The Design of Slot Machine Games

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Topics

- My Background
- How Slot Machines Work
- The Design of Slot Machines
- Conclusion

My Background

- Computer Science
- Teach computer game design (video games)
- Head of a problem gambling research team. Provide factual research-based information about:
  - the design of slot machine games
  - the player's physiological responses
- Have written 5 peer reviewed journal articles

- Only researcher to have studied slot machine game design documents (PAR Sheets). Obtained through Freedom of Information.

Hold : 14.988%
Model #: ###XX###, Category Code: AM, Paytable ID: 680A107

Coin	Payline	Pay Back	Hit Freq	Total Hits	Total Pays
1	1-15	85.012%	4.899%	12,708,964	220,554,516

Regular Symbols

Symbol	Number Per Reel				
	R1	R2	R3	R4	R5
WS	2	2	1	4	2
LM	4	3	3	3	4
BU	3	4	3	8	5
BO	4	3	4	3	4
LH	3	4	6	3	7
TU	4	3	6	6	6
CL	10	8	3	4	7
SG	3	9	4	10	5
SF	10	3	10	7	8
LO	2	5	6	0	0
LT	2	2	2	2	2
Total	47	46	48	50	50

Older-style Machines

- Still popular
- Player inserts money
- Presses spin or pulls the handle
- Reels spin for 5-6 seconds
- The outcome is either a win or a loss

Newer-style Video Slots & VLTs

Multi-lines

Bonus Mode & other wins

Touch screen.

How Slots Work

- Controlled by a computer
- Random number generator generating thousands of random numbers per second even when machine is not being played

How Slots Work con't

- Player inserts money
- Player presses spin
- Random numbers available at that instant are used to determine the outcome
- Reels spin for 3-6 seconds
- The player then sees the outcome
- Reels are for entertainment only
- There is no skill involved in slot machine play
  - The player cannot influence the outcome

Slot Machine Outcomes are Random, but Weighted

- Reels are weighted

- Blanks and low-paying symbols occur more often than Jackpot symbols

- Randomness and weighting are controlled by the computer

- Player does not know the weighting

- Weighting gives game designers ability to play with the odds – and play with the perceived odds

Slot Machines Payback % (Harrigan, 2007)

- Payback Percentage is 90%

- If the reels represented the odds (no weighting) the payback percentage would be 185% - 297%

- Above the payline: 193% - 496%

- Below the payline: 192% - 485%

Awww Shucks Effect (Near Miss/Near Win)

- A failure that is close to a success
- The type below can appear 12 times more often than by chance alone, on each reel
- Accomplished by weighting the blank on the 3rd reel to often occur on the payline

Near Misses - Research Results

- Research shows that near misses have an effect on the player (Clark et al, 2009)
  - Near Misses enhance motivation to gamble
  - Near misses activate areas of the brain associated with wins, even though it was not a win
  - Brain activity correlated with self-reported measures of gambling propensity

The Term "Near Miss"

- Gaming industry and regulators state that near misses don't exist. But the type of near miss just described does exists on most slots.

- Independent Testing Lab: "I am pleased to report that the near-miss concept went out with the '80s. In fact, near-miss games simply don't exist in North America, period." (Maida, 1997)

- Regulators: Ontario bans Near Misses in 14.1 and allows the type of near misses described above in 20.4 (AGCO, 2007)

- Nevada standards don't mention the type of Near Miss just described but allows them.

Unbalanced Reels

- One reel is starved of the jackpot symbol
- A type of near miss
- See the Jacks in non-winning positions

Regular Symbols

Symbol	Number Per Reel				
	R1	R2	R3	R4	R5
WS	2	2	1	4	2

Losses Disguised as Wins

- Depending on the wager, approximately 60% of "wins" are really losses
- Wager $3,75 and "win" $2.25
  - Really a loss of $1.50
  - But the slot machine produces winning sounds and winning graphics

Game Pays 45

$ .05   15 LINES   5 BET   75 TOTAL BET

Losses Disguised as Wins

- '"The perception is that you're winning all the time, when you're really not— you're putting 25 in and winning 15 back, 45 in and 30 back, over and over." Randy Adams of Anchor Gaming (Schull, 2005)

- "Positive reinforcement hides loss." Nathan Leland of Silicon Gaming (Schull, 2005).

