wheels on slot machines. You push the button or pull the lever and your dopamine neurons fire like crazy, trying to predict an outcome to the utterly random whirl of characters, as you excitedly wait to see where each wheel will land. It's the unpredictability that is so addictive. Think of spinning roulette wheels, throwing a pair of dice, salary bonuses, rugby games, email and SMS alerts - all have the same anticipatory mechanism that gets you excited.

Okay, so let me make myself clear here... I am not a fan of casinos and I certainly don't want to make anybody addicted to anything, but there are at least three lessons to be learned. Firstly, as soon as your advertising is predictable, people will lose interest in it. Secondly, anticipation is often better than actual receiving, so always try to build it. Lastly, stay away from casinos.

ABOUT JOHN LAURENCE

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