

# Slot Machines: More Than a Penny for Your Thoughts

## Abstract

This mini-review discusses the reinforcing properties of the slot machine, thereby making them potentially addictive. These properties include themes, payoffs, potential player control, and escape from reality among others. Finally, a brief treatment of strategies for potentially eliminating slot addiction is addressed.

**Keywords:** Slot machines; Gambling addiction

## Mini Review

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**N. Clayton Silver**

*Department of Psychology, University of Nevada, USA*

**\*Corresponding author:** N. Clayton Silver, Department of Psychology, University of Nevada, Las Vegas, 4505 Maryland Pkwy, Las Vegas, NV 89154-5030, USA, Tel: 702-895-0191; Email: fdnsilvr@unlv.nevada.edu

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## Introduction

Approximately 50 years ago, we thought of a slot machine as simply pulling a lever and hopefully obtaining three lemons or three oranges across a center payline. A winning combination would trigger coins emptying into the payout trough with the noise solidifying the reinforcement. However, with slot machines now in approximately 40 states and providing the greatest revenue for the casino [1], they have become much more sophisticated and appealing. Instead of a center payline, many slot machines have a 3 x 5 or larger matrix of symbols thereby creating a multitude of lines (usually ranging from 20 to 100). Of course, each line costs money, therefore the "penny" slot machine can range from 20 cents to over three dollars a pull depending on the number of lines and bet multiplier. Nowadays, one need not pull a lever. Simply touching a button spins the reels. This allows for more playing and potentially more losing in a shorter amount of time. Moreover, the bonus (e.g., free spins, spinning a wheel, or an animated scenario), which can also be random at times, is usually interactive. The interaction ranges from touching a button to spinning a wheel to pointing on a screen for choosing from among equally plausible alternatives depending on the theme of the game (e.g., five different balloons) to reveal a prize. Sometimes you could be awarded all prizes, sometimes it could advance you to another level in which you could increase your winnings by picking from a different set of alternatives (e.g., five different gift boxes), or you could choose "collect" which ends the bonus. Payment now consists of obtaining a ticket voucher rather than dealing with unwieldy change. Although it is certainly more convenient, it is not really tangible money (like coins) except to the slot machine or casino, thereby making it potentially more spendable.

The slot machine has various themes ranging from some of our favorite TV programs (e.g., Flintstones, Happy Days, I Love Lucy, Friends, The Big Bang Theory), game shows (e.g., Jeopardy, Wheel of Fortune, Press Your Luck) and movies (e.g., Wizard of Oz, the Godfather, Alien, Return of the Jedi) to more generic themes such as animals (e.g., Cats, Double Dinosaur), money or riches (e.g., Pay Dirt, Open the Vault, Texas Tea), and fantasy (e.g., Colossal Wizards, Zodiac Sisters). Some of these themes may be more appealing to certain ethnicities (e.g., Lucky Tree, Triple Fortune

Dragon, Towers of the Temple, and 100 Pandas to attract Asians; Coyote Moon and Wolf Run to attract the Native Americans, and the Leprechaun with his pot of gold to attract the Irish). The slot machine also emits easy-listening, soothing, and agreeable music. In some cases, we might become nostalgic by hearing the themes from Happy Days, the Flintstones, Batman, etc. The lights highlighting the possible progressive awards (which usually range from 10 dollars to 10 thousand dollars) with a maximum bet (usually with these actual words printed in smaller lettering) are also quite attractive. In order to enhance the experience, some slot machines, like Superman, have seats that reverberate. In short, the marketers have made playing slot machines a fun, interactive, and halcyon experience in which potentially losing money may be perceived as relatively painless (and sometimes quick).

Of course, slot machines payoff on a variable ratio schedule. Often times an individual may bet more than they receive back. Among novice players, the more "losses disguised as wins" as "coined" by Dixon and colleagues [2] (betting more than receiving back, or what I would define as a "payout loss"), the higher their win estimates [3]. Hence, this type of "win" might increase the reinforcement rate, yet not provide a winning payout. Furthermore, betting only one line will yield no payout losses, whereas playing the most number of lines will provide the majority of payout losses [4]. Yet, players would rather play slot machines with a greater number of winning lines than those with only one winning line (usually the center payline) [5]. Finally, players would rather play machines that have sounds for winning (even if they technically lose on that spin) [6]. In general, sounds also overestimate how much they won on the slot machine [7].

Individuals play slot machines because of grief gambling, a fantasy of being able to control losses, and they may also be put into a "trance" [8]. There is certainly superstitious behavior as indicated by my own observations of slot players rubbing the machine screen in the hopes of obtaining a bonus or a big win. In some cases, players may actually have a modicum amount of control of the outcome. For example, on some machines (e.g., Shadow of the Panther, Giant's Gold), the player can stop the machine at a certain place. That is, on Shadow of the Panther, one needs to obtain the same symbol across the first three or

more of the five reels in order to receive a payout. A savvy player might observe the spinning reels and press the button again to stop them. Depending upon the machine and the reaction time of the player, there may be a slight delay in stopping the machine and that can be the difference between winning and losing. This minimal amount of control, in certain situations, may also add to the irrational cognitive process.