Losses Disguised as Wins:
Our Research (Galvanic Skin Response)
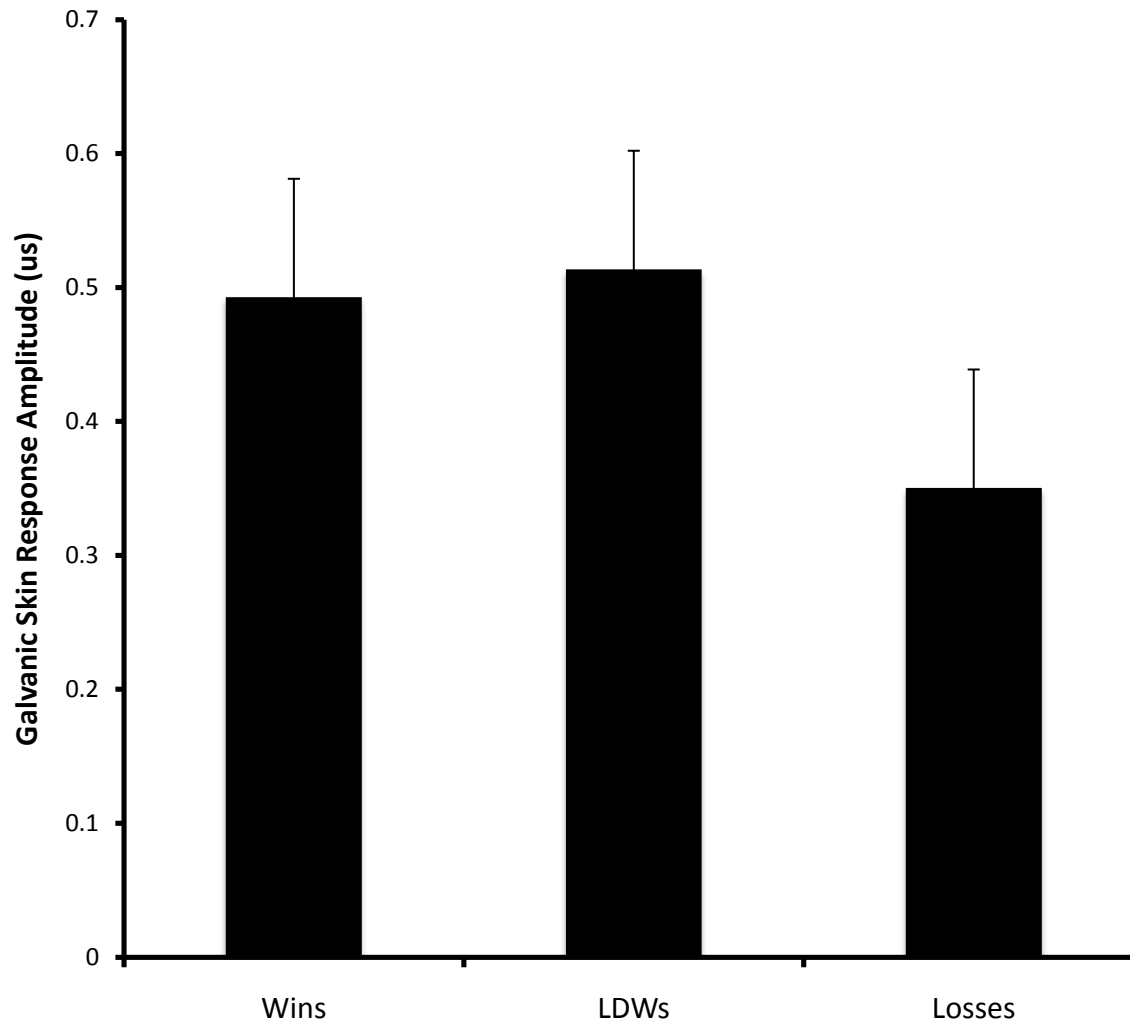
Faulty Cognitions

- Around 50 per cent of gaming machine gamblers have false beliefs about how gaming machines work, which pose risks to them" (APC, 4.1)

- We have just seen four ways in which slot machines foster faulty cognitions.
  - Reel design
  - Awww Shucks Effect
  - Losses Disguised as wins
  - Unbalanced reels

Stop Button

- Player can stop the reels before 3-6 seconds
- Doesn't affect the outcome
- Provides an "illusion of control"
- Giving the player an "illusion of control" gives a player a sense of control even when the player fully understands that the outcome is random (Langer, 1975).

Credits vs Currency

- Usually your money is shown as credits
- Ex: A five cent machines pays 150,000 credits
  - Not easy to convert to currency

Multiple Versions of the Same Game

- Payback percentage is not disclosed to the player

- In Ontario, same game can payout between 85% to 98%

- All versions look identical to the player

Paytable ID	Percent
680A107 +	97.99
680A107	97.40
680A107	96.20
680A107	94.99
680A107	94.00
680A107	92.51
680A107	90.00
680A107	87.50
680A107	85.01

Size of Symbols vs Blanks

- Blanks are smaller but show up on the payline more often

Denomination of the machine

On a "one cent" machine, players can wager $1.80.

Configuration
5-Reel, 9-Line, 180-Credit

Max Bet
180

Inducements for Maximum Wager

- Various messages on the machine
  - "Play all 15 lines for maximum excitement"
  - "Play three credits"
- Some prizes can only be won with maximum wager

Progressive Jackpots

- On the machine itself
- Wide area – on many machines
- Large prizes
- Often prize cannot be won without "max bet"