However, aside from payout losses that may increase the reinforcement rate [9], reinforcement is also increased by the machine “teasing” the player in a near-miss situation. That is, if there is a five reel machine in which the free spin bonus symbols are on reels 2, 3, and 4 (and you must get all three in order to receive the free spin bonus), then seeing the machine obtain the free spin bonus symbols on reels 2 and 3, and then watching it spin around on reel 4 (sometimes in a highlighted color for an additional effect), the anticipation and exhilaration may itself be reinforcing. There may also be self-verbalization rooting for that possibility. When it does not hit on reel 4 (which is more often than not), the player is still left with a sense of the “anticipatory reinforcement” along with solace through the potentially fallacious line “I nearly got the free spins, so it is close to hitting.” Consequently, there will be additional play given the closeness of the win [10,11].

Aside from monetary and “anticipatory” reinforcement, slot machines also allow us to escape into these worlds and away from everyday problems. This is similar to a video game or even a movie. Of course, the difference is that in a video game or movie, you pay one nominal price and have an experience for a potentially long time (i.e., even 90 minutes for a movie). Such is not quite the case in slot machines. There is a nominal fee, but the experience may last for 10 seconds until the next fee. Therefore, one might be consistently paying for escaping away from realism. For example, playing \$2.50 per spin, I have seen players lose over \$100 in about 10 minutes (sometimes even less time). Of course, if you are playing only a nickel (five lines), then for the same number of pulls (and supposed escape experiences), you will potentially lose much less. Hence, gambling addicts may play not necessarily for profit, but simply for escape or what has been referred to as the “machine zone” [12].

Another appealing feature of the slot machine is that one does not really need to think as the machine does everything for you (except insert the money, determine the bet, and press the button for spinning the reels). In games such as blackjack, one needs to think about the probabilities that the next card may put them over 21. There are intricacies in the rules and betting strategies of roulette and craps. Moreover, how many people really know the rules of Pai Gow Poker or Caribbean Stud? Do players really want to ask the attendants or dealers about how to play these games (or attend a workshop)? In most cases, probably not for a variety of reasons (not the least of which is demonstrating a potential stigmatic ignorance or naivety to the casino).

Furthermore, in these table games, there is greater opportunity for human interaction. This would be through the dealer and other players. Although people may sit next to you in a row of slot machines, they tend to focus on their machine unless the player next to them received a bonus (in which sounds will go off) or

if the sound of the other’s machine is too loud. In many cases, this mental solitude may be reinforcing especially if escape is of importance.

The combination of any or all of these reinforcements (plus others that may not be mentioned), may interact leading to a gambling addiction for slot machines. The addiction may be cognitive and it could also have physiological roots as well. For example, examining the near-miss situation (e.g., a jackpot symbol appeared on the first two of three reels), there was greater heart rate, skin conductance responses, and smaller post reinforcement pauses than for either winning or losing outcomes [13,14]. Furthermore, fMRI data determined that there was greater mesolimbic (reward) and ventromedial activity given these near-miss situations [15].

Gambling addiction had been considered an impulse control disorder in the DSM-IV [16]. However, in the DSM-V, it has been reclassified as an addictive disorder; specifically a behavioral addiction [17]. There have been a number of techniques to combat this addiction in an attempt to extinguish the behavior. For example, one such technique is imaginal desensitization, a relaxation based therapy, in which individuals provide a handful of situations that foster gambling. They are ranked on the difficulty of leaving the particular situation. From there, the procedure is similar to systematic desensitization in which the participant learns how to relax muscles and then uses that relaxation technique to accompany the anxiety situations from least to most [18]. Second is cognitive restructuring, which identifies maladaptive thoughts and uses a Socratic approach (for example) to arrive at a logical retort to the irrational thought [19]. A third approach is a real-world exposure to response prevention and stimulus control [20]. In a case study with a pathological gambler [21], the researchers described how the combination of response prevention and stimulus control (e.g., taking money only necessary for the specific task; avoiding gambling friends) for five weeks followed by four weeks of relapse prevention dramatically decreased the behavior even after a one-year follow-up. Their recommendations included determining strategies for motivating behavioral change, using stimulus control as the first part of therapy and exposure to enticing gambling situations as the second part of therapy. Finally, they suggested implementing strategies to prevent relapse in order to totally extinguish the behavior over time.

Given this brief review, let me conclude by stating that slot machines are definitely not evil. In fact, they can provide an outlet of entertainment for players as a diversion when used properly. In fact, I have noticed a number of elderly persons play one line at a time, with a bet multiplier of one (for one penny) on machines that may have a maximum of 50 lines and a bet multiplier of 5 (for \$2.50). Although they will never break the bank, they may play for a while on five dollars, which may be therapeutic and reinforcing. For these individuals, the casino gives them the opportunity to get away from their senior living environment for a small price. However, for those who are betting away their social security checks, then it could be problematic. Although the purpose of these therapies may be extinction of the maladaptive behavior, the question is what adaptive behavior would take its

place? In other words, could the gambling behavior be substituted for going to the movies, if it provides for an escape? However, if going to the movies does not provide the same emotional escape for the gambler, then perhaps a modification of the behavior (e.g., playing one line at a time with a bet multiplier of one) would be somewhat beneficial. This could also be further controlled by having the gambler count to five before the next button press. Of course, the behavior would probably not extinguish, but the negative consequences could at least be somewhat mitigated while providing an appropriate escape mechanism. Therefore, instead of thinking of the slot machine as a “one armed bandit” which implies a pulling of the lever under an illegal connotation, perhaps it would be more befitting to simply call it a “one button casino money maker.”

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