Continuous Form of Gambling

- One spin every six seconds
- Ten spins per minute
- 600 spins per hour
- 15 line machine equates to 9,000 line wagers per hour (600x15)
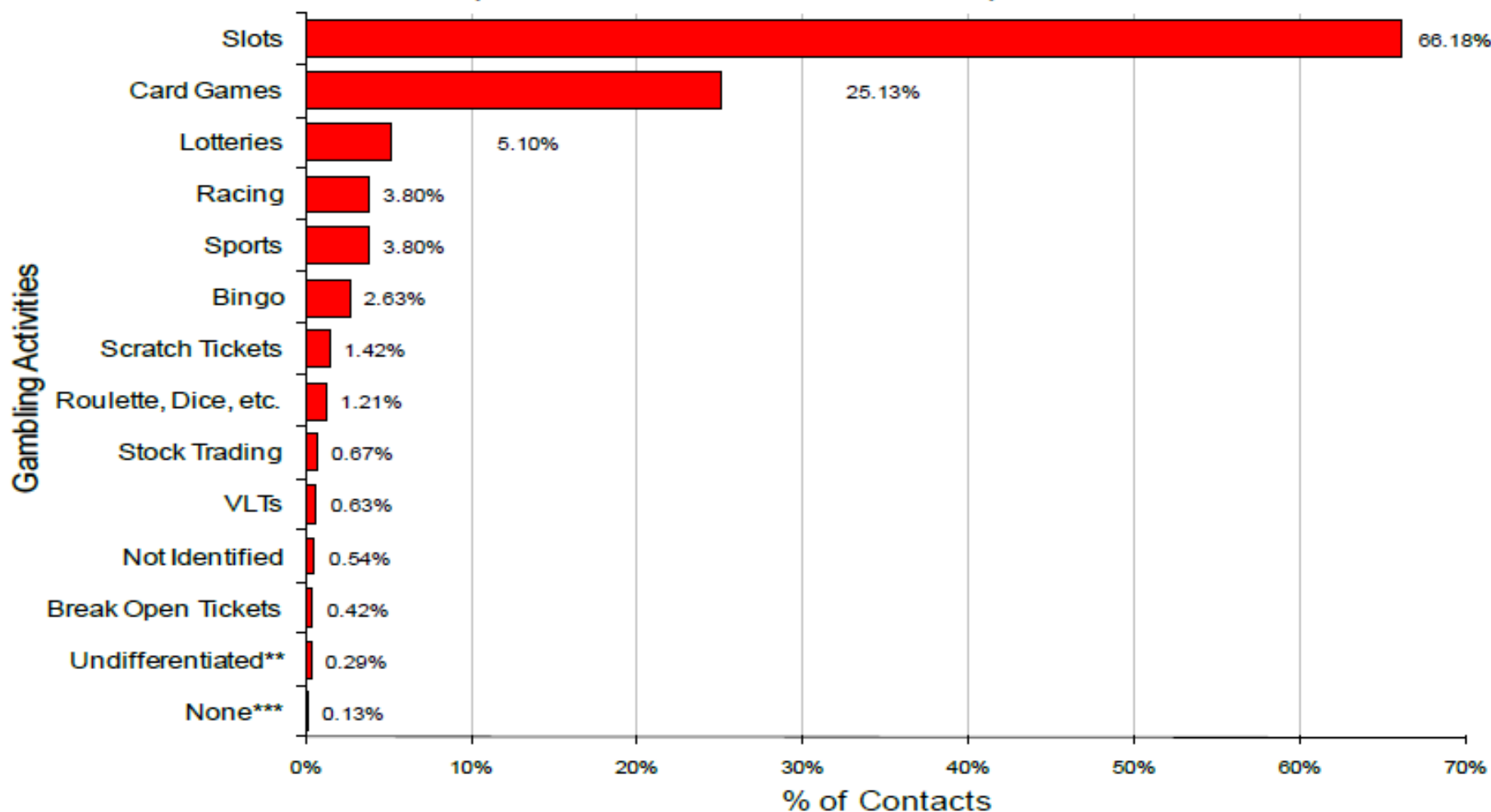
Reinforcement Schedule/Churning

- On their way to losing their money, players have many small wins

- Example:
  - Gambler's Ruin Scenario: Arrive with $100 and play until broke
  - Win $1,250 in small wins, and losses disguised as wins, on way to going broke
  - Total net loss: $100
  - Churn: $1,250

Conclusion

- Slots deserve their reputation as "the crack cocaine of gambling"

- 60% of Ontario slot revenue from problem players

- Ontario slot revenue greater than all other gambling revenue combined

Ontario Problem Gambling Helpline (OPGH)

Gambling Activities* Identified by Individuals
Seeking Problem Gambling Treatment Services through OPGH
As Percentage of Contacts
(November 1, 2008 to October 31, 2009)

Gambling Activities	% of Contacts
Slots	66.18%
Card Games	25.13%
Lotteries	5.10%
Racing	3.80%
Sports	3.80%
Bingo	2.63%
Scratch Tickets	1.42%
Roulette, Dice, etc.	1.21%
Stock Trading	0.67%
VLTs	0.63%
Not Identified	0.54%
Break Open Tickets	0.42%
Undifferentiated**	0.29%
None***	0.13%

Conclusion

- Game design features contribute to faulty cognitions and addictiveness:
  - Stop button
  - Near Misses – "Awww shucks, just missed it"
  - Losses disguised as wins
  - Unbalanced reels
  - Multiple versions of the same game
  - Reinforcement schedule – churning
  - Currency not displayed
  - Inducements for maximum wager

References

